Article

Philosophy of the Social Sciences
2023, Vol. 0(0) 1–23

DOI: 10.1177/00483931231208512
journals.sagepub.com/home/pos
Sage

Ontological and Methodological Limitations of Certain Cultural Evolution Approaches

Martina Valković[1]

Abstract

Recently there has been a rise in the application of concepts and methods from biological evolutionary theory to human cultures and societies where the aim is to explain these by describing them as population-level phenomena reducible to individual-level processes. I argue against this type of view by using Mesoudi's *Cultural Evolution* as a case study. I claim that Mesoudi's ontological assumptions about cultures and societies are dubious and his methodological assumptions inadequate when it comes to addressing cultural and social phenomena. A consequence is that this approach to studying culture is, at the very least, incomplete and of limited application.

Keywords

cultural evolutionary theory, social ontology, methodology, individualism, reductionism

> "[M]odels are only ever as good as their assumptions."
>
> Alex Mesoudi, *Cultural Evolution*, 163.

Received 17 October 2022

[1]Leibniz University Hannover, Germany

Corresponding Author:
Martina Valković, Institute for Philosophy, Leibniz University Hannover, Lange Laube 6, Hannover 30167, Germany.
Email: mvalkovic@gmx.com

1. Introduction

The last decades have seen a rise in the application of concepts and methods from biological evolutionary theory to human cultures and societies in an attempt to explain their change and complexity. Some of the most influential proponents of this approach include Cavalli-Sforza and Feldman (1981), Boyd and Richerson (1985), Henrich (2015), and Mesoudi (2011). In their theories, culture is conceptualized as information which is mainly stored in individual humans. At the more radical end of the spectrum, it is even primarily seen as neural patterns in the brain (Mesoudi 2011). Culture is typically also broken down in distinct cultural traits or types which are transmitted from one individual to another. These traits vary in respect to their "fitness," which is sometimes understood in biological, and sometimes in cultural terms, and the cultural change is then the resulting change in the frequency of cultural traits. The aim of these theories is to explain cultural phenomena such as languages, institutions, and societies by describing them as population-level phenomena which can be reduced to consequences of individual-level processes.

In this paper, I will offer some arguments against this type of view, which is prevalent in a certain strand of influential, mainstream cultural evolution theories. I will be using Mesoudi's influential *Cultural Evolution: How Darwinian Theory Can Explain Human Culture and Synthesize the Social Sciences* (2011) as a case study. Even though the criticism focuses on one theory, the arguments also apply to other theories that espouse similar ontological and methodological assumptions, to the extent that they do. Mesoudi (2011) is chosen primarily because his work aims at providing a summary and a synthesis of work in cultural evolution[1] (ix), and does that in a particularly clear and straightforward, accessible manner. I will claim that Mesoudi's ontological assumptions about cultures and societies are dubious, and that his methodological assumptions, which follow directly from his ontological ones, are inadequate when it comes to addressing typical cultural and social phenomena. A consequence is that this approach to the study of human culture and its change is, at the very least, incomplete and applicable only to limited cases (cf. Lewens 2015, chap. 7; Cofnas 2018).

Cultural evolutionary theory, as it stands presented in this work, does not fully appreciate the complexity of human cultures and societies and the

[1]It is important here to note that, while "cultural evolution" label can and is applied to a variety of approaches and theories, in this paper the term is used exclusively to refer to Mesoudi's approach and other that share the same ontological and methodological assumptions, as elaborated in the text. It should not be assumed that the discussion in this text also applies to all the other approaches elsewhere referred to as cultural evolutionary. I would like to thank an anonymous reviewer for raising this point.

complex interaction between various processes determining their change. The ontological assumptions at the core of accounts like these limit them in explaining social complexity, thereby posing significant limitations to their explanatory scope and relevance and making it unlikely that they will be able to adequately explain most cultural phenomena, and even less likely to synthesize the social sciences, as Mesoudi (2011) claims. The implication is that this approach to studying human culture and its change is, at best, incomplete and of a rather narrow scope, which makes it less relevant in studying human sociality. In a worst-case scenario, this kind of cultural evolutionary theory could be said to be a distortion, rather than a simplification, of human social processes (Cofnas 2018, 316), making it unfit to explain most or possibly even all cases of human sociality.

The paper will proceed as follows. First, in section 2, I will present Mesoudi's account according to which culture is information in individual brains, societies are sets of individuals, each of whom possesses certain cultural traits, and the cultural "macrolevel" is just a consequence of the phenomena at the "microlevel." I will argue that these ontological claims are unwarranted, by using insights from social philosophy and social ontology. Then, in section 3, I will show how these ontological assumptions lead Mesoudi to adopt equally unwarranted methodological assumptions. Finally, in section 4, I will show how Mesoudi's ontological commitments, through his methodological commitments, can lead to unsatisfactory explanations of cultural phenomena. I will illustrate this on several of Mesoudi's examples. In this way, the paper aligns with the broader work on how bad ontological assumptions can lead to bad modeling and (social) science (cf. Epstein 2015, 9, 41, 127). Section 5 concludes with some remarks on Mesoudi's work in connection to the Extended Evolutionary Synthesis.

2. Mesoudi's Ontology

Mesoudi, in agreement with some other prominent cultural evolutionists (e.g., Boyd and Richerson 1985; Cavalli-Sforza and Feldman 1981; Richerson and Boyd 2005), sees culture as information "acquired from other individuals via social transmission mechanisms such as imitation, teaching, or language" (Mesoudi 2011, 2-3). This information is primarily stored in human brains as neural connection patterns, and to a lesser extent in artefacts such as written language and computer code (Mesoudi 2011, 3). Mesoudi clarifies that "information" is intended to cover what we usually term "knowledge, beliefs, attitudes, norms, preferences, and skills, all of which may be acquired from other individuals via social transmission and consequently shared across social groups" (Mesoudi 2011, 3). What could be termed cultural behavior is taken to be just an expression of this cultural information, rather than culture itself: "artifacts, speech sounds, and stated beliefs are the outward behavioral

expressions of information stored in the brain and as such are the cultural equivalents of phenotypic traits such as height or skin color" (Mesoudi 2011, 42).

Mesoudi is clear that, in his view, culture itself is ultimately reduced to the neural level, to patterns in the brain which somehow get transmitted to other brains, making it "the preserve of neuroscience" (Mesoudi 2011, 214), to be studied with neuroscientific methods, which, as they advance, will likely produce "future cultural equivalents of Watson and Crick making key discoveries concerning how information is stored in the brain, expressed as behavior, and transmitted to other brains" (Mesoudi 2011, 216).

Mesoudi, again like other cultural evolutionists such as Cavalli-Sforza and Feldman, and Boyd and Richerson, makes the ontological assumption that cultural change is a Darwinian process, just like biological change (Mesoudi 2011, 55). Mesoudi is not employing a metaphor here. His fundamental premise is an ontological one: cultural change (i.e., change in socially transmitted beliefs, knowledge, technology, social institutions, language, and other) and biological change as described by Darwin share the very same principles—"*culture evolves*" (Mesoudi 2011, viii; italics in the original).

Mesoudi is also in agreement with the cultural evolutionary theory pioneers when it comes to the particularities of their view of cultural evolutionary change. According to this view, cultural change is best seen as a change in population-level patterns, and human groups and societies are best seen as populations, in the sense of sets of individuals (Mesoudi 2011, 55). The resulting view of cultural change is that it is enacted by individuals, each of whom "possesses" certain traits:

> In a typical cultural evolution model, a population is assumed to be composed of a set of individuals, each of whom possesses a particular set of cultural traits. A set of microevolutionary processes is specified that changes the variation in those traits over time. The variation is then transmitted to the next generation, simulating the process of cultural transmission from individual to individual. (Mesoudi 2011, 55)

This individual-focused view is also visible in his delineation of the cultural microevolutionary processes modeled by Cavalli-Sforza, Feldman, Boyd, and Richerson (Mesoudi 2011, 57; chap. 3): cultural transmission occurs from one or more individuals to one or more individuals; guided variation means that individuals are modifying acquired information according to their individual cognitive biases; the three most prominent ones, content, model- and frequency-biases, all mean that individuals are preferentially adopting traits based on, respectively, the content, model or frequency of the trait. Thus, individual mental processes, choice and action is what makes the difference in culture.

Mesoudi makes a distinction between microlevel and macrolevel processes (Mesoudi 2011, 51-53). The microlevel includes small-scale, individual-level processes which change the frequency of culturally transmitted traits within a population, while the macrolevel stands for large-scale patterns at or above the level of societies, such as cross-cultural differences or historical trends (Mesoudi 2011, 51). Disciplines that investigate processes on the macrolevel include cultural anthropology, historical linguistics, and history, while those investigating microlevel processes include psychology, psycholinguistics, and microeconomics (Mesoudi 2011, 51-53).

Mesoudi sees the macrolevel processes as just a consequence of microlevel processes and believes that cultural change can be accounted for by change in what he calls the microlevel or individual-level processes. What he terms cultural macroevolution is, then, reduced to a consequence of microevolutionary or individual-level processes. This stance is visible in various points in his text. For instance, after enumerating microevolutionary processes such as vertical, oblique, and horizontal transmission, guided variation, and various individual-level biases, he proceeds to say that each of these has different macroevolutionary consequences when it comes to the gradual change of culture as a whole (Mesoudi 2011, 56). Similarly, when discussing competition between cultural traits, he claims that it happens in minds, at the psychological level, with cultural change as its effect, which takes the shape of extinction of different cultural practices and forms (Mesoudi 2011, 31).

In certain passages, though, Mesoudi does give an impression that he believes that influence can also go the other way round, that is, that the macrolevel processes can also influence microlevel processes. For instance, he points out that some microlevel disciplines like psychology do not acknowledge the extent to which individual behavior is shaped by cultural processes at the macrolevel (Mesoudi 2011, 52), and that culture shapes various aspects of behavior, from cooperation to perception, to a degree greater than previously expected (Mesoudi 2011, 53). Perhaps most directly, in a note he writes that macrolevel phenomena may be both caused by individual behavior and in turn influence it (Mesoudi 2011, 226, note 81).

The influence that Mesoudi here has in mind, however, seems to be of a quite limited type. In certain passages on guided variation, he seems to say that, next to the individual-level processes, there are also populational-level processes, such as the frequency of a trait in a population. The latter could influence the former by impacting the individual choice, for instance, by impacting which trait the individual is going to copy if she has a conformist bias, and which if she has an anti-conformist bias, and similar. However, it is still *a matter of individual action and choice* which trait is going to be copied. This mode of reasoning is clearly shown in the following:

> Guided variation is where people individually modify acquired cultural traits according to their own individual learning biases. Content biases, like other forms of cultural selection, occur when people preferentially choose among existing traits found in the population without changing those traits. Guided variation is an individual process, content bias is a population process. As such, content biases depend on variation in the population to work: if everyone has the same cultural trait, then there is nothing for content biases to select, and so content biases will be impotent. […] Guided variation, on the other hand, is unaffected by cultural variation in the population because it is a purely individual process, and other people's cultural traits are irrelevant. (Mesoudi 2011, 69)

This view of the influence of the macrolevel processes on the microlevel processes through its impact on individual choice is, however, something quite different from seeing cultures and societies themselves as structured wholes that shape, limit and enable choices. Note that Lewens is making the same point about other cultural evolutionists such as Richerson and Henrich (Lewens 2015, 139).

Mesoudi's view of the influence of the macrolevel phenomena is therefore something quite distinct from the view that macrolevel phenomena could have their own causal efficiency, as will be seen in more detail below.

2.1. Alternative Ontologies: Structures, Systems …?

Perhaps one of the most striking aspects of Mesoudi's ontology is that there is no mention of structural and systematic phenomena and properties. In this account that is supposed to explain human culture and synthesize the social sciences, there seems to be not much room left for social structures and the possible effects they might have. However, if it is so that social structures exist and can influence social and cultural change in a way that cannot simply be reduced to the accumulated thoughts and actions of individuals making up a population, then it appears that Mesoudi's theory is to that extent limited and less relevant. Indeed, there appear to be some very good reasons to think that social structures in this sense exist and to an important degree shape societies and cultures. In this section I will briefly present some of these reasons.

First, it seems that social structures can sometimes enable the act itself, which makes it unclear how culture could just be information in individual brains. This can be illustrated by the famous example including sheep theft by Clifford Geertz (1973). This example shows how, while it may be necessary for one to have certain mental states in order to steal a sheep, it is not sufficient. To be able to steal a sheep, one needs to find herself in an appropriate social or institutional context in which, say, sheep are considered as private property, as having an owner, and removing them from the said owner as criminal. In other

words, to steal a sheep it is not enough that one has certain mental states and acts in specific ways (e.g., taking a sheep and bringing it elsewhere): one also needs institutions, social structures, and meanings such as property and theft, and one relies on these since they enable the act of sheep theft as such (see also Lewens 2015, 135-36).

Another, related issue that clearly shows the importance of social institutions and other structures is that of power. In his seminal work, Lukes (1974 [2005]), for instance, highlights how organized groups such as unions and interest groups exert power in a society. Cofnas (2018) raises a similar complaint, claiming that cultural evolutionary models miss the fact that power is often situated in groups of collectively acting individuals (301), which collectively organize norm enforcement and form "a collective decision-making body that cannot be legitimately atomized, as in cultural evolutionary models" (311). He criticizes the "radical individualism" of cultural evolution for its characterization of cultural change as being "driven by the decisions of uncoordinated, independently acting individuals" (Cofnas 2018, 299). His objection is that such highly individualistic models of decision-making and action cannot capture the fact that a person's position in networks of power can determine which cultural variants they will adopt, making learning biases and similar irrelevant (Cofnas 2018, 301). It is not clear how cultural evolutionists can account for these exertions of power (for more on this point, see section 4.3 below).

As a more general example of how social structures can (inadvertently) have important effects on individuals and societies, we can imagine that, for a variety of reasons, there are certain governmental and other institutional set-ups and procedures which systematically emphasize concerns and interest of certain kinds of individuals, while disregarding those of others. For instance, we could have labor, pension, or social security laws and practices that are set up in such a way that they favor individuals that are able to work without taking substantial periods off for, say, medical, pregnancy and childbirth, or some other reasons. That context would obviously favor certain kinds of people, such as healthy men, rather than others, such as people with health issues or pregnant women. Furthermore, there could also be other effects of this institutional set-up, that certain kinds of people, say women of child-bearing age, come to be systematically disadvantaged in certain contexts, for instance when seeking employment. It is not clear how cases such as this could be adequately accommodated within the Mesoudi network, except for the unsatisfactory solution of pushing them into the "institutional background."

The above examples all pick out certain difficulties or inadequacy related to the view of societies and cultures as populations, understood in the sense of sets or aggregates of individuals. In this view, cultural change is a product of interactions between individuals in a population. What this view ignores are the effects of structured relations between individuals and groups, such as

organizations, institutions, procedures, and the like. The reasoning behind this approach is that focusing on the details of individual lives is crucial for understanding cultural change (Lewens 2015, 139). Mesoudi continues in this reductionist tradition which "aim[s] to show how the stability of institutional practices can result from the aggregated behaviours of individuals" and holds that that "institutions should only be considered as respectable explanatory devices if they are also reducible to patterns of interaction between individuals" (Lewens 2015, 139-40). This view of society as a population, as Fracchia and Lewontin (1999) point out, "precludes the possibility that social systems might have properties unique to them as organized systems," resulting in a view of social hierarchy as a consequence of just differential cultural fitness of individuals or cultural traits, rather than the consequence of social relations (70).

The idea that societies and cultures should be explained by reducing them to individuals and individual actions and mental states is neither rare not confined to cultural evolutionary theory. In fact, it is a predominant assumption in various areas of social philosophy and social sciences, and it is often defended by claims such as that societies are constituted by individuals, that individuals make up societies, and that they are therefore the appropriate units to focus on if one wants to study societies and social change. However, there are many competing ontologies, which give the central spot to the reality of the social world and its irreducibility to the individual.

One important account of that kind is that of Brian Epstein in his 2015 book *The Ant Trap: Rebuilding the Foundations of the Social Sciences*. Epstein claims that the assumption that the social world is built out of individual-level phenomena is inadequate since facts about social groups and their action are grounded by a wide range of facts, not just facts about individuals. For instance, there are facts about membership conditions and power hierarchies, which are all anchored by historical tokens, practices, and environmental and other facts. In Epstein's words, "just because a group is constituted exclusively by people does not mean that facts about those people (or about any people) ground most facts about the group" (Epstein 2015, 150), since "basic facts about groups can have heterogeneous grounds, ones that have little to do with the members" (Epstein 2015, 161). Epstein illustrates his claim that facts about groups do not have to be exhausted by or emerge from the facts about their members with the example of the American Supreme Court (Epstein 2015, 167). The fact that this court is constituted by the set of its members is not sufficiently grounded by "individualistic facts" about those members, nor does it emerge from them. Here we also need facts about legal regulations, specific historical events related to the court's existence, function, and constitution, and other.

Perhaps even more strikingly, Epstein argues that actions of group members do not suffice to determine the group action. Group action is constrained by a wide variety of facts: "Family structures, for instance, involve membership conditions and hierarchies of power. These are anchored by historical tokens, practices, environmental facts, and more." (Epstein 2015, 235, note 16). "We introduce external grounds for group action not just by imposing specific constraints on it, but by making use of hierarchies and membership mechanisms. It is hard to think of a group that is not influenced by one of these sorts of external grounds, if not by all of them" (Epstein 2015, 235). This can be perhaps most clearly seen by considering the unequal contributions of members to the group action, which is the norm in social groups (Epstein 2015, 223). Social groups commonly set up conditions for group action by establishing hierarchies, labor divisions, and power structures, thereby structuring the group in such a way that members will make unequal contribution to group action (Epstein 2015, 219). As a consequence of these structures and processes member action is not able to fully determine group action (Epstein 2015, 219). This failure of supervenience of group action on member action is illustrated on the example of owning shares in a company. The fact that I own 100 shares of Microsoft and Bill Gates hundreds of thousands of them are not grounded by facts about the two of us and all the other stockholders. Instead, "they are grounded by facts about historical contracts, stockholder agreements, money transfers, stock markets, and so on. […] It is not just the differential voting power that defeats the supervenience of group action on member action, in this case. Rather, it is the assignment of that differential power to particular people. The fact *The Microsoft stockholder group does J* does not just depend on the fact that someone has differential power. The action depends on the particular assignment" (Epstein 2015, 222; italics in the original). In short, in Epstein's view, "[b]uilding the social world out of people, or modeling by starting with people, is a gross distortion" (Epstein 2015, 247). Social groups and facts about them, including their existence, constitution, action, and practical activity, are not reducible to individuals and facts about them (Epstein 2015, 246-47).

Of course, the ideas of social facts being insufficiently determined by individuals or, even stronger, of constraining, preceding and exerting causation on them, is hardly new. Durkheim famously held that social facts present an external constraint over individuals (Durkheim 1895 [2013]; López and Scott 2000). We are born into a world of pre-existing, general, and external social facts that constrain us in a variety of ways, limit our abilities to act as well as open up new opportunities for action (López and Scott 2000, 14). These social facts determine family

roles and relations, language, monetary system, and professional practice.

In a similar vein, Lewontin and Levins (2007) write that "[t]he fate of individuals is often the consequence of social forces" and "virtually never their cause" (136). They diagnose the individualist error in assuming that the individual is causally prior to the whole and failing to appreciate that "the social has causal properties within which individual consciousness and action are formed" (Lewontin and Levins 2007, 30). Social forces constrain and direct factors that influence individual consciousness. They draw a more general distinction between reduction and reductionism to pinpoint the problem: "*Reduction* looks to lower levels of analysis for differentiating symptoms of forces at higher levels, whereas *reductionism* claims that forces at lower levels are the actual causes of the phenomena higher up. Modern biology has made immense progress in understanding through the process of reduction, but at the same time the evidence has accumulated that structures at one level do not bear a one-to-one relationship to structures at other levels, and forces must be understood at their appropriate level" (Lewontin and Levins 2007, 136; italics in the original; see also section 5.1 below). Similar points have been widely acknowledged in biology (e.g., Kincaid 1997; Rosenberg 1978). For instance, critics of reductionism have pointed out that the outcomes of processes on molecular levels depend on their context, with the result that "one molecular kind can correspond to many higher level kinds," and the other way round: biological processes and structures on higher levels are typically realized by different molecular processes, meaning that "many molecular kinds can correspond to one higher level kind" (Brigandt and Love 2008 [2022]). The fact that molecular properties depend on cellular and organismal contexts presents an obstacle for theories claiming that higher-level phenomena can be reduced to lower-level phenomena and illustrates the limits of reductionist research programs and their explanations (Brigandt and Love 2008 [2022]).

Even those skeptical of the views like those of Epstein, Durkheim, or Lewontin and Levins, might still agree that reductionism of Mesoudi's kind is not the best way to understand social phenomena. For instance, Lewens (2015) writes that one could plausibly think that in more complex social contexts, "sociocultural phenomena have an autonomy that may arise out of relations between individuals, but which cannot be reduced to claims about individual psychology" (141). This could give people reasons to be skeptical of the populational view of culture, for instance, if they put importance on the decisions of a few powerful people or structured networks of influential actors (Lewens 2015, 142).

Above are presented just some of the views and reasons why one might choose not to subscribe to a Mesoudi-like ontology. In short, by focusing exclusively on individuals, information in their heads and their unstructured

interactions as the constitutive units of societies and cultures and the agents of their change, and by pushing structural aspects to the background, we disregard the existence, importance, and effects of social structures such as institutions and other processes that can be plausibly seen as forming human culture and society.[2] The view of culture as a collection of cultural variants, typically individual beliefs and traits, and of society as a population in the sense of a set individuals, might be convenient or natural for proponents of cultural evolution. However, there are good reasons to doubt that human societies and any interesting groups are best described as populations in this sense. One could reasonably argue that they are more than just accumulations of individuals colliding like atoms in a social space. They, just like human cultures, can be seen as structured wholes, with their own dynamics and causal efficacy. If one subscribes to this ontological image of culture and sociality, then it is natural to ask which methodology would be appropriate to study these areas. Arguably, that would not be a methodology based on a reductionist ontology of the social world.

3. Mesoudi's Methodology

As mentioned before, saying that culture evolves is for Mesoudi not just a figure of speech, nor is he using Darwinian concepts and methods for purely methodological purposes. That is, he does not simply believe that evolutionary methods are beneficial or useful outside of their original domain, while acknowledging that the actual cultural change is not a Darwinian process, or remaining agnostic on the question. On the contrary, he commits himself to a view of cultural change as an *ontologically* Darwinian process.

This is an important commitment since, in Mesoudi's view, it underpins his argument that cultural change can be appropriately studied by using methods from biological evolution. In his discussion of the use of phylogenetic trees in historical linguistics, for instance, he writes that the reason that these phylogenetic methods are applicable to culture is that cultural traits, just like species, undergo descent with modification, that is, they are transmitted from one individual to another and between generations via imitation and other social learning mechanisms, thereby forming lineages of traits (Mesoudi 2011, 90). Similarly, when presenting the use of phylogenetic methods in studying

[2]An interesting thought to entertain here is whether this social structuring can be understood as both developments *in* and *across* subpopulations within a society, and whether these could be studied with the help of cultural evolution. In that case, perhaps, some of the arrangements could be seen as forming a part of the environment of some cultural evolution, while being a result of some other cultural evolutionary processes. I would like to thank an anonymous reviewer for raising this point, further development of which goes beyond the scope of this article.

the history of projectile points, as described in a series of works by Michael O'Brien and colleagues, he points out that these authors explicitly held that it is only possible to apply phylogenetic methods to artefacts if it is assumed that they undergo true evolutionary change, which is the process of descent with modification outlined by Darwin (Mesoudi 2011, 92). Possibly the clearest statement of his belief in the necessity of connection between ontology and methodology is seen in the conclusion of Chapter Four, when he writes that evolutionary methods can be applied to phenomena in culture because culture as well evolves; both culture and genetic evolution of species are processes of descent with modification (Mesoudi 2011, 110).

Mesoudi also draws a parallel with the Modern Synthesis in biology which, according to him, solved the micro-macro problem through the use of formal quantitative methods, and goes on to claim that "an equivalent evolutionary synthesis in the social sciences would use similar models to show how cultural macroevolution, as studied by macroeconomists, macrosociologists, historical linguists, historians, cultural anthropologists and archaeologists, is consistent with, and indeed explicable from, microevolutionary processes studied by microeconomists, microsociologists, psycholinguists, neuroscientists, and psychologists" (Mesoudi 2011, 54). Mesoudi is here clearly relegating the macrolevel disciplines to a role of a helper—they are valuable so we could check whether the results of micro-disciplines are valid. Thus he writes that without the links between microlevel disciplines (e.g., psychology, microeconomics) and the "real-world patterns of cultural change and variation" as documented by macrolevel disciplines (e.g., cultural anthropology, archaeology), the validity of microlevel experiments and theories of human behavior remain doubtful (Mesoudi 2011, 53). The micro-disciplines, then, take the lead.

It is clear that this approach to the micro- and macro-disciplines follows directly from Mesoudi's view of the micro- and macrolevel phenomena. This is plainly visible in numerous of his passages, from the talk of the macro-evolutionary consequences of microevolutionary processes (Mesoudi 2011, 86), to the insistence that culture is essentially patterns in the brain, and to his very description of culture as a Darwinian process (e.g., Mesoudi 2011, 53) and of cultural competition occurring at the psychological level, with the extinction of cultural practices a just its consequence (Mesoudi 2011, 31).

Mesoudi's stated ultimate goal is to "explain macroevolutionary patterns in terms of specific underlying microevolutionary processes," in this way bridging the micro-macro divide in the social sciences (Mesoudi 2011, 86). Indeed, he sees "unwillingness" to account for macrolevel "patterns and trends" in terms of individual-level processes, or, in other words, "to reduce cultural phenomena down to individual behavior," as a failure (Mesoudi 2011, 51-52). He goes on to speculate that "this reluctance to reduce cultural phenomena to individual psychological processes" is rooted in the mind-body

dualism, deeming them inherent in many approaches to culture which he labels non-scientific (Mesoudi 2011, 52).

3.1. Reductionism: Possible, Desirable?

Mesoudi, however, does not stop to ask whether this supposed "failure" to reduce the cultural to the individual is desirable, feasible, or, in fact, plain impossibility. That is, he does not consider the possibility that culture *cannot* be reduced to or adequately studied as a consequence of individual-level phenomena. This is even more remarkable considering that, in biology, the discipline from which Mesoudi draws his methods and his inspiration, limits of reductionism have been broadly recognized (Kaiser 2011), not least because of concerns that are arguably as valid in the social sciences, such as that "the functioning of individual components is transformed by the many influences of the other components" (Brigandt and Love 2008 [2022]) and considerations of complexity (Hooker 2011; Wimsatt 1974).

Mesoudi's methodological assumptions, that societies are best modeled as populations understood as sets of individuals and cultures as outcomes of individual-level processes, flow directly from his ontological views outlined in the previous section, namely, that societies just *are* sets of individuals and culture just *is* an outcome of individual psychology and behavior. Indeed, that the social cannot be adequately studied in this proposed reductionist way does not even seem to be entertained as a serious possibility (but rather is just proclaimed "non-scientific"). It appears that, as a consequence of his strongly reductionist ontological views, Mesoudi does not recognize the limits of methodology based on them. That is, because Mesoudi sees societies as nothing more than populations, in the sense of aggregates of individuals, and culture as nothing more than an inert outcome of individual-level processes, he holds that empires and agricultural methods really can be best studied by reducing them to individual thoughts and behaviors. However, if these ontological assumptions are called into question, as in the previous section, then it would seem that methodological choices based on them would also find themselves on a shaky ground.

It could be argued, though, that while Mesoudi sees the adequate ontology of culture as a precondition of studying it via evolutionary methods, this is not necessarily so. Someone might be agnostic or indifferent about the ontology, while remaining keen on using evolutionary methods to study cultural phenomena. They might argue that methodological reduction does not have to depend on ontological reduction. One might even hold non-reductive ontological views, while still holding reductive methodological views, and vice versa. In this line of thinking, one would use evolutionary methods for pragmatic reasons, while disregarding the question of ontology. While this

pragmatic mode of thinking certainly has its merit, there are at least two possible reasons to be cautious or skeptical toward it, which I will here briefly outline.

Firstly, while a certain simplification of reality is a necessity of any model or theory and therefore by itself not problematic as long as the representation is not mistaken for the actual phenomenon, distortion is a different story. The question then becomes whether modeling social and cultural processes and change in individualistic terms falls into the simplification or distortion category. As seen above, Epstein (2015, 247) considers modeling of the social world by starting with people to be a gross distortion, since the social world does not supervene, emerge, or is fully determined by people. Cofnas (2018) accuses certain cultural evolutionary models, those of the evolution of morality and norms, of distortion on the basis of anthropological evidence which, according to him, shows how these models "postulate forces that are not operative at all, or ignore those that have a decisive influence on the phenomena under investigation" (316). Both of these examples arguably point to the fact that model choice cannot be neutral when it comes to the ontology, since the fit between the two will determine whether the real-world processes are being simplified or misrepresented. As Lewontin and Levins (2007, 123) write, "[t]he internal workings of the variables in a model, the dynamics of the model itself, or the development of the science eventually reveals all models as inaccurate, limited, and misleading. But this does not destroy the distinction between models that are terribly wrong from the start and those that have relative validity."

Secondly, model-choice is also not neutral in another sense, in that it matters which aspects of phenomena we decide to highlight and which not. When discussing populational approach in studying cultural change, Lewens (2015) writes that this way of thinking "tends to draw our attention away from the potential efficacy of bureaucratically structured organizations such as trade guilds, learned societies, schools, councils, governments, and so forth" by making us focus on individual humans and their interactions (139). Lewontin and Levins (2007, 122) write about it being a political as much as a technical problem what is taken as a given and what as fundamental, and this arguably extends to the posing of the problem and where the boundaries of the domain are drawn (see also Sarkar 1998 for similar points regarding the representation of biological processes; Robert 2004 for limits of exclusively reductionist methodology). It is widely recognized that methodology choice is not neutral (see e.g., Reiss and Sprenger 2014 [2020]). The use of a certain method will always privilege not only certain solutions, but also certain problems, for instance those that yield themselves more easily to the preferred manner of explanation (Levins and Lewontin 1985, 3). In this respect, Mesoudi's methodology has an important blind spot when it comes to social structures.

The danger lies in privileging certain problems as well as in privileging explanations which do not adequately address them.

Even if we assume, for the sake of the argument, that social and cultural phenomena could be reduced to individual-level processes, this does not imply that we could (best) study them at an individual level. Various objections to methodological reductionism as *the* method in the social sciences have been raised in this respect, including multiple realizability of higher-level properties (List and Spiekermann 2013), causal efficacy of social phenomena (Elder-Vass 2010; Kincaid 2009; List and Spiekermann 2013; Sawyer 2003), irreducibility of social to individualist theories (Sawyer 2005). The sufficient treatment of these topics goes beyond the scope of this paper (for the discussion see e.g., Zahle 2016). Similarly, in biological sciences it has been recognized that the appropriate level of explanation depends on the explanandum, as well as that research methods that are exclusively reductionist "exhibit systematic biases that overlook relevant biological features" (Brigandt and Love 2008 [2022]; see also Robert 2004).

Assuming that social and cultural phenomena can be reduced to the individual can be seen as offering a distorted, rather than simplified, view of these phenomena. Models and methods based on this ontological view are inadequate if in their aim to explain cultural change they highlight only certain, arguably minor, factors in societies and cultures, such as the transmission from one individual to another and individual-level cognitive biases. These methodological choices easily lead to overlooking other, more plausible explanations. The point here is that the choice of methodology is not neutral: choosing one approach over the other always has consequences as to what will be discovered and how it will be explained. And, considering the above outlined ontological considerations, this individualistic methodological approach does not appear as the most logical or the most appropriate, and certainly not the only, choice. This claim will be further illustrated below by focusing on several of Mesoudi's explanations of cultural phenomena and difficulties they meet.

4. Mesoudi's Explanations

4.1. Hybrid Corn: The Adoption of Innovations

Mesoudi's preferred explanation of the adoption of innovations such as hybrid corn is by individuals learning from each other and copying each other's "attractive" behavior (Mesoudi 2011, 69-71). Here he closely follows Joseph Henrich who sets out to investigate whether innovations, such as the new hybrid corn, spread via content bias or guided innovation. In guided variation, individuals engage in their own independent trial-and-error learning. Individuals switch to the new "trait" (planting hybrid corn seed, in this case) when

it gives a higher payoff than the old trait (planting the "old", non-hybrid corn seed). For this reason Mesoudi terms guided variation an individual-level process—it is independent of variation in the trait in the population in general. In content bias, on the other hand, individuals from time to time sample the behavior of other individuals in their population, and switch to that behavior if it is "intrinsically more attractive" ("it elicits emotional reactions, it is cheaper, or whatever," Mesoudi 2011, 70) than their own existing behavior. Henrich compared the shapes of distribution curves generated by content bias and guided innovation models to those depicting the adoption of hybrid corn, concluding that the adoption of hybrid corn was a content bias process since the two generated similar S-shaped curves. Mesoudi concludes that "the diffusion of most innovations is driven by content-biased cultural selection rather than guided variation" (Mesoudi 2011, 71).

Explanation of the adoption of innovations that focuses solely on individuals and their preferences, choices, and actions appears to offer only a (small) part of the full story. For instance, it glosses over the facts such as that the innovation goes from first being unavailable or rare to possibly eventually becoming the only available option. The reason for this does not have to be "the popular demand," which would return us back to choices and preferences of the individuals in the population. Some of the reasons could include the state policy. For instance, growing regular, non-hybrid corn could be actively discouraged by the government, or growing the hybrid could be promoted, or both. The government policy could here include measures ranging from education or persuasion to subsidies and penalties. Another set of reasons include financial interests of producers and traders. These agents could benefit from a widespread adoption of hybrid corn if, for instance, hybrid seed is more expensive, needs to be purchased anew year after year, and offers these actors more control over the farming practice.

Indeed, when it comes to hybrid corn adoption in the US, it could have been a combination of these two groups of reasons that did the trick. Lewontin (1991) writes about the invention of hybrid corn as "[t]he best documented example we have of purely commercial interest driving what is said to be a fundamental discovery about nature" (53). He disputes the claims about the superior productivity of hybrid corn as being the reason behind its adoption, and instead focuses on one of its other characteristics, that of hybrids not being true-breeding. That is, one cannot save the seed of hybrid corn and plant it again next year in order to again get a full crop of hybrid corn. Instead, it is necessary to every year buy the hybrid corn seed again. In this way, Lewontin claims, "the hybrid seed corn producer has found a method of copy protection" (Lewontin 1991, 54). Even more strongly, he claims that the invention of hybrid corn was "a deliberate use of the principles of genetics to create a copy-protected product," citing the inventors of hybrid corn themselves in support of that claim (Lewontin 1991, 55). Realizing that hybrids can

be a guarantee of immense profits to the inventor has, according to Lewontin, resulted in the introduction of the method into nearly all of agriculture, with millions of dollars of investment in the production of new hybrids. In 1930s, the founder of the Pioneer Hybrid Seed Company, one of the major seed companies in the US, was appointed secretary of agriculture (Lewontin 1991, 56). If Lewontin is right, the adoption of hybrid corn was in fact a result of commercial interests of a group of powerful actors, rather than some kind of "grassroots" copying phenomenon that Mesoudi (and Henrich) have in mind.

Be that as it may, a cursory glance at some other important innovations shows how their explanation in terms of aggregates of individual preferences and choices is unsatisfactory. In today's world, one has little choice over whether to use the internet, smartphones, and cashless payment. The appearance of these innovations and its use by governments, institutions and ever wider swathes of the public made it practically impossible to choose not to use them. Indeed, it can be said that their very appearance changed our social environment. In agriculture, this lack of individual choice can be illustrated by bank policies that make funding conditional on the use of certain agricultural methods, as well as governmental policies that proscribe as well as prescribe various modes of work.

In any case, it seems that an explanation of the spread of innovation which does not take into account the effects of structured agents, including the reasons why certain behavior might be considered "more attractive" (is hybrid seed more attractive because of some of its intrinsic qualities, such as higher productivity, or because the use of non-hybrid seed is effectively penalized?), is an over-simplification which disregards some of the actual and important factors at play and quite possibly offers a distorted view of their relative importance.

4.2. Prestige Bias and Social Status

Prestige bias is an important concept in many cultural evolutionary theories. It is one of the so-called model-based biases, and it stands for individuals' preferences for copying models with high social status or particular skills (Mesoudi 2011, 73). In relation to prestige bias, Mesoudi writes that it functions to make individuals prestigious or successful themselves: "if you copy the behavior of prestigious people then you stand a chance of becoming prestigious yourself. For example, if you want to become a good golfer, then copying Tiger Woods's swing is probably a good learning strategy to follow. At least it is probably quicker and easier than figuring out on your own, through painstaking trial-and-error individual learning, what a good golf swing is" (Mesoudi 2011, 74).

There seems to be some confusion going on here between terms including *prestigious*, *good* and *successful*: surely becoming a *good* golfer, in the sense

of being good at the game, is not the same as becoming a *successful* or *prestigious* one. While copying Tiger Woods's swing might make you good at golf, it is arguably less likely to make you a successful golfer, since to achieve that distinction it is necessary to fulfill many other conditions in addition to having a good swing or indeed being good at golf. For instance, you would need to join competitions, perform well at them, and rise through the ranks of the golf world. To become a prestigious golfer, it is not sufficient that one behaves in certain ways or displays certain traits, that one is good at golf, or even that one is a successful golfer, it is also necessary that other people deem one prestigious. Prestige is something conferred on one by other people. It is not easy and certainly not a given that one will earn it just by acting in certain ways, such as performing an excellent swing. Prestige is a socially assigned status rather than a trait such as having blonde hair or being able to lift 10 kg. To be prestigious, one needs to be deemed prestigious by one's society, community, social group, and the like. In this sense, one depends on the social context in a way similar to the sheep stealing example presented above. Indeed, it seems that there are many cases where copying someone prestigious is the exact opposite thing to do if you want to become prestigious yourself. Think, for instance, of your chances of becoming a prestigious artist by copying another prestigious artist or artists. Alternatively, think of the value often placed on originality, innovation, uniqueness, and difference in various areas of human enterprise.

As evidence that people in the "real world" use prestige bias, Mesoudi cites social psychology experiments that allegedly show that people preferentially copy prestigious or successful people's choices, attitudes, and behavior (Mesoudi 2011, 74). In these experiments, people have been found to shift their art preferences in accordance to that of another participant if she was introduced as an art director, but not if she was introduced as a student. Yet, what this experiment arguably shows is that people copy someone with a certain socially assigned status or role (the art director), rather than someone who is successful or prestigious. The success or prestige could maybe be inferred from that status, but they are not what the imitation is based on. So, it would seem that the socially assigned status, or rather a role, is what makes the difference in the experiment above, and it is unclear how Mesoudi's theory could accommodate this fact.

Mesoudi comes close to discussing the notion of prestige as socially constructed when discussing studies on diffusion of innovations and dialect changes (Mesoudi 2011, 75). There, he writes that dialect changes are driven by prestigious, high-status members of the community. In an example of an island community, residents who valued the island life and considered the local fishermen as having high social status have adopted their distinctive dialect. Other residents, who did not value the island life and wished to move, did not copy that dialect, "because they had a different notion of prestige." An

interesting question, which Mesoudi however does not raise, is where do these different notions of prestige or these different values come from and how are they influenced. It might be argued that they are socially constructed and shared by the community, and that they confirm prestige as a socially-conferred status, rather than an indication of skillfulness or success. In that case, what remains unexplained is *why* are certain individuals or traits deemed prestigious in the social group under consideration, as well as who decides what is to be deemed prestigious.

4.3. The Issue of Power

Notions such as prestige bias and similar also do not seem to able to do the trick when it comes to the question of power. As already noted above, the cultural evolutionary assumptions of transmission from one individual to another, without variants being imposed on groups by using power, "do not apply to many real-life scenarios that have been studied by cultural evolutionists" (Cofnas 2018, 313). In particular, these models do not seem to be useful for understanding modern societies, since these are "founded on extensive, complex systems of power. The information we are able to obtain, the opinions we are exposed to, and the options that are presented to us are constrained in all sorts of ways by the (often hidden) exercise of force and authority" (Cofnas 2018, 305). This role of procedures and similar processes is also highlighted by Lukes. As Lewens notes, they can have biasing effects that result in ignoring the interests of marginalized groups. As a consequence, "one cannot fully understand power—i.e. how some agents' interests are systematically ignored, while the interests of others tend to predominate—without understanding these procedural facts" (Lewens 2015, 137). These considerations echo those of certain conflict theorists, who noted that a powerful social group could be able to impose its preferences on others, potentially resulting in institutions reflecting the values of the powerful minority (López and Scott 2000). By pushing the institutional power into the background or assuming it as a given, cultural evolutionary theories in fact choose to ignore an important source of cultural and social change and influence, as well as one of the most important concepts in the social sciences.

5. Conclusion

As it stands, Mesoudi's theory does not seem to sufficiently appreciate the complexity of human sociality and culture. Cultural evolutionary theories can appear oblivious to the consequences of the fact that human societies are not just aggregates of individuals (Lewens 2015), but rather structured wholes irreducible to individual psychology and behavior. While social groups may be constituted by people, this should not be taken to be

equivalent to the claim that people determine all facts about groups, their actions and intentions, or that the social world completely depends on individuals, their actions and mental states. Social structures cannot be assumed to be reducible to individual actions nor merely emergent from them, and they could indeed have their own causal efficiency. Contra Mesoudi's claim that cultural evolution can synthesize the social sciences, cultural evolutionary theory of this kind appears to be fairly limited and myopic, and can at best serve as one approach among many others. I will conclude this paper with a brief note on the Modern Synthesis and Extended Evolutionary Synthesis in biology with respect to Mesoudi's theory.

5.1. The Modern Synthesis and Extended Evolutionary Synthesis

Mesoudi's vision is for cultural evolutionary theory to synthesize the social sciences much in the same way that, according to him, biology was synthesized during the Modern Synthesis (Mesoudi 2011, xii). He exalts the latter as a process in which a previously fractionated field, with various isolated disciplines with often conflicting theoretical assumptions, was unified under the same theoretical framework, thus advancing the biological sciences. Impressed by the success of this "evolutionary synthesis" in biology, Mesoudi wishes the same for the social sciences. (This supposed successful unification of biology might, however, be overstated; see e.g., Brigandt and Love 2008 [2022]).

Be that as it may, the fact is that the framework of the Modern Synthesis has come under serious criticism in recent years. While acknowledging its undoubtful usefulness and success in the first decades of its emergence, these authors question its ability to accommodate the new and rapid advances in areas including developmental biology, genomics, and ecology (Laland et al. 2015). Among other, the literature on evo-devo, developmental plasticity, inclusive inheritance, and niche construction provides arguments that a conceptual framework alternative to the contemporary evolutionary theory is needed, what its proponents call the extended evolutionary synthesis (EES), which would retain the basics of evolutionary theory, but would give a much prominent place to constructive processes, ecological interactions, and systems dynamics in development and evolution, as well as allow for a reciprocal and multi-level image of causation in these processes (Laland et al. 2015; Müller 2017). In the EES view, developmental processes such as developmental bias, inclusive inheritance, and niche construction are co-responsible for the direction of evolution and the origin of variation. Development is constructive, in that an organism is able to shape its own development by continuously responding to and altering both its internal and external conditions, in this way emphasizing the interdependence of gene expression and

the environment and going beyond the concept of gene-environment interaction (Laland et al. 2015, 6). A consequence is that causation goes in both ways, from the "higher" levels of organization to the "lower" ones (such as genes), and vice versa. This view challenges one of the default assumptions in evolutionary biology, that of the unidirectional causation (Laland et al. 2015, 7).

As seen above, Mesoudi bases his claim that culture can be studied by evolutionary methods on the ontological claim that culture evolves, that is, that cultural change shares the same principles as biological evolution, as outlined by Darwin and further developed in the Modern Synthesis. Above I tried to make a case that these assumptions are not warranted from a social ontology point of view. However, if some of the principles of the Modern Synthesis, such as the unidirectional causation or the passivity of the organism, are not even valid for evolutionary change in biology, this would seem to present further problems for a theory of cultural change based on these principles. In this respect, attempts at providing an evolutionary theory of culture could profit from more recent insights from the study of biological evolution.

Acknowledgements

I would like to thank Boran Berčić, Bart Geurts, Simon Lohse, Thomas Reydon, and an anonymous reviewer for their helpful comments and suggestions on earlier versions of this paper.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

ORCID iD

Martina Valkovic https://orcid.org/0000-0001-9670-4990

References

Boyd, Robert, and Peter J. Richerson. 1985. *Culture and the Evolutionary Process*. Chicago: University of Chicago Press.

Brigandt, Ingo, and Alan Love. 2008 (2022). "Reductionism in Biology." In *The Stanford Encyclopedia of Philosophy*, edited by Edward N. Zalta and Uri Nodelman. https://plato.stanford.edu/entries/reduction-biology/

Cavalli-Sforza, Luigi Luca, and Marcus W. Feldman. 1981. *Cultural Transmission and Evolution: A Quantitative Approach*. Princeton, NJ: Princeton University Press.

Cofnas, Nathan. 2018. "Power in Cultural Evolution and the Spread of Social Norms." *Quarterly Review of Biology* 93 (4): 297-318.

Durkheim, Émile. 1895 (2013). The Rules of Sociological Method. Edited by Steven Lukes. Translated by W. D. Halls. 2nd ed. Houndmills, Basingstoke, Hampshire, UK: Palgrave Macmillan.

Elder-Vass, Dave. 2010. *The Causal Power of Social Structures: Emergence, Structure and Agency*. Cambridge: Cambridge University Press.

Epstein, Brian. 2015. *The Ant Trap: Rebuilding the Foundations of the Social Sciences*. New York: Oxford University Press.

Fracchia, Joseph, and Richard C. Lewontin. 1999. "Does Culture Evolve?" *History and Theory* 38 (4): 52-78.

Geertz, Clifford. 1973. "Thick Description: Toward an Interpretive Theory of Culture." In *The Interpretation of Cultures*, 3-30. New York: Basic Books.

Henrich, Joseph. 2015. *The Secret of Our Success: How Culture Is Driving Human Evolution, Domesticating Our Species, and Making Us Smarter*. Princeton, NJ: Princeton University Press.

Hooker, Cliff, ed. 2011. *Philosophy of Complex Systems*. Amsterdam: Elsevier.

Kaiser, Marie I. 2011. "The Limits of Reductionism in the Life Sciences." *History and Philosophy of the Life Sciences* 33 (4): 453-476.

Kincaid, Harold. 1997. *Individualism and the Unity of Science: Essays on Reduction, Explanation, and the Special Sciences*. Lanham, MD: Rowman and Littlefield.

Kincaid, Harold. 2009. "Causation in the Social Sciences." In *The Oxford Handbook of Causation*, edited by Helen Beebee, Christopher Hitchcock, and Peter Menzies, 726-743. Oxford: Oxford University Press.

Laland, Kevin N., Tobias Uller, Marcus W. Feldman, Kim Sterelny, Gerd B. Müller, Armin Moczek, Eva Jablonka, and John Odling-Smee. 2015. "The Extended Evolutionary Synthesis: Its Structure, Assumptions and Predictions." *Proceedings of the Royal Society B* 282: 20151019.

Levins, Richard, and Richard C. Lewontin. 1985. *The Dialectical Biologist*. Cambridge, MA: Harvard University Press.

Lewens, Tim. 2015. *Cultural Evolution: Conceptual Challenges*. Oxford: Oxford University Press.

Lewontin, Richard C. 1991. *Biology as Ideology: The Doctrine of DNA*. New York: Harper Perennial.

Lewontin, Richard C., and Richard Levins. 2007. *Biology under the Influence: Dialectical Essays on Ecology, Agriculture, and Health*. New York: Monthly Review Press.

List, Christian, and Kai Spiekermann. 2013. "Methodological Individualism and Holism in Political Science: A Reconciliation." *American Political Science Review* 107 (4): 629-643.

López, José J., and John Scott. 2000. *Social Structure: Concepts in the Social Sciences*. Berkshire, UK: Open University Press.

Lukes, Steven. 1974 (2005). *Power: A Radical View*. 2nd ed. Houndmills, Basingstoke, Hampshire, UK: Palgrave Macmillan.

Mesoudi, Alex. 2011. *Cultural Evolution: How Darwinian Theory Can Explain Human Culture and Synthesize the Social Sciences*. Chicago: University of Chicago Press.

Müller, Gerd B. 2017. "Why an Extended Evolutionary Synthesis Is Necessary." *Interface Focus* 7: 20170015.

Reiss, Julian, and Jan Sprenger. 2014 (2020). "Scientific Objectivity." In *The Stanford Encyclopedia of Philosophy*, edited by Edward N. Zalta and Uri Nodelman. https://plato.stanford.edu/entries/scientific-objectivity/

Richerson, Peter J., and Robert Boyd. 2005. *Not by Genes Alone: How Culture Transformed Human Evolution*. Chicago: University of Chicago Press.

Robert, Jason Scott. 2004. *Embryology, Epigenesis, and Evolution: Taking Development Seriously*. New York: Cambridge University Press.

Rosenberg, Alexander. 1978. "The Supervenience of Biological Concepts." *Philosophy of Science* 45 (3): 368-386.

Sarkar, Sahotra. 1998. *Genetics and Reductionism*. Cambridge: Cambridge University Press.

Sawyer, R. Keith. 2003. "Nonreductive Individualism: Part II—Social Causation." *Philosophy of the Social Sciences* 33 (2): 203-224.

Sawyer, R. Keith. 2005. *Social Emergence: Societies as Complex Systems*. Cambridge: Cambridge University Press.

Wimsatt, William. 1974. "Complexity and Organization." In *PSA 1972: Proceedings of the 1972 Biennial Meeting of the Philosophy of Science Association*, edited by Kenneth F. Schaffner and Robert S. Cohen, 67-86. Dordrecht, the Netherlands: Springer.

Zahle, Julie. 2016. "Methodological Holism in the Social Sciences." In *The Stanford Encyclopedia of Philosophy*, edited by Edward N. Zalta and Uri Nodelman. https://plato.stanford.edu/entries/holism-social/

Author Biography

Martina Valković is a Research Assistant and a PhD candidate at Leibniz University Hannover, as well as a Guest Researcher at Radboud University Nijmegen. She is currently employed in the ANR-DFG project *The Explanatory Scope of Generalized Darwinism: Towards Criteria for Evolutionary Explanations Outside Biology* within which she has recently co-edited a collection titled *Evolutionary Thinking Across Disciplines: Problems and Perspectives in Generalized Darwinism* (Springer, 2023).