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Title: Methodological Individualism in Evolutionary Biology and in Social Science: a comparison

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Abstract

Methodological individualism is a doctrine in the philosophy of social science, according to which all social phenomena should be explained in terms of the actions of individuals. This paper explores a parallel between methodological individualism in the social science and the debate in evolutionary biology over 'levels of selection', with particular reference to the arguments of G.C. Williams against group-selectionism. A number of facets of the parallel are examined.

1. Introduction

Methodological individualism is a well-known doctrine in the philosophy of social science, concerning the form that social-scientific explanations should take. It says that all social phenomena are to be explained in terms of the actions of the individuals that give rise to them. For example, suppose we wish to explain why US-Soviet relations thawed in the late 1980s. One might cite broad geopolitical factors, e.g. the rise in foreign investment in the USSR, or the shift from military to civilian expenditure. But by the standards of methodological individualism, these are inappropriate (or at least incomplete) explanations. A proper explanation should cite the actions of the particular individuals, e.g. Gorbachev, Reagan and their subordinates, which ultimately led relations to improve. Only then can we attain a genuine understanding of why the social phenomenon occurred.

The doctrine of methodological individualism derives from the work of the German sociologist Max Weber (though the term itself was coined by Joseph Schumpeter). In *Economy and Society* (1922), Weber wrote: “collectivities must be treated as solely the resultants and modes of organization of the particular acts of individual persons, since these alone can be treated as agents in a course of subjectively understandable action” (p.13). Later in the twentieth century, versions of methodological individualism were defended by the social theorists Friedrich Hayek and Richard von Mises, the philosophers Karl Popper and John Watkins, and the social scientist Jon Elster. The influence of methodological individualism on the actual practice of social science has been considerable, though not uniform. Much of neo-classical economics adheres to individualist strictures, but in fields such as sociology and anthropology the picture is more mixed.

In this article I argue that the debate over methodological individualism finds an interesting parallel in evolutionary biology. In particular, arguments made by George C. Williams in *Adaptation and Natural Selection* (1966), a book which had a considerable influence on twentieth century evolutionary biology, contain clear echoes of methodological individualism. My aim here is to explore this parallel, to ask how deep it runs, and to consider similarities and dissimilarities between the social scientific and evolutionary biological debates.

2. Some aspects of methodological individualism

In a useful survey of the topic, Heath (2015) makes the important point that methodological individualism, at least in its original Weberian version, does not simply stem from a commitment to “bottom-up” or reductionist explanations. The generic issue of reductionism versus anti-reductionism arises whenever there is part-whole structure, so is not specific to social science. (For example, consider the debate over whether the macroscopic properties of gases can be explained in terms of their constituent atoms.) The distinctive feature of

methodological individualism is not reductionism per se, but rather its emphasis on explaining social phenomena as outcomes of the deliberate actions of individuals.

This point can be clarified as follows. One might demand that social phenomena be explained individualistically on the grounds that societies are “ultimately” composed of individuals, and that bottom-up explanations are generally preferable in science. But this was *not* Weber’s reason, and indeed is orthogonal to it (though an argument along these lines is found in both Popper and Watkins). Rather, Weber’s demand was that social phenomena be explained in terms of the actions of intentional agents, for only then would they be “subjectively understandable”. Since only individuals are intentional agents, i.e. are capable of performing actions for reasons, it follows that social phenomena should be explained individualistically.

Weber’s emphasis on the need for “subjective understanding” is related to his doctrine of *verstehen*, which refers to the special sort of understanding (of action) that we attain when we grasp the action’s subjective meaning for the actor. For example, consider an anthropologist studying a religious ritual. On Weber’s view, the anthropologist needs to understand the significance that the ritual has for the participants; a purely “objective” analysis of the ritual, of the sort that the methods of natural science can yield, will never provide this. This element of *verstehen* is what sets apart the natural from the social sciences, for Weber, and underpins his version of methodological individualism.

A different aspect of methodological individualism, emphasised by Elster, is opposition to “functionalist” explanations in the Marxist tradition (Elster 1982, 1985). Marxist explanations often appealed to the “interests” of sectors of society, for example in the suggestion that it is in the interests of capitalists to keep wages low. This explanation is suspect: an individual capitalist might well profit from raising wages slightly to attract the best workers (Elster 1982). The point is that the interests of one individual capitalist need not coincide with the interests of capitalists as a whole. By attempting explanations in terms of “capitalists” and “workers” en masse, Marxists were thus led to overlook collective action problems. So methodological individualism is an antidote against fallacious patterns of argument.

A related point is the association between methodological individualism and rational choice theory, also stressed by Elster. Rational choice theory, in its canonical version, seeks to explain actions in terms of the goals, beliefs and desires of agents. On the assumption that only individuals have these psychological states – and in particular that collective entities such as firms, nations and committees do not – the commitment to individualistic explanation falls directly out of rational choice theory. It is no surprise that in those areas of social science where rational choice theory holds pride of place, notably economics, there is often an explicit commitment to methodological individualism.

3. Methodological individualism in evolutionary biology: the parallel

To see the parallel in biology, one point must be laid aside. Since the biological world is hierarchically organized, i.e. smaller biological entities are nested within larger ones, what I have called the generic issue of reductionism versus anti-reductionism arises ubiquitously in the biological sciences. Different biological sub-disciplines take different positions on this issue. Thus molecular and cell biology use a reductionist methodology, while systems biology and ecology typically do not. However this does not truly parallel the social scientific case, for as we have seen a commitment to reductionist explanation per se is not the motivation for the most interesting form of methodological individualism in social science.

The true biological parallel, rather, can be found in the debate over ‘levels of selection’ in evolutionary biology. This decades-old debate, which seems to be re-discovered by each generation of evolutionists, is about whether it is legitimate to apply the Darwinian concept of adaptation at the level of groups, e.g. to family units, colonies, tribes or species. Simplifying somewhat, opponents of group selection hold that this is rarely if ever legitimate; a good Darwinian explanation of a trait’s evolution must show why the trait is advantageous to the individuals who possess it, not to larger entities. Opponents of this view argue that natural selection sometimes acts on whole groups, that as a result groups can exhibit adaptations, and thus that some valid Darwinian explanations invoke group rather than individual advantage.

This biological debate is parallel to the methodological individualism debate in an interesting and deep way, I believe. In both cases, the individualist argument stems from a commitment to a particular mode of explanation; this mode of explanation involves the attribution of a certain special property; it is then argued (or assumed) that only individuals possess that property; hence the conclusion that explanations should be individualistic.

In the social scientific case, the mode of explanation is intentional or action-theoretic, for this is needed to “make sense” of the social phenomena in question. The property which this mode of explanation requires is that of having intentional psychological states – goals, beliefs, desires etc. The assumption is that only individuals have these states – groups and other collective entities do not. In the biological case, the mode of explanation is adaptationist, i.e. explaining traits in terms of their adaptive significance (or Darwinian function). The property which this mode of explanation requires is that of being an adapted unit, or possessing adaptations. The assumption is that only individuals possess adaptations – groups and other collective entities do not.

If this is correct, it suggests an isomorphism between *adaptation* and *intentionality*. Interestingly, this isomorphism has been defended before in a different context, by Daniel Dennett (1983, 1995). He argues that adaptationist explanations and explanations in intentional psychology are of a piece. Dennett’s reason for saying this is not entirely pellucid, but can be reconstructed as follows. In intentional psychology (and in rational

choice theory), we explain an action by showing why it made sense from the agent's point of view, given their goals and beliefs. In evolutionary biology, we give an adaptationist explanation of a trait by showing why it makes sense from the point of view "mother nature", i.e. natural selection, whose goal is to maximize fitness. Thus in both cases explanation proceeds by showing that a particular action or trait is appropriate to the agent's goal. In one case, the goal is a human agent; in the other case, it is mother nature herself.

Dennett's way of spelling out this point is questionable, involving as it does the metaphorical reification of "mother nature". But I share Dennett's sense that there is a deep connection between adaptive and intentional explanation, for two reasons. Firstly, it is widely accepted that the existence of Darwinian adaptations licenses certain teleological attributions, as when we ask what a trait is designed for, or what its function or purpose is; and these are arguably quasi-intentional notions. Secondly, both adaptationist and intentional-psychological explanation yield a type of understanding different from the understanding we get when a phenomenon is subsumed under natural law. In both cases, we come to understand some feature – an action or a trait – by seeing why it was the appropriate or advantageous, rather than by seeing why it had to occur. Both modes of explanation have a normative dimension, involving comparison of how the world actually is, in some respect, with how it *should* be.

4. G.C. Williams as a methodological individualist

The main aim of Williams (1966) book was to bring "discipline" to the study of adaptation, by critiquing the many biologists who applied the concept at the group level. This "good of the group" fallacy, as it is known, can be illustrated by the suggestion that earthworms' physiology has been designed by natural selection to improve the quality of the soil, and thus to aid the local ecosystem. Williams ridicules this suggestion: the effect on soil quality is a byproduct of the earthworm's feeding activities, not its function. A valid Darwinian explanation of the earthworm physiology needs to show advantage to individual earthworms, not to more inclusive biological units, he argues.

Williams offers a range of objections, both empirical and conceptual, against the idea of group adaptation (or "biotic adaptation" as he put it). Firstly he argues that empirically, group adaptation is rarely found in nature (though he exempted family groups from this claim). Secondly he argues that group adaptations would need to evolve by a process of between-group selection, a hypothesis which is "unparsimonious" compared to ordinary individual-level selection. Therefore the concept of adaptation should always be applied at as low a hierarchical level as possible. Thirdly, Williams insists on the distinction between true group adaptation and "fortuitous group benefit". The point here is that even if a trait is beneficial for a group, it does not follow that it evolved for that reason – the group

benefit might be a side-effect of selection on individuals. Thus Williams memorably contrasted a “herd of fleet deer” with a “fleet herd of deer”.

Williams saw clearly that individual and group interests are not necessarily aligned. An immediate corollary is the existence of a biological “collective action” problem: individuals pursuing their own interest may lead to outcomes that are sub-optimal at the group level. Thus a hypothesis of group adaptation needs to be able to explain why individual free-riders do not undermine group functionality. Moreover, Williams’ point about fortuitous group benefit shows that even if individual and group interests *are* aligned, it does not follow that group adaptations exist.

How do Williams’ arguments fare from the standpoint of contemporary evolutionary biology? His points about individual and group interests not coinciding, about free-riders, and about the dangers of naïve group selectionism are widely accepted; indeed they are a mainstay of social evolution theory. His point about not confusing group adaptation with fortuitous group benefit, though clearly correct, is not always appreciated. His claims that group adaptations are rare and that group selection is inherently implausible are accepted by many but not all biologists; see section 5.

Notice that Williams’ argument is strikingly similar to the arguments of the methodological individualists in social science. Williams is concerned with a particular mode of explanation, namely the Darwinian (or adaptationist) mode. He argues that only individuals exhibit adaptations and thus that explanation should be individualistic: evolved traits should be explained by the advantage they confer on individuals, not groups. The abstract logic of this argument – a commitment to a particular mode of explanation, plus a claim that the property required by this mode is only possessed by individuals – is identical to the logic of Weber’s argument, as we have seen. Note also that Williams’ argument, like Weber’s, is genuinely methodological: it is not merely a claim about what the world is like, but a recommendation for how a particular scientific endeavour – adaptationist biology – should be pursued.

The parallel holds in two further respects. Firstly, Williams holds that group properties should generally be treated as side-effects, or byproducts, of individual-level adaptations. Similarly, methodological individualists such as Hayek (1942) argued that the conscious actions of many individuals could lead, in aggregate, to unintended social phenomena of considerable complexity, for example markets. The task of the social scientist was to explain these social phenomena as resulting out of individuals’ actions. Hayek’s point about social phenomena being *unintended* neatly parallels Williams’ point that group features are often byproducts of selection on individuals. Just as no individual consciously intends their action to lead to a well-functioning market, biological individuals are not “designed” to produce group-beneficial outcomes.

Secondly, Williams' argument that failing to adhere to individualist strictures has led biologists to commit fallacies is exactly analogous to Elster's objection to Marxist explanations. In both cases, alignment of interests is the critical issue. Just as the interests of an individual capitalist need not coincide with that of capitalists as a whole, so the evolutionary interests of an individual organism need not coincide with that of their colony, local population, or species. Explaining a social phenomenon in terms of a class interests is thus mistaken, for Elster; as is explaining a biological phenomenon in terms of group evolutionary interests, for Williams.

As we saw, a concomitant of Elster's point was the close association between methodological individualism and rational choice theory. This too finds a parallel in biology. A few years after Williams' book, evolutionary game theory was founded by Maynard Smith and Price (1973), who borrowed concepts from economic game theory to shed light on strategic behaviour in animals. It is no accident that Maynard Smith, like Williams, was an implacable opponent of "good of the group" thinking. Indeed the whole point of Maynard Smith and Price's paper was to explain observed features of animal conflicts without invoking the good of the species.

5. Beyond individualism?

If our reconstruction of the case for methodological individualism is correct, there are two possible ways of countering it. Firstly, one might hold that the characteristic mode of explanation – intentional-psychological or adaptationist – is not appropriate for the phenomenon in question. Secondly, one might dispute the claim that the relevant properties – having intentional states or possessing adaptations – are solely possessed by individuals.

Interestingly, arguments of both types can be found in both cases. In the social scientific case, part of Durkheim's case against methodological individualism stemmed precisely from his rejecting Weber's idea that social phenomena could only be explained in terms of individuals' motives. Durkheim wrote: "every time a social phenomenon is directly explained by a psychological phenomenon, we may rest assured the explanation is false" (1895 p.129). Durkheim believed in an ontology of social facts, irreducible to facts about individuals, and maintained that "a social fact can only be explained by another social fact" (1895, p. 145). Thus for example in his famous work on suicide, Durkheim (1897) claimed that higher levels of education lead to higher rates of suicide. This was intended as a causal explanation, but not one that is operative at the level of individual psychology.

A standard objection to Durkheim's argument is that we do not *really* understand the phenomenon until we know what is about having a high level of education that makes people more likely to kill themselves. *Why* are better educated people more prone to

suicide? This pushes us towards Weber's position, that what is needed is an understanding of the individual act of suicide from the viewpoint of the actor. Here is not the place to try to adjudicate the Durkheim / Weber debate; the point to note is how the former is able to reject individualist methodology by rejecting the commitment to the particular mode of explanation that underpins it.

In the biological case, the adaptationist mode of explanation, which underpins the argument for individualism, is not the only possible mode, and is not always appropriate. It is a familiar point that not all biological traits are adaptations – think of spandrels, vestigial organs, non-adaptive traits that are pleiotropically linked to adaptive ones, and so-on. Such traits cannot be explained in terms of their adaptive significance, for they have none. In a different vein, it is sometimes argued that developmental and phylogenetic constraints, rather than adaptation to the environment, shed more light on certain biological traits, or at least are a key piece of the jigsaw. This is part of what motivates the traditional “developmentalist” opposition to adaptationism (cf. Amundson 2005).

Biologists who oppose the hegemony of adaptationism for these reasons have not typically been concerned with individualist versus non-individualist methodology. A possible exception is in ecosystems ecology. The mode of explanation in this field is non-adaptationist; the emphasis is often on “self-organization”, and physical rather than biological variables play a central explanatory role (Sarkar 2014). Ecosystems ecology does not conform to methodological individualism. The aim is not to explain ecosystem features as resulting from individual features, but rather to find universal laws governing all ecosystems, e.g. from thermodynamic considerations. This is what we would expect if the diagnosis above – that individualistic methodology falls out of a commitment to adaptationism and the belief that only individuals are adapted – is correct.

The second way of countering the case for individualism, in the social science case, finds expression in the idea that collective entities such as firms, nation-states and corporations can be “agents” in their own right, and are thus capable of acting. If such a view is accepted, then a commitment to the intentional-psychological mode of explanation would not entail individualism. Traditional methodological individualists held that talk of collectives “acting” is a mere *façon-de-parler*, but this opinion is not universal. Recently List and Pettit (2011) have argued at length that groups of various sorts can be rational agents, with full blown motivational and doxastic attitudes. Groups “are agents in their own right with minds of their own”, they write. (p. 77).

List and Pettit describe their view as “individualist”, however by this they simply intend an ontological claim, namely that the properties of groups, including their mental states, supervene on the properties of their constituent individuals. When it comes to explanation, rather than ontology, List and Pettit hold that social phenomena can sometimes be legitimately explained in terms of group attitudes. This counts as a form of methodological anti-individualism, as I am using the term. List and Pettit offer an elegant

account of the conditions under which groups can sensibly be credited with beliefs and desires, using the theories of preference and judgement aggregation.

In evolutionary biology, the second way of countering individualism finds expression in the idea that, *pace* G.C. Williams, certain groups do in fact exhibit adaptations. For example, the idea that certain social insect colonies, e.g. honey-bees, are “superorganisms” – originally associated with the Chicago ecologists Allee and Emerson who were the targets of Williams’ attack – has recently enjoyed a resurgence (Hölldobler and Wilson 2008), as has the view that natural selection can act at multiple hierarchical levels (Okasha 2006). Also relevant here is the realization that paradigmatic biological individuals, such as multi-celled animals, are in fact groups of cooperative cells, all working for the common good (Buss 1987, Maynard Smith and Szathmáry 1995). Since multicellularity clearly has evolved, this suggests that group-level adaptation cannot be dismissed *tout court*.

This last point leads Queller (1997) to argue that “individual” does not denote a fixed level in the biological hierarchy at all, but rather refers to any entity whose constituent parts engage in primarily cooperative interactions. Whether or not we accept this, the underling point – that cohesive groups can only evolve if the evolutionary interests of their constituents are somehow aligned – is a widely accepted principle of social evolution (Maynard Smith and Szathmáry 1995, Bourke 2009). Mechanisms by which individual-group interests become aligned include clonality, policing of selfish individuals, and randomization (e.g. in meiosis). These mechanisms explain how entities such as single cells, multi-celled organisms, and insect colonies can achieve the status of “evolutionary individual”.

This principle of social evolution has an interesting connection with the List-Pettit theory of group agents. List and Pettit argue that a *sufficient* condition for a whole group to be agent-like is if its members share identical preferences (as then the problem of aggregating individual preferences into a “group preference” has a trivial solution.) This can be thought of as a social-scientific analogue of the biological point that for groups to be adapted entities, the evolutionary interests of their constituent individuals are aligned.

One final point deserves mention. In the early biological debates, the difference between group and individual selection was portrayed as a factual empirical matter. But more recently it has been argued that in some cases at least, the difference is one of perspective rather than fact (e.g. Sober and Wilson 1998, Lehmann et al. 2007). To illustrate, consider the question of whether worker sterility in social insect colonies is an adaptation designed to benefit the whole colony, or the inclusive fitness of individual workers. These explanations may sound different, but some authors argue that they amount to the same thing; so it is a matter of convention, not empirical fact, whether an individualist methodology is adopted or not; see Okasha (2015) for discussion.

This conventionalist thesis has no parallel in the social science case that I am aware of. A similar sounding position was defended by Schumpeter (1991), who wrote that it is “a

matter of convenience” whether social-scientific explanation is individualistic or holistic (p.287, quoted in Udehn 2001, p.106). However what Schumpeter meant was that some social phenomena were better explained from an individualistic basis, others in terms of social wholes. This is different from saying that one and the same phenomenon can equivalently be explained in both ways.

6. Conclusion

Philosophers are fond of pointing out parallels between different areas of science. This strategy is often fruitful but can be pushed too far. I believe that the parallel explored above is instructive, in particular because it draws attention to the link between adaptationist and intentional-psychological explanation. However it would be wrong to suggest that the case for methodological individualism in the philosophy of social science stands or falls with the case for individualism in evolutionary biology (in the sense outlined above). Structural similarity, however deep, is a weaker relation than identity.

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