



Gould on species, metaphysics and macroevolution: A critical appraisal



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ABSTRACT

Stephen Jay Gould's views on the ontology of species were an important plank of his revisionist program in evolutionary theory. In this paper I cast a critical eye over those views. I focus on three central aspects of Gould's views on species: the relation between the Darwinian and the metaphysical notions of individuality, the relation between the ontology of species and macroevolution, and the issue of contextualism and conventionalism about the metaphysics of species.

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1. Introduction

Stephen Jay Gould's revisionist program for evolutionary theory (see especially his 2002) has generated widespread discussion and debate both within and beyond evolutionary biology. His views on the ontology of species were, in his mind, an important plank of this revisionist program. In this paper I cast a critical philosopher's eye over those views. I focus on three central aspects of Gould's views on species: the relation between the Darwinian and the metaphysical notions of individuality, the relation between the ontology of species and macroevolution, and the issue of contextualism and conventionalism about the metaphysics of species.

Gould defends views on both the first-order question of the ontological status of species, and the second-order question of realism vs. pluralism about the first-order question. In the first part of the paper I discuss his arguments for his first-order views. Gould's central argument is that the species-as-individuals thesis (SAI) follows from the macroevolutionary theses of punctuated equilibrium and species selection. In response, I argue that SAI is neither necessary nor sufficient for either of these theses.

In the second part of the paper I turn to Gould's arguments concerning the second-order question of whether to construe the first order question in realist or pluralist terms (or both). We will see that he defends a pluralist position that, at first blush, appears to conflict with his realist-sounding first-order arguments. There may be ways for him to reconcile his first-order and second-order

views. But I suggest that these strategies are not ultimately successful.

Gould's views on the ontology of species are, in his mind, central to his whole revisionary program. They are, for instance, closely connected with his views on punctuated equilibrium, and higher-level selection. His co-thinker Niles Eldredge argues (1985) that the question of 'ontology' is *the* central issue for those, like Gould and himself, who are seeking to challenge the orthodoxy of the Modern Synthesis. Gould would no doubt agree with this claim. Hence if, as I will argue, Gould's views on the ontology of species are questionable, this may well have major significance for the viability of his overall project (although I am not able in this paper to go on to consider in detail precisely whether and in what ways this may be the case).

Throughout the paper it will be useful to compare and contrast Gould's views with those of another prominent defender of SAI, David Hull.

2. Gould on species, individuality and macroevolution

The question of the ontological status of species – whether they are individuals, natural kinds, sets, or something else – has been much discussed since Ghiselin offered his 'radical solution to the species problem' in 1974. In *The Structure of Evolutionary Theory*

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(2002) Stephen Jay Gould offers a defence of Ghiselin's species-as-individuals view.¹ Gould's defence of SAI draws on the arguments offered over the years by SAI's most prominent advocates, such as Ghiselin and Hull, but he departs from them somewhat in his emphasis on the tight connection between SAI and macroevolutionary theory. Perhaps unsurprisingly, given Gould's interests, he views SAI as significant primarily for the role he sees it playing in helping to validate the independence and theoretical importance of macroevolution in general, and in particular the two macroevolutionary theses for which he is well known, punctuated equilibrium and species selection.

The potential connection between SAI and macroevolution has been noted since the early days of SAI (Hull, 1976). But Gould (along with other biologists such as Eldredge, Stanley and Cracraft) emphasises the connection to a much greater degree than other supporters of SAI (I have in mind here philosophers such as Hull and Sober).

I'll briefly summarise the main arguments that have been offered for SAI, then turn to Gould's own defence of it. The general argument for SAI is this:

- 1 Evolutionary theory treats, or ought to be interpreted as treating, species not as classes, or natural kinds, but as concrete individuals.
- 2 If evolutionary theory treats species as individuals, then they are individuals.
- 3 So, species are individuals.

Most attention has been focused on the justification for the first premise, but I am going to argue that the second, often unacknowledged, premise, is as important. For now though I focus on the first premise. The main arguments for it, now very familiar, were as follows: species evolve over time, but classes, as abstract entities, cannot change or evolve; species are not defined by intrinsic essences; species, like concrete individuals but unlike natural kinds or classes, are spatiotemporally restricted; the members of a species *causally interact* in certain characteristic ways, as the parts of an individual typically do; species, like individuals, exhibit *internal organisation and structure* – they are *functionally integrated*, and they are *cohesive* (gene flow is the mechanism that causes species to be cohesive); and like individuals but unlike natural kinds, species do not figure in laws of nature. It follows from this view that organisms are not *members* of species, but *parts* of species.²

Gould occasionally gestures towards one or two of these points, but I think it's fair to say that none of them figures prominently in his defence of SAI. His main argument for premise one above has to do with the fact that species are, in his opinion, *Darwinian*, or *evolutionary*, individuals. Darwinian individuals are entities that instantiate the properties required to be 'units of selection', specifically entities that exhibit heritable variation in fitness. In his classic paper on the units of selection, Lewontin (1970) pointed out that natural selection requires only heritable variation in fitness, and that any entities at any level in the genealogical hierarchy that satisfy this condition will count as potential units of selection.

¹ I will be focusing mainly on Gould's views as set out in his (2002), setting aside the question of the ways in which his views may have changed and developed over time.

² One topic of debate has been the question of which of the above points are actually arguments for SAI, and which are simply *consequences* of SAI. I don't see this as a big issue, as these are not mutually exclusive. Given that the above points are implications of SAI, if they turned out to hold, that would give support to SAI. (The SAIers will be begging the question though if they don't have independent arguments for these points, that is, if they do presuppose that SAI is right.)

Obviously Darwinian individuality is not the same thing as metaphysical individuality, as plenty of things that are metaphysical individuals are not Darwinian individuals – e.g. tables, chairs, planets. But Gould holds that being a metaphysical (what he calls 'vernacular') individual is nonetheless a *necessary condition* for being a Darwinian individual (Hull agrees with Gould here; see Gould, 2002, 600, Hull, 1990, 215³). So if he can establish that species are Darwinian individuals, he believes he will have established that evolutionary theory treats species as metaphysical individuals. That this is Gould's strategy is evident from the structure of his book – his defence of SAI is located in the chapter entitled 'Species as Individuals in the Hierarchical Theory of Selection' and in this chapter he spends twenty pages on SAI and one hundred and thirty pages defending group, and especially species, selection.

Gould suggests further that the truth of Punctuated Equilibrium (PE) entails that species are metaphysical individuals (in evolutionary theory). PE (Gould, 2002; Gould & Eldredge, 1972, 1977) is the thesis that the predominant pattern for the life history of a species is rapid birth by branching, followed by sustained stasis throughout its lifespan, followed by either extinction or speciation. On this view the majority of phenotypic and genetic change within a lineage takes place relatively soon after the moment of speciation, in geological time. PE, Gould argues, implies that species have rapid, objectively specifiable births and deaths, maintain a high degree of genetic and phenotypic stability throughout their existence, and are, from the point of view of macroevolution, discrete, identifiable historical units which play an independent (and central) role in (macro)evolutionary processes. PE implies, in other words, that species are treated as individuals, not classes.

So Gould holds, in short, that evolutionary theory treats species as metaphysical individuals 1. Because they are Darwinian individuals, that is, they are the subject to (units of) replication and selection; and 2. Because they are caught up in the punctuationalist pattern of speciation. If punctuated equilibrium is thought of as a distinctive *pattern* hypothesis in macroevolutionary theory, and species selection as one of the *process* hypotheses associated with it (see Ereshefsky, 1988; Sterelny, 1992), we can say that for Gould species are individuals because of both the macroevolutionary patterns and the macroevolutionary processes they feature in. I don't want to go into the question of the plausibility of species selection or punctuated equilibrium in this paper.⁴ What I want to explore is whether Gould's inference from each of these to SAI is valid.⁵

But first, a point of clarification. As I noted above, Gould talks of 'vernacular' rather than 'metaphysical' individuality. I will not consider the differences, if any, between the 'vernacular' and 'metaphysical' concepts of individuality. It doesn't seem that this distinction is of much importance in Gould's thinking. For instance, Gould offers the following criteria for vernacular individuality: 'a

³ It is notable however that Sober and Wilson, in their extended defence of group selection (1998) do not say much about the issue of metaphysical individuality. Sober at least is sympathetic to SAI, but Sober and Wilson do not appear to hold that being a metaphysical individual is a necessary condition for being an evolutionary individual. Their 'trait groups', for example, are supposed to be Darwinian individuals, but their claim to being metaphysical individuals appears tenuous at best (see Ereshefsky, 1988, pp. 219–221). See Sterelny (1996) for reasons for thinking some groups, such as ant colonies ('superorganisms'), that are evolutionary individuals, might be metaphysical individuals, but others, such as ephemeral trait groups, might not be.

⁴ It seems to me that punctuated equilibrium is fairly well supported by the evidence. The prevalence and importance of species selection is more difficult to defend, and is not widely endorsed, but see Okasha (2006) for a fair discussion from a philosophical perspective.

⁵ My conclusions will be much the same as those defended by Ereshefsky (1988), although my arguments are somewhat different from his, as we shall see.

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