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Personification as ‘Way of Knowing’ and the perpetuation of ‘Species as Natural Kind’

3250 words / (should be around ~ 3000)

Abstract

Drawing on Charles Darwin’s *On the Origin of Species* (1857) (Darwin 2008) and Richard Dawkins’ *The Selfish Gene* (1976) (Dawkins 2016), we make two arguments. First, personification - attributing fictitious intelligence and motivation to a biological entity purely for the sake of argument - was a core epistemic practice for Charles Darwin on the one hand, and for the 20th century sociobiologists working in the “Modern Synthesis” tradition on the other. Whereas Darwin made his discoveries by personifying *Nature*, the sociobiologists made discoveries through the personification of *genes* and *organisms*. We propose that personification is sufficiently distinct from the epistemic practices introduced by John V. Pickstone (Pickstone 2004) that it deserves its own special category. Second, specieshood continues to be treated as a natural category by academic philosophers and culture at large (Richards 2016). This is surprising because biological orthodoxy since Darwin has it as a conventional category (Darwin 2008). We propose an explanation for this discrepancy, namely that it is due to the perpetuation of an old-fashioned biological explanation for animal altruism (as the ‘good of the species’), rooted in group selection theory (Dawkins 2016).

175 words

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Introduction

If only because they are widely considered the most influential biology books of the 19th and 20th centuries respectively[1], a close reading of Charles Darwin’s *On The Origin of Species* (1859) and Richard Dawkins’ *The Selfish Gene* (1976) would be expected to reveal the evolving core epistemic practices (ways of knowing) of professional biologists. We first briefly sketch John V. Pickstone’s account of epistemic practices (Pickstone 2004), and then reveal that ‘personification’ as it appears in *Origin* and *Selfish Gene* should be treated as a distinct epistemic practice - a fourth category in

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[1] The books are placed No. 1 and No. 3 respectively on Science Direct’s list of ‘Top 10 Most influential popular science books’ (“Top 10 Most Influential Popular Science Books” 2012). Whereas both books are written for the generally educated reader (Beer 2009; Dawkins 2016, preface), it seems to me reasonable to assume that professional biologists are overrepresented in the readership of these books.

Pickstone's typology. Finally, we explore the impact of this epistemic practice on the perpetuation of the idea of a 'species as a natural kind'.

In *Ways of Knowing* (2004), Pickstone proposes three ways of knowing in the natural sciences: *natural history* (the describing and classifying of things), *analysis* (explaining complex phenomena by reducing them to simpler constituents) and *experimentation* (controlling phenomena and systematically creating novelties) (Pickstone 2004). We give three illustrative examples.

Natural history was employed by Darwin in his argument that what we are used to calling 'species' is an arbitrary category rather than a 'natural' one. It is based on his own field observations and various animal and plant catalogues, including those by H.C Watson (Darwin 2008, p. 42):

> How many of those birds and insects in North America and Europe, which differ very slightly from each other, have been ranked by one eminent naturalist as undoubted species, and by another as varieties, or, as they are often called, as geographical races!
>
> — Darwin 1859, *Origin* (Darwin 2008, p. 47)

In other words, Darwin argues that the line between a "species" and a "variety" is often subjective and inconsistent, suggesting that these categories are merely points on a continuum of gradual change rather than fixed, distinct boundaries. Next, Pickstone's *experimental* way of knowing can be illustrated by Darwin's argument from experiments in plant hybridization. He starts by reminding the reader of the 'standard view' among his contemporaries in natural theology:

> The view generally entertained by naturalists is that species, when intercrossed, *have been specially endowed with the quality of sterility*, in order to prevent the confusion of all organic forms.
>
> — Darwin 1859, *Origin* (Darwin 2008, p. 47)

To argue against this view, Darwin brings to bear decades of experimental evidence on plant hybridism by Kölreuter and Gärtner. He concludes that the "two most careful experimentalists who have ever lived, have come to diametrically opposite conclusions [...]", suggesting that intercross-sterility is not a *specially endowed quality*, but an *accidental one* based on the physical incompatibility of reproductive organs.

Lastly, to illustrate *analysis* we turn to the so-called 'Modern Synthesis' of biology. Whereas *Origin* was instrumental in convincing biologists of the reality of *evolution*, it took almost five decades for them to warm up to *natural selection* as the main driver, a period with Julian Huxley has called 'the eclipse of Darwinism' (Huxley 1942). The discovery of the gene and the sequencing of DNA prompted a re-evaluation of the theory. A new research programme calling itself the 'Modern Synthesis' emerged between the 1930s-1950s (Gayon and Huneman 2019). Under this research programme, natural selection was taken to be the dominant or sole driver of evolution, and both the *gene* and the *organism* were entities subject to natural selection (Gayon and Huneman 2019). Dawkins' *Selfish Gene* put into vivid words for a popular audience what had mostly been implicit in the mathematical modelling of gene frequencies by biologists working in this tradition (Dawkins 2016).

As we have seen, Pickstone defines *analysis* as "reducing complex phenomena to simple principles" (Pickstone 2004, p. 56). We can illustrate this with the following example from the 'Modern Synthesis' tradition: how do we explain that animals in the wild tend to form clusters or herds? In 1972 W.D Hamilton published his "Selfish Herd" model (Hamilton 1971), a mathematical model that predicts the clustering behavior by simulating prey organisms trying to maximize their own survival, by minimizing their probability of being attacked. When prey use their neighbors as living shields, groups and herds form, with very few assumptions about the organisms in question (Hamilton 1972). Hamilton is said to use *analysis*, in the Pickstonian sense, because he has explained a complex behavior as a natural consequence from a simple rule (an organism's desire for self-preservation).

While Pickstone's three categories are remarkably well-suited to cover a large portion of epistemic practices in biology, we will next show that a careful reading of *Origin* and *Selfish* reveals *personification* to be a distinct, fourth epistemic practice.

Personification as Epistemic Practice

Darwin personifies *Nature* and *natural selection*. Dawkins personifies *genes* and *organisms*. Both are careful to stress that we should not take their personification *literally*:

> So again it is difficult to avoid personifying the word Nature; but I mean by Nature, only the aggregate action and product of many natural laws, and by laws the sequence of events as ascertained by us.
>
> — Darwin, *Origin of Species* 3rd Ed. (Beer 2009)

Dawkins is more forceful:

> Personification of genes really ought not to be a problem, because no sane person thinks DNA molecules have conscious personalities, and no sensible reader would impute such a delusion to an author.
>
> — *Selfish Gene* (Dawkins 2016, Prologue)

The fact that these personifications are taken to be metaphors by their authors has probably contributed to them being neglected in existing accounts of scientific epistemological practice. Nevertheless, Gillian Beer has argued from the following passage that Darwin's personification of Nature is more than merely metaphorical (Beer 2009):

> as man can certainly produce great results by adding up in any given direction mere individual differences, so could Nature, but far more easily, from having incomparably longer time at her disposal
>
> — *Origin of Species* (Darwin 2008, p. 64)

Nature appears to be endowed by the agency to "produce great results". By comparing Nature to a human breeder ("as man can certainly produce great results… so could Nature"), Darwin uses the familiar to make the novel intelligible to a Victorian audience. Personification is therefore not merely a literary metaphor, but a didactic tool. But it is more than a didactic tool, too: Victorian audiences had moral objections to accepting evolution by natural selection, which was a threat to the "assumption that all manifestations of nature are aspects of a relationship between God and Man" (Beer 2009). A common sentiment was that evolution threatened human dignity by reducing "morality to a mechanical process" (*"VESTIGES OF THE NATURAL HISTORY OF CREATION"—AVOWED INFIDELITY.* 1846). Personifying Nature, therefore, helped soften the moral blow by maintaining the 'awesomeness' of creation - replacing a real, active God with a personified, metaphorical Nature.

So personification was a literary device, a didactic tool (to make the unfamiliar accessible), and a rhetorical device to make the unacceptable palatable. This is not yet enough to justify calling it an ‘epistemic practice’. But as Pickstone has pointed out, reasoning from analogy with an active human selector was a key insight that led Darwin to formulate his theory. Citing Desmond and Moore’s biography of Darwin (Desmond and Moore 1991), Pickstone has convincingly argued for the influence of commercially-driven experimentation on natural selection (Pickstone 2004, p. 30):

> In Britain from 1750, cattle and sheep were changed radically as breeders sought marketable characteristics and faster growth. […] the theory of evolution by natural selection […] can be shown to have built on this shift in breeding technology.
>
> — Pickstone 2004, *Ways of Knowing* (Pickstone 2004, p. 30)

If analogies with human selection are how Darwin stumbled upon his theory in the first place, then Beer’s suggestion that Darwin’s theory “needs” a more strongly personified nature is spot on. Darwin’s personification of Nature allowed him to see what others couldn’t, and thus should be viewed as an epistemic practice.

It may be suggested that *personification*, if it is an epistemic practice, should be seen as a sub-set of analysis, since it is employed as a tool to simplify complex phenomena. But this view is problematic: for all cases of *analysis*, as understood by Pickstone, require the breaking down of a complex phenomenon into simple, constitutive parts *which are taken to be real* (Pickstone 2004). But Darwin, as he vehemently made clear, did not literally hold a personified view of nature. It is the using of established fictions to come to grips with reality that makes this a practice quite distinct from Pickstonian *analysis*.

We will next see how personification-as-epistemic practice reappeared in the 1960s ‘Modern Synthesis’, with the *gene* and *organism* replacing *Nature* as the thing being personified. By the 1960s biologists needed tools to navigate the complex, mathematics-heavy turn of the modern synthesis. Personification was one of these tools. Thus, Dawkins states that “natural selection for selfish genes tends to favour cooperation among genes”, ascribing to genes (taken to be the basic unit of heredity) the (anthropomorphic) quality of *cooperation*. For Dawkins, personification of this kind is not “just a quaint didactic device”:

> “[in] Darwinian calculations of altruism and selfishness […] it is very easy to get the wrong answer. Personifying genes, […] often turns out to be the shortest route to rescuing a Darwinian theorist drowning in muddle”.
>
> — Dawkins 1976, *The Selfish Gene* (Dawkins 2016, Introd. p. xii)

To give a concrete example, the biologist W.D Hamilton attributed “to the genes, temporarily, intelligence and a certain freedom of choice”, in a paper on the sterility of worker ants (Hamilton 1972). Thus, the *personification of genes* becomes a way of quickly and reliably arriving at the result of a long mathematical calculation without having to explicitly go through it.

Dawkins does not just personify genes; organisms are also given fictitious motivations and intelligence *purely for the sake of argument*. In describing the death-throes of the runt of a litter, Dawkins presents the following argument:

> As soon as a runt becomes so small and weak that his expectation of life is reduced to the point where benefit to him due to parental investment is less than half the benefit that the same

> investment could potentially confer on the other babies, the run should die gracefully and willingly. He can benefit his genes most by doing so.
>
> — Dawkins 1976, *The Selfish Gene* , (Dawkins 2016, p. 168)

Dawkins does not describe the *actual* mental state of the runt when he says “the runt should die gracefully and willingly”. And yet, the effects of gene selection are such that we can *pretend* that the runt is a rational actor attempting to optimize the chances of passing on his genes. Dawkins explains that this *personification of the organism* reasoning is mental short-cut for the following argument, which relies on the *personification of the gene*:

> A gene that gives the [runt] the instruction, “Body, if you are very much smaller than your litter-mates, give up the struggle and die” could be successful in the gene pool, because it has a 50 per cent chance of being in the body of each brother and sister saved.
>
> — Dawkins 1976, *The Selfish Gene* , (Dawkins 2016, p. 168)

So, sociobiologists working in the ‘Modern Synthesis’ tradition personify organisms by giving them the fictitious intelligence and motivation to rationally calculate the maximum chances of passing on their genes. They personify genes in attributing to the what Dawkins called ‘selfishness’ - the motivation and intelligence to maximize their own chances of survival. Both instances of personification, like the one employed by Darwin, are ways of knowing.

The essentialisation of specieshood

Having introduced personification as a key epistemic category in both Darwinian and the Neo-Darwinian paradigms, let us turn to a surprising disconnect between mainstream biology on the one hand, and academic philosophy and general culture on the other. These concern so-called ‘natural kinds’. Following Richard A. Richards, we take ‘natural kinds’ to be “real and discovered”, in contradistinction to “conventional kinds” which are “fabricated or invented” (Richards 2016). The distinction is important, because, quoting Richard Richards again: “We might plausibly think, for instance, that natural kinds are more important for understanding the world than conventional or artificial kinds precisely because they are real and objective in ways the other kinds are not” (Richards 2016).

The following paradox begs an explanation: biology has plausibly argued that species are conventional kinds since 1859, whereas academic philosophy and wider culture still appear convinced that species are natural kinds.

As we saw in the Introduction, Darwin has convincingly argued, using *experimental* and *natural history* evidence, against the essentialization of species. By calling varieties “incipient species”, and arguing for their mutability by natural selection, Darwin convinced biologists that determining the boundaries of specieshood is relatively unimportant for understanding the natural world: what matters more is variation, multiplication, and the selective effects of natural selection.

In contrast, mid-twentieth century philosophers such as Saul A. Kripke (Kripke 1980) and Hilary Putnam (Putnam 1973) have viewed species such as tigers and elms to be essential natural kinds. Richard A. Richards’ *Why Classify?* (2016) argues against the notion of species as conventional kinds, despite the acknowledgment that the essentialist view of natural kinds appears to exclude species: “The distinction between humans and dogs and wolves does not seem to be a mere convention. Nor does it seem to be arbitrary” (Richards 2016).

While Richards concedes that Darwin "seemed to think of biological species instead as conventional kinds" by citing an obscure passage from the Darwin's unfinished manuscript *Natural Selection*, there is no need to rely on unfinished manuscripts. Darwin stated his position forcefully in the *Origin*: "there is no fundamental distinction between species and varieties" (Darwin 2008, p. 205). By prioritizing an obscure, private draft over Darwin's definitive published work, Richards appears to overlook a foundational principle of Darwinian biology.

It is not just mid-twentieth century academic philosophy that maintains species essentialism. Public engagement with biology is still built on viewing 'species' as essential categories that map cleanly onto the natural world. Calls to conservation, for example, reify specieshood - it is hard to conceive of wildlife protection without a 'list of endangered species'. In the Amsterdam Museum *Micropia*, visitors are told that there are between 10-100 million species on the planet, without adding the rather obvious suggestion that such a wild range of uncertainty might be a sign that at the level of microbes, specieshood ceases to be a useful analytical category, suggesting it may not be a 'natural kind' at all. Indeed, as is common with conventional categories, the very definition of a species is unclear and inconsistently - there are 30 definitions of species currently in use (Zachos 2016). The most commonly taught high-school version is "groups of organisms that can mutually interbreed", but this definition only applies to a the fraction of life that reproduces sexually. These differing definitions are not problematic for biologists who accept that 'species' is a convention - useful in some contexts, useless in others.

The key to understanding the perpetual essentialization of specieshood outside the realm of professional biology lies in old-fashioned explanations for altruism. Consider the following apparent paradox for Darwinian Evolution: If a honeybee stings an intruder, the bee loses its barbed stinger and dies. Why would natural selection perpetuate this altruistic, self-sacrificial trait when it is clearly terminal to the individual organism? Wouldn't the effects of natural selection wipe out such altruistic organisms in favour of their selfish cousins? A commonly-held resolution to this problem[2] is that in this case we should consider natural selection to be acting at the *species* or group-level: A hive of bees that has a few suicidally altruistic 'kamikaze' fighters is more likely to survive than a hive lacking these brave warrior-bees.

Explanations that root altruism in "group selection" act as an essentialising force for the species concept, perpetuating the idea of the "species as a natural kind".

In 1964, John Maynard Smith proved that for group selection to work, species have to be so isolated and go extinct so fast that it almost never happens in nature (Maynard Smith 1964). Group selection therefore became a key target Dawkin's *Selfish Gene* attempts to discredit. So, how do Dawkins and the sociobiologists of the "Modern Synthesis" explain altruism in bees? J. M. Smith coined the term 'kin selection' to explain this (Dawkins 2016). The key lies in the personification of the gene: The bees, after all, share many genes with their hivemates. Genes which tell their bees "when you sense an intruder, exhibit kamikaze-like behavior, sacrificing yourself for the hive" will more likely be passed on than genes that do not (Hamilton 1964). The key analytical measure is the 'coefficient of relatedness *r*'. An altruistic behavior like bee stinging will proliferate in a hive when $rB > C$ (B is the benefit to the recipient and C is the cost to the actor), that is, when it increases the chances of the perpetuation of an individual's genes - even if that means the death of the organism. One reason why bees are particularly given to suicidally altruistic acts is a genetic quirk called haplodiploidy (Beye et al. 2003). Bees actually share $\frac{3}{4}$ of their genetic material with their sisters, but only $\frac{1}{2}$ with their offspring. From a 'selfish gene' perspective, a worker bee is actually passing her genes more

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[2] This problem is nearly identical to the prisoner's dilemma from game theory

effectively by dying to save three sisters $\left(3 \times \frac{3}{4} = 2.25\right)$ than she would be by staying alive to have four daughters $\left(4 \times \frac{1}{2} = 2\right)$.

However, the sustained resistance to the 'selfish gene' concept, ranging from Midgley's (Midgley 1979) philosophical critiques to Noble's (Noble 2011) systems biology and Gould's anti-adaptationism (Gould and Lewontin 1979) —has effectively acted as to preserve group-centered evolutionary thought. For a culture instinctively wary of atomism and reductionism, group selection offers a more intuitive, if essentialist, vision of the species as a cohesive unit of evolution. In doing so, these critiques inadvertently perpetuate the notion of 'species as natural kind,' long after Darwinian analysis showed us that those categories are merely conventional.

Conclusion

Through the lens of Pickstone's epistemic practices, we have seen that personification is far more than a didactic metaphor. Personifying Nature allowed Darwin to view the similarities between artificial breeding and natural selection, and let to the formation of his radical theory. For Dawkins and the sociobiologists of the Modern Synthesis, the personification of genes and organisms serves as a rigorous analytical shortcut—a way to navigate complex mathematical probabilities by treating biological entities as rational actors. These uses of *personification* cannot be reduced to Pickstone's category of *analysis*, as they have the distinctive quality of using *useful fictions* to making discoveries about the world.

Furthermore, the persistent essentialization of specieshood reveals a significant disconnect between biological orthodoxy and broader intellectual culture. While Darwinian analysis effectively dissolved the species as a "natural kind," treating it instead as a conventional category of human convenience, the concept remains essentialized in philosophy and public discourse. We have argued that this persistence is fueled by the deceptive appeal of group selection. Because "for the good of the species" explanations provide a comfortable moral framework for altruism, they inadvertently perpetuate the essentialist idea of the species as a 'natural kind'.

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