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Personification as 'Way of Knowing' and the perpetuation of 'Species as Natural Kind'

3217 words / (should be around ~ 3000)

Abstract

Drawing on Charles Darwin's *On the Origin of Species* (1857) [1] and Richard Dawkins' *The Selfish Gene* (1976) [2], 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 and for the 20th century sociobiologists working in the "Modern Synthesis" tradition. Whereas Darwin made his discoveries by personifying *Nature*, sociobiologists produce knowledge through the personification of *genes* and *organisms*. We propose that personification is sufficiently distinct from the epistemic practices introduced by John V. Pickstone [3] that it deserves its own special category. Second, specieshood continues to be treated as a natural category by academic philosophers and culture at large [4]. This is surprising because biological orthodoxy since Darwin has it as a conventional category [1]. 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 [2].

167 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 'epistemic practices' [3], and then reveal that 'personification' as it appears in *Origin* and *Selfish Gene* should be treated as distinct epistemic practice - a fourth category in Pickstone's typology.

[1]The books are placed No. 1 and No. 3 respectively on Science Direct's list of 'Top 10 Most influential popular science books' [5]. Whereas both books are written for the generally educated reader [2, preface], [6], it seems to me reasonable to assume that professional biologists are overrepresented in the readership of these books.

Finally, we explore the impact of this epistemic practice on the perpetuation of the idea of a 'species as a natural category'.

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) [3]. 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. Is based on his own field observations and various animal and plant catalogues, including those by H.C Watson [1, 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* [1, p. 47]

In other words, Darwin is 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. 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.
>
> — [1, p. 182]
> (emphasis mine)

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.

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' [7]. 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 [8]. Under this research programme, natural selection was taken to be the dominant driver of evolution, and both the *gene* and the *organism* were entities subject to natural selection [8]. 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 [2].

As we have seen, Pickstone characterizes analysis as "reducing complex phenomena to simple principles" [3, 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 [9], a mathematical model that predicts the clustering behavior by simulating prey organisms trying to maximize their own survival by minimize their

probability of being attacked. When prey use their neighbors as living shields, groups and herds form, an explanation which relies on very few assumptions about the organisms in question [10]. 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).

But a careful reading of *Origin* and *Selfish* gene will show us that personification emerges as a key 'way of knowing' for the two authors. This personification-as-epistemic-practice does not fit into Pickstone's three categories, and we therefore argue for its recognition as a distinct, fourth one.

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. [6]

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* [2, Prologue]

Gillian Beer has argued from the following passage that Darwin's personification of Nature is more than merely metaphorical [6]:

> 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* [1, 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 a didactic tool, but it is also more: 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" [6]. A common sentiment was that evolution threatened human dignity by reducing "morality to a mechanical process" [11]. 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 is a didactic tool to make the unfamiliar accessible and a rhetorical device to make the unacceptable palatable. But this is not yet enough to call it an 'epistemic practice'. As Pickstone has pointed out, reasoning from analogy with an active human selector was a key insight that led him to formulate his theory. Citing Desmond and Moore's autobiography of Darwin [12], Pickstone

has convincingly argued for the influence of commercially-driven experimentation on natural selection [3, 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* [3, 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* [3]. But Darwin, as we saw, did not literally have an anthropomorphic 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* [2, Introd. p. xii]

To give a concrete example, the biologist W.D Hamilton, working in the 'modern synthesis' tradition, attributed "to the genes, temporarily, intelligence and a certain freedom of choice", in a paper on the sterility of worker ants [10]. 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 do it.

But 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 the 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 1977, *The Selfish Gene* , [2, 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.
>
> — Selfish Gene, p168

So, in the Modern Synthesis tradition - organisms are personified by being given the fictitious intelligence and motivation to rationally calculate the maximum chances of passing on their genes. Genes are personified by giving them the motivation and intelligence to maximize their own chances of survival. Both are epistemic tools - ways of coming to understand the world.

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 of the wider 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" [4]. The disconnect is as follows: 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.

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" [4].

As we have seen, 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 definitely showed that specieshood itself is relatively unimportant for understanding the world: what matters is variation, multiplication, and the selective effects of natural selection.

In contrast, philosophers such as Saul A. Kripke [13] and Hilary Putnam [14] have viewed species such as tigers and elms to be essential natural kinds. Richard A. Richards' *Why Classify?* (2016) argues against species as conventional kinds, despite the acknowledgment that the essentialist view of natural kinds does not apply to species: "The distinction between humans and dogs and wolves does not seem to be a mere convention. Nor does it seem to be arbitrary" [4].

While Richards cites an obscure passage from the unfinished Natural Selection to suggest Darwin held the opposite view, 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" [1, 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 of biology is still built on the reification of the species concept. Calls to conservation are guilty of reifying 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 stopping to think 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'. Indeed, as is common with conventional categories, the very definition of a species is unclear and inconsistently sporadic - there are 30 definitions of species currently in use [15]. The most commonly taught high-school version is "groups of organisms that can mutually interbreed", but this definition only applies to a small fraction of life[2]. This contestation is not problematic for biology, because biologists since Darwin have ceased to view species as essential categories that nature has organized itself into. There is no major research program to discover "what is a species, really?". Just like a doctor does not need an exact definition of "brain" in order to perform brain surgery, neither to biologists.

The key to understanding the perpetual essentialization of specieshood outside the realm of professional biology lies in the 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[3] is that in this case we should consider natural selection to be acting at the *species*-level: A species of bee with that includes altruistic, suicidal 'kamikaze' fighters is more likely to survive than a species without them.

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

This species or group selection was a key target of the Modern Synthesis as well as a key target of Dawkin's *Selfish Gene* . Mathematical modelling of beehives found that there is no evidence for species selection: beehives are always vulnerable to being overrun by less altruistic individuals (because they reap the protection of the hive without paying the cost of defense [16]). John Maynard Smith proved that for species selection to work, species have to be so isolated and go extinct so fast that it almost never happens in nature [17].

So, how does the "Modern Synthesis" explain altruism in bees? John Maynard Smith coined the term 'kin selection' to explain this [2]. The key lies in the personification of the gene: The bees shares 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 [18]. 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 given why bees are particularly given to suicidally altruistic acts is a genetic quirk called haplodiploidy [19]. 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 effectively by dying to save three sisters $(3 \times 0.75 = 2.25)$ than she would be by staying alive to have four daughters $(4 \times 0.5 = 2.0)$.

The persistent survival of group selection as an alternative to gene-centric orthodoxy is largely a product of this multidisciplinary friction. From the philosophical critiques of Midgley [20] to the physiological systems-thinking of Noble [21], there has been a sustained resistance to the 'selfish gene' narrative. For a culture wary of reductionism, group selection offers a more intuitive, if

[2]The sexually reproducing kind

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

essentialist, vision of the species as a cohesive unit of evolution, thus perpetuating the notion of 'species as natural kind'.

Conclusion

Through the lens of Pickstone's "Ways of Knowing," we have seen that personification is far more than a didactic metaphor. For Darwin, personifying Nature allowed for a transition from the familiar world of artificial breeding to the radical agency of natural selection, effectively softening the moral blow of a non-teleological universe. 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.

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 reified 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'.

Bibliography

[1] C. Darwin, *On the origin of species*. in Oxford World's Classics. London, England: Oxford University Press, 2008.

[2] R. Dawkins, *The selfish gene*, 40th anniversary edition. in Oxford landmark science. Oxford, United Kingdom: Oxford University Press, 2016.

[3] J. V. Pickstone, *Ways of knowing: a new history of science, technology, and medicine*, Nachdr. Chicago, Ill: Univ. of Chicago Press, 2004.

[4] R. A. Richards, *Biological Classification: A Philosophical Introduction*, 1st ed. Cambridge University Press, 2016. doi: 10.1017/CBO9781107588233.

[5] "Top 10 most influential popular science books," *New Scientist*, vol. 215, no. 2884, p. 48, 2012, doi: https://doi.org/10.1016/S0262-4079(12)62523-8.

[6] G. Beer, "Introduction," in *On the Origin of Species*, Revised., G. Beer, Ed., in Oxford World's Classics., Oxford University Press, 2009.

[7] J. S. Huxley, *Evolution: The Modern Synthesis*. London: George Allen & Unwin, 1942, pp. 22–28.

[8] J. Gayon and P. Huneman, "The Modern Synthesis: Theoretical or Institutional Event?," *Journal of the History of Biology*, vol. 52, no. 4, pp. 519–535, Dec. 2019, doi: 10.1007/s10739-019-09569-2.

[9] W. Hamilton, "Geometry for the selfish herd," *Journal of Theoretical Biology*, vol. 31, no. 2, pp. 295–311, May 1971, doi: 10.1016/0022-5193(71)90189-5.

[10] W. D. Hamilton, "Altruism and Related Phenomena, Mainly in Social Insects," *Annual Review of Ecology and Systematics*, vol. 3, no. 1, pp. 193–232, Nov. 1972, doi: 10.1146/annurev.es.03.110172.001205.

[11] "VESTIGES OF THE NATURAL HISTORY OF CREATION"—AVOWED INFIDELITY.," 1846, [Online]. Available: https://oldnews.vjbe.net/waterford_chronicle/1846/05/review-vestiges.html

[12] A. Desmond and J. Moore, *Darwin: The Life of a Tormented Evolutionist*. London: Michael Joseph, 1991.

[13] S. A. Kripke, *Naming and Necessity*. Cambridge, Massachusetts: Harvard University Press, 1980.

[14] H. Putnam, "Meaning and Reference," *The Journal of Philosophy*, vol. 70, no. 19, pp. 699–711, 1973, doi: 10.2307/2025079.

[15] F. E. Zachos, *Species Concepts in Biology: Historical Development, Theoretical Foundations and Practical Relevance*. in Species and Systematics. Cham, Switzerland: Springer International Publishing, 2016. doi: 10.1007/978-3-319-31395-5.

[16] G. C. Williams, *Adaptation and Natural Selection: A Critique of Some Current Evolutionary Thought*. Princeton, NJ: Princeton University Press, 1966.

[17] J. Maynard Smith, "Group Selection and Kin Selection," *Nature*, vol. 201, pp. 1145–1147, 1964.

[18] W. D. Hamilton, "The Genetical Evolution of Social Behaviour. I and II," *Journal of Theoretical Biology*, vol. 7, pp. 1–52, 1964.

[19] M. Beye, M. Hasselmann, M. K. Fondrk, R. E. Page, and S. W. Omholt, "The gene csd is the primary signal for sexual development in the honeybee and encodes an SR-type protein," *Cell*, vol. 114, no. 4, pp. 419–429, 2003, doi: 10.1016/S0092-8674(03)00606-8.

[20] M. Midgley, "Gene-Juggling," *Philosophy*, vol. 54, no. 210, pp. 439–458, 1979.

[21] D. Noble, "Neo-Darwinism, the Modern Synthesis and selfish genes: are they of use in physiology?," *The Journal of Physiology*, vol. 589, pp. 1007–1015, 2011, doi: 10.1113/jphysiol.2010.201384.