Review of: "Femmes finales: natural selection, physiology, and the return of the repressed"

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I divide my comments on this fascinating piece of intellectual history into four sections. The first section concerns one of the main arguments of David Haig's article, an argument that I think is essentially sound and a genuine contribution — full of invaluable material — to the interpretation of changing attitudes toward final causes in the life sciences of the nineteenth and twentieth centuries. However, I sense some ambiguities in the terms Haig uses that I believe deserve clarification, to which I try to contribute in the second section. The third section summarizes, in just three paragraphs, my understanding of the author's position on final causes. Of course, I would like to know if I have understood it correctly. My fourth and final comment suggests a slight modification of this position, after bringing into focus an issue that Haig touches on in passing.

1. According to what I consider the standard account, Darwin's theories were instrumental in changing attitudes toward final causes in the nineteenth century from public recognition to vilification. From this account, however, Haig concedes only one essential and uncontroversial point, namely, that natural selection was an alternative hypothesis to natural theology about the origin of all that is functional in living things. Darwin would have shown that what appears to be the realization of the designs of a divine architect ("evidence of design," in Whewell's words) can be neatly explained by appealing to random variation together with mechanical laws and forces, without the need to assume foresight or decisions. Haig, on the other hand, does not admit that Darwinian explanations have rendered meaningless the habit of speaking of the purposes of plant and animal parts, contrary to the usual inferences.

With respect to teleological language and reasoning in describing and explaining the organization and behavior of living entities, Darwin's position, judging from the statements and passages discussed by Haig, would have been distinct: that the "use" (function, service) of the details of the parts of those living entities has a scientific meaning and relevance that his evolutionary hypothesis assures in most cases. The debate about the usefulness of final causes as principles of knowledge, a debate evidenced by the shifting metaphors applied to them, should, in his view, be resolved in the affirmative. Haig infers that it was not precisely Darwin who contributed to the ostracism of explanations appealing to purposes at the end of the nineteenth century.

Therefore, other possible causes of the official ostracism should be considered, starting, of course, with the misrepresentation of the spirit and content of Darwin's writings (according to Haig, for a correct understanding of Darwin's intentions, we should rather read Asa Gray than T. H. Huxley). And, in Haig's opinion, we must above all recognize the role played in the bad reputation of final causes by the "physico-chemical turn" in physiology promoted by Brücke and

DuBois-Reymond in continental Europe, which predated the publication of Darwin's theories. It would have been this turn that extended from physics to biology the idea that final causes are "virgin" or "sterile" for science. One might even think that it was this mechanistic turn, independent and prior, that paved the way for the mechanistic reading of Darwin.

2. Haig explains the notoriousness of final causes as the result of a debate that developed throughout the nineteenth century concerning the usefulness (or sterility) of investigating them. This debate was marked by terms whose meanings shifted. These shifts created some ambiguities that I think are worth solving. They mainly concern three interconnected questions: whose purposes are discussed in the texts, what does the usefulness of an investigation have to do with the truth of the assumptions that guide it, and in what sense are the functions at stake final causes?

Whose purposes. Before the hypothesis of natural selection gained plausibility, it was natural to equate the existence of purposes in nature, or natural purposes, with the existence of divine designs realized in nature. The best possible explanation for everything in nature that is exquisitely functional (beneficial) was that it was created to produce certain effects, i.e., to serve a purpose. Thus, figuring out the functions of natural beings was tantamount to figuring out why God created them the way they are. But as soon as Darwin's non-theological hypothesis became respectable and we were able to entertain the thought that natural beings do not exist for anything in particular, the two questions became disconnected. And yet, when the idea that nature reveals nothing specific about divine intentions propagated and these intentions were deemed unknowable, the thought that the ultimate purposes that things serve (Huxley's "wider Teleology") are equally inaccessible was intimated — a thought which, in turn, may have sown doubt about the usefulness of investigating "final causes".

The assumption of utility. The fact that it is pointless to speculate about divine designs does not mean that it is not worthwhile investigating whether natural beings, especially their parts, produce benefits of some kind (for something, for themselves) wherever they are found. Moreover, non-theological Darwinian theories answer how it is possible that the traits and behaviors of organisms are fundamentally adaptive, i.e., that they produce benefits for those who exhibit them. It follows that both the theological and the non-theological hypotheses *equally* invite the assumption that natural beings are functional in some sense. It is to be expected, therefore, that the history of the reception of Darwinian theories does not record a change of opinion on this point, as it indeed happens. This is confirmed by Haig's account of John Burdon Sanderson's idea that purposiveness remains a heuristic principle (a "regulative" principle, as Whewell would call it, using his comparable Kantian term) in physiological and morphological research. I therefore think that the debate about the fruitfulness of the investigation of final causes was not lost by the general assumption of functionality; it was lost rather by the idea that the effects that functional organs and behaviors have are necessarily the cause of their existence, not to mention the naïve idea that regularly producing a benefit — including the benefits that some beings produce in others — is a reliable sign that something has a purpose, properly speaking.

Functions and final causes. The above clarifications place us before a fundamental ambiguity in the very concepts of function, purpose and final cause. Insofar as having a function means being employed with a view to bringing about a result, functionality presupposes foresight and decisions, and hence natural functionality, if it exists at all in this sense, must derive from an "intervening intelligence", which governs nature as a whole. But we can also speak of the function of

something, more liberally, to refer to the effects it usually produces and, in particular, to the effects it produces within the context of the activities of a larger whole, to which it is supposed to belong in some sense, without implying anything about the origin of such functionality. And, finally, one may prefer to strictly speak of functions (“proper functions”) only when the effects that something produces explain — are the cause of — that it produces them at all; in which case, some natural beings can be considered to have functions, without postulating neither foresight nor intentions, but without discounting the question of their origin either, indeed, implying that they have precisely their origin (somehow) in their own preceding operation.

Hence, I think it should be said that the debate on the epistemological fecundity of purposes in the life sciences throughout the nineteenth century: (1) was settled against speculations on divine intentions; (2) but in favor of the general assumption of the functional character of the organs of organisms; (3) without, however, forcing an agreement on the strict meaning of the terms purpose, function and final cause; and, in particular; (4) without establishing when the meaning of these terms entailed a commitment to particular explanations of the origin of functions and which in particular. For all that, talk of functions remained as necessary as ever, but could no longer be done in good conscience, since the terms themselves would suggest undesirable ontological implications. The logical result of the debate was that “final causes” became indispensable secret “mistresses”.

3. Haig himself beliefs that the point of the investigation of organic functions is beyond doubt and that teleological language — organ, function, etc. — suits the nature of the subjects of physiology and evolutionary biology (ironically he refers to the paradox of a science of functions that abjures or pretends to abjure the term “function”). At the beginning of the article he speaks of a fruitful, if problematic, marriage between life sciences and “final causes”. Equally beyond doubt seems to him, I infer, the sterility of speculations about divine intentions supposedly materialized in nature. His article basically expresses sympathy for Darwin’s positions. In Haig’s eyes, Darwin would have dealt a “death blow” to the teleology of divine designs (to natural theology, therefore), but he would have empirically explained the “rational sense” (in Marx’s phrase) of the “proper”, intrinsic, Aristotelian purposiveness of the features, parts and behaviors of living beings.

Haig interprets this Darwinian position that he subscribes to as “reconciliatory” (not in Huxley's sense, however, and even less in Owen’s, because, I insist, the teleology that Darwin would reconcile with morphology is not the teleology of inscrutable divine designs). The theory of natural selection would explain how what is functional can arise — and how what has a certain function can come to have a different one — in a world that can be said to consist of mechanical interactions and accidents. Haig infers that those who accept this theory do not have to choose between mechanical explanations and functional explanations. These two kinds of explanations will become more or less relevant depending on whether we ask about the remote causes or the proximate causes of a biological fact. The proximate causes of the condition or state of an organism, in particular, will be mechanical. But its constitution, its structure, its habits are explained rather by means of teleological considerations on adaptive advantages.

In one of the very interesting passages of Darwin’s work that Haig cites, Darwin argues that the law of the Conditions of Existence (the law of adaptation) has primacy over the law of Unity of Type (the law of morphological homology). In my interpretation, which I believe to be Haig’s, this means, to put it briefly, that function explains the existence of organs

(Darwin's and Haig's would thus be a causal conception of functions). Yet, Haig does not believe that a primacy of teleological explanations immediately follows from this role of functions.

4. The theory of natural selection, despite the teleological connotations of its name, is often interpreted as a mechanistic theory. Even those who believe that it explains the appearance of what has a function in itself and are not ashamed of teleological language usually understand that the explanation of that appearance is to be found in the "blind chance" of variations and the Malthusian "necessity" that the fittest prevail, absolutely or relatively, by reproducing more frequently. This interpretation has led to the conclusion (explicitly represented in Haig's article by Sanderson and Edin) that teleological language may be useful, yes, but functions are not true causes; that true causes, even remote true causes, are efficient and mechanical causes. Hypotheses concerning functions might at best help to discover these true causes.

The mechanistic interpretation of Darwin can be resisted, as Haig does, by appealing to Darwin's intentions and insisting that we do not have to choose between causes of one kind or another in our explanations (it is just as true, for example, that nails have sharp points and broad heads *to* maximize mechanical efficiency when hammering as that they have sharp points and broad heads *because* pairs of blades cut one end and plungers struck the other during their manufacture). I suppose that the mechanistically inclined, however, can always retort that when we have a sufficient, valid mechanical explanation, explanations of other kinds become superfluous and masked (if not mystifying) descriptions of what is truly important (of what makes a difference). And I certainly believe that pure compatibilism between mechanical explanations and teleological explanations (Haig's thesis of the absence of primacy) is an easy prey to mechanistic eliminationism. Is there any further rational sense to be found in Darwin's thesis of a primacy of teleological language? I would like to close my review by suggesting several ways of reconsidering that primacy.

In the first place, teleological explanations can be considered in specific cases the only available explanations, explanations that are not abbreviated forms of explanations of other kinds, and not because we do not have other explanations or do not even know how to find them, but because what we want to understand, to see explained, only comes into view as such when we adopt a teleological point of view (that which Dennett calls "the design stance"; he defends the irreducibility of teleological explanations for this sort of reason). Thus, one could argue that in order to explain what causes a living being to do what it does, one must understand what is in its best interest and what means are appropriate and, therefore, treat it as an entity that has interests and is in a position to do something to satisfy them.

Another way of defending the non-subordinate and non-epiphenomenal role of final causes would be to advocate a non-standard, non-mechanistic interpretation of the theory of natural selection. In the standard interpretation, it is assumed that the causal factors that explain life and its functions are chance and necessity, and that the full explanation is to be found in a particular combination of these factors. So, arguably, the standard interpretation overlooks the fact that chance and necessity act on functional organisms. It is because there are functional organisms that reproduce that something that varies randomly becomes relevant and the "struggle for life" is unleashed. It could be argued, then, that Darwin's theory of natural selection is not a mechanistic theory, for at the heart of it are organisms that reproduce themselves, whose existence is the effect of what they do, which, therefore, do what they do because of the effect this has, and which, thus, are to be considered ends in themselves (one author reasoning in this direction is McLaughlin, see *What Functions*

Explain).

It is still possible to adopt a more belligerent attitude and question that mechanical, parts-to-whole explanations, in general, are complete, adequate, self-sufficient in their typical form. After all, mechanical explanations do not work by appealing to isolated factors and influences (random coincidences and general laws), but have to take into consideration a multitude of components that need each other in order to produce a joint effect. So, it might be argued that teleological explanations have the virtue of making intelligible the existence of mechanisms composed of elements that appear to be concerted. One might argue that we need to understand organisms in order to explain mechanisms and not the other way around (a classical, pre-Darwinian, neo-Aristotelian version of this inversion is found, in my reading of him, in Hegel).

I do not claim that these strategies work (either all of them or at least some of them). I simply would like to suggest in closing that a non-mechanistic interpretation of Darwin has first to rehabilitate a causal (causal-final) concept of function, such as the one Haig adopts, which is a concept contested in many ways in the literature, but, in addition, I think, to prove that functions explain something that mechanisms are not in a position to make intelligible. I would like to know if David Haig would admit that this is the case.

[PS: I hope your health problems have been solved or are in the process of being solved, Professor Haig.]