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Review of “Norms of Nature: Naturalism and the Nature of Functions”

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Book Review

Norms of Nature: Naturalism and the Nature of Functions, by Paul Sheldon Davies. Cambridge, Massachusetts and London, England: MIT Press, 2001. iv + 234 pp. Bibliography and index. ISBN 0-262-04187-1 (hardback).

How often does a philosophical theory that is scientifically entrenched, manifestly justified, and widely endorsed and applied by both scientists and philosophers, crumble under its own weight? At least once, argues Paul Sheldon Davies, in his excellent *Norms of Nature*. The selective success theory of functions touts its many boons, all of which turn out to be banes. And Davies' own systemic capacity theory of functions stands ready to supplant selective success's ruination with a new, more reputable account of functions.

The theory of selected functions is grounded in the theory of natural selection: functional traits are traits that were selected for. More specifically, a trait has a function just in case ancestral tokens of that trait performed a certain task, and this enabled organisms possessing that trait to reproduce, which further enabled the trait to proliferate in the population. In the evolutionary history of humans, having eyes enabled us to see and to be reproductively successful and, so, having eyes proliferated. Hence, seeing is the function of human eyes. On this approach, traits have functions in virtue of their selective history. With the systemic capacity approach to functions, however, a trait's history is irrelevant to its functional status. On Davies' preferred analysis, a trait has a function just in case it causally contributes to a higher-level capacity of the system to which it belongs. Because the eye's seeing contributes to an organism's capacity to survive and reproduce successfully, the eye's function is to see.

Two primary virtues are the pride and joy of the selective success approach. The first virtue is that selected functions are naturalistic. A trait's successful selective history generates a function for that trait and, so, natural selection grounds function attributions. Thus, since the theory of natural selection is the paradigm of a successful, naturalistic, scientific theory, positing functions on the basis of selective history yields naturalistic properties underwritten by a wholly naturalistic theory. The second virtue is that the selected function approach accounts for malfunctioning traits. A deeply-rooted and widely-held intuition is that some traits malfunction, that, for example, an eye that cannot see malfunctions. And the selected function approach can place this intuition theoretically. The human eye was evolutionarily selected for seeing and, so, seeing is the eye's proper function; any human eye that cannot see thus malfunctions.

Davies' attack on the selected function approach targets these two alleged virtues. First, he argues that selected functions rest upon naturalistically dubious grounds in terms of both ontology and

methodology. In four kinds of case, he claims, biologists posit selected functions in the absence of a thoroughly naturalistic foothold. Traits acquire functional status (i) in the absence of even indirect historical evidence, (ii) with no concern for the evolutionary history of the traits involved, and (iii) in the face of practical difficulties in identifying the causes of selection. Even worse, (iv) selection acts only upon phenotypes but, yet, biologists attribute functions to genotypes. Thus, because of its oftentimes wayward application, the selected function approach is not so deeply tied to the theory of natural selection as it boasts.

This self-aggrandized naturalistic approach to functions faces yet deeper worries, namely, an outright commitment to non-naturalism. Proponents of the selected function approach claim that evolutionary history confers a *proper* function upon a property, but no mechanisms in the processes comprising natural selection could produce the normativity attaching to selected functions. Endorsing proper functions drives the approach to non-naturalism.

Moreover, endorsing *malfunctions* drives the approach to non-naturalism. It is important for the selected function theorist to uphold the claim that malfunctions can be accounted for, as this is supposed to be one of the primary virtues of the approach. Now, the approach can endorse one of two views concerning the conditions under which a trait has a function. Either (i) a trait has a function just in case it has a successful selective history, or (ii) a trait has a function just in case it has both a successful selective history *and* it currently possesses the physical properties required to perform its selected task. But if something's having a successful selective history is sufficient for its having a function, then nothing can malfunction and, so, (i) is unacceptable. Hence, the approach must endorse (ii). But, then, if an item must possess both the appropriate history and physical structure, then functional properties are abstract, noncausal properties. This is because malfunctions obviously lack the requisite physical properties and, so, malfunctions are not equivalent either to their history or to any physical, causal properties. Malfunctions are, hence, abstract, noncausal properties, clearly not deserving any piece of the naturalistic pie.

Davies' second central attack on selected functions' alleged virtues resides in a simple, yet powerful, argument that its proponent cannot plausibly endorse malfunctions. The force of the argument is that the selected function theorist individuates selected traits too coarsely, holding, for example, that *eyes* were selected for and, thus, that eyes can malfunction. But Davies perspicuously points out that only *functioning eyes* were selected for, as only functioning eyes enabled their ancestral bearers to survive and successfully reproduce and, thus, enabled the trait to proliferate in the population. Incapacitated eyes were not selected for, as they did not enable survival, reproduction, and proliferation. Thus, since eyes gain their functional status on the basis of their selectively successful history, incapacitated eyes have no functional status at all; they are nonfunctional. And parallel reasoning applies to all selected traits. Only functioning traits were selected for; incapacitated traits were not. Thus, all incapacitated traits, which the selected function theorist wishes to classify as malfunctioning, are nonfunctional. The selected function theorist has no theory-embedded access to malfunctions. The selected function approach boasts of its pride and joy, its naturalism and its treatment of malfunctions. But its pride and joy is a Rosemary's baby.

Davies' systemic capacity approach, he argues, avoids the mistakes that bring to ruin the selected function approach. First, Davies does not endorse malfunctions so, of course, he avoids the mistake of trying to account for them. If a trait contributes to a higher-level capacity of the system of which it is a component, then it is functional relative to that capacity; otherwise, the trait is non-

functional. Still, however, the intuition that some traits malfunction pervades--what are we to make of this intuition? Davies suggests that it is merely a psychological byproduct of the expectations we foist upon internally complex systems. No pressing theoretical need drives us to account for malfunctions. Furthermore, the systemic capacity approach is naturalistic, as it posits no noncausal, abstract properties. And Davies holds that there are no *proper* functions: an item is functional relative only to the higher-level capacity of a system that interests us. Thus, the account is naturalistic through and through.

In addition to treating both naturalism and malfunctions more cautiously and, thus, appropriately, Davies' approach resourcefully attempts to withstand a prominent objection. Opponents of the systemic capacity approach argue that it is permissive, as it indiscriminately attributes functions where, intuitively, there are none. For example, it is intuitively not the heart's function to vibrate the sternum. But Davies' rival may hold that this is, nonetheless, a capacity of the heart and, thus, a function of the heart. Davies responds that vibrating the sternum is a capacity of the heart, but not a function of the heart, for a trait is functional only if it contributes to a higher-level capacity of a system of which it is a component. Vibrating the sternum contributes nothing to any higher-level capacity of the organism possessing a heart. Davies restricts his account to hierarchically organized systems, and this move serves to delimit the range of functions the account posits.

And as a final insult to his competitor, Davies notes that the systemic capacity approach both metaphysically subsumes and methodologically precedes the selective success approach. Any trait affected by selection can be analyzed in terms of its systemic effects. Further, the systemic function of a trait guides us to discover historical evidence for its specific selected history; we could not discover the selected history of a trait without first knowing its systemic function.

Compellingly argued, clearly written, and thoroughly researched, *Norms of Nature* merits intense study. Still, however, Davies leaves three striking gaps in his case for the systemic capacity approach. The first main weakness in Davies' case is that he much too quickly discounts malfunctions, ultimately jettisoning them as psychological epiphenomena. But at least two alternative accounts of malfunctions are available to Davies and the systemic capacity approach. First, an organism might malfunction relative to other members of its kind, so long as kind membership is determined independent of an organism's possessing the salient trait. Suppose that most members of a kind possess a trait that enables a higher-level capacity. Any organism belonging to the kind but, yet, lacking that enabling trait may be said to malfunction relative to the other members of the kind. Nothing Davies says against malfunctions prevents his so understanding and endorsing malfunctions.

As a second strategy for endorsing malfunctions, note that an organism may possess a trait that enables a higher-level capacity but, then, lose that functioning *to some degree*. Relative to its prior functioning, the organism's trait may be said to malfunction since it no longer performs its function as well as it used to. Davies claims in a footnote that this possibility is opened up only if we misunderstand how properly to individuate functions. A heart may lose its ability to function at full capacity but, he asserts, "it is likely that the [heart's] function is to pump blood at a certain rate and with certain force depending on a variety of conditions internal and external to the organism." (p. 197) If this is so, then if a heart is not pumping at a specific rate and force, then it is simply nonfunctioning—it is not malfunctioning. But Davies cannot so narrowly individuate functions. If a

heart's function is so specific, then functional types will (probably) be unique to individual organisms, for the relevant rate, force, and internal and external factors will be specific to individual organisms. And if an individual organism's heart possesses a certain function, virtually no individual in its selective past will have possessed that very function. Thus, by positing narrowly-individuated functions, Davies' systemic capacity approach cannot account for traits' selective history. And this is a problem because one of the virtues of Davies' approach is supposed to be that it metaphysically and methodologically subsumes the selective success approach.

The second main weakness of the systemic capacity approach is that Davies restricts it to hierarchically organized systems, so that it can avoid indiscriminately positing intuitively nonfunctional properties. But what are Davies' reasons for so restricting functions? First, he argues that "restricting the theory to hierarchically organized systems provides resources with which to distinguish the functional from the merely causal" (p. 86). Second, "...many natural phenomena are in fact hierarchically organized...A theory designed to uncover the operations of such layered systems is a desirable theory." (87) Third, "Conceptualizing [a] system in terms of a hierarchy of levels facilitates inquiry into capacities at levels not directly accessible." (p. 87) And, finally, "Experts in a given domain recognize and remember domain-specific information on the basis of hierarchically derived patterns." (p. 88)

But all four arguments are consistent with the selective success approach to functions. The systemic capacity approach may well provide resources with which to distinguish the functional from the merely causal, but so does the selective success approach. And many natural phenomena are, indeed, hierarchically organized, but many natural phenomena are also evolutionarily selected; if it is a virtue of an account of functions that it reflect the structure of the natural world, then the two approaches are equivocal. Next, a proponent of the selective success approach could acknowledge, and inquire into, the hierarchical structure of many natural phenomena but, yet, still posit functions on the basis of a phenomenon's selective history. Finally, experts may recognize and remember hierarchical patterns but, still, posit selective functions.

The third main weakness in Davies' case is that he fails to consider more charitable versions of the selective success approach as viable competitors. The central downfalls of the selective success approach, Davies argues, are that it claims to account for malfunctions but, yet, malfunctions are not even possible and, second, that it claims to be thoroughly naturalistic but, yet, it is not. But the selective success approach's non-naturalism results primarily from its purporting to account for malfunctions. Is there any reason a proponent of selective success couldn't simply abandon the claim to accounting for malfunctions and, thereby, evade susceptibility to Davies' two central objections?

Davies fails to capitalize on these opportunities to strengthen his account. Nonetheless, these shortcomings do not detract from the overall force of the book. *Norms of Nature* possesses a stunning rigor of argumentation, clarity of writing and explanation, and breadth and depth of literature analysis. This is an important book for scientists and philosophers alike.

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