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The concept of health: beyond normativism and naturalism

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Abstract

Philosophical discussions of health and disease have traditionally been dominated by a debate between normativists, who hold that health is an inescapably value-laded concept and naturalists, such as Christopher Boorse, who believe that it is possible to derive a purely descriptive or theoretical definition of health based upon biological function. In this paper I defend a distinctive view which traces its origins in Aristotle's naturalistic ethics. An Arisotelian would agree with Boorse that health and disease are ubiquitous features of the natural world and thus not mere projections of human interests and values. She would differ from him in rejecting the idea that value is a non-natural quality. I conclude my discussion with some comments of the normative character of living systems.

Introduction

Our conduct affects our health just as our health affects our conduct. Unsurprisingly then the question of the relationship between physical health and moral well-being is an ancient one. The Greeks noticed that morality and medicine seemed inextricably entwined: the work of a typical Hellenistic moralist could easily be exchanged for that of a doctor and only the most astute scholar would notice. A few centuries later Descartes in his final work, *The Passions of the Soul*, boldly announces that he will approach the emotions neither as 'an orator, nor a moralist' but through medical science, before settling into well-worn moralizing territory.[1] [1] In our own day, worries about the over-medicalization of social and moral problems persist. Should naughty children be given enough amphetamines to make the average street corner dealer blush? Should clearly psychotic killers be dragged to execution simply to placate the baying mob?

These questions are perhaps insuperable. Programmatic statements by leading medical bodies help little. The WHO's famously hyperbolic declaration carries the ambivalence deep within its core. Health, it admonishes, 'is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity' [2]. For all its lofty ambition, many sympathize with Robert Hughes' quip that this definition better befits 'a bovine than a human form of life' [3]. Its insistence upon the socially activist nature of medicine troubles those who believe that we do best when we are left alone. Even the more circumspect note its systematic vagueness. What on earth would 'complete physical, mental and social well-being' look like and how to tell when one achieved this Elysian state?

Philosophy flourishes where confusion abounds. In this context, a vigorous and sometimes acrimonious debate has emerged between normativists, who insist that medical diagnoses are inherently value-laden and naturalists, who believe that it is possible to formulate a purely descriptive theory of health. Normativism remains the consensus view among philosophically sophisticated doctors [4–6]. Conversely, naturalism has exerted its greatest pull upon philosophers for whom value-freedom is the hallmark of science and who aspire to see medicine become truly scientific [7–9].

It might seem therefore that there is no real dispute: normativism appeals to practising doctors while philosophers with scientific ambitions can content themselves with constructing pristine but practically useless definitions of health. Such a compromise would, I contend, be a mistake. In medicine, theory and practice are conjoined twins. For that reason, it should not surprise us that normativism purchases practical applicability at the expense of theoretical incoherence, while naturalism gains theoretical clarity

[1] p. 17 There is some controversy about the best way to render Descartes' expression 'comme un physicien' Voss opts for 'physicist' which is correct in the context of the work but we should also bear in mind that Descartes in common with the medievals treated 'physiology' and 'physics' as synonyms.

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at the cost of defining health and disease in ways unrecognizable by most practitioners or patients.

My aim in this paper will be to find a way through this morass. I will defend a broadly Aristotelian naturalism about health [10–12]. It is naturalist in two senses: first, it regards human beings as animals, albeit peculiar ones, and recognizes no gaping void between us and the rest of organic nature; second, it considers value as an inherent feature of our shared natural world. Consequently our moral evaluations are made in the same logical tone of voice that we use when we evaluate any living being. For this reason we can recognize an affinity between health and broader human well-being. We evaluate a person or a society in the context of the typical standards of a human form of life. But this is no different from asking what it is for a cat, a lungfish or a liver to do well or badly. To know whether a particular individual is doing well, we need to know what it is for cats, lungfish and livers to do well. Consequently, the content of an evaluation is more than an arbitrary projection of human interests.[2]

One powerful objection to Aristotelian accounts is that unlike other animals, there is no unique human form of life but rather a plurality of culturally defined goods. Human beings are socio-cultural animals and living well involves living harmoniously with one's peers. To do this we need to constantly negotiate individual and collective differences. However, the underlying assumption upon which this objection rests is an outdated distinction between biology and culture which is untenable for various philosophical and scientific reasons. Put simply, it overemphasizes human diversity while under-emphasizing diversity in the organic world. Historical experience has taught us that while tolerance of diversity is a *prima facie* good, certain forms of life have proven themselves incompatible with a properly human existence. By the same token, recent work in the life sciences has demonstrated the sheer complexity of biota. This new understanding has major ramifications for our concepts of health and disease.

Health without hair: Christopher Boorse's bald naturalism

Baldness, shortness and ugliness are aspects of human life which have significant impacts upon its quality but which no sensible theory would call diseases. Yet, this seems precisely the conclusion one is forced to adopt, if one accepts the standard normativist definition of disease as a disvalued physical or mental condition. Equally, the 'disvalue' model fails to capture pathological states which are asymptomatic and thus neither valued not disvalued. Moreover, disease is an inherent feature of the biological world which long pre-dated our existence and will outlast us. Thus disease cannot be an evaluative concept.

This, in brief, is the position which Christopher Boorse has vigorously defended since the 1970s. It was articulated partly in response to the debate initiated by Thomas Szasz. Szasz had argued that psychiatric diagnoses were little more than codified descriptions of troublesome behaviour. Unlike somatic medicine, which rests upon a solid core of pathology, psychiatry was really a sophisticated form of moral and political coercion. Enforced incarceration and psychiatric treatment, routinely employed in both the totalitarian East and ostensibly liberal West, had no scientific warrant.

Szasz's critique quickly provoked a response. One common objection questioned his dichotomy between somatic medicine's apparently objective diagnoses and the normative diagnoses employed in mental health. Medicine, it was argued, is normative to the core. The identification of a pathology requires the invocation of complex evaluative frameworks which vary between cultures and over time. What we identify as a disease is closely related to what we find troubling enough to treat.

While not primarily concerned with psychiatry, Boorse agreed with Szasz that somatic diagnoses should be the benchmark. He vociferously rejects the normativist view and also considers and dismisses several naturalist options. Diseases cannot simply be deviations from a statistical norm, as this would have the absurd implication that top athletes might be considered ill. Neither can a purely evolutionary account furnish a satisfactory view: Darwinian accounts emphasize the capacity to successfully reproduce but reproduction may exact a heavy toll on an individual's health. Many childless people live their lives in rude health.

His preferred option therefore is a composite of evolutionary and statistical conceptions of health which he dubbed the Bio-Statistical Model (BST). This model has four elements:

1 The *reference class* is a natural class of organisms of uniform functional design; specifically, an age-group of a sex and species.
2 A *normal function* of a part or process within members of the reference class is a statistically typical contribution by it to their individual survival and reproduction.
3 *Health* in a member of the reference class is *normal functional ability*: the readiness of each individual part to perform all its normal functions on typical occasions with at least typical efficiency.
4 A *disease* is a type of internal state which impairs health, that is, reduces one or more functional abilities below typical efficiency. ([7], p. 555)[3]

I will not rehearse the main normativist responses. Instead, I will take a different approach and argue that the account is insufficiently naturalist. This may seem a paradoxical accusation to level against someone regarded as the paradigm naturalist, so in what follows I will attempt to justify my claim.

Whose theory? Which practice?

Much of Boorse's argument rests upon a rigid distinction between medical science and clinical practice. Boorse purports to have revealed the true meaning of the terms 'health' and 'disease' as manifested in their use by the appropriate body of experts. This is to be distinguished from their stereotypical uses in ordinary non-expert speech. In his most recent defence of the theory, Boorse states that he is 'content for the BST to live or die by the considered usage of pathologists' ([8], p. 53). But do pathologists even operate with a definition of disease which resembles Boorse's? Moreover, why should pathological definitions of disease be given priority over those of other medical specialists and layfolk, especially because the rise of evidence-based medicine has tended to diminish the centrality of pathology in medicine?

[2] I also believe, although it is not essential to my argument here, that our evaluations are successful to the extent that they track how things actually are in the natural world.

[3] In his more recent work [8] he has modified the definition of health to be simply 'the absence of disease'.

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Many of these issues are addressed by William Stempsey, a philosopher with medical training, including a residency as a pathologist [14]. Stempsey challenges his rigid dichotomy between medical theory and clinical practice, even in the context of his favoured area of pathology. As Stempsey notes, most pathologists are also clinicians and the favoured textbook definition of the science of pathology is not in terms of functional abnormality but in terms of the study (*logos*) of suffering (*pathos*). It is implausible that doctors would be concerned with human suffering in a practical setting but then indifferent to it in a theoretical one.

Pathologists' primary concern is with the morphological character of diseases rather than disease *per se*. Moreover, pathologists look for definitions which are practically efficacious. There is no reason to suppose that they have any special expertise in dealing with the kind of conceptual issues that engage philosophers. Even if, in unconsidered usage, they give a definition similar to Boorse's this would not settle the matter. This would be an empirical sociolinguistic fact rather than a conceptual norm. The haphazard usage of one group of specialists has no more authority than that of any other. Stempsey suggests that the best source for considered usage would be doctors with philosophical training and he notes that the overwhelming consensus among philosophically sophisticated doctors is normativist.

Presumably what Boorse appeals to in pathologists' usage is an implicit philosophy of science. Analysis of pathologists' best descriptive practice should yield a definition of disease which is value-free, precisely because this would be the 'scientific' definition of disease. Put aside the potential circularity. Is it even true that Boorse's theoretical definition is based upon an adequate philosophy of science? Stempsey suggests that Boorse has ignored an entire trend in the history and philosophy of science which rejects the fact-value distinction.[4]

A biological theory of disease?

Stempsey suggests that Boorse is unlikely to find support for his theoretical definition among doctors but it is possible that he might among biological scientists. However, the problem here is that the further one gets from medicine, the further one also gets from the contexts which give sense to concepts like health and disease. Viewed through an evolutionary lens, our concerns with health and disease seem curiously parochial. This is eloquently summarized by Elliot Sober [16]. Sober argues that one of the most significant aspects of the Darwinian revolution is the replacement of an essentialist conception of species membership with what the biologist Ernst Mayr defined as 'population thinking'. Essentialist views of species view development in terms of progression towards a 'natural state'. Population models regard species as united only by reproductive history and characterized by a phenotypic norm of reaction.

Consider the recent discovery in the Potomac River of male Largemouth and Smallmouth Bass producing eggs. On the natural state model, these fish are obviously monsters, as it is unnatural for males to produce eggs. They are defective specimens of *Micropterus dolomieu* and *Macropterus salmoides*. In a more natural environment, they would not have developed in this distorted way. The natural state model reflects common-sense developmental assumptions. The population model's analysis would be more complex. The production of eggs by male fish is part of the reaction norm for that genotype, as expressed in a polluted environment. Furthermore, it is possible that some such mutation may actually increase the inclusive fitness of an individual such that its genes come to dominate future populations. There is nothing in the nature of the species itself that permits us to classify this variation as defective.

This view seems counter-intuitive when we turn to ideas of health and disease. Sober notes that:

> our current conceptions of function and dysfunction, of disease and health seem to be based upon the kinds of distinctions recommended by the Natural State Model. And both of these distinctions resist characterization in terms of maximum fitness. For virtually any trait you please, there can be environments in which the trait is selected for, or selected against. Diseases can be rendered advantageous, and health can be made to represent a reproductive cost [16].

This draws upon some fairly obvious observations about the evolutionary process: on the one hand, its cold indifference to the interests of any organism or species; on the other, that any function can only be defined as normal in relation to a given selective environment.

In his Rebuttal, Boorse considers, but fails to comprehend, just how devastating the 'bad biology' arguments are to his case. They thoroughly undermine his central notion of a species design as anything other than a theoretical abstraction. Boorse appeals to the authority of anatomical textbooks. He argues that while the evolutionary process selects from variation, selective pressures ultimately produce the kinds of uniformities found in *Gray's Anatomy*. Diseases and deformities are statistical deviations from those uniformities. This intuitively appealing idea formed a cornerstone of a recent fad called evolutionary psychology. Evolutionary psychologists argued that just as evolution produces anatomical uniformity, we can also expect it to produce psychological uniformity. In his recent devastating critique David Buller carefully dismantles the analogy [17].

Two of his arguments are especially devastating. First, Buller argues that the type of uniformities upon which *Gray's Anatomy* is based are abstractions designed for pedagogic purposes. Like any abstraction they can illuminate or they can mislead depending upon context. Notoriously, the 70-kg male was until recently considered the anatomical norm. As a result, disastrous clinical decisions were made as a result of neglecting profound physiological differences between men and women. Furthermore, conditions which only affect women were either neglected or else mistakenly treated as pathological. Florid textbook descriptions abound of normal processes like menstruation and childbirth [18].

Second, the greater the degree of uniformity, the less likely a given feature is unique to our species. As Buller ([17], p. 426) notes, 'all primates have two hands, all mammals have lungs, and all vertebrates have two eyes, a heart, a liver, and a stomach'. This is not necessarily as devastating an objection to Boorse as it is to the evolutionary psychologists. After all, one of Boorse's strongest arguments against normativism is that it neglects our continuities with other animal species and he is not searching for an essential human nature.

[4] The discussion broaches the much broader question of the alleged value-freedom of science. Stempsey has defended elsewhere at much greater length a position that he describes as 'value-dependent realism' [15].

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Against design

However, closer consideration reveals a deeper problem. If we abandon the notion of a uniform 'species design' then a core tenet of his analysis is undermined. With a notion of 'species design' certain functions are simply a given and it is possible to make sense of the claim that the 'normal is the natural' without illicitly importing evaluative premises. Without it, it becomes a matter of analytic choice what to count in and what to count out. Do we, for instance, have a wide comparison class, against which we evaluate members of our own and other species? Or alternatively, do we have a narrow class restricted perhaps (as Boorse suggests) to a particular age group of a particular gender. If we choose the former, we elide the difference between human and veterinary medicine. If choose the latter, the obvious response is to wonder why we should stop there. Would not a more accurate assessment be arrived at, if we only considered subjects living in the same locale and pursuing similar occupations? Consider here the notorious problems of devising common health outcomes for comparing Scandinavians and Scots.

Buller's third related argument is that if we narrow our focus from putative uniformities at a global level, we come to see that there are numerous differences between individual human beings. As a result, 'strictly speaking, there is no single human anatomy and physiology possessed by all humans around the world'. In support of this, he lists conditions such as *situs inversus*, children born with only one kidney, or with ambiguous genitalia and less dramatically the variation in human blood type. He urges therefore that we abandon 'the idea that *Gray's Anatomy* provides *a single* "detailed" and "precise" picture of the anatomy and physiology of every human on earth [since this] is plausible only if one ignores known facts about human anatomical and physiological variation'. The same holds, *mutatis mutandis*, for Boorse's appeal to uniform design in support of this theoretical definition of health. But without this idealization, neither simple deviation from norm nor diminished function will provide a satisfactory value-free conception of disease.

As Buller later argues, it is an unfortunate historical accident that Darwin's theory had to be articulated in opposition to Natural Theology. We are thus burdened with a conceptual framework of design metaphors. Talk of a uniform species design is seriously misleading both practically and theoretically. As medicine increasingly conquers pathogenic disease and shifts its attention to genetic impairment, the situation becomes even more complex. Take Glucose 6-Phosphate Dehydrogenase Deficiency or 'favism'. Those afflicted experience anaemia and related disorders after exposure to fava beans. Even the most hard-headed genetic reductionist would accept that the disease only emerges as the result of a complex interaction between genetic predisposition and developmental contingencies. Someone raised in a culture which shunned fava beans would be unaffected. Moreover, as with sickle-cell anaemia, there is some evidence that the gene for favism has conveyed anti-malarial benefits, on heterozygote female carriers [19].

From a biological perspective, there is consequently no useful way of specifying the normal or natural state of an organism outside some environmental context. One forlorn strategy that evolutionary psychologists have resorted to is to appeal to the putative 'wild state' of the human genome. The candidate for this is the Pleistocen Savannah. Disregard for the moment the fact that the Pleistocene period encompassed a variety of ice ages and temperate periods and was characterized at several points by mass migrations. When unpacked, talk of a genotypes's natural environment amounts to little more than the observation that that particular genotype was selected for, when compared with all the available alternatives. It is always logically possible that a different environment may have been even more advantageous to that genotype or conversely that another genotype may have been even more successful.

Boorse's talk of uniform design is beset by similar problems. In both cases, a particular trait is mapped onto an idealized version of an ancestral selective environment and the extent to which that trait is functioning well or badly in the current environment is then given as evidence for how far it remains true to its natural design. This is a curiously static version of evolutionary theory. If we recall that the primary purpose of evolutionary theory was to explain diversity rather than stasis, it becomes even more curious. Sometimes the rationale is that the length of time is crucial, because a certain feature has been stable over a long period, it is more natural than one that has recently developed.

There are a number of possible responses. The first is that given the enormous length of time involved in the evolutionary process, there is no reason to privilege the Pleistocene over any period of human evolution, including our current one. For instance, one of the most crucial events in human development was our discovery of agriculture but it seems likely that for ecological reasons this could only have occurred during the later Holocene period [20] Growing evidence suggests that the development of agriculture led to increasing parasite load and thus a massively changed selective environment. Indeed, rather than slowing down, there seems to have been a degree of speeding up of human genetic evolution, possibly in response to increased pressures upon the immune system.

The study of such gene–culture interaction forms part of a larger process in the biological sciences which aims at integrating evolutionary and developmental insights. As John Dupré has argued, this represents a shift away from an older preformationist view of development, in which the life cycle of an organism was thought to unfold along lines 'programmed' by a genetic 'blueprint' towards one which sees development in much more epigenetic terms [21]. This view stresses the mutually conditioning character of developmental process and the heavy hand that a wide range of contingencies play in that process.

Some theorists have even gone so far as to posit the life cycle of the organism, rather than the gene as the primary unit of selection [22–24]. Even less radical thinkers acknowledge that selection, particular in the case of human beings, operates at multiple levels [25]. There is not the space to engage with these detailed technical debates but the implication for the accounts of health and illness are profound. An epigenetic view of organismic development undermines the appeal to 'uniform functional design' upon which Boorse's analysis so heavily relies. Function attribution only makes sense in the context of the life cycle of the organism in question, or so I will argue in the next section.

Organism, mechanisms and value

The shift towards a developmentalist perspective marks a shift away from a Cartesian view of organisms as little machines. It might raise 'the bogey of vitalism' in some readers' minds. Surely

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modern science has freed us of an anthropomorophic view of living things and rendered obsolete the dichotomy between animate and inanimate matter. Boorse's naturalist theory of health can be viewed as an attempt to extend that project into medicine which has always been saddled with the ambivalent status of being both science and art. His aim was to supply a theory which did justice to the distinctiveness of living things without importing illicit evaluative assumptions. The fact that he is unable to successfully achieve this suggests a worrying possibility: perhaps it is not possible to save the phenomenon in the health sciences without the (illicit) projection of human values.

Earlier, I summarily rejected such a projectivist version of normativism. In what follows I will expand upon this and also defend my naturalized form of normativism. Implicit in all versions of the projectivist view is the following assumption: as the natural world is bereft of all value, any value we discover there must come from outside. Typical candidates include a deity or human beings whether individually or collectively. In what follows, I will restrict my considerations to humans.

Projectivism offers us an image of human beings standing outside the natural world projecting our values onto it which, while intelligible on some crude theological visions, flies in the face of all hitherto scientific understanding but most especially Darwinism. As Boorse rightly argues, any satisfactory theory should not ignore the continuities between ourselves and other animals. However, in order to maintain that continuity, Boorse feels compelled to reject any legitimate role for values in the diagnosis of disease. This betrays a fundamental projectivist assumption: if health and disease are necessarily evaluative concepts, then they cannot be genuinely part of the furniture of the world.

Projectivism rests upon two distinct theses: the first is that scientific rigour equates with its degree of value-freedom; the second is that the universe, as discovered by the natural sciences is necessarily disenchanted. Indeed, the disenchantment thesis provides the warrant for the value-freedom of scientific enquiry. These theses are, however, distinguishable. Value-freedom as a postulate was formulated explicitly (if never clearly) by Max Weber and was intended primarily as an account of the methodology of the social sciences. Because social phenomenon is necessarily value-laden Weber recognized the danger of bias. His central concept, *Verstehen*, entails that in conducting social or anthropological research one should not approach one's subjects from an alien standpoint. Weber's maxim is thus most intelligibly rendered as the claim that one should be careful in one's choice of framework not that one values can be dispensed with.

Furthermore, recent work in the history and philosophy of science has questioned whether even the natural sciences are ever genuinely value-free [26,27]. Many philosophers including Boorse have grudgingly acknowledged this, while falling back upon a rigid distinction between epistemic and non-epistemic values. According to this distinction, epistemic values, such as integrity, fidelity to evidential canons and so on are appropriate whereas non-epistemic values are not. This merely kits out the dowdy fact-value dichotomy in more fashionable garb.

Hilary Putnam has proposed a 'disinflation' of the fact-value dichotomy which should address some of the worries about illicitly importing values into science. We can acknowledge

> a distinction to be drawn (one that is useful in some contexts) between ethical judgments and other sorts of judgments. This is undoubtedly the case, just as it is undoubtedly the case that there is a distinction to be drawn (and one that is useful in some contexts) between *chemical* judgments and judgments that do not belong to the field of chemistry. *But nothing metaphysical follows from the existence of a fact-value distinction in this (modest) sense.* ([27], p. 19)

In actual scientific practice, Putnam notes, value and fact are intermingled. To illustrate this, one might distinguish between a medical scientist and a quack. Clearly, they are distinguishable in terms of the respective methodologies each employs but to reduce the distinction to this alone is to miss something crucial. Even someone using an unsuccessful method can still manifest many intellectual virtues. The genuine medical scientist has a commitment to the truth of her findings which the quack does not. The quack might be happier if his pills and potions worked, not least because this would increase his sales. But provided that his deception goes undetected, the quack is indifferent to the truth of his claims, in ways that the scientist cannot be. Indeed, part of the appeal of the notion of value-freedom is that it implies that the scientist places the pursuit of truth above all other considerations.

In the real world, scientists' motives may be less noble. But the intellectual pedigree of the natural sciences is well-earned and partly reflects a recognition that many scientists do manifest a high degree of personal and intellectual integrity. The notion therefore that any scientific practice is value-free, while intended to flatter the natural sciences is ultimately demeaning. The worry that science may be corrupted by illicit moral or political values is genuine but the best safeguard against is not to pretend that scientists operate in an evaluative vacuum but rather to foster the right kinds of intellectual and moral values, some of which will be internal to the sciences but others of which draw upon a common set of shared values.

Consider another example. Running diagnostic tests is a core activity of medical investigation and may appear at first blush to be a paradigmatically value-free domain. However, depending upon how the test is calibrated, it may yield either false negatives or false positives. The researcher has to make a decision about direction of error. Suppose the test in question detects prostate cancer in elderly men. Because many men will die with, though not of, prostate cancer, the decision must be made as to whether it is worth risking emotionally traumatizing these men and making them undergo a painful and costly procedure. A large number of false positives are likely to have this effect and thus the tendency has been to favour false negatives.

Suppose however the test in question detected testicular cancer in younger men. The fact that the cancer in question is eminently controllable, if detected early, but otherwise aggressive, combined with the fact that the men in question have an entire working and reproductive life ahead of them tends towards a preponderances of false positives. Practical considerations, and values as constitutive elements of those considerations, determine diagnostic outcomes. Some of the values in question are epistemic, others are clearly ethical.

The value of life

The arguments in favour of a naturalized normativism about health run deeper. Taken together they state: judgements about health are judgements about living beings. Medical science can never be just

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applied pathology for the simple reason that a central defining feature of living beings is typically absent in the path lab. Living beings are defined above all else by the characteristic activities which they undertake in pursuit of their life goals. This means that certain predicates are attributable to living beings which do not apply to inanimate matter. This insight is captured well in Michael Thompson's essay *The Representation of Life* [28]. He suggests that when we come to think about life certain forms of thought become appropriate which do not apply to inanimate matter.

Thompson illustrates this with a discussion from a biology text, in which the author attempts to tabulate some of the defining features of living beings. As Thompson points out, even where the vocabulary used shares similarities with the discussion of inanimate objects in biology it takes a distinctive form. This becomes most obvious in the discussion of the claim that 'living things respond to stimuli'. This fairly standard formulation assimilates the description of living processes to analogous inanimate ones. Thompson offers the following example:

> *The warming of an asphalt road bed and the train of photosynthetical events in a green leaf* are both of them, in some sense, the effect of sunlight. *And the thawing of icy ponds* and *the opening of maple buds* are each occasioned by rising spring temperatures [28].

From the physical point of view, energy conversion occurs in all of these cases. However, we miss something distinctive about biological explanations if this is all we see. In the case of biological phenomena, the question: 'and what happens next?' has a special sense. For, what we are interested in is how a given process, say photosynthesis or budding, figures in the life of the organism, what contribution it makes to the plant's characteristic life activities. Questions about characteristic life activities make no sense when dealing with planets or rivers.

For this reason, the appropriate form of judgement for living beings is what Thompson refers to as the Aristotelian categorical. This is a statement like: 'swallows fly south in Winter' which is true in general for swallows, and which gives a description of a feature of the characteristic form of life of a swallow but which, unlike the exceptionless generalities of physics and chemistry, is not undermined by the discovery of aberrant swallows. The swallow is aberrant precisely because it is not acting as a swallow should.

Boorse is sensitive to some of the issues here. In his Rebuttal, he stresses the centrality of the notion of organisms as goal-directed systems to his view of health and disease. The problem for Boorse is that is not possible to have a satisfying account of goal-directed systems which is value-neutral in his required sense. The most promising attempt to offer an aseptic analysis of biological function can be found in cybernetic systems theory. Mark Bedau has demonstrated that such an approach cannot succeed [29].

The problem with this approach is that, on the aseptic analysis, any steady state system will pass the test for being goal-directed. To illustrate this, Bedau asks us to consider the distinction between the biological processes that maintain a steady concentration of approximately 90% water in mammalian blood and the swinging of a pendulum. Both of these can be understood as equilibrium systems but only one is truly goal-directed. If the systems theorist conceded that both were, in a sense, goal-directed the scope of goal-directed explanation would thereby become vacuously extended.

Bedau expands this example by asking us to consider a marble-shaped object in a bowl. The tendency of the marble to return to the bottom of the bowl does not make the 'marble-plus-bowl' a goal directed. The example is obviously trivial and a systems' theorist might propose that we project goals onto systems to the extent that we are interested in them and on this account the reason that the marble-plus-bowl system is not truly goal-directed is the fact that no one is interested in it. This example parallels the projectivist claim concerning health and disease and faces similar problems. Presumably there would still be goal-directed systems in nature without the existence of human beings and similarly we must assume that there currently are innumerable such systems of which we are unaware and in which we could not be interested. By the same token, it might be possible for someone to take an interest in whether the marble returns to the bottom of a bowl without it being genuinely goal-directed. Crooked casinos notwithstanding, roulette wheels are not goal-directed systems.

After considering and rejecting a number of further standard defences of the systems approach to teleology, Bedau argues that 'equilibrium systems fail to be genuinely goal-directed, when their equilibrium maintaining behaviour is of no value for anything' [29]. Goal-directed systems, whether natural or artefacts, benefit some living being. Bedau illustrates this by considering the circumstances under which the marble-plus-bowl system could become genuinely goal-directed. Perhaps a creature has evolved with 'marble-plus-ball' organ which enables it to balance correctly. Possession of this organ benefits the creature to the extent that it needs to balance in pursuit of its characteristic life activities. Similarly, we can imagine a 'marble-plus-bowl' style instrument that someone uses to measure flat surfaces. Nothing has changed in the mechanical principles upon which the marble-plus-ball system operates. What has changed is the context. Both the organ and the instrument are now of benefit to something and it is this which entitles us to regard them as genuinely goal-directed.

Conclusion

While all living beings suffer disease and at least some of them may fear it, none have the ability to conceptualize it and orientate their individual and collective responses to it in the way that we do. Moreover, the pursuit of health provides a compelling reason to act for rational beings such as ourselves. Thus veterinarians give advice to owners but not to their pets. Other animals act or fail to act in ways that promote their health. We, by contrast, can be said to have a responsibility, all things considered, to protect health. We should of course be mindful of the continuities between ourselves and other animals. Darwinism teaches us this much. But we should also attend to the differences. The naturalistic perspective I have attempted to outline here gives us a framework for doing this.

When we start to consider living beings concepts like values, goals and interests seem inescapable. For the purpose of this paper, I have not attempted to engage with the thornier metaphysical question of whether this inescapability represents an inherent feature of our conceptual scheme or whether it is built into the nature of reality.[5] What I have hopefully succeeded in doing is undermining the projectivist account of value in such a way that neither a bare naturalist account such as Boorse's or a projectivist

[5] My own preference is for a moderate realism.

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version of normativism seems attractive. Given that all our interactions with the world and each other are mediated through our concepts there is a trivial sense in which values are projections of our interests. But in this trivial sense, so to is the conceptual framework with which we understand living things.

If we take projectivism seriously, then it seems to inevitably degenerate into the claim that our values are mere projections. But if this is so, we seem forced to admit that our perception of living beings as self-organized goal-directed entities must also be. But if the claim that the existence of health and disease somehow presuppose the existence of human minds is implausible, then the idea that the very existence of other living beings, for whom 'to exist is to live', depends upon us is even more so. Idealism seems too high a price to pay for naturalism[6].

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[6] Idealism in this context is the philosophical thesis that the world (or some of aspect of it) is the product of human minds.

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