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On a naturalist theory of health: a critique

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ABSTRACT

This paper examines the most influential naturalist theory of health, Christopher Boorse's 'biostatistical theory' (BST). I argue that the BST is an unsuitable candidate for the rôle that Boorse has cast it to play, namely, to underpin medicine with a theoretical, value-free science of health and disease. Following the literature, I distinguish between "real" changes and "mere Cambridge changes" in terms of the difference between an individual's intrinsic and relational properties and argue that the framework of the BST essentially implies a *Cambridge-change criterion*. The examination reveals that this implicit criterion commits the BST to the troubling view that an individual could go from being diseased to healthy, or vice versa, without any physiological change in that individual. Two problems follow: (1) the current framework of the BST is ill-equipped to formally embrace Cambridge changes and (2) it is theoretically dubious. The arguments advanced here are not limited to the BST; I suggest they extend to any naturalist claim to underpin medical practice with a value-free theory of health and disease defined in terms of an evolutionary view of biological fitness.

1. Introduction

Christopher Boorse (1975, 1976, 1977, 1987, 1997, 2002) has over many years been trying to develop a "naturalist" account of health and disease. It is generally agreed his biostatistical theory (or, simply, BST) is the most influential naturalistic account of health and disease.[1] In a nutshell, his basic idea is that a disease state is a state in which an organism functions in some sense subnormally and hence a healthy state is a state in which an organism does not function subnormally. He wants to argue that these accounts of health and disease are both value-free. The upshot, Boorse contends, is that 'Medicine has a distinctive theoretical foundation in a value-free science of health and disease' (Boorse, 1997, p. 23). In his most recent papers he draws upon his earlier accounts again using the notions of "normal functional ability", "impairment", "statistical normality", "reference class", "natural class of organism", "uniform functional design" and "internal state". The result is that an individual counts as being diseased when it performs one (or more) of the relevant functions sufficiently below the statistical norm of the appropriate reference class on typical occasions. What must be stressed, then, is that an organism's biological fitness is relative to the fitness of others—there is no notion of 'intrinsic fitness' at work. Boorse has most recently offered the following formal definitions:

D*: Boorse's official definition schema:

1) The *reference class* is a natural class of organisms of uniform functional design, specifically, an age group of a sex of a 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) A *disease* is a type of internal state which is either an impairment of normal functional ability, i.e. a reduction of one or more functional abilities below typical efficiency, or a limitation on functional ability caused by environmental agents.
4) *Health* is the absence of disease. (Ibid., pp. 7–8)

In this paper, I will argue that despite the strengths of Boorse's account as a candidate for being a *naturalist* and hence *empirical* and possibly *value-free* conception of disease and health at a

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[1] To list just some authors making this claim: Kovács (1998); Amundson (2000); Cooper (2002); Nordenfelt (2004); Richman (2004); Khushf (2007); Schramme (2007); Kingma (2010); Ereshefsky (2009).

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deeper level the BST, in general, and biological fitness, in particular, faces some serious challenges if it is to play its intended rôle as a value-free theoretical foundation which can be used in building scientifically well grounded data for the development of medicine and health care policy. In particular, I argue (in Sect. 2) that the current framework of the BST essentially implies what I call a "Cambridge-change" criterion and as such is problematic for the reasons I will explicate later. Following the literature, I describe "mere Cambridge changes" and "real" changes in terms of the difference between an individual's relational and intrinsic properties. The main point will be that a Cambridge-change criterion presents itself because statistical norms of the BST's reference classes will not remain static; some will undergo changes. In Section 3, I will go on to explore two problems that I contend arise from the BST advancing a Cambridge-change criterion. This criterion, I will argue, commits the BST to the troubling view that an individual could go from being diseased to healthy, or vice versa, without any physiological change in that individual. What appears is that such a view besets the BST with two profound, perhaps insurmountable, problems: (1) it is ill-equipped to formally embrace Cambridge changes and (2) it is theoretically dubious.

As a first step in my examination of Boorse's suggested account I need to review in a little more detail the role which Boorse has indicated he wants his definition to play out in practice, that is, I will spell out in a little more detail how Boorse intends the schema set out in D* above to be interpreted.

2. The Biostatistical Theory (BST)

Firstly, it is clear from D* above that Boorse firmly insists that the only biological mechanisms relevant to the determination of health and disease are those that contribute to individual survival and reproduction.[2] Boorse, most importantly, requires a relevant function 'to be an *actual* contribution to a goal' (ibid., p. 66; my emphasis).[3] So unlike some other notions of natural functions,[4] Boorse employs a conception that is solely concerned with the actual or present contribution the relevant functions may make at the time of the health/disease ascription and not the role they may once, in the past, have served.

Secondly, for Boorse the BST includes psychology within the domain of biology: 'The BST does insist that all genuine disease or illness must involve biological dysfunction, on the broad view of biology as including psychology' (ibid., p. 98).

With this in mind, we may summarize Boorse's account as follows: an organism counts as diseased when one of the relevant functions falls below the statistical norm of the same species reference class on species-typical occasions.[5] And because Boorse stipulates that health is the absence of disease, it would seem he commits the BST to the following positive definition of health: an individual is healthy if and only if *all* the functions that contribute to the species member's survival and reproduction *today* are capable of performing in a way that is species-typical (i.e., the statistical norm of the relevant functions of the same species, sex and age at time *t*) on species-typical occasions.[6]

There are two points worth explicitly noting: first, health and disease seem to be collectively exhaustive and mutually exclusive states. That is to say, an individual is either healthy or he is diseased and no individual is ever both healthy and diseased. Second, notice that the BST's demarcation of health and disease turns on the biological and statistical normalcy of the relevant functions of the appropriate reference class.

2.1. Biological normalcy and the BST

If Boorse's definitions of health and disease are to be naturalistic then clearly he will need an empirical conception of normalcy and crucially a conception for which a naturalistic account can be given.

I should point out from the outset that Boorse's alleged naturalistic conception of normalcy appears to turn on the usability of several highly problematic concepts. Indeed, it would be implausible to deny that there is a heated debate within the philosophy of biology community about the concepts of *species design*, *function*, *individual survival and reproduction*. Thus it has become a matter of significant controversy whether the biological concepts Boorse draws upon are indeed entirely empirical and, moreover, are non-normative concepts.[7] However the extent to which, if at all, biological function in particular, and biology (and other "hard" sciences?) in general, are normative is a matter that clearly transcends the scope of this paper. Thus I shall leave it an open question whether, in fact, Boorse employs a notion of biological function that is at root crucially normative. However, that being said, at the end of the day all that Boorse surely requires is for the BST to be no less empirical and no more normative than biology and physiology (read: medical science?).[8]

In this paper I will leave this question on one side because I wish to draw attention to what I take to be a stronger and more radical tack against Boorse: that the BST implies what can be seen to be a *Cambridge-change* criterion—a criterion that as such renders the BST inadequate to serve its own purposes. Or so I shall argue.

2.2. Statistical normalcy and "Cambridge changes"

It is his conception of statistical normalcy that Boorse hopes will serve as the machinery by which the BST will forge a non-normative view of "normal" functioning—it is the standard against

[2] Boorse insists that his choice of goals is not normative: 'The fact is that human physiologists have as yet found no functions clearly serving species survival rather than individual survival and reproduction' (Boorse, 1997, p. 28; see also 2002, pp. 69, 76).

[3] See also Boorse (1976), p. 80, where he defines his goal-directed theory of biological functions: X is performing the function Z in the G-ing of S at *t*, means at *t*, X is Z-ing and the Z-ing of X is making a causal contribution to the goal G of the goal directed system S.

[4] Like, for example, Wakefield's (1992) evolutionary account of natural function or Wright's (1973) etiological function theory.

[5] Two points need to be made clear: firstly, the requisite sub-normal functioning may also occur when, strictly speaking, one of the relevant functions is performing at a level abnormally above the statistical norm such that the level of functioning would place the individual's survival and/or reproduction at risk. As Boorse rightly states: 'Now the most obvious logical feature of medical normality is that most functions have a normal range of values ... there is a normal range of values around a mean, with either one or two pathological tails' (Boorse, 2002, p. 101; see also 1977, p. 564; 1987, p. 371). And secondly, when it comes to environmental causes, Boorse allows for sub-normal functioning to be species-typical functioning.

[6] This would appear to be very much in line with a previous positive account of health Boorse explicitly outlined: '*Health* in a member of the reference class is *normal functional ability*: the readiness of each internal part to perform all its normal functions on typical occasions with at least typical efficiency' (Boorse, 1977, p. 555).

[7] See, for example, Brown (1985); Engelhardt (1976, 1986); Fulford (1989). Boorse (1997) responds directly to these criticisms. For some more recent criticisms see Amundson (2000); Stempsey (2000); Nordenfelt (2001, 2004); Cooper (2002); Kingma (2007, 2010); and Ereshefsky (2009).

[8] Of course, that being said, Boorse is quite clear that he views biology and physiology as value-free: 'If health and disease are only as value-laden as astrophysics and inorganic chemistry, I am content. I admit having no sympathy for the view that scientific concepts or knowledge is evaluative. Obviously, we do science, as we do everything, for evaluative reasons. But I do not see why our motives for information-gathering must infect the information gathered, injecting values into science, mathematics, and the Bell telephone directory. However, I leave defending the value-freedom of physics to physicists and philosophers thereof. If the BST shows that health in medicine is as objective as physics, it achieves everything I ever dreamt of for it' (Boorse, 1997, p. 56; see also ibid., p. 75).