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Élodie Giroux *Editor*

Naturalism in the Philosophy of Health

Issues and Implications

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Chapter 1
Introduction. Why a Book on Naturalism in the Philosophy of Health?

Élodie Giroux

Abstract The nature, normativity and definition of health and disease are one of the major issues in the philosophy of medicine. First proposed in 1975, the biostatistical theory of Christopher Boorse has been central in shaping the debate between the naturalist and normativist views of these concepts and this theory still provides the main naturalist definition of health. But what exactly is meant by naturalism in the BST, and more generally in the philosophy of health, is far from clear. Further, over the past few years, interest in the naturalist stance has been strongly renewed. The time has thus come to re-assess the relevance and status of naturalism in the analysis of health concepts, as well as its implications for healthcare and the debate on health enhancement. Three main reasons for this reassessment are considered: (1) clarifications of the BST, as well as possible improvements, have been proposed by several authors; (2) there could be other forms of naturalism in the philosophy of health than that of the BST: the notion of 'biological normativity', initially coined by Georges Canguilhem, has seen some revived interest, along with the recent development of 'organizational approaches' to biological function; (3) more needs to be said about the utility of and reason behind philosophical efforts to seek a definition of health concepts. These three main reasons correspond roughly to the three parts of the volume, which are introduced in this opening chapter.

Keywords Naturalism • Health • Disease • Definition • Conceptual analysis • Biological normativity

The concepts of health and disease, normal and pathological, as well as related notions such as illness, disability, and impairment are commonly used by physicians in theoretical or practical contexts, as well as by laypersons. It is generally considered that labelling a condition a 'disease' has various important social and practical consequences or implications (treatment decisions, psychological impacts, sociological and legal implications, health insurance policies, etc.). The demarcation between the normal and the pathological and, more generally, the question of

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determining whether certain particular conditions like fibromyalgia, osteoporosis, mild hypertension, hyperactivity, etc. should be classified as a disease or not is of great importance for the people concerned by such classification but also for health insurances, the healthcare system, and society as a whole.

Since the 1980s, Anglo-American and continental philosophy of medicine has been dominated by the discussion of the concepts of health, their nature, their normativity and their definition. At the end of the 1970s, when the prevailing view was that the use of these concepts is cultural-relative and value-dependent, Christopher Boorse published four major and highly influential papers in which he defended the existence of a theoretical and value-free concept of health as distinct from other practical and value-laden (diagnostic, therapeutic, clinical, social, positive, etc.) concepts of health (Boorse 1975, 1976a, b, 1977). These papers put forward a naturalist definition of health – or more precisely a "naturalist definition of the normal-pathological distinction" (Boorse 1997, 8) – based on "three perhaps debatable concepts: the reference class, statistical normality, and biological function". The theoretical concept of disease is defined as a type of internal state that compromises normal functioning, and normal functioning (of a part or process) as its 'statistically typical contribution' to the survival and reproduction of a biological individual belonging to a given species (the reference class). Boorse's theory is usually called the 'bio-statistical theory' of health (BST). The BST has shaped and influenced discussion in the philosophy of medicine in two main ways. Firstly, it could be said that the numerous commentaries on Boorse's theory lie at the origin of what is usually referred to as the debate between the 'normativists' and the 'naturalists'. Secondly, Boorse adopted the method of 'conceptual analysis' (i.e. a definition of necessary and sufficient conditions) to define health which was then followed by other major participants in the debate (Lawrie Reznek, Lennart Nordenfelt, Jerome Wakefield, etc.).

1.1 The Debate Between Naturalism and Normativism and the Problematic Meaning of 'Naturalism'

The debate between normativists and naturalists concerns the question of whether the concepts of health and disease are intrinsically value-laden or not. In his paper on mental health (1976a), Boorse described the 'normativist' thesis as the prevailing one in the philosophy of health, and more particularly in mental health. The principal characteristic of normativism is to consider that the judgment about what sort of condition – at the level of type (the normal and the pathological) and not token (individual disease entities) – we should call a disease is necessarily dependent on social or subjective valuation: a disease is a type of condition that we disvalue. The main difficulty for this position is to escape cultural relativism and to explain why and how our use of the term 'disease' nevertheless relies implicitly on an intuitive distinction between moral or social valuations and pathological medical conditions. Moreover, there are some diseases that we do not necessarily value

negatively. There seems to be something specific to judgments or diagnoses of pathological conditions and the basic aim of the naturalists is precisely to bring that specificity to light.

Today, naturalism is still mainly represented by the biostatistical theory of health, and several scholars, such as Masheh Ananth (2008), Daniel Hausman (2012, 2014), Peter Schwartz (2007b), Justin Garson and Gualtiero Piccinini (2014) have proposed and developed what they consider to be improved versions of the BST. But what naturalism really means in the BST, and more generally in the philosophy of health, is far from clear. The term 'naturalism' covers a wide range of philosophical positions and, as such, is a very ambiguous term (see Kingma 2014 for useful clarifications). A distinction is usually proposed, however, between two main kinds of naturalism in philosophy, which may or may not be associated: (i) the view that all phenomena are natural (ontological naturalism); and/or (ii) the view that the methods of the natural sciences are applicable in every area of inquiry (methodological naturalism). The predominance of the BST in philosophy of health is such that 'naturalism' tends in this context to be defined in the very terms of this theory. But to what sort of naturalism does the BST belong?

Boorse eventually endorsed the term 'naturalism', but he said he would have preferred "descriptivism", or even simply, "non-normativism". As Boorse himself states (1997, 4): "the classification of human states as healthy or diseased is an objective matter, to be read off the biological facts of nature without need of value judgments. Let us refer to this general position as 'naturalism' – the opposite of normativism, the view that health judgments are or include value judgments". Daniel Hausman adopts a similar position when he states: "Naturalism: whether a part of an organism is functioning adequately is a scientific rather than an evaluative matter" (Hausman 2012, 524). Boorse's view of theoretical health is indeed described by opposition to the normativist conception that is seen by him as an inescapable route toward cultural relativism. We have to find a way for explaining why drapetomania and masturbation, for example, are not diseases, not only because they are not seen any more by our culture and society as such, but also and primarily because it is not *correct* to classify them as pathological. This way, according to Boorse, is the dysfunction-requiring account. Drapetomania and masturbation are not biologically dysfunctional and for that reason they are not pathological conditions. For Boorse, "the main thing is to avoid false presumptions caused by calling something a disease (e.g., masturbation) which lacks the biological dysfunction on which alone such presumptions depend" (1997, 99). It is understandable that Peter Schwarz advocated the replacement of the opposition between normativism and naturalism by an opposition between "dysfunction-requiring" accounts, which include the presence of biological dysfunctioning in the definitions of disease, and value-requiring accounts (Schwartz 2007a). But in that case, what seemed to be an essential component of the BST's naturalism, the *non-normativity*, disappears, for it allows for *normative* concepts of function, as is the case in etiological theories or in organizational approaches to biological function (see below).

1.2 Conceptual Analysis and Its Motives

The method known as 'conceptual analysis' came from the tradition of analytic philosophy. Its key principle is that to understand a concept is to understand it in terms of necessary and sufficient conditions. Boorse's BST was the first tentative application of the method of 'conceptual analysis' to the concepts of health and disease, thus bridging the gap between philosophy of medicine and analytic philosophy of science, while at the same time opening the door to analytic philosophy of medicine. Indeed, prior to Boorse's work, philosophy of medicine was generally neglected by philosophers of science, who were often more interested in general philosophy of science, philosophy of physics, or in the then nascent philosophy of biology.

One of the main motives for analysing and defining disease is to distinguish between the pathological and the normal. In the context of contemporary medicine, whose scope increasingly appears to be extended to the problems of everyday living, such a definition could also offer a safeguard against medicalization of all aspects of our lives (Schramme 2007). At first glance, a naturalist or neutral definition appears to be more promising in delivering a useful and relevant definition of health, for it could help solve medical controversies in an objective manner. At the very least, however, it should be noted that, for both normativists (or at least those of them who adopt the project of defining health) and naturalists, defining the concepts of health and disease, or the normal and the pathological, plays an important role in medicine, for it helps to define its field of application. But, as we will see below, this motive for defining disease depends on – or at least requires us to consider – the relation between *medicine* and *health*, as well as the question of the goals of medicine. Another important question is medicine's epistemological status. Do we not need a value-free concept of health to legitimate and attest to the existence of a medical *science*? In demonstrating the existence of a theoretical concept of health, the goal of the naturalistic view of Boorse was also to demonstrate the scientific status of medicine (or at least of certain parts of medicine).

1.3 Defining Disease: A 'Degenerative Project'?

Since the 1970s, and in spite of the importance assumed by the debate surrounding concepts of health and disease in philosophy of medicine, no definition has appeared to generate any consensus, and this applies as much for the naturalists as for the normativists, or even for those who favour a hybrid approach. No definitions, it would seem, really succeed either in neatly defining what disease is (its essence), or in creating a series of inclusion and exclusion criteria that correspond to the use of the word 'disease' (Nesse 2001, 37). For all purported definitions, the medical literature provides counter–examples. For example, the BST categorizes homosexuality as a disease on the grounds that it obstructs reproduction, even though it was finally excluded from the Diagnostic and Statistical Manual of Mental Disorders

(DMS-II) in 1973. Likewise, it also excludes diseases that are statistically frequent or "universal diseases" in Boorse's terms (e.g. lung irritation, artheriosclerosis) thus generating what Peter Schwartz has called the problem of "common disease" (Schwartz 2007b). Moreover, in addition to the evocation of counter–examples, the theoretical framework of the BST has also been the target of several major criticisms: the three core concepts of the definition (physiological function, reference class, statistical normality) have all been called into question (Wachbroit 1994; Engelhardt 1996; Amundson 2000; Kingma 2007; Ereshefsky 2009; Giroux 2009), as has the relation between the individual's state of health and the environment (Nordenfelt 1995; Kingma 2010, etc.). As for normativist definitions, they are often criticised for being either too inclusive or too vague.

Since the 1990s, the debate has, however, evolved in an important manner: it seems that the issue is less about whether the concept of disease is value-laden, i.e. about the right content and status of the definition *per se*, than about the utility and the relevancy of philosophical analysis of the concepts. Indeed, several philosophers have criticised the project of seeking definitions, which is in some case considered a "degenerative project" (Worrall and Worrall 2001), and have likewise contested the relevance of the method of conceptual analysis, either because they think the relevant concepts should be seen as practical, or at least non-theoretical (Brown 1985; Hesslow 1993), or as problematic *per se* (Nordby 2006; Lemoine 2013). Other philosophers consider that the basic concepts (health, disease, etc.) are too vague and ambiguous to be clearly defined. These reservations have led many to conclude that a unique definition is unobtainable and thus defend an irreducibly pluralistic perspective (Hofmann 2001, 2002; Simon 2007, etc.), according to which there are several incompatible meanings of the words 'disease' and 'health'. It should be noted, however, that the BST is already pluralistic inasmuch as it defends what Boorse called a multilevel framework, though this pluralism is hierarchical: the theoretical concept is the basic concept on which the other practical concepts are built.

It has also been argued that the initial objective of helping to solve medical controversies through defining health and disease *is not* achievable (and *should not* be achieved in that way) (Hesslow 1993; Worrall and Worrall 2001). The definitions of these concepts *cannot* and *should not* be used for resolving medical and social debates concerning controversial medical cases. Such a goal, it is claimed, is misleading and even dangerous. According to Hesslow, for example, philosophical analysis of the concepts of health and disease tends to "focus attention on secondary issues and muddle the really important ones", which are moral and social in nature (12–13). To Worrall and Worrall (2001, 54), "society off-loads too many of its important, evaluative issues onto doctors. By often phrasing the question in such cases in terms of whether someone is really ill, really has a disease, society is in effect, though perhaps confusedly rather than deliberately, salving its conscience by pretending that it is asking for objective, scientific medical advice". Hence, according to Ereshefsky (2009), we should not try to find the correct definition of health or perfectly capture our use of these terms, but rather rely on the simpler distinction between 'state descriptions' on the one hand and 'normative claims' on the other, thus abandoning the overly confusing terms and concepts of health and disease,

normal and pathological. For Ereshefsky, the distinction between state descriptions and normative claims is an effective way of making all normative assumptions in medical discussions as explicit as possible. The question, then, is not whether the concepts of health and disease, normal and pathological, are value-laden or not, but rather whether and to what extent these values could be made explicit.

1.4 The Three Main Motives for Pursuing Health and Disease Analysis and Exploring the Potential of a Naturalist Approach

In the context just described, the time has come to re-assess the relevance and status of naturalism in the philosophy of health, as well as its implications for healthcare and for the debate on health enhancement. There are three main reasons for such a reassessment.

First, as said above, over the past few years, interest in the naturalist stance has been strongly renewed and clarifications of the BST, as well as possible improvements, have both been proposed. New definitions, presented as modified, reinterpreted or improved versions of the BST have likewise come into existence. Peter Schwartz (2007b) has modified the formulation of the organism's physiological goals from 'survival *and* reproduction' to 'survival *or* reproduction'. And, to solve what he calls the "problem of common disease" (i.e. the fact that someone could be considered as normal even if she has a trait that has negative consequences just because this trait has become more frequent in her reference class), Schwartz introduces an additional factor to the frequency approach of function in the BST: a "negative consequences" criterion, that is to say, one which takes into account in the definition of function and dysfunction the *effect* that a given level of functioning has on the organism. The difficulty is how consequences are evaluated and quantified. They should be more fine-grained and contextual than just looking at effects on survival and reproduction, they should be "those that impact some standard activity or capacity of the organism" (2007b, 379). He calls this account of function and dysfunction: "Frequency and Negative Consequences approach". To deal with the problem of the insufficient place given to the environment in the BST, Mashesh Ananth (2008) defends an 'evolutionary-homeostatic' concept of *physical* health. And Daniel Hausman (2012, 2014) has proposed the 'functional efficiency theory' as a non-evaluative account of health that explicitly derives from and complements Christopher Boorse's BST. The naturalism of this theory relies on the BST's idea that there is no definitional connection between health on the one hand, and well-being or moral and aesthetic good on the other. It differs, however, in that Hausman relativizes the role of the problematical concept of 'statistical normality': it serves as a guide to the distinction between health and pathology rather than as *defining* the difference. Moreover, he argues that the fundamental *theoretical* task is to distinguish the levels of efficiency at which the parts and processes within organisms function, rather than to decide which of them are to be labelled as healthy or patho-

logical. In *practical* contexts, such a labelling is influenced by evaluative considerations. In a similar spirit, Justin Garson and Gualtiero Piccinini (2014) focus on the BST's concept of function and defend an improved version that specifically answers the problem of the situation-specificity of functions raised by Kingma (2010): functions must be performed at appropriate rates in appropriate situations. Their account pretends to clarify, amend, and extend previous versions of BST on some crucial points. I shall not further expose or discuss these naturalist theories of health: for the purpose of this introduction, it is sufficient to show that several proposals have been made which are presented as a complement to, or an improvement of, the BST, rather than as a challenge to it.

Secondly, there could be other forms of naturalism in the philosophy of health and disease than the naturalism of the BST. One of the core aspects of the BST's naturalism is that the concept of health it advances is value-free because it is based on a non-normative concept of biological function. But there is some ambiguity regarding the term 'normativity', for it can have both *value-laden* and *prescriptive* meanings. Boorse himself, for example, talks about "natural norms", in which case it could perhaps be said that he supposes a certain kind of 'natural normativity'. Boorse also speaks of "non-normative norms". But what does this mean? Non-prescriptive or non-evaluative? Both? But how could a norm be neither prescriptive nor evaluative? Could it be purely descriptive? According to Boorse, this norm is indeed purely descriptive because it is a natural fact and a natural fact has no link with any kind of normativity. For him, life and death cannot be considered as normative or evaluative concepts. This, then, is the main difference between the BST and other approaches, such as that of the French philosopher of medicine and physician, Georges Canguilhem (1978), or those presented in the second part of this volume. Boorse's concept of function has some proximity with the 'causal-role' or 'systemic' approach defended firstly by Robert Cummins (Cummins 1975). On this view, a function is a causal disposition that contributes to a specific class of capacities of a system. In the philosophy of biology this approach is opposed to the 'etiological' and normative concept of function. In the etiological view, which is based on evolutionary theory, a function is a selected effect: the function of an organ is that which was *beneficial* for it and thus was selected for in the evolutionary process (Neander 1991). But very few versions of a naturalist concept of health based on the etiological concept of function have been developed within the philosophy of medicine. The distance between physiology and evolutionary theory probably explains this.

The notion of 'biological normativity', initially introduced in 1943 by Georges Canguilhem, in order to characterize the normative status of the concepts of health and life (Canguilhem 1978), has seen some revived interest, along with the recent development of the 'organizational approaches' of biological function. These recent developments offer the opportunity to give increased biological support and content to Canguilhem's seemingly rather vague or metaphysical concept of "biological" or "vital" normativity. It seems appropriate to further examine whether these approaches could be called 'naturalistic' and what kind of 'normativity' is implied here. At the very least, these developments would appear to appeal to and justify a dialogue between Boorse's BST and Canguilhem's conception of health.

A third reason for continuing to analyse the concepts of health and disease concerns the fact that most of the previous criticisms of this project do not hold that it is irrelevant *in itself*, but rather that it is irrelevant because of the method used or the practical motives usually associated with it.[1] For Lemoine (2013), the philosophical analysis and definition of health and disease is still considered an important and central objective of the philosophy of medicine; the problem, he thinks, concerns the method of conceptual analysis. And Peter Schwartz has suggested adopting the project of "philosophical explication", according to which definitions "should be evaluated as *proposals* about how to define a term in the future, not as *discoveries* about the current meaning or criteria of application" (2007a, and Chap. 11 this volume, see also 2014). While much more critical of the project itself, Hesslow (1993, 3) writes that: "in saying that the concept of disease has no functions, I am not suggesting that the word should never be used, or that everything that philosophers have written about it is useless (…). Nor am I suggesting that the concept of disease cannot be explicated" (see also, Ereshefsky 2009 or Worrall and Worrall 2001). But what does this really mean? Is it simply condescension for the work of philosophers? If "the concept of disease has no functions" (Hesslow 1993), what could be the utility of and reason behind philosophical efforts to seek a definition?

Whether or not one agrees with these criticisms, they clearly highlight the importance of clarifying the fundamental aim of naturalism, and particularly the BST, as regards the philosophical analysis of health. As said above, at first glance, the attractiveness of a naturalist point of view is that it could offer protection against excessive 'medicalization' (Schramme 2007). In keeping with this, the BST had been used in medical ethics to ground a health need analysis (Daniels 1985). But this means that the natural is used to define the limits and goals of medicine and that a naturalistic norm grounds an evaluative or prescriptive norm. Yet how could the BST be faithful to the distinction between fact and value in delivering a value-free concept of health, and then be used to commit the 'is-ought fallacy'? Whether and to what extent the naturalistic view of health and disease can really contribute to defining healthcare needs, as well as the practical concept of disease, remains to be clarified. An exploration of the conceptual links between *medicine* and the concepts of *health* and *disease* is thus needed. Even if Boorse wrote in 1997 that "a value-free scientific disease concept [is] a bedrock requirement to block the subversion of medicine by political rhetoric or normative eccentricity" (1997, 100), his contribution to this volume, "Goals of medicine", shows that it does not follow from this claim that the concepts of disease or health delimit the constitutive goals of medicine, and, in that case, they do now allow one to generate a moral framework specific to medicine.

[1] According to Hesslow, for example, diagnostic investigation or medical treatment, insurance cover, freedom from the obligation to work, moral responsibility and legal liability do not in fact depend on the theoretical definition of health and disease (Hesslow 1993, 6).

1.5 Presentation of the Book

The three main reasons presented above for reassessing naturalism in the philosophy of health correspond roughly to the three parts of this volume.

The first part focuses mainly on the BST. While critical of certain aspects of the BST, all the authors of this part are, in some way, sympathetic to the naturalist spirit of the BST. They provide some new criticisms and suggest some improvements or complementary developments.

In the first chapter, "Is Boorse's Biostatistical Theory of health naturalistic?", Lemoine and me attempt to determine the kind of 'naturalism' to which the BST belongs. Arguing that it seems to belong to a methodological, rather than an ontological naturalism, we raise several issues concerning two major claims we see as implicit in the methodological naturalism of the BST. These implicit claims are: (1) that priority should be given to the theoretical, value-free, scientific concepts of health and disease; and (2) that conceptual analysis is the right method for defining theoretical health and disease. After having shown that conceptual analysis does not work in the case of 'weak theoretical' terms such as disease, we question an important assumption of the BST that has been largely neglected in the critical literature: that physiology is the basic and unique theory underlying medicine. This leads us to claim that a relevant methodological naturalism in medicine should also take account of other key biomedical sciences in its definition of health and disease.

In their chapter, "In search of normal functions: BST, Cummins functions, and Hempel's problem", Marion Le Bidan and Denis Forest explore the problem of the relevant concept of function in physiology. While explicitly sympathetic to the naturalistic spirit of the BST and its ambition to give us a value-free conception of health, they criticise the alleged necessity of reference to individual survival and reproduction, at least in the medical context of the definition of a function, and suggest an alternative. Their point of departure is what they call "Hempel's problem", which they define as the problem of choosing and "making explicit the background that justifies legitimate functional ascriptions in the context of biomedical sciences". They first provide a useful clarification of the difference between Cummins' conception of function (or "causal role functions") and the concept of normal function as it is defined within the BST and show how some criticisms of the BST's concept of function are due to misconceptions of the BST. They then argue that, at least as far as Hempel's problem is concerned, the BST's concept of function is preferable to the "Cummins functions". Nevertheless, they also suggest that there is an alternative way of approaching Hempel's problem, one which avoids the problematic reference to individual survival and reproduction and that is based instead on causal role analysis of function. After having shown that effects on survival and reproduction are consequences of normal or abnormal functioning rather than part of the definition of what normal functions are, they argue that in the medical context, normal functions are defined as contributions to capacities that are: (1) distinctive in a given reference class; (2) physiologically or psychologically determined (rather than sociologically or politically); and (3) basic to our usual interactions with our

environment. One of the particularly useful secondary aspects of this chapter is that it clarifies the relation between medicine and evolutionary theory, specifying the role and place of evolutionary considerations in medicine.

In "Is a comparativist approach to health more relevant than a non-comparativist one?", Daniel Hausman reacts to an important criticism of the BST put forward by Andrew Schroeder in a paper untitled "Rethinking health: healthy or healthier than?" (2013). According to Schroeder, one of the main limits of the debate on health and disease that could explain the current stalemate is that most authors adopt a non-comparativist approach. Hausman, by contrast, defends and develops a comparativist approach, showing also that we can interpret the BST in a comparativist way, for the BST rests mainly on comparisons of the functional efficiency of parts and processes. Nevertheless, a comparative view is shown to be not only compatible with a non-comparative view of overall health, but even requires it. Indeed, Hausman shows that a fault of the BST is that it is too thoroughly comparative: other relevant non-comparative considerations, such as design maxima, appear necessary to make health judgments, and judgments about overall health cannot be based only on comparisons.

In the last chapter of this part, "What a naturalist theory of illness should be", Thomas Schramme propounds a stimulating analysis of the concept of illness from a specifically naturalist stance. He argues for an evaluative concept of illness while remaining in the framework of a naturalist account. Schramme begins by exploring and criticizing Boorse's conception of illness, which over time evolved from a value-laden to a value-neutral one. For Schramme, and contrary to the Boorse's view, the concept of illness is evaluative, for it means "that a particular condition is harmful to the person affected". But in contrast to many normativists, he sees the scope of the concept of illness as being restricted by the concept of disease. A *naturalist* theory of illness is thus defined as relying on an analysis of the logical relation between the concepts of disease and illness; it holds that a condition qualifies as a potential illness only if it is a disease. Naturalism, he claims, can be beneficial here, for it allows for the fact that certain pathological conditions are always regarded as cases of illness, independently of what the affected persons themselves feel or believe. This is this objective aspect of the concept of illness that Schramme sets about exploring.

The second part explores normative perspectives on health. In particular, it investigates the concept of natural or biological 'normativity', presenting various different accounts of how it may ground the concept of health. The concept of 'biological normativity' was introduced by Georges Canguilhem, who defined it as the biological ability of an organism to establish a norm in a given environment (Canguilhem 1978). Several chapters of this part examine whether and in what sense this concept is naturalistic, and whether it is possible to develop naturalistic or objectivist views of health other than the BST.

In the first chapter, "Contextualizing medical norms: Georges Canguilhem's surnaturalism", Jonathan Sholl explores the question of the type of naturalism to which Canguilhem's view of health belongs, arguing that it should be characterized as a form of "surnaturalism". The specificity of Canguilhem's conception of health is

that it integrates the environment in what could be called a 'contextualist approach', or even an 'ecological' approach. For Canguilhem, it is relative to a given environment that health and disease can and should be determined. Such environmental relativity is not exceptional in biology: many key biological concepts, such as allostasis, phenotypic flexibility and biological robustness, rely on the observed inseparability of the organism from its environment. But, according to Scholl, such a view, as Boorse has shown, faces the risk of an excessive relativism and so does not enable this form of naturalism to prevent diagnostic misuses, such as drapetomania. Sholl examines in detail the contextualist approach of Canguilhem, focusing on its conception of normativity and health. He compares it to the BST, showing both its force and its limitations. According to Canguilhem's naturalism, *naturalness* does not lie in conformity to a norm but rather in transgressing a temporary norm. Canguilhem's view "is naturalistic in that it defines health and disease as two distinct biological norms, and is *sur*naturalistic by acknowledging the plasticity and variability of living beings" (Chap. 6, 93). Such an approach has the advantage of integrating both the dynamism and the variability of biological norms, two key characteristics of what Sholl calls Canguilhem's "surnaturalism".

In "Organizational malfunctions and the notions of health and disease", Cristian Saborido, Alvaro Moreno, María González Moreno and Juan Carlos Hernández Clemente offer a chapter that strongly complements the preceding one. They develop a systemic-organizational account of a normative concept of biological function and which they claim constitutes the basis of a new kind of naturalist concept of health. The Organizational Approach (OA) is a new perspective that has been developed within the philosophical discussion of the notion of biological function. This approach has been introduced as an improvement and integration of the well-known "etiological" view of function thanks to an articulation with "systemic-dispositional" approaches (or causal role functions) (Mossio et al. 2009). Biological systems are defined as "self-maintaining systems and, within a self-maintaining organization, functions are interpreted as specific causal effects of a part or trait, which contribute to generating a complex web of mutual interactions, which, in turn, maintain the organization and, consequently, the part itself". This approach escapes some of the difficulties encountered in Boorse's concept of physiological function, avoiding for example the problematical concept of 'reference class'. But, as in Canguilhem's view of health, it is a concept that is individual-relative. And the question then is whether, as Sholl asks, "the resulting 'relativism' is really so hard to swallow".

The chapter "Biological organization and pathology: three views on the normativity of medicine," by Arantza Etxeberria, explores the multiple meanings given to normativity in biology and in medicine and defends a weak medical normativism compatible with methodological naturalism. According to Etxeberria, medicine is normative in a special way that is not reducible to biology: it is based on descriptions of facts considered to be *wrong* or *harmful*. Nevertheless, it assumes that science and biology are necessary to understand the real and objective ontological status that diseases have. Etxeberria first shows that both normative and descriptive approaches to biological organization within biology have been historically

defended and that they should in fact be considered complementary to each other. She then turns to medicine and explores how biology can help medicine define pathology, showing that the main naturalist attempts (functional, mechanistic, systemic) fail to produce fully comprehensive descriptions. Finally, she proposes three kinds of medical normativity in the context of biological descriptions: (1) 'naturalist normativity,' which relies on a weak sense of normativity which can be applied to the BST; (2) 'heuristic normativity'; and (3) 'vital normativity'. Canguilhem's approach corresponds to this last kind of medical normativity. She concludes by insisting on multiplicity in the ontology of diseases and the necessity of an epistemic pluralism in medical knowledge.

The third and final part addresses the implications of a naturalist definition of health and disease for healthcare and medical ethics. In the opening chapter, "Goals of medicine", Christopher Boorse ventures for the first time into the domain of medical ethics. He clarifies the implication of his BST for the practice of medicine and examines the issue of the goals of medicine. His naturalism as regards the concepts of health and disease does not aim to provide foundations or even a moral code for the practice of medicine. To understand why this is the case, it should be remembered that Boorse's main objective in elaborating the BST was to describe the concepts of disease and health used by pathologists and medical scientists and thereby to isolate judgments regarding pathology from therapeutic and clinical (and even social or political) judgments. Part of his reason for doing this is that, particularly in the case of mental health, the former tend to be incorrectly reduced to the latter. But contrary to the prevalent view, Boorse thinks that health and disease concepts cannot be used to define and delimit the goals of medicine and thus to generate either an internal medical morality or a distinction between medical treatment and enhancement. It would appear that Boorse's definition of health, which he readily admits is "ultraconservative", is compatible with a liberal and permissive vision of the practice of medicine. Indeed, according to Boorse, "contrary to the usual view, medicine has no essential connection to disease or health" (Chap. 9, 146), an assertion that is at first rather surprising and as such requires justification. For Boorse, the value-free meaning of health and disease highlights the irreducibility of medical activity to improving health and treating disease. Indeed, the "ultraconservative" concept of health leads Boorse to conclude that many accepted and legitimized medical activities do not aim to restore or improve health. Boorse draws on medical history to provide two examples: contraception and Victorian obstetrical anaesthesia. These examples show that doctors have traditionally been willing to go beyond fighting disease and promoting health. Likewise, Boorse also argues "there is no medical imperative to eliminate all pathological conditions at any cost" (Chap. 9, 172; see also in 1997, 99: "there can be diseases that are neither disvaluable nor worthy of therapy (…). So the concepts of health and disease are far from settling all clinical or social questions"). Thus health and disease concepts cannot be used to define either the limits and goals of medicine or the activities of the physician. The main thesis that Boorse defends is that "there are no distinctively medical goals, only distinctively medical means" (Chap. 9, 146).

Once one admits that the treatment of normal conditions is an important part of both medicine and the activities of the physician, it would seem that one is obliged to endorse a very large and liberal vision of medicine that embraces "an Internal Medical Morality containing, on the patient side, only the single goal of using biomedical knowledge and technology for the patients' benefit" (173). One of the main implications of this liberal vision of the goals of medicine is that a value-free concept of the distinction between the normal and the pathological cannot be used to make objections, based on internal medical morality, against biomedical enhancement or Voluntary Active Euthanasia (VAE). Indeed "such practices, if they are in patients' best interests, will either be genuine medicine, or something besides medicine that physicians can permissibly do – in either case acceptable." Possible objections, it follows, could only be based on a general morality not specific to medicine. That said, Boorse also warns us against thinking that he thus adopts an ultra-permissive view of medical treatment. Concerning enhancement, he does not believe that doctors will be able to improve on normality: he suspects that "for a long time, feasible genuine enhancements will be few" (174). Many alleged enhancements could even prove harmful in the end. And concerning VAE, he seems to consider that it is the role of public law to impose clear limits; and in fact, "physician-assisted suicide and VAE are too liable to abuse to be allowed by law".

In his chapter, "From 'Better than well' to 'More than human'", Jean-Yves Goffi examines the relevance of the naturalist concept of health for the project of founding the distinction between therapy and enhancement. He fuels Boorse's final caveat in "Goals of medicine" on the enhancement program, showing that it is "probably a dangerous illusion to believe that one can have absolute mastery over one's own health" (Chap. 10, 195). In explaining and analysing the transhumanist program, Goffi shows how it leads us largely beyond the traditional issues of biomedical ethics and philosophy of medicine: it concerns rather philosophy of technology, or even philosophy of mind. From the perspective of these fields, Goffi argues that the extent to which the program is unworkable becomes even clearer. Goffi also analyses the ways that transhumanists think their program should be realized: "superbiology" (a term coined by Simon Young, and more or less equivalent to "radical human enhancement") and advanced Robotics. This analysis shows that the argument of the bioconservatives (who sometimes speak like those naturalists who make the 'is/ought fallacy') proves to be misdirected, for it does not really address the core of the transhumanist program, but only certain minor points linked to biomedical ethics: "some transhumanist dreams do not have much to do with medicine as such, but rather with advanced robotics, even if the two are supposed to work together towards a transhumanist future". Goffi also explains and analyses the huge diversity in the socio-political principles of the transhumanists; a spectrum running from libertarian fundamentalism to the democratic can be observed. In the final part of the chapter, the transhumanists' conception of health is examined and its indeterminacy is shown to constitute an important difficulty for the theory.

The two last chapters of the book deal with the difficulty of accepting a specific position defended by Boorse in "Goals of medicine", namely, that there is no conceptual connection between medicine on the one hand and disease and health on the

other. In two very different ways, Peter Schwartz and Lennart Nordenfelt defend the opposite view: that there is a strong connection and that medicine does have the central goal of combatting and responding to disease and promoting health. Peter Schwartz, an advocate of the biostatistical definition of health, contests the separation between the philosophical definition of theoretical health and the practice of medicine or medical ethics implied by the methodological assumptions of conceptual analysis. Following Norman Daniels, he considers that the BST offers a relevant definition of disease that helps to clarify and address questions in ethics and health policy. This in turn implies renouncing the conceptual analysis approach. Defining disease should thus be seen as a "philosophical explication" that seeks to offer new definitions rather than as a description or a *discovery* of the implicit meaning of a concept. Commenting on Boorse's chapter about the goals of medicine (Chap. 9), his key claim is that non-cognitive goals of medicine cannot be subsumed under the single goal of using biomedical knowledge and technology for the benefit of patients (Goal IV in Boorse's chapter), a goal that does not require reference to health or disease. He argues that the efficacy of folk remedies in treating pathological conditions or even the mere fact of the placebo effect show that there are compassionate concerns in Goals I-III – (I) Preventing pathological conditions, (II) Reducing the severity of pathological conditions, (III) Amelioration of the effects of pathological conditions – that are not reducible to biomedical technology and knowledge (IV), and can only be understood in terms of the goals of combatting disease and improving health. He thus defends the idea that the biostatistical definition of health and disease is compatible with the view that there are central (I-III) and peripheral (IV) goals of medicine.

In his chapter, "A defence of a holistic concept of health", Lennart Nordenfelt adopts a rather different critique of Boorse's "Goals of medicine". According to Nordenfelt, the difficulties the BST faces in connecting the concepts of health, medicine, and the work of the physician arise from a major flaw regarding its negative definition of health, rather than from a flaw in the method of conceptual analysis. The solution he proposes, then, is not to abandon the method of conceptual analysis but rather to adopt his own holistic concept of positive health. Since 1987, Lennart Nordenfelt has defended a holistic concept of health, which is based on the notion of ability (also used by Canguilhem) rather than that of function, while also drawing on an analytic theory of action (1995). Nordenfelt's point of departure, then, is not biology or the philosophy of biology but rather the philosophy of action and welfare. This positive concept of health, he maintains, makes it possible to define the goals of medicine in connection with health without excluding other goals, thus escaping the dilemma created by Boorse's ultraconservative concept of health (either medicine is connected with health in which case medical care is *only* healthcare, or they are disconnected, in which case medical care, or the goals of medicine, is not reducible to healthcare). In including the benefit of the patient in the holistic definition of positive health, it becomes easier to account for the fact that "health has traditionally had a central role among the goals". A holistic concept of health, which connects health and well-being, is thus better suited to understanding the connection between medicine and health, and thus also to serving practical issues

and playing a major role in ethical debates. As Nordenfelt argues: "My conclusion therefore is that a holistic theory of health can give a simpler and more unified account of the concepts of need, of health care, and also of the goals of medicine. (...) My claim is, however, certainly not that health constitutes the only goal of medicine" (Chap. 12, 218).

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Part I
The Biostatistical Theory of Disease: Criticisms and Improvements

Chapter 2
Is Boorse's Biostatistical Theory of Health Naturalistic?

Maël Lemoine and Élodie Giroux

Abstract Christopher Boorse's biostatistical theory of health and disease (BST) puts forward a naturalistic definition of these two concepts. Indeed, 'naturalism' in the philosophy of medicine was initially defined in terms of the BST, and has often been since. This chapter is an attempt to clarify in what sense Boorse does in fact defend a naturalistic definition of health and disease. We identify different theses that make naturalistic claims regarding health and disease and which help analyze the core claims of Boorse's naturalism. Some of them have mainly to do with the central role physiology plays in medicine. But, as no physiologist has hitherto proposed a satisfactory scientific definition of 'disease' and 'health', Boorse's naturalism must at the same time: *(i)* propose just such a definition; and *(ii)* prove that it is central to medicine. Our claim is that even if Boorse's definition possibly succeeds in *(i)*, it merely assumes *(ii)*. We conclude by examining the necessity that a naturalistic definition of health and disease takes into account not only physiology but also other medical sciences.

Keywords Physiology • Conceptual analysis • Biostatistical theory of health • Health • Disease • Naturalism • Normality

2.1 Introduction

According to the Biostatistical Theory of Health (BST), 'health' is defined as the statistical typical functioning in a reference class, and 'disease', as a "statistically species-subnormal biological part-function" (Boorse 1997). It is generally seen as the most prominent defense of a naturalistic and theoretical conception of health. It allegedly arises from a rational reconstruction of the notion of health implicit in

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physiology, considered as the basic medical science. The result would be a value-free concept.

Many objections have been raised against the so-called 'naturalism' of the BST. Among the topics of discussion are the place of values, the possibility of a non-normativist concept of biological function, the role of statistics, the non-normative determination of a reference class, and the relevance of a standard environment to the definition of health. Nevertheless the question whether the BST is a faithful description of physiology and whether it is right to consider the latter to be the basic medical science, has seldom been examined. Yet it is crucial in the debate about the 'naturalistic' nature of the definition of health and disease.

Why is that so? In order to answer this question, it is first of all essential to define 'naturalism'. To be sure, Boorse accepted the label, but he did not choose the term himself (Boorse 1997, 102). Because of this, and also because of the widespread use of this term, 'naturalism' in this context remains unclear. Most importantly, is it ontological or methodological naturalism? Although the BST is ambivalent about this question, we consider it to be at its best when it is understood as a methodological naturalism. Second, 'rational reconstruction' is a variant of conceptual analysis that admits minor stipulations, but nevertheless claims to be a completely *descriptive* method of definition. Is medical science in general, and physiology in particular, formalized or fixed enough for such a descriptive definition of health and disease to be a manageable task? We claim that it is not, not to undermine naturalism on the whole, but to deny that conceptual analysis should be its proper, or at least its main, tool. Lastly, we discuss the BST's conception of physiology and of its prominent place in the definition of a theoretical concept of medical normality.

We conclude by highlighting the fact that our criticism of the BST's assumptions about physiology does not seek to underpin a normativist point of view, but rather to reposition the discussion about how best to define health and disease within a framework of a methodological naturalism based primarily on what is actually done and thought in the contemporary biomedical sciences.

2.2 In What Sense Is the BST 'Naturalistic'?

In contemporary philosophy as a whole, such terms as 'naturalism' are highly contested and thus vary significantly depending on the context of their use. Whereas in some contexts 'natural' is opposed to 'supernatural', in other contexts, it is opposed to 'logical' (Popper 2002) or 'rational' (Giere 1990). In the philosophy of health and disease, 'naturalism' is opposed to 'normativism' (Boorse 1975; Nordenfelt and Lindahl 1984).[1] Nonetheless, a generic, if vague, distinction seems to cover all

[1] The opposition is so important to the definition of naturalism that Boorse felt the need to coin the term 'normativism', without referring to its opposite (Boorse 1997): indeed, he accepts 'non-normativism' as a more accurate description of the BST (personal communication). This should not, however, undermine the claim that the BST is a genuinely naturalistic theory of health and disease.

species of naturalism: *ontological* naturalism and *methodological* naturalism. For instance, Boyd et al. define 'naturalism' as "the view that all phenomena are subject to natural laws, and/or that the methods of the natural sciences are applicable in every area of inquiry" (Boyd et al. 1991). Taking up this distinction between ontological and methodological naturalism, Papineau comments:

> The ontological component is concerned with the contents of reality, asserting that reality has no place for 'supernatural' or other 'spooky' kinds of entity. By contrast, the methodological component is concerned with the ways of investigating reality, and claims some kind of general authority for the scientific method. (Papineau 2009)

Which kind of naturalism should the BST be classified as?

2.2.1 Ontological Naturalism or Methodological Naturalism?

Ontological naturalism about *x* consists in the claim that *x* is a natural fact. In keeping with this, the BST claims that health and disease are natural facts. It can therefore be classified as ontological naturalism. To be more specific, the BST's *ontological* naturalism consists in two broad claims:

1. *Naturism*: "the normal is the natural" (Boorse 1975, 57; 1977, 554–555; 1997, 7, etc.). This is to be understood in the ancient, that is, Hippocratic and Aristotelian, sense, though without theological connotations.[2] As a matter of fact, the Hippocratic tradition had assumed the idea that health is a stable, self-maintaining state of the organism. When the organism deviates from that state to a state of disease, it tends to come back to it, though not always successfully, and sometimes only with the help of the medical art. From this follows the '*natura medicatrix*' statement: nature is its own doctor. This thesis and its consequence have been called 'naturism'(Daremberg 1870). Part of the BST's ontological naturalism is akin to that idea, although it rests in a non-Hippocratic ground, that is, the idea that the normal state of an organism is its natural tendency: "health is conformity to a 'species design'" (Boorse 1997, 7).
2. *Natural distinction*: "the *classification* of human states as healthy or diseased is an objective matter, to be read off the biological facts of nature without need of value judgments" (Boorse 1997, 4, our emphasis). However, Boorse does not commit himself to the naturalness of nosography, i.e. the classification of

[2] See Boorse 1975, 57: "The root idea of this account is that the normal is the natural. The state of an organism is theoretically healthy, i.e. free of disease, insofar as its mode of functioning conforms to the natural design of that kind of organism. Philosophers have, of course, grown repugnant to the idea of natural design since its co-optation by natural-purpose ethics and the so-called argument from design. It is undeniable that the term "natural" is often given an evaluative force. Shakespeare as well as Roman Catholicism is full of such usages, and they survive as well in the strictures of state legislatures against "unnatural acts". But it is no part of biological theory to assume that what is natural is desirable, still less the product of divine artifice. Contemporary biology employs a version of the idea of natural design that seems ideal for the analysis of health".

specific diseases, in its current form (see 1977, 551–552), but only to the naturalness of the distinction between health and disease.

Yet both claims remain ambiguous.

Against naturism, it has been pointed out how problematic it is to assume that the normal is the natural: aren't diseases natural facts too (Worrall and Worrall 2001)? Boorse has not explicitly replied to this objection. One can nonetheless suppose that the species design, i.e., the "typical hierarchy of interlocking functional systems that supports the life of organisms of [one] type" (Boorse 1977), consists in a certain kind of stability or equilibrium or resistance to change. The maintenance of this species design is called survival and reproduction. This is also what is called a 'goal', to which functions are contributions, according to Sommerhoff and Nagel's analyses of this notion (Sommerhoff 1950; Nagel 1961; Boorse 1977). In a way, then, diseases are constraints that force the functioning to deviate from this natural norm. So while diseases obviously are natural phenomena, they can also be considered anti-natural in a sense. One can only guess what the BST would have to say in defense of this poorly justified claim that the normal is the natural.[3] If "natural" states are states in which an organism tends to maintain itself, it remains to be seen whether this conception can be defended in the face of stable, resistant pathological states, such as the metabolic syndrome. Such states display a homeostatic state of their own. Are they not "natural" too? Gross has recently defended the view that organisms naturally have multiple point attractors, some of which are pathological (Gross 2011). To be sure, they are less efficient ways of surviving, but they are still ways of surviving.

The naturalness of the distinction is supposed to be a matter of facts: it is not invented, nor is it dependent on our conceptions – it is discovered through experience and experimentation. The meaning of "natural" here seems to be simply "occurring in nature". It seems that such a commitment would also imply that 'health' and 'disease' refer to natural kinds, a thesis Boorse might not readily endorse for such broad concepts. In any case, he does not seem to take side in the similar, but different, debate about specific diseases being natural kinds. Yet what would remain of the idea that there is a natural distinction between health and disease, if health and disease are not natural kinds in the ontological sense? Boorse's main argument for naturalness would thus appear to be on the side of what we called here "methodological naturalism".

Methodological naturalism consists in the claim that priority must be given to a scientific investigation of x over any other kind of investigation. In the specific case of the BST's naturalism regarding health and disease, this should be interpreted as the claim that whereas other approaches investigate connotations and representations of x, only what science says of x defines x. A first important point to note is that this is obvious inasmuch as the BST's claim that a philosophical investigation of health and disease should at first focus on the "*theoretical* concept" of health and

[3] "Diseases are conditions foreign to the nature of the species" (Boorse 1977, 554).

disease as found in medical textbooks (Boorse 1975, 1977, 1997). Its goal is to: "capture a concept of health (…) in theoretical scientific medicine" (Boorse 2011, 19):

> The basic issue for the BST is normativism about health: whether health and disease, specifically, can be descriptively defined. The position that they can I am calling naturalism. (Boorse 1997, 21–2)

Second, and more specifically, this theoretical concept of health and disease has priority over the investigation of normative aspects of health and disease.

Through all these claims about naturism, natural distinction, and the priority of the theoretical, the BST seems to endorse methodological naturalism as well as ontological naturalism. Yet these are different positions. It sometimes seems that the former depends on the latter (Boorse 1977). Another naturalist, Hausman, defines 'naturalistic' views as '*non-evaluative*' – i.e., methodological naturalism, according to our distinction – and 'non-evaluative' as meaning that "whether a trait is (…) beneficial is not a human evaluative choice; it is nature's 'choice'" (Hausman 2012) – i.e., ontological naturalism.

Yet one might like to endorse methodological naturalism about health and disease, that is, the claim that "their recognition is a matter of natural science" without endorsing ontological naturalism, i.e., without assuming that "diseases are deviations from the species biological design". Fortunately, however, the success of philosophical investigation does not lie in the demonstration that disease is indeed a natural fact, but rather in the correct description of what medical science says it is. For instance, Boorse writes:

> Beyond disputes over the analysis of function, several authors charge the BST with using obsolete or oversimplified biology. (…) Insofar as the BST fits the medical idea of disease, the charge, if true, would simply prove that medicine is using bad biology. To have shown that fact clearly would be a virtue of the BST. (Boorse 1997, 28)

Thus, if medical science, which for Boorse means physiology, was wrong about health and disease being statistically species-typical or species-subnormal biological functioning, this would endanger ontological naturalism, not methodological naturalism. Because they are separable, and because ontological naturalism is not necessarily upheld by the BST, the investigation should focus on methodological naturalism, i.e. the question of whether the BST's description of the medical scientific concepts of health and disease is faithful and accurate.

2.2.2 The BST's Methodological Naturalism Consists in the Conceptual Analysis of a 'Theoretical' Concept

In the BST, health and disease in medical science are called 'theoretical' concepts. Methodological naturalism in this context implies a focus on medical science, i.e., on the theoretical concepts of health and disease. To describe the theoretical concept of health, Boorse uses the method of conceptual analysis. A conceptual analysis aims at a descriptive definition of the meaning of a term based on its use, that is, its

given extension. Stipulation is therefore normally banned. Nonetheless, Boorse recognizes that a bit of stipulation is always involved in his conceptual analysis, and readily embraces "rational reconstruction of a scientific concept in the style of Carnap, Hempel, or Quine" (2011, 20). But this stipulation has to do with either the "precisification" of a term or the "exclusion" of a case. For instance, medicine is faced with questions of what the norms are for the elderly: are the norms of health specific to this population or should we take adults as the reference group? Philosophers can advise physicians and physiologists to consider that the elderly have their own norms of health, thereby accepting that atherosclerosis is not pathological for all humans. A typical example of trivial exclusion is the stipulation that 'macacus ear' should not be considered a disease because it is a "structural disease" involving minor deviation from the functional design (1977, 566).

Moreover, as the BST is a description of the 'theoretical' use of the term 'disease' (and not the common use), this account is very different from other attempts at conceptual analysis of health in philosophy of medicine that search for a monistic concept capturing a common understanding, such as Nordenfelt's or Wakefield's. But what does 'theoretical' mean exactly for Boorse? First, the most important consequence or connotation of being 'theoretical' is being 'value-free'. For instance: "at least at the theoretical foundation of modem Western medicine, health and disease are value-free scientific concepts" (Boorse 1997, 4). Secondly, while the theoretical, value-free concept of health (and disease) is necessary to define the corresponding practical, value-laden concepts, the opposite is not true. In other words, the theoretical concept is the fundamental one upon which the other's practical and evaluative concepts are built (Boorse 1975).

Our contention is therefore that Boorse's methodological naturalism is the conjunction of two theses:

1. priority should be given to the theoretical, value-free, scientific concepts of health and disease
2. conceptual analysis is the right method for defining theoretical 'health' and 'disease'

It is interesting to compare this definition of naturalism to other positions in the debate about 'health' and 'disease'. Nordenfelt, a normativist, shares the second recommendation (Nordenfelt 1995), but he does not share the first one: he is therefore consistently not a naturalist. Wakefield abides by the second and by a qualified version of the first: he is a naturalist if one considers the dysfunction requirement of his "harmful dysfunction analysis" to be more fundamental than the harm requirement, and neutral if there is no priority (Wakefield 1992).[4] Murphy shares the first, but not the second thesis (Murphy 2006): in his own terms, he is an objectivist (first thesis), but also a revisionist (negation of the second thesis).

[4] The Harmful Dysfunction Analysis is the claim that for something to be pathological, harm done (according to social standards) and biological dysfunction (according to science) are conjointly required.

What, then, is essential to naturalism? It is obviously the priority given to a theoretical concept of health and disease, not the conceptual analysis of that theoretical concept. To the BST, however, description through conceptual analysis is as important as the theoretical stance. Both theses will be examined in turn in Sects. 2.3 and 2.4 of this chapter.

2.3 Conceptual Analysis of a Weak Theoretical Term: A Critical Analysis

How theoretical are the concepts of health and disease in medical science? Following Hesslow's analysis, we admit that they are weakly theoretical concepts at best (Sect. 2.3.1). This has an important consequence for Boorse's project of a conceptual analysis of health and disease, that is, the fact that it is not really a description. Indeed, because of their theoretical underdetermination, 'health' and 'disease' have several acceptable meanings that match with usage, among which it is impossible to choose from a merely *descriptive* stance (Sect. 2.3.2).

2.3.1 How Theoretical Are Health and Disease in Medical Science?

Hesslow (1993) questions the relevance of the conceptual analysis of 'disease' in general. One of his main points is that "[t]here is no biomedical theory in which disease appears as a theoretical entity and there are no laws or generalizations linking disease to other important variables" (Hesslow 1993, 5). Boorse concedes that 'health' and 'disease' are not formalized terms such as 'force' or 'electron' in physics, and that there is no formalized theory of health and disease analogous to the Hardy-Weinberg law or the axiomatized version of the evolutionary theory by Mary Williams (1997, 54). It is an important issue for methodological naturalism that its focus of interest – in philosophy of medicine, the concepts of health and disease – is not theoretically accurate. Indeed, what remains of a theoretical concept if there is no formalized theory that it is a part of? Nonetheless, Boorse does not agree that this undermines the BST. His defense consists in two additional theses:

(I) Even if physiological and pathological knowledge do not constitute a *theory* in the strong sense of the term, it is still a single, organized body of knowledge.
(II) There can be conceptual analysis even of non-formalized or weak theoretical terms: it is sufficient that there exist a scientific domain and a scientific usage of the concept inside this domain.

Let us see in more detail how these theses can be developed.

(I) The problem that such a naturalism encounters is that 'health' and 'disease' are weak concepts in medicine, just like "learning, memory, intelligence" in psychology (Boorse 1997, 54) or "validity" in logic (Boorse 1975, 60). What does "weak" mean here? None of these concepts is strongly operational, nor does any of them have explanatory status. There is nevertheless a set of "theoretical health judgments", "medical judgments of pathology" (Boorse 2011, 28), and "medical judgments of normality" (Boorse 2011, 30). This set obviously constitutes a "whole body of usage" (1977, 551). 'Health' and 'disease' can thereby be thought of as "intellectually organizing a body of knowledge" (Hesslow 1993, 4, cited in Boorse 1997, 54). This body of knowledge, usage or judgments, though not included in a clearly defined theory, would be nevertheless clearly, if implicitly, expressed in physiological textbooks and by nosology instead, that is, the classification of disease entities, in the standard form of the Nomenclature Boorse constantly refers to. Thereby, conceptual analysis should be conceived of as an attempt at a definition fitting all (and nothing but) the cases listed in the Nomenclature (minus a few questionable ones). It seems therefore that analysis of scientific usage would provide a good means to capture the theoretical meaning of the terms in question.

Is a concept theoretical only because it is extracted from scientific medical usage rather than common or practical usage? In fact, there is no reason why we should admit that medical scientists use a theoretical concept at all. In other terms, it is doubtful that all *scientific* terms have *theoretical* meanings. A seemingly good reason to think so is Boorse's insistence on physiology being the theoretical foundation of medicine. Yet, somewhat unexpectedly, his analysis remains focused on the nomenclature rather than on physiology itself (Nordenfelt 2001, 14). It seems plausible that the former is mainly based on the latter. But should not the analysis of a theoretical concept be based on an analysis of the theory itself, rather than on an analysis of the derived "body of judgments" that consist in its application? There is yet another problem in this position: the fact that the definitions of health as "statistical typical functioning in a reference class" and of disease as "statistically species-subnormal biological part-function" match most healthy or pathological cases – as far as physiology textbooks and the current medical Nomenclature are concerned – does not entail that *these are* the theoretical concepts of health and disease, in the sense of the description of the basic concepts at work in physiological science.

(II) Nobody doubts the fact that the theoretical terms of health and disease are currently not as formalized as certain others terms in science, or that there is no explicit, strong theory of what the natural phenomena of health and disease consist in. Several authors have raised the claim that conceptual analysis of a weak theoretical term like disease is not relevant because disease is not well-defined scientifically. Boorse sums up:

> other writers, notably Worrall and Worrall (2001), Murphy (2006), and Nordby (2006), reject conceptual analysis altogether. Worrall and Worrall call the attempt to define disease 'a degenerative project' (2001, 55). To Murphy, the best characterization of mental disorder

> as a theoretical concept must emerge from scientific *theorizing*, not analysis of scientific usage. (Boorse 2011, 20)
>
> The distinction between "scientific *theorizing*" and "analysis of scientific usage" is interesting, although Boorse does not say more about it. Whenever successful scientific theorizing occurs, scientific usage follows. On the other hand, scientific usage does not always follow scientific theorizing, nor is it always consistent. Analysis of scientific usage is naturalism of one kind – that advocated by Boorse – whereas when philosophy joins in scientific theorizing, it is naturalism of a different kind – that advocated in Murphy (2006) or Lemoine (2015).

Our contention in the following section will be to question these two claims (I) and (II). As a matter of fact, it appears that, in a naturalistic approach, conceptual analysis in the form of rational reconstruction is much more problematic for weak theoretical terms than Boorse seems to admit.

2.3.2 *Underdetermination of Weak Theoretical Concepts of 'Health' and 'Disease'*

Conceptual analysis and *rational reconstruction* as they were originally designed were supposed to apply to "weak" theoretical terms in a specific sense, in order to strengthen them up by formalization. To this end, a philosopher had to account for instances of correct use of the word in the terms of the existing formalized (or at least semi-formalized) scientific theory. If the term was theoretically ambiguous, that is, could refer to several theoretical entities within the formalized theory, then conceptual analysis could genuinely clarify the meaning of the term. A famous example is Carnap's analysis of 'probability', of which he distinguished two senses. As terms such as 'frequency', 'series' and 'events' were already formally defined as theoretical entities, as laws were already formulated, and as correct uses of the word in scientific discourse were also available, a conceptual analysis was possible, and its result was that the term had two senses within that theoretical framework.

Such concepts as health and disease do not come with a clearly defined theoretical framework. 'Disease' is a theoretically weaker concept than 'probability', because it does not even have *any* formalized theory to refer to. Pathophysiology may contain formalized theories and therefore relevant terms to define particular disease entities - for instance, glucose, Hb1c, insulin, pancreas, Langerhans cells, etc., which serve to define 'diabetes' -, but it does not contain any formalized theory of disease in general.

So, what are the *theoretical terms* to resort to in order to define 'disease' in general? Should they come from pathophysiology, or semiology, or epidemiology, or a mix of all these disciplines? The BST is bound either to choose one

disciplinary framework, or to pick terms here and there, or even to create them. It is true that terms such as 'function' or 'system' are widely used in physiology; on the other hand, 'statistical normality', 'species design' and 'reference class' are not. As it is, usage is ambiguous, and any disambiguation by a philosopher would be a theoretical choice, and thus a non-descriptive move towards *one particular* theoretical concept. The choice to introduce such concepts as 'statistical normality', 'species design' and 'reference class' is not trivial. These concepts do more than conferring accuracy through rational reconstruction: they go beyond a descriptive stance. Moreover, if any theoretical concept of disease in general was to come out of, say, physiology, how could a philosopher know that its definition should be couched in given terms (function, species design, reference class) rather than other widely used terms, such as, for instance, 'mechanisms', 'activities' and 'entities', or 'system', 'information', 'feedback control', and 'homeostasis'?

The general problem here is that of underdetermination of 'health' and 'disease', (due to the weak theoretical status of physiology) and the notion of a 'reference class' provides a clear example of this problem. To begin with, the phrase itself is nowhere to be seen in physiology or pathology, although it has been coined in other areas of science, e.g., statistics, programing, and decision theory. As a term in statistics and decision theory, it can definitely provide useful insight into how we should classify organisms in a species regarding health and disease. But this is definitely not a term used in physiology or pathology. It seems to us that the stipulation that takes place here (i.e., the choice of fundamental concepts in the terms of which the concept of disease should be explicated) is not explicitly assumed by the BST and renders it incompatible with a strict descriptive stance.

It could be answered here that the definition is no more stipulative than when any scientific theory is proposed. The BST would therefore not consist in a modest analysis and reconstruction of the meaning of the term 'disease', but in a much more ambitious analysis and reconstruction of the theoretical framework of our knowledge of diseases, from which a definition of disease follows: that is, as Boorse himself writes: "an *explanatory theory* of the whole body of usage" (1977, 551). In any case, we hope to have shown that a conceptual analysis of a weak theoretical term cannot be at the same time a descriptive and an explanatory theory (i.e. a philosophical theory) of what 'disease' means in scientific usage. Schwartz, for example, clearly endorses the project of a "philosophical explication" that wholly assumes that the definition is "a decision rather than a discovery" (Schwartz 2007). Any description implies the choice of one scientific domain within biomedical science, and maybe also an ambitious reconstruction of this scientific domain as a more formalized theory than is currently the case.

2.4 Is Medicine One Body of Knowledge Organized Around a Physiological Notion of Health and Disease?

In this last section, we provide arguments against Boorse's view that the medical concept of health and disease could and should be extracted from physiology and pathology. We proceed through two main arguments. First, we argue against Boorse's description of the so-called physiological notion of normality, and second, we argue against his view that physiology and pathology alone define the medical concepts of health and disease. We will then conclude, somewhat paradoxically, that the BST is best conceived of as a description of a concept implicit in medical *practice*.

2.4.1 Is There Any General Concept of Normality in Physiology?

The BST offers a conception of normality dependent on the notion of species design and attributes that conception to physiological science. Here is the BST's definition of normality: "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" (Boorse 1977). The whole picture of interlocking functions provides the description of a *species design*:

> For each type a textbook provides a composite portrait of what I will call the *species design*, i.e. the typical hierarchy of interlocking functional systems that supports the life of organisms of that type. Each detail of this composite portrait is statistically normal within the species, though the portrait may not exactly resemble any species member. (…) But the field naturalist abstracts from individual differences and from disease by averaging over a sufficiently large sample of the population. The species design that emerges is an empirical ideal (…). (Boorse 1977, 557)

At last, this definition is supposed to capture the core concept of normality in physiology and pathology: "The above account defines a theoretical concept of health, not a practical one. It aims at a pathologist's concept of disease, not a clinician's, and still less at any social or legal category" (Boorse 1997). According to Boorse himself, such a description is dependent on three concepts: reference class, statistical normality and biological function (Boorse 1997). Do these three concepts *describe* the use of 'health' and 'disease' in physiology?

2.4.1.1 Does Physiology Resort to 'Reference classes'?

The first of the three important concepts that define health and disease in the BST is 'reference class'. We have already said (see Sect. 2.3.2) that the term 'reference class' is not actually borrowed from physiology, where it is never used, but

stipulated by Boorse with the sense of "a natural class of organisms of uniform functional design" (Boorse 1977, 562). Nevertheless, this term is supposed to capture what physiological textbooks portray. Is that the case?

In the first place, no physiological textbook is dedicated to the description of all biological functions in one reference class, say, elderly women, but there are indeed physiological textbooks dedicated to the description of what is specific to such categories as women or children. There also are physiological textbooks dedicated to specific cases that are not relevant candidates for being a reference class: for instance, living in high altitude (West et al. 2012). In general, is it not a correct description of the structure of physiological knowledge to claim with Boorse that there is a typical functioning of, say, adult women, and that it is different from adult men in important respects?

In fact, two very different claims are mixed in this argument. The first is that there are several different types of general functioning in any species, not just one. This is a noncontroversial claim. The second is that clearly defined reference classes are necessary to physiology. This is questionable. As a matter of fact, we suggest that they are not, and that this concept has in fact been introduced not to describe physiological knowledge, but as a counter-argument to obvious objections to the claim that health and disease are the same for all individuals in a given species. Moreover, although it is crucial for the problem of the distinction between health and disease, it is, perhaps shockingly, not crucial to physiology. As a matter of fact, what reference classes should be is a question with no obvious answer in physiology, probably because physiology is not the place where the demarcation between health and disease is established.[5]

2.4.1.2 Idealization in Physiology Is not Statistical

The second concept defining health and disease according to the BST is that of statistical normality. Is it borrowed from physiology? To Boorse, from each reference class, an "empirical ideal" is abstracted through statistics and the pathological is the statistical subnormal: i.e., what is largely under the mean of a continuous distribution of the functional efficiency of a trait or a part. It has been argued that physiological normality is rather to be understood in a theoretical sense (Wachbroit 1994). In this sense, although biologically normal states can and do exist (1994, 588), normality itself is the idea of an idealization or simplification of the nitty-gritty of the functioning of an organism. Such an idealization is a necessary first step to account for biological organization and define observable effects as functions. Thus, according to Wachbroit, "the biological sense of "normality" is distinct from "normality" as either a statistical term or as a value term" (587), and "the distinction

[5] For another kind of criticism of Boorse's notion of "reference class", see (Kingma 2007).

between functioning and malfunctioning need not reflect any statistical norm, nor need it express cultural or ethical norms" (581).[6]

What is conceptually important, then, is to understand that physiology is about explanations of states, not classification of states into 'normal' and 'pathological'. Physiology offers a specific kind of explanation which Wachbroit calls "explanations by approximation" or "perturbation analysis". The perturbation in question is exactly similar to friction in a pendulum or volume in a moving body abstracted as a point-mass. He considers pathological phenomena in general to be that specific kind of perturbation physiology studies.

There is no discussion of Wachbroit's article in Boorse's later papers. The debate is about the notion of the 'normal', meaning 'frequent' or 'canonical,' and, beyond this, about whether physiology is a descriptive or explanatory science. We have a preference towards the second thesis, provided allowance is made for the fact that physiology is hardly a statistical discipline, and that the notion of 'statistical normality', which is indeed important in medicine, comes from biometry or anthropometry, or even perhaps epidemiology, rather than physiology. It is true that normal values corresponding to normal levels of part-function efficiency are often taught in physiology courses; but it is also true that the point in physiology is to *explain* how the body works first, and then to *describe* what normal (or physiological) values are. The functions of organs or parts of the body are normal to the extent that they are described in theoretical models.

2.4.1.3 Are Biological Functions "Contributions to Survival and Reproduction"?

The third and last concept basic to the BST is that of biological function. We agree with Boorse that the concept of a function used in physiology and in medicine is systemic rather than evolutionist (or etiologic). What is questionable is the claim that survival and reproduction are the basic goals physiologists assume for the organism: "since physiology [is] the subfield on which somatic medicine relies, medical functional normality [is] presumably relative to the goals physiologists seem to assume, viz, individual survival and reproduction" (Boorse 1997, 9).

Wachbroit discusses the notion of a goal of an organism in physiology: his conclusion is that for any part of the organism, no goal can be assumed before normality (in the aforementioned "theoretical" sense) is defined (Wachbroit 1994). A goal is therefore to be understood as something that part of the organism does ideally, i.e., when it is not perturbed. This seems to have counter-intuitive consequences. For one, is this notion of normality the physiological notion of health (and perturbations to ideal functioning the physiological notion of disease)? It seems so insofar as Wachbroit only mentions pathological phenomena as examples of

[6] According to Wachbroit, it is not statistical, but it is not without link with the statistical: "statistics, for example, may provide important evidence for determining biological normality and biological functions" (Wachbroit 1994).

perturbations. Our view, however, is that physiology offers models of isolated, partial systems of the organism, once *the variations of the other systems in the organism have been abstracted*, bearing in mind that these variations are also considered perturbations of ideal states, though they cannot be considered pathological phenomena. Heart rate and blood pressure normally (in the medical sense) increase and decrease in quite dramatic proportions under the influence of other systems in the organism, yet this is not normal (in the physiological sense): that is, it is not *canonical*.

The upshot of this first analysis is that physiology does not contain a picture of interlocking systems tending toward survival and reproduction in a way that is typical in a certain reference class. It contains a collection of separated ideal models of partial subsystems in the organism, plus a description of the relations that obtain between a few of them.

2.4.2 The Prominence of Physiology in Medicine

In this last section, after examining Boorse's conception of the status of physiology, we suggest that physiology and pathology, though 'basic' in some sense, are not 'basic' in the sense of defining, by themselves, theoretical concepts of health and disease for the rest of medical science. Other medical sciences could also participate in their determination. Thus, a naturalistic definition of health and disease should probably be based on more than one medical science.

2.4.2.1 What Does Being "The Paradigm Health Discipline" Involve?

According to the BST, physiology is "the paradigm health discipline" (Boorse 1975, 49). What does 'paradigm' mean? Physiology and its counterpart, pathology, are "basic" medical sciences which are "distinctively medical in being wholly devoted to [health and] disease." As such, they are opposed to "biochemistry, genetics and other biological sciences" (Boorse 1997, 52). We understand that among biomedical sciences, physiology and pathology are paradigmatic because they are the only ones to be both 'basic' and 'distinctively medical'. Molecular biology, genomics, and so on, are basic sciences but are not distinctively medical (in fact, they are more basic than physiology and pathology, because the latter are "based on" the former). What does 'basic' exactly mean? It seems that pathology, for instance:

> comprises whatever general principles about disease can be stated, plus descriptions of basic manifestations and recurrent types of pathologic reaction with whatever generality is possible, plus specific disease entities. (Boorse 1997, 52)

Moreover, other medical sciences seem to be "based on" physiology and pathology in the sense that the latter two provide some kind of starting point for the discovery, and framework for the organization, of further biological knowledge:

> In general, there is clearly some plausibility in the claim that the history of medical theory is nothing but a record of progressive investigation of normal functioning on the organismic, organic, histologic, cellular, and biochemical levels of organization, and of the increasingly subtle kinds of pathology this investigation reveals. (Boorse 1977, 560)

What concerns normal function is physiology and what concerns dysfunction is pathology, whatever the level. Therefore, every new discovery in medicine, past or future, will fall into one category or the other; this, in any case, seems to be Boorse's main idea. New knowledge is just a matter of further accuracy in determining what function and dysfunction consist in. That is a crucial thesis for the BST: the prominence of physiology and pathology in medicine, meaning their being the more basic and specifically medical sciences, justifies the prominence and centrality of physiology and pathology in defining health and disease. We question this crucial thesis through two arguments: (1) Boorse does not even mention the ongoing debates about whether physiology is just such a theoretical framework for medical knowledge, and about the disciplinary status of physiology as a science and as a profession (Kremer 2008); (2) he seems to assume that health and disease are basic concepts not only for, but also of, physiology.

2.4.2.2 Is Physiology a Basic Science?

According to Boorse, physiology is the basic biological science of medical practice. However, although physiology has mainly been developed for medical purposes, it is questionable that it is medical in itself. Comparative physiology, for example, which Boorse himself evokes (Boorse 1977), is not a medical science, and yet it is not simply homonymous with medical human physiology. Besides, physiology seems to have had a murky status from the beginning of the twentieth century: is it a discipline, an "attitude", or a "supradiscipline"? (Kremer 2008) Some defend the idea that it is not a science but rather a point of view that pervades the life sciences, a way of looking at life processes. Indeed, "to a host of observers, physiology in the twentieth century, especially after 1945, has seemed like a discipline on the verge of "being pulled apart" by new clinical specialties such as endocrinology or immunology and by new biological disciplines such as biochemistry or neurology" (Kremer 2008, 358). Moreover, medical science has dramatically evolved since the 1970s. Even nowadays, there is still much debate about how physiology should be defined. Some, probably in large part because they do not consider themselves as institutional physiologists, seem to consider that it is a historical, outdated phase of biomedical science, a certain way of experimenting on living beings, mainly at the macrolevel; this paradigm may still be useful, but it is certainly losing ground to the emerging sciences such as systems biology and the various "–omics". To them, physiology is perhaps not dead yet, but surely dying (Pinter and Pinter 1993; Barman et al. 2013).

Obviously, Boorse does not feel today the need to address this debate. The reason, as we will show in the last section of this paper, is probably that his view is based more on what physiology is to the *practitioner* than on what it is to the *researcher*.

2.4.2.3 Are 'Health' and 'Disease' Basic Concepts for, or Basic Concepts of, Physiology?

There is both a broad and a narrow sense of 'physiology'. In the broad sense, physiology can be defined as the science of function and dysfunction, health and disease. Now, function and health are the objects of physiology in the narrow sense, i.e. of 'normophysiology', whereas what dysfunction and what disease are the objects of pathophysiology (as a part of physiology in the broad sense).

Boorse is consistently looking for a theoretical definition of health and disease in physiology, because they are its objects of investigation. But a science can either investigate an object it itself defines, or an object defined for it by another science. Geometry defines triangles and investigates their properties. In the same way, diabetology defines diabetes and investigates its properties. Triangle and diabetes are basic concept not only *for*, but also *of*, respectively, geometry and diabetology. But, on the other hand, medical anthropology investigates specific properties of objects that it does not define in the first place, such as 'disease'. 'Health' and 'disease' are basic concepts *for* physiology (in the broad sense), but are they basic concepts *of* physiology? The priority Boorse attributes to physiology assumes that health and disease are basic concepts *of* physiology, for it is to physiology that Boorse thinks we must look to find a definition of health and disease.

This is questionable for several reasons.

First, the fact that the BST manages to provide a definition of health and disease based on physiological concepts such as 'function' is no evidence to the fact that they are basic concepts of physiology. On the contrary, we already mentioned that the statistical side of the BST, i.e., the statistical concept of normality and the notion of a reference class in particular, are foreign to physiology. It follows that either the definition the BST provides is not the correct one, or that it is not the basic 'physiological' definition.

Second, it is consistent to claim that physiological science in the broad sense deals with healthy and pathological states, but that it does not define them as such. What is deemed healthy is studied in physiology, and what is deemed pathological in pathophysiology, whatever is meant by these two words. Sometimes, the study of a supposedly healthy state is recategorized as pathological owing to certain properties it exhibits, and the reverse can also be true. But this does not mean that the question is settled on physiological considerations. When physiologists discovered how high blood pressure could lead to strokes, the negative social consequences of strokes could, in addition to their impact on survival, have been sufficient to consider that high blood pressure might be pathological.[7]

[7] See for example Canguilhem (1991, 123): "The question is whether it is physiology which converts – and how? – descriptive and purely theoretical concepts into biological ideals or whether medicine, in admitting the notion of facts and constant functional coefficients from physiology would not also admit – probably unbeknownst to the physiologists – the notion of norm in the normative sense of the word. And it is a question of whether medicine, in doing this, wouldn't take back from physiology what it itself had given".

We will not endorse either claim here, but instead observe that it is possible that no demarcation is needed between the healthy and the pathological for physiology to study the workings of the organism. As a matter of fact, the basic concern of physiology is not to distinguish what is normal from what is abnormal; it is to investigate how the organism works, in health as well as in disease. Such a claim is not so far from Hausman's (2012, 540) who defends the idea that "for theoretical purposes, the distinction does not need to be drawn at all".

Third, it could be the case that physiology does not itself define health and disease, but participates in their theoretical definition. On such a view, health and disease would be inter-theoretical concepts, and perhaps also the central concepts of an "interfield theory" (Darden and Maull 1977). As its name suggests, an interfield theory is designed to bridge various fields, none of which having a theory of its own, but sharing both a common interest in explaining the same phenomena and common knowledge about those phenomena. It often occurs that questions that emerged in one field can only be answered thanks to knowledge coming from another field. The interfield theory addresses the question of the relations between the various fields. This is not the same thing as an integrative theory, which would *encompass* various fields. In medicine, health and disease clearly play that role. The various domains this theory has to link comprise physiology, pathology, epidemiology, bacteriology, semiology, genetics and more besides. The population perspective of epidemiology, for instance, introduces specific knowledge and explanation regarding the normal and the pathological, i.e., knowledge that is not reducible to functional or physiological analysis and description (Giroux 2015). Darwinian medicine has shown that there are at least some kinds of processes that have particular features as regards heredity and evolution which could be defined as pathological from an evolutionary perspective (Nesse et al. 1996). Insofar as one considers that there is a consistent theoretical and medical notion of health and disease, the interfield theory *unites* all those fields. Here again, we get an idea of why the BST resorts to a statistical view: that view could be key to an inter-theoretical, naturalist definition of health and disease. We will not develop this idea further here.

The above analysis of physiology presents us with three possibilities: (i) there is no theoretical definition of health and disease in medicine; (ii) Boorse fails to reconstruct one on purely physiological grounds; (iii) such a definition cannot be found in physiology alone. Yet the BST is obviously neither counterintuitive nor overly dependent on stipulation. One question thus remains: what theoretical concepts of health and disease does the BST capture, if any?

2.4.3 The BST: Health and Disease as Implicit Theoretical Concepts of Medical Practice

Boorse claims that the BST captures the meaning of health and disease in a body of knowledge consisting of consistent health judgments. He also claims that this meaning is theoretical in that it is based on physiological science. The result of our analysis

is that the latter is untrue, but not that the former is untrue. On the contrary, the BST seems to be a good analysis of the criteria of health that practitioners have in mind when making judgments faced with individual cases. The *theory* of health and disease it captures is not, therefore, a theory that recapitulates our scientific knowledge of what health and disease consist in general, but rather a theory of how they are used in medical practice (and that probably guide medical research).

A health or disease judgment is a proposition asserting that x is healthy or that y is a disease, x being for instance 'having a heart rate of 60/mn at rest' or y being 'having a heart rate of 120/mn at rest'. What is the justification for such a body of judgments? This is the question the BST addresses. It is exactly tantamount to asking what justifies, in medical practice, the demarcation physicians make between healthy and pathological conditions. The answer is a given theory, i.e., the BST (at least according to Boorse). That demarcation remains implicit in usage, and the BST is about making it explicit.

But this theory is not at all identical with what physiology has to say about health and disease (and so does not fit even methodological naturalism). It is based on a broader basis, just as medical practice is not based on physiology alone, but also on epidemiology, statistics, clinical knowledge, and so on. On the other hand, physiology has more to say about health and disease than just the systemic notion of a function as a contribution to survival and reproduction. Notions such as metabolism and catabolism, homeostasis and allostasis, and '–osis' and '–itis' phenomena, such as sclerosis or arthritis, would tell us much more about how health and disease are theorized in physiology and pathophysiology.

2.5 Conclusion

The upshot is that the BST fails as a naturalistic theory in the methodological sense, that is, in the sense of describing medical theory. Since this sense is primary for Boorse, given the ontological sense is based on it, the BST fails in being naturalistic in both of the two senses of 'naturalism' we have proposed with regard to the BST. In other words, when claiming to find a genuine, physiological sense of health and disease, the BST ultimately only imports the implicit notion of these notions that physicians have in mind.

It does not follow that methodological naturalism is refuted. On the contrary, we believe that it is only by rejecting the method of conceptual analysis, at least as it is applied by the BST and its opponents, and by embracing a wider view of what medical knowledge consists in, that satisfactory naturalistic definitions of health and disease are likely to emerge. In particular, it does not make sense to look to physiology to find a health-disease demarcation, for physiology is incapable of providing one. Moreover, it is questionable whether the concept of a general and basic physiology is still relevant today. A further question of significant interest is whether there are field concepts of health and disease, or whether these concepts instead belong to a consistent and unified interfield theory.

As regards the BST itself, we consider that its intuitive appeal is sufficiently strong that it should not, and will not, be abandoned altogether. Indeed, we consider it to be the best philosophical attempt thus far provided of a theory of health and disease. Like any scientific theory, however, it is unlikely to stay the way it was originally conceived, and must instead evolve.

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Chapter 3
In Search of Normal Functions: BST, Cummins Functions, and Hempel's Problem

Denis Forest and Marion Le Bidan

Abstract One key element of Boorse's view on health and disease is its definition of Normal Functions. In this paper, we question his reference to survival and reproduction both in this definition and within the general framework of BST. We suggest that, beyond the naturalistic stance of BST, this reference is motivated by what we may call Hempel's problem, that is, the necessity to make explicit the background of functional ascriptions in scientific contexts. We offer reasons to doubt that Boorse's solution of Hempel's problem coincides with standard medical thought and we suggest an alternative.

Keywords Biostatistical theory • Cummins functions • Mechanisms – Norms of functioning

3.1 Introduction

A theory like the Biostatistical Theory vindicated by Christopher Boorse in his papers (Boorse 1977, 1987, 1997, 2002) does not have to be accepted, or rejected, as a whole. Since we sympathize with its naturalistic spirit, its ambition to give us a value-free conception of health, in what follows we will accept the broad framework of BST, its idea of a functional Design of biological species, its view of statistical normality within each given reference class, and the usefulness of the concept of normal functions if we want to define disease in a non-arbitrary way. What we want to pay critical attention to, however, is the definition of normal function offered in the context of physiological medicine. As is stated in the seminal paper *Health as a theoretical concept* (Boorse 1977):

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> 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* [emphasis added].

We would like to raise two questions:

- What are the relations between the conception of function proposed by Cummins (1975) and the concept of Normal Functions as it is defined within BST?
- Is it necessary to refer to individual survival and reproduction when we define normal functions in the medical domain, and if not, what would the alternative be like?

It seems quite obvious that the reference to biological notions like survival and reproduction within BST has a double motivation. First it derives from Boorse's rejection of constructivist and normativist views in philosophy of medicine: one way to obtain a value-free definition of health is to assume a continuity between the medical perspective on health and the biological sciences, among which evolutionary biology has a prominent position. Second, this reference also derives from the necessity to make explicit the background of both functional ascriptions in physiology and non-arbitrary judgments about disease states. This could be called Hempel's problem, as Hempel wrote "It is essential […] for functional analysis as a scientific procedure that its key concepts be explicitly construed as relative to some standard of survival or adjustment" (Hempel 1965). If producing a given amount of noise was considered a distinctive and important ability of the body, then the noise made by the heart while pumping blood would be one of its functions and a silent heart (other things being equal) would be *impaired* or malfunctioning. In this sense, solving Hempel's problem is important for philosophers of medicine because drawing the line between health and disease is tightly linked to our ability to draw another line between functions and mere side effects of physiological activity, and to do this we need what Hempel calls "some standard of survival or adjustment".

The rationale underlying Boorse's definition of normal functions is that other possible solutions of Hempel's problem will not work. In his famous paper (Cummins 1975), Cummins has provided us with a definition of what a function can be in a context where we analyze a system in order to be able to explain its distinctive capacities. To summarize Cummins' view:

- The function ϕ of a component C in a given System S is its contribution to the explanation of S's ability to ψ.

It is reasonable to understand physiological decomposition of the body as applied functional analysis using this causal role concept of function (Craver 2001), and to understand medical conditions as impairments of Cummins functions of some kind.[1] But if the function of C is its *contribution* to the explanation of ψ, it is well

[1] In the literature, the concept of function analyzed by Cummins in his paper of 1975 has received different names: Amundson and Lauder speak of "causal role functions" (Amundson and Lauder 1994), Craver of "role functions" (Craver 2001), Godfrey-Smith and Millikan of "Cummins functions", (Godfrey-Smith 1993; Millikan 2002). Without having reservations on alternative choices, we shall use "Cummins functions" in the rest of the present paper.

known that we may ascribe functions quite liberally and Hempel's problem is still unsolved. As noted by Paul Griffiths, the ability of the human body to die of various diseases may be analyzed as a systemic high-level capacity and body-parts may receive "functions" accordingly (Griffiths 1993). This suggestion reminds us that medical sciences are interested in only a subset of all possible Cummins-style functions. Accordingly, Boorse's BST can be construed as an answer to Hempel's problem in the medical context where enabling the individual to die of heart failure cannot be understood as the function of the heart.

However, once we have in mind these two reasons why normal functions within BST receive the definition quoted above, we may part company with Boorse. First, naturalistic views in medicine are not necessarily linked to the framework of evolutionary biology. For instance, the suggestion that psychiatry is nothing but clinical cognitive neuroscience, made recently by Dominic Murphy (2006), is clearly naturalistic (if psychiatry is a part of clinical cognitive neuroscience, then mental disorders can be understood as neurocognitive disorders), but it does not rely on evolutionary considerations. Second, we may doubt that Boorse's solution to Hempel's problem is the only one, or in many cases the best suited to ordinary medical thought and practice. More precisely, we may doubt that the only way to constrain functional analysis in order to define normal functions is the one favored by Boorse. This leaves us with a question: how could we redefine the proper background of functional ascriptions in physiology and medicine?

In this paper, to underline what is special to BST we begin by making more explicit the analogy between Boorse's construal of normal functions and Cummins functions (3.2). Then, we question the usefulness and relevance of the reference to survival and reproduction: to do that, first, we analyze briefly some aspects of mechanistic explanations in medicine (3.3); second, we propose a thought experiment to reflect on what sufficient conditions of disorders and impairments may be (3.4). Then we suggest an alternative to BST's understanding of the background of normal functions ascriptions (3.5).

3.2 Normal Functions and Cummins Functions: A Family Resemblance

Even if Boorse himself, as we know, has expressed strong reservations about Cummins-style causal analysis (Boorse 2002), some philosophers like Karen Neander (2009), have seen a close connection between what is suggested by Cummins and the spirit of Biostatistical Theory. If, according to Cummins, functions are, in the words of Karen Neander, "actual causal dispositions of things, which contribute to a complexly achieved overall capacity, *z*, of a system, *S*, when *S*'s capacity for *z* is under analysis" (Neander 2009), then Normal Functions as seen by Boorse can be understood as a *special* kind of Cummins functions, namely, those causal dispositions that contribute to a specific class of capacities of living systems, the abilities to survive and reproduce. The vocabulary used by Boorse in "A rebuttal

on Functions" (Boorse 2002), where he advocates what he calls "a general goal-contribution (GCC) analysis", strengthens our thesis: such an analysis "defines functions generally as causal contributions to goals" (Ibid., 63). According to Boorse, goal-directedness is the background of all functional ascriptions in medicine, and survival and reproduction are the appropriate goals to which any functional activity contributes within the biological world, in the absence of intentions and purposes.

We observe that both Boorse and mechanistic philosophers inspired by Cummins (Machamer et al. 2000; Craver 2001, 2007) are ready to describe living systems in terms of hierarchical organization, with several integrated levels. For instance, "The structure of organisms shows a means-end *hierarchy* with goal directedness at any level" (Boorse 1977, emphasis added), "Mechanisms occur in nested *hierarchies* and the descriptions of mechanisms in neurobiology and molecular biology are frequently multilevel" (Machamer et al. 2000, emphasis added). The idea of Hierarchy is clearly central to the analysis of functioning and non-functioning living systems. But we think the analogy ends there: Biostatistical Theory is, so to speak, far-sighted: it looks at *distal* effects of causal dispositions situated at what Boorse calls "the Apex of the hierarchy" (Boorse 1977). Goal-directedness goes beyond the limits of physiological organization because physiological organization offers means to reach behavioral and, ultimately, biological goals. By comparison, causal analysis is, or may be, near-sighted: its aim is the explanation of higher-level capacities, and the *explanandum* can be located at *any* level of the hierarchy. Within BST, normal functions are related to the biological goals of survival and reproduction, because, as we have seen, these goals alone are supposed to solve the demarcation problem. Normal functions are those effects that serve the highest-level biological goals. On the contrary, causal role analysis is concerned with the explanation of causal dispositions at any higher level; it may be concerned with typical effects, but not directly by their adaptive value. In the perspective of causal analysis, functions are regular conditions of distinctive effects within living systems, whatever they may be.

3.3 Immunity to Refutation, and Why It Is not Enough

In order to avoid mistaken objections about BST, we shall add first several caveats. First, in Boorse's definition, when it is said that a normal function of a part or a process is its contribution to the individual's survival and reproduction,[2] this is clearly meant by Boorse as a typical contribution to individual survival *or* reproduction (Schwartz 2007). Second, to say that the normal function of x within members of a given reference class is its statistical (positive) contribution to individual

[2] Garson and Piccinini (2014) have suggested that we substitute "survival and inclusive fitness" to "survival and reproduction" to handle cases like the one of the stingers of bees. While clearly an improvement on the original formulation, this proposal has little consequence for human medicine and it remains within the framework of evolutionary biology in its definition of normal functions.

survival and reproduction is not to say that a disease is a condition that in all cases reduces longevity or fertility, or in the terms of Boorse himself, that the "failure" of "physiological functions […] will be fatal in any particular case" (Boorse 1977, 561).

In our view, the main point is not that, for instance, medical reasons may occasionally keep a recruit out of the army and save his life (Boorse 1977, 545); or that in a society that is "suitably supportive" an individual with a medical condition "won't necessarily have lowered expected survival or reproduction", as Schwartz has pointed out (Schwartz 2007). The main point is rather that survival and reproduction are crucial in BST in the definition of normal *functions*, but not directly, as Wakefield seems to think (Wakefield 1992, 378), in the characterization of *diseases*. For example, a segmental (or focal) vitiligo counts as a disease, as it results from a local dysfunction of the skin, even if we can suppose that it would have no effect on individual survival and reproduction. A segmental vitiligo counts as a dysfunction because skin itself, seen as an organ (Boorse 1977, 561), has a normal protective function, not because *any* disease of the skin has life-threatening consequences. This means that if understood correctly, BST is immune to refutation through cases of disorders that have no effect on mortality or fertility.

We agree that the fact that many diseases are not life-threatening cannot be used as evidence against the type of definition of normal functions that is offered by Boorse. But it gives us no reason to favor his conception of normal functions against others, or to consider that in physiological medicine in general, what is called a dysfunction is diminished efficiency in the contribution of a given part or process to the survival or reproduction of the individual, although we gladly recognize that in many cases, physiological dysfunction may usually *coincide* with such consequences on survival and reproduction. For instance, in Alzheimer's, research tells us that neurofibrillary tangles, or the tau proteins that are their main components, disrupt axonal transport (Hemachandra Reddy 2011). To understand this explanation of neurodegeneration, we have to know that axonal transport of organelles is the function of microtubules within neural cells, and that neurofibrillary tangles, or something that is closely related to them, have a negative effect on the standard performance of this function. Losing the proper ability of microtubules to allow the transport of mitochondria has negative consequences at the upper level of synaptic activity. And to understand what makes Alzheimer's a medical condition, we have to correlate this disruption of the normal function of microtubules with consequences at the behavioral or cognitive level, where the loss of standard abilities is closely correlated to the spread of neurofibrillary tangles from one brain area to another. What we want to point out is that in this case causal analysis is able to ascribe a functional role to cell components within a physiological context, and to define a pathological mechanism without any direct reference to survival and reproduction. The upper-level consequences are well-identified through impairment, for instance, of standard human abilities like episodic memory. Microtubules have normal functions within cells, because what they make possible contributes to explaining the typical cognitive abilities of individuals. Impaired abilities of the individual (clinically salient) are the background of our understanding of the dysfunctional

state of microtubules and nerve cells. The combination of disruption of lower-level mechanisms and unhappy consequences at the cognitive and behavioral level is all we need to speak of abnormal functioning in this kind of case.

As we understand it, the reference to survival and reproduction in BST has a double status. On the one hand, it is part of a definition: according to Boorse, physiological functions *have to* be defined in terms of contribution to survival and reproduction. On the other hand, this reference could lead to an empirical research program: in each case, the performance of the function should have the predicted consequence on survival and reproduction, and as a consequence, its complete loss would usually reduce the fitness of individuals. Two things strike us here.

The first thing is that, although the concept of function that Boorse favors most of the time is not the etiological concept advocated by philosophers like Karen Neander (Neander 1991), when it comes to the explanation of the very *existence* of functions viewed as causal powers within organisms, his view of functions is then backward-looking, rather than forward-looking. "Skins, noses, and ears certainly play a causal role in the organized hierarchy of activities by which members of our species live and bear offspring. Otherwise they could never *have been established* in the species, at least by natural selection" (1977, 561) [Emphasis added]. But we know that aphasia is a pathological state without knowing much about the evolution of the language faculty, or about the exact role of natural selection within the evolutionary process that led to the acquisition of such a faculty. If the structure of human languages was, for instance, merely the consequence of a capacity that has been selected for reasons that have nothing to do with communication (Hauser et al. 2002), that would not change much in our judgment about aphasia. Conflicting scenarios about the evolution of language may be equally compatible with our medical assessment of language disorders. And no strong hypothesis about the selective advantage conferred by episodic memory, or linguistic ability in past history, needs to be confirmed for us to know that amnesia or aphasia are medical conditions.

Second, if, as is usually the case within BST, the reference to survival and reproduction is meant in a forward-looking manner, then in order to correctly ascribe a normal function we should always have at our disposal *evidence* of detrimental effects on survival or reproduction of the loss of a given function. For a given disease, we would need epidemiological studies and hard facts that would allow us to think that not only is the loss of a given function usually *correlated* with negative effects on fertility or longevity (due to the simultaneous loss of other functions), but that it is directly *responsible* for those effects. But, to come back to our former example, for medicine to define Alzheimer's or semantic dementia as diseases, it is not necessary to know something about the relations of, say, episodic memory, or semantic memory and expected longevity. In fact, while they are on firm ground when they speak of diseases in such cases, when it comes to the survival value of episodic memory, medicine doesn't know much – and it seems to us that, more importantly, it doesn't need to know.

3.4 Disease in a World Where Life Neither Begins nor Ends: A Thought Experiment

To these considerations, we would like to add a thought experiment. Let us compare two worlds that we shall call World 1 and World 2. World 1 is our familiar world. In World 2, there are people who look like us, whose physiological functioning is broadly like ours (except for genitals), but who are immortal and do not reproduce.

In World 1, we know that there is a condition called Huntington's disease with several distinct phases. The first signs consist in disturbances in the wake-sleep cycle. At a later stage, we can observe motor signs, and a gradual impairment of the mental processes involved in comprehension, reasoning, judgment, and memory. In the last stage, patients become unable to walk, have poor dietary intake, eventually cease to talk, and become unable to care for themselves, therefore requiring long-term institutional care. In this stage, life-threatening complications may result from injuries related to serious falls, poor nutrition, infection, choking, and inflammation.

In World 2, there is an internal device that works just like our central nervous system and brain, and there is a degenerative condition that has the same effects on cognitive and motor functions as Huntington's disease (except the life-threatening dimension of the last stage). Surely, we may conceive that such a degenerative condition would count as a disease in World 2, and we may also imagine in World 2 patients complaining because of their impaired abilities to walk, talk and remember, people who have legitimate concerns and do not suffer from hypochondria. We may even conceive forms of anosognosia in World 2 and patients who *do not* report any functional disturbance although they meet diagnostic criteria and mistakenly believe they are in good health. In World 2, some conditions would be considered dysfunctional or pathological, even if there is no theoretical background that allows us to say in this case that physiological functions are contributions to individual survival or reproduction. In World 2, medicine would certainly be similar to what medicine is in World 1, even if it had a narrower range – gynecology, for instance, would not be a medical specialty.

Consequently, even in such a world as World 2 in which nobody dies or reproduces, we can recognize not only that some states would count as diseases, but approximately *what* kinds of states would count as diseases. This means that maybe Boorse's intuition about a theoretical conception of health and disease based on a conception of normal functions as contributions to survival and reproduction is not the right one. Surely we refer to normal functioning when we consider a state as a disease, but maybe we don't consider normal functioning relatively to survival and reproduction in all cases.

One objection to our thought experiment would be that, of course, for a naturalistic philosopher, World 2 is not a genuine possibility. However, we agree with Derek Parfit (1984), that the real importance of thought experiments is to test our intuitions and concepts, not to explore real possibilities. In conceiving disease in World 2, we have an opportunity to reflect on the meaning of the concepts of health

and disease as we use them in ordinary life. If it is possible to conceive somatic states that intuitively count as pathological when survival and reproduction are not at stake, then our thought experiment tells us something, not about an imaginary world, but about what the sufficient conditions of normal functions may be for us.

3.5 Contribution to What? An Alternative View

One central worry is that in not referring to survival and reproduction and adopting Cummins-style functions, we would be led to false ascriptions of functions (Boorse 2002, 64–65). Causal analysis would allow us to ascribe functions where we do not need to and where we do not have to – in the non-living world, the cumulus clouds can be said to have the function to produce rain in the rain-cycle system (Millikan 2002). However, the question for us is not why such an inflation is possible in principle. It is rather to make explicit the reasons why physiology is interested in a subset of all possible Cummins functions, and why we can usually agree about them. This subset is defined according to an understanding of what a living organism is able to do, an understanding of its basic capacities. This is in a sense a variant of the idea of Functional Design. But our aim is to make explicit why it is clear that Korsakoff's syndrome is a disorder that deserves medical attention and prevention, even if we do not know much about the contribution or the lack of contribution of episodic memory to our ability to survive and reproduce.

Instead of being understood as contributions to survival and reproduction, we will suggest that normal functions may be understood as contributions to capacities that share three important features. First, such capacities are distinctive in a given reference class. For example, the capacity of one's arm to make a shadow on the wall is not relevant for medicine as a background for functional ascriptions, because it is not a distinctive capacity of the organism seen as a living system; it is a capacity that is shared with non-living entities, like piles of sand, and it is a capacity that is kept by the body after death.

Second, these capacities result from one's psychological and physiological organization, not from sociological and political conditions. Medicine will try to restore or preserve some specific cognitive capacities and would count their absence or disturbance as pathological or dysfunctional (the capacity to read, count, memorize…). But medicine will not be interested in the capacity to vote in a presidential election, because such capacities are acquired or can be lost because of external, sociological conditions. In a sense, the whole point of functional analysis (and physiological investigation) is to explain how these capacities become possible: in the formula by which we synthesize Cummin's view ("The function ϕ of a component C in a given System S is its contribution to the explanation of S's ability to ψ"), all the values of ψ may count as capacities of the organism.

Third, these capacities are typically needed for usual interactions between a member of the reference class and his environment. For instance, the function of the hip is to join the thigh to the pelvis, and ultimately, to make it possible for us to

walk. When a hip is dysfunctional, that is, when a patient is partly or totally unable to walk because of osteoarthritis, a medical intervention may set up a hip replacement. In this particular case, the ultimate capacity that physiologists want to restore is locomotion. But why should we say that its contribution to locomotion is the function of the hip? Not because the ability to walk contributes to survival, even if it is true that it does, but because the ability to walk is a capacity that is in our species (a) distinctive, (b) physiologically determined and (c) basic to our usual interactions with our environment. The primary medical justification of hip replacement is not to allow a person to live longer, nor it is the subjective preference of the patient, but it is our understanding of functional integrity.

We agree with Garson and Piccinini (2014) that in defining normal functioning we have to take into account appropriate levels of performance (what they call "rates of functioning"). But we suggest to define the adequate rate of functioning of a trait X in a situation s, not as its "adequate contribution to survival or inclusive fitness in s" but as its "adequate contribution to the intrinsic abilities of the individual that subserve its typical transactions with its environment".

We would like to mention several reasons why this characterization of the background of medical evaluations of health and disease might be preferred.

First, this characterization tells us, for instance, why there is something dysfunctional when in Huntington's disease the wildtype Huntingtin protein (Htt) is replaced by the mutant polyQ type (Schulte and Littletown 2011). We learn from medical research that the expansion of the polyglutamine domain of this protein (mutant polyQ) causes the formation of aggregates within neural cells with toxic properties, aggregates which induce neurodegeneration in the striatum region and among pyramidal neurons, this neurodegeneration leading to psychiatric disruption, cognitive deficits and loss of motor coordination. First, medicine contrasts the effects of the mutant form with the biological roles of the Htt non-polyQ-expanded protein. Second, these biological roles are identified within a causal chain which is related to the integrity of motor and cognitive abilities of the individual. Third, these motor and cognitive abilities are the background of the ascription of a normal function to the activity of the Htt protein, and when they are impaired, of the pathological character of aggregates within cells and of neurodegeneration. Lastly, the task of medicine is to explain how these specific abilities become impaired, and this task would be similar in World 2 where Huntington's disease cannot have a lethal outcome (see above, Sect. 3.4.)

Second, we want to pay attention to the fact that in different organisms, and even in different reference classes within the same species, health has different conditions but also different expressions. This has led Lennart Nordenfelt to hold that it is only by analogy that we use the concepts of health and disease when we consider animals and plants, because we cannot ascribe to them "vital goals" identical to the ones we have (Nordenfelt 1995). Although we do not think this is a very attractive solution in itself, it derives from a very perceptive view of the diverse, heterogeneous manifestations of health. Normal functions, as we see them, do not serve only the goals that are *common* to all biological entities. They serve the abilities that are *specific* to different species, the abilities through which different ways of "flourishing"

become possible. In our understanding of normal functions, we want to be sensitive to the *varieties* of health.

Third, we think our characterization is closer to the ordinary understanding of health and disease that is shared by patients and doctors, laymen and professionals. Patients often complain because of the impairment of their standard abilities (pain, and the inconvenience due to pain, are a major source of such an impairment) and doctors aim at restoring these standard abilities as much as they care about long-term consequences of diseases in terms of life expectancy. This means that there is a meeting point between a medical and a sociological approach of health: when Parsons pointed out that "illness incapacitates for the effective performance of social roles" (Parsons 1951), he understood health as the sum of the prerequisites of such a performance by the human adult, social roles being an important subtype of what we have called typical transactions or interactions with the environment.

Fourth, we think this characterization of crucial capacities fits the domain of mental health.[3] To know that drapetomania is not a mental disorder, we do not need to link mental health to survival and inclusive fitness. All we have to do is to observe that the decision to escape an unfair and cruel treatment is a reasonable manner to cope with unfavorable circumstances. To explain this decision, we only need the folk psychology of beliefs, basic rationality and desires, while to explain the Cotard delusion where a patient claims he is dead and his body is dead, we will need to go beyond our basic understanding of human behavior and try to explain his extraordinary beliefs, experiences and suffering. Our intuition is that there is something that requires a special kind of explanation in the case of the patient with a Cotard delusion and that there is nothing odd in the decisions and the behavior of the slave fleeing from a plantation. This intuition has to do with our knowledge of standard human abilities and dispositions, and not on tentative hypotheses on past or present biological consequences of cognitive activity. In the case of drapetomania, the transactions of the individual with his environment are unproblematic (even if his behavior may endanger his life) and we do not need to postulate any disorder or internal dysfunction to explain them.

To the charge of vagueness that can be raised against our alternative view, we would give the following answer: this vagueness is intrinsic to medical thought itself, at least in some areas of medicine. First, is "typical transactions with the environment" a vague notion in itself? Before an organism is dead, it always has some kind of "interaction with the environment", but only several of these interactions are distinctive in the sense we have defined above, and made possible by the integrity of the physiological organization of the individuals. In medical conditions, usually some capacities may remain intact while others do not – for instance, in a vegetative state. Second, we believe that the question of the appropriate level of performance of functions may be easier to answer if norms of functioning are defined in relation with the capacities as defined above, rather than with biological goals. For instance,

[3] In this paper, we do not address the question of the possibility of defining normal psychological functions on the model of normal physiological functions. All we claim is that *if* we can define them, it will be in their relation to capacities of the type defined here.

it is when neurofibrillary tangles produce significant consequences at higher levels of the organization of the brain, and have observable consequences on memory, that we shall speak of disease: failure to perform basic tasks, a clear sign of loss of competence and of impairment of typical transactions with the environment, will be the background of the ascription of a pathological state. Third, we also think that disputes in some areas of medicine are disputes that concern what "typical transactions with the environment" may be. Typically, in the province of psychiatry, it is disputable whether "transactions with the environment" in certain cases are the result of some kind of mental disorder or derive from atypical dispositions – see for instance the recent debate about axesuality as a sexual orientation rather than a disorder that cripples sexual functioning (Hinderliter 2015), or the mislabelling of young individuals with a reduced interest in social life as Asperger patients (Nugent 2012). We very much doubt that a reference to survival or inclusive fitness would help to draw the line correctly in such cases, which have to do with the general distinction between difference and impairment. Our hypothesis is compatible with a demand: the demand that atypical modes of functioning may be recognized as compatible with health.

One could also point out that, with our third characterization of capacities to which normal functions contribute, we are not far from the notion of *harm* as understood by Jerome Wakefield (1992): diseases and disorders are identified through their harmful consequences, and harmful consequences are tightly linked to the impairment of the transactions of an individual with his environment. However, saying that diseases and disorders are harmful is not necessarily committing oneself to a view where harm is appreciated relatively to cultural "values". Aphasia as a result of a brain dysfunction is harmful because *de facto* it disrupts communicational and social exchange (distinctive transactions with one's environment), not primarily because we give a special "value" to language in our societies. We can easily imagine a society where language would be "disvalued" for several kinds of reasons: aphasia would remain harmful because some personal interactions would become impossible under the circumstances. Abilities that subserve biological and social life are the proper background of normal functional ascriptions, and we conceive normal functions as enabling conditions within biological individuals of different types.

3.6 Conclusion

BST remains to date the most remarkable attempt to solve Hempel's problem (see above, Sect. 3.1), that is, to make explicit the background that justifies legitimate functional ascriptions in the context of biomedical sciences. In many cases, we agree that BST solves Hempel's problem, and that it leads to functional ascriptions that are the right ones. But in our view, effects on survival and reproduction could be seen as *consequences* of normal or abnormal functioning rather than as part of the definition of what normal functions are.

By saying that survival and reproduction may not be the most appropriate and universal background of functional ascriptions in medicine, by no means did we intend to deny that evolutionary considerations in medicine may be enlightening (Nesse and Williams 1995), or to minimize the fact that they meet human concerns of primary importance. In relation with this last point, we would rather underline that caring about survival and reproduction is not specific to medicine, but is common to several human activities: agriculture promotes the growth of human populations by providing food with high nutritive value; when they are protecting civilians, soldiers may prevent the early death of defenseless individuals; the birth rate in France compared to other nations in Western Europe seems to have everything to do with child-care services and other social measures and institutions. Medicine is only one among many activities that prevent untimely death and contribute to the growth of human populations. What makes medicine special is that it promotes life, but also restores physiological integrity, through knowledge of their internal, physiological conditions. It is this knowledge of enabling internal conditions of our distinctive abilities that makes medicine special as a science in general, although it shares with other social practices the ambition of promoting life and fighting against death.

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Chapter 4
Comparative and Non-comparative Concepts of Health

Daniel M. Hausman

Abstract Although Christopher Boorse relies in part on distributional facts to distinguish health from pathology, his account rests on comparisons of the functional efficiency of parts and processes. It is thus ironic that in defending a comparative view of health (whereby "healthy" is defined in terms of "healthier than", as "tall" is defined in terms of "taller then"), Andrew Schroeder criticizes Boorse for defending a non-comparative view. Schroeder's critique cannot be easily dismissed, because a comparative view of the functional efficiency of parts such as Boorse's, is consistent with a non-comparative view of overall health. This essay draws some conclusions concerning both how to interpret Boorse's view and whether a comparative view of health is, as Schroeder argues, superior to a non-comparative view.

Keywords Health • Christopher Boorse • Andrew Schroeder • Functional efficiency

Christopher Boorse defends a naturalistic theory of health in terms of the functioning of the parts and processes within organisms. He assumes (plausibly) that organisms are goal-directed systems with overall goals of survival and reproduction and that the systems within organisms are also goal directed, with goals that typically contribute to survival and reproduction. He takes the functions of parts and processes to be the contributions they make to the goals of the systems of which they are parts. Pathology is malfunction, where malfunction consists not only of a failure of a part to carry out its functions at all but also of a failure of a part to carry out its function well enough for the system of which it is a part to achieve its goals.

What is fundamental to health is how well parts are functioning, or, in Boorse's terminology, "functional efficiency." Judgments of functional efficiency evaluate functioning, but since the evaluation is in terms of the biologically given goals of organisms and their subsystems, the account is still naturalistic. Functional

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inefficiency can be a matter of both insufficient and excess functioning. For example, thyroid disease can involve excess hormone production as well as insufficient hormone production. Functional efficiency is also largely a matter of dispositions or capacity, rather than current activity. When there are no pathogens around, a healthy immune system may be as inactive as a damaged immune system, but the former, unlike the latter, is disposed to go into action when needed.

It is possible to define perfect function with respect to some systems within organisms, such as perfect teeth or optimal vision (given the design of the human eye), but for the most part judgments of functional efficiency are comparative. Though it would be hard to specify what perfect heart function, liver function, or kidney function would be, we can compare how well the hearts of different people function or heart function at one time to heart function at another time. And when all the parts of one organism are functioning with at least as much efficiency as the parts of another organism, we can say that the first is at least as healthy as the second. When some parts of one organism are functioning with greater efficiency than the parts of another and other parts are functioning at lesser efficiency, then more needs to be said before a comparison of overall health can be made. And the notion of functional efficiency does not by itself permit one to distinguish healthy from unhealthy organisms.

Although Boorse discusses functional efficiency explicitly, most of the commentary on his work has focused on how he distinguishes healthy from unhealthy or "pathological" part function. Because there are differences in the functioning of the parts of men and women, infants and adults, caterpillars and butterflies, the distinction between health and pathology must be relativized to what Boorse calls "a reference class" – in the case of mammals, an age group of a sex. Second, the distinction between health and pathology must be relativized to a typical environment. There is no distinction between healthy and pathological vision in complete darkness, and in unusual environments diseases may promote survival and reproduction. Healthy part function is thus part function that is "good enough" within the reference class in a typical environment.

When is functioning "good enough" – that is, sufficiently efficient? To help clarify his views, Boorse presents the following diagram[1]:

The horizontal axis in Fig. 4.1 represents level of functional efficiency, while the vertical is the frequency of each level in a reference class. The horizontal axis may in some cases be ambiguous, because the functioning of a part may have different efficiencies with respect to different goals of the organism or systems within the organism. There is no reason why the distribution of functional efficiency should be normal, continuous, single-peaked, or symmetrical, as the diagram might suggest.

What Boorse proposes, which at least as a rough cut is extreme plausible, is that the median efficiency of functioning in a typical environment in a reference class sets the benchmark. Functional efficiency at that level or greater, or levels of functional efficiency that are not much worse (in terms of their consequences for system goals) count as healthy. Levels of functional efficiency that lie in the lower

[1] (1987, 370; 1997, 8). Boorse accidentally reverses the labeling of the axes.

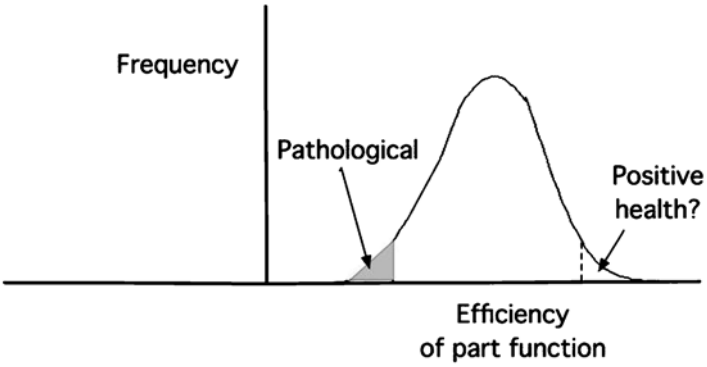

Fig. 4.1 Statistically subnormal part function

tail of the distribution and are "significantly" worse – count as pathological. Where to draw the line between normal and pathological functioning is arbitrary. "The concept of a pathological state has vague boundaries—though the vast majority of disease processes involve functional deficits by any reasonable standard" (1987, 371).[2] If, as I read Boorse, comparisons of functional efficiency are fundamental, unlike the distinction between pathological and healthy part function, this unavoidable vagueness is not a serious problem.

What, Boorse asks, apart from prevalence, would lead physiologists to conclusions such as that 20–20 vision is healthy while 20–50 vision is not, rather than judging them both to be pathological as compared to the vision of an eagle (Boorse 2002, 102) – or as compared to the maximum of which human eyes are capable, which is roughly 20–10? On Boorse's view, statistically normal functional efficiency with respect to some part or process is a sufficient condition for health in that regard. In other words, if the efficiency with which some part or process is functioning is not much below the level that is statistically normal, then there is no pathology: the part or process is healthy.

Boorse says relatively little about what it is for a whole organism (including a person) to be healthy. The complete absence of any pathology provides one standard of health, but it is too demanding. On that standard, nobody is healthy. Boorse maintains that in different contexts we have different standards and to some extent different notions of health. We are concerned about physical and mental conditions that cause people distress and that significantly limit what they can do, and we count as healthy people who are not distressed and face only normal limits. In a therapeutic context, doctors and other health professionals are concerned about whether individuals have a physical or mental condition that is treatable. Fundamental to health are comparisons of functional efficiency. Given the median as a benchmark, physiologists and pathologists can draw a theoretical distinction between healthy and pathological *part function*. But when it comes to specifying what constitutes

[2] See also Boorse 1977, 559.

overall health and comparisons of overall health, Boorse's theory allows context to rule, although not without some constraints.

In a recent paper "Rethinking health: Healthy or healthier than," Andrew Schroeder argues that appraisals of health should derive from comparative appraisals of specific aspects of health. I think his central thesis is correct, but he criticizes Boorse's theory on the mistaken grounds that it is committed to a non-comparative concept of health.

Schroeder points out that some monadic properties, such as "tall," derive from relational properties, such as "taller than," while others such as "straight," do not. Putting things roughly, one can say that something is tall if and only if it is taller than most of some relevant reference class, while whether something is straight does not depend on how crooked members of any reference class may be. The comparative notion, "straighter than" is instead defined by the non-comparative "straight": One line is straighter than another if it is closer to a perfectly straight line. As Schroeder reads the literature, both philosophical explorations of the concept of health such as Boorse's and practical systems for measuring health have treated "healthy" as a non-comparative notion like "straight," and to the extent that they have deployed a comparative notion of "healthier than," they have defined it in relation to a prior non-comparative notion of health. Schroeder argues that this is a mistake: he maintains that "healthier than" is the fundamental relation in terms of which "healthy" should be defined.

Schroeder offers two main arguments in defense of his thesis that the comparative notion should be fundamental. First, it enables one to make sense of how it is possible for medieval "Alys" to count as healthy in her environment, for modern Allie to count as unhealthy in her very different environment, yet for Allie to be healthier than Alys (2013, 138–42). If "healthy" were like "tall," this would be no more puzzling than if a tall medieval Alys were shorter than a short modern Allie. Second, and of greater practical importance, Schroeder points out that if health measures rely on a non-comparative measure of health, they either set the standard for health so high that most people count as unhealthy or they are unable to register important health gains or losses among the healthy. For example, if, as a result of disease or malnutrition, someone's IQ is reduced from 125 to 115 or their eyesight is 20–20 rather than 20–15, the person has suffered a loss of health that shows up on a comparative view of health, but which will be undetectable on a non-comparative view of health on which those with 20–20 vision and an IQ of 115 count as healthy (2013, 152–56).

One further important detail: as Schroeder notes (in agreement with Boorse and health measurement systems), health is multidimensional. People's health varies in many different ways that are difficult to compare. One individual may suffer from depression, while a second has headaches, a third has acne, and a fourth has irritable bowel syndrome. How can one compare them in terms of some "healthier than" relation? According to most systems of health measurement and according to the most prominent philosophical accounts of the concept of health such as Boorse's, the "healthier than" relationship is massively incomplete (Hausman 2012b). Health

states like those above are ranked by their *value* rather than in terms of any quantity or magnitude of overall health.

Rather than tackling the problem of defining a complete "healthier than" or "better health than" relation, Schroeder restricts his discussion "to assessments of health along a single dimension: asking whether someone is healthy or healthier than someone else with respect to respiratory function, for example" (2013, 133). Such judgments are, he maintains (in agreement with Boorse), "more basic than what we might call composite judgments of health: whether someone is healthy or healthier than others overall" (2013, 133). Moreover, Schroeder expresses some sympathy for the view that one cannot "meaningfully talk about" someone being healthier than someone else in a very different health state. Accordingly, Schroeder's discussion is limited to single-dimension judgments, and it leaves open the question of how the generic or, in Schroeder's terminology, the composite judgment that someone is healthy derives from a comparison of overall physical and mental states. Readers who skip the footnote where this issue is discussed may not notice that Schroeder does not address the question of whether the generic notion of being healthy should be defined by the generic comparative "healthier than." I shall return to this issue at the end of this essay.

Schroeder is, I maintain, mistaken to claim that a non-comparative notion of health dominates philosophical discussions of the concept of health and systems of health measurement.[3] I shall defend this claim with reference to the main examples that Schroeder discusses: Boorse's theory and the Health Utilities Index (HUI), a system of health-state classification developed in Canada. Version 3 of the HUI classifies health states by distinguishing five or six levels of functioning along eight dimensions: vision, hearing, speech, ambulation, dexterity, emotion, cognition, and pain. Schroeder reproduces the descriptions of the levels along two of the dimensions, ambulation and vision. Since the HUI(3)'s levels along the emotion dimension have much briefer descriptions, I shall discuss them instead. Here they are[4]:

1. Happy and interested in life.
2. Somewhat happy.
3. Somewhat unhappy.
4. Very unhappy.
5. So unhappy that life is not worthwhile.

With respect to emotion, those who fall under the first classification – that is, who are happy and interested in life – count as healthy. All the other levels of emotion are unhealthy. Schroeder maintains that "since it [the HUI] describes them

[3] He maintains that he has found only one explicitly comparative proposal, but he also concedes that some definitions of health appear to be implicitly comparative, and he allows for the possibility of what he regards as strained comparative interpretations of some explicitly non-comparative accounts (2013, 150). What matters, he maintains is that the accounts he will discuss are "formally non-comparative" (2013, 135).

[4] For an overview of the HUI(3) including the quality weights assigned to the health states, see http://www.healthutilities.com/hui3.htm. The emotion dimension makes it especially easy to make my case, but one can make similar arguments about all the dimensions.

[individuals who are at the highest level] as being *perfectly* healthy, the metric seems to be working with a non-comparative notion of health" (2013, 136 [Schroeder's italics]).

Schroeder's reasoning is as follows: If "healthy" is defined in terms of "healthier than," then the notion of being "perfectly healthy" is undefined. Since the HUI(3) countenances perfect health, it does not define health in terms of healthier than. On the other hand, notice that each level of emotion is obviously intended to be healthier (with respect to emotion) than the levels below. So, despite Schroeder's argument, there seems to be an underlying comparative notion of greater emotional health in the HUI(3), which is not defined in terms of perfect emotional health.

I think two related factors explain this tension or possible contradiction. The first, which Schroeder does not discuss, is the fact that many comparative adjectives have limits on their ranges. A young person may be older than an old dog, because "young" is defined as younger than most of the reference class. But a newborn is young absolutely, regardless of reference class. So it is possible, for example, for visual acuity both to be a comparative notion, with good vision defined as vision that is not much worse than average and also for there to be a notion of perfect vision for a given species defined in terms of the maximum capacity of eyes of that design. The possibility of defining a non-comparative notion of perfect vision does not preclude the possibility of defining "good" or "adequate" vision in terms of a comparative notion of "better" vision.

What is called "perfect health" with respect to vision in the HUI(3) is however not "perfect" vision, defined in terms of the maximum capacity of the human eye. The highest level of vision according to the HUI(3) is, instead, being "able to see well enough to read ordinary newsprint and recognize a friend on the other side of the street, without glasses or contact lenses." Since the health economists responsible for constructing the HUI(3) are no doubt aware that there are differences in how well the visual system is functioning among individuals who are "able to see well enough to read ordinary newsprint and recognize a friend on the other side of the street, without glasses or contact lenses," they cannot mean by "perfectly healthy vision" "perfect vision" (for a human being). Similarly, it is obvious that not all of those who are happy and interested in life are in perfect emotional health. In other words, the HUI does not count differences in visual or emotional functioning above some threshold as differences in *health* or in the value of health. In Schroeder's terminology, the HUI defines a "realistic" notion of health (2013, 136), where a realistic notion is one that counts most people living in favorable environments as healthy.

Why doesn't the HUI(3) allow that there are health differences among those who count as healthy? Why insist instead that all those who pass the threshold are perfectly healthy? One explanation is Schroeder's: since "healthy" is not defined in terms of "healthier than," there is no way to make sense of the possibility that some of those who are healthy are healthier than others who are also healthy – just as there is no way to make sense of the claim that some straight lines are straighter than others. Another explanation is that those responsible for the HUI(3) judged that it was not important to distinguish between (for example) those who can read nothing

smaller than ordinary newsprint and those who can read the compact edition of the *Oxford English Dictionary* without the magnifying glass that is included with it. As Schroeder mentions, health-classification schemes such as the HUI(3) can be regarded as like thermometers designed to check whether home freezers are operating properly. Just as such thermometers do not need to measure temperatures below 0° Fahrenheit, health measures do not need to measure vision that is better than that described in the top category (2013, 153).

Schroeder argues that the authors of such scales are mistaken not to discriminate among different health states that these scales lump together as "perfect health" (2013, 153–56). As illustrated above when discussing conditions that lower IQ while leaving it above a threshold of cognitive health or diminish vision from 20–15 to 20–20, Schroeder makes a strong case that for both the purposes of measuring population health and allocating health-related resources, differences in functioning among those who count as healthy should not be ignored. This is, however, an argument against relying exclusively on the distinction between those who are healthy and those who are not, whether or not "healthy" is defined in term of the comparative "healthier than" relation. It does not establish the conclusion that health measurement schemes rely on a non-comparative notion of health. Apart from the use of the term "perfect health," which, I have argued, should not be read literally, the HUI(3) appears to rely on a comparative assessments of functioning along each of its eight dimensions, whose highest level is fixed by practical (and contestable) considerations concerning which levels of functioning the health system should be concerned with.

Let us turn now to Schroeder's criticisms of Boorse. Schroeder quotes Boorse as saying,

> We have supposed that the basic notion is 'X is a healthy Y'[…] As long as the efficiency of all functions exceeds a minimum, any value of these traits is as healthy as any other. In this way, our definition […recognizes] a wide range of individual differences of equal intrinsic health'. (1977, 562–3)

Since Boorse says explicitly that the basic notion is "X is a healthy Y," Schroeder concludes that Boorse defends a non-comparative notion of health. But, before accepting Schroeder's conclusion, let us examine some of what he leaves out of the quotation. Here is the beginning of the quotation with some of the missing material restored:

> We have supposed that the basic notion is 'X is a healthy Y'—*that it is by comparing X with its reference class Y that one distinguishes the way X does function from the way it ought to.* This comparison presupposes enough uniformity in the species to generate a statistically typical species design (…). Correspondingly, no version [of a trait] is a disease unless it depresses some function far below the group mean. As long as the efficiency of all functions exceeds a minimum, any value of these traits is as healthy as any other. (1977, 562–63 [italics added])

This quotation is hard to interpret, and Schroeder's reading of Boorse's words is plausible. But the passage is compatible with the interpretation I offered above, which also makes better sense of Boorse's overall view.

Schroeder may interpret Boorse as follows[5]: Given the distribution shown in Fig. 4.1, one picks some low probability – that is, some small percentage of the area under the curve in Fig. 4.1 starting from the left and bounded by a vertical line. This choice defines health. Whatever levels of functional efficiency lie to the left of the vertical line bounding this region are pathological, while whatever levels are to the right of boundary count as healthy. Health is a non-comparative matter of prevalence.

This interpretation is untenable. Health cannot be exclusively a matter of prevalence, since health states whose functional efficiency is far to the right on the horizontal axis are also rare. A more plausible interpretation of Boorse takes the statistical distribution to be relevant only insofar as the median level defines a benchmark of "adequate" functional efficiency.[6] What distinguishes pathological from healthy functioning is whether the actual functioning or functional capacity is significantly worse than the median level. The low frequency of some level of functional efficiency tells us nothing about whether it is an adequate level of functional efficiency. That is determined by a comparative evaluation of how well the part is functioning. The only role for frequencies is to identify the median level of functional efficiency, the adequacy of which natural selection will secure in stable environments.

To judge how efficiently a (token) part is functioning is to judge how well the part is able to serve the goals of the systems of which it is a part. This judgment is independent of any information concerning frequencies. Indeed, until one has defined functional efficiency and how its levels are to be distinguished, one cannot talk about their frequencies and draw a graph such as Fig. 4.1. Boorse says little about how to define and measure functional efficiency (1977, 559; 1987, 371; 1997, 21), but however functional efficiency is to be cashed out, comparisons of functional efficiency coincide with judgments whether, with respect to some aspect of health, someone is healthier or less healthy than someone else. As noted above, Schroeder restricts his discussion "to assessments of health along a single dimension: asking whether someone is healthy or healthier than someone else with respect to respiratory function, for example" (2013, 133). To compare the functional efficiency of respiratory systems is to judge which respiratory system is healthier. In defining health in terms of functional efficiency, Boorse is accordingly doing exactly what Schroeder counsels.

What then should one make of the passage Schroeder quotes? Part of it, which Schroeder left out, supports the interpretation I am defending. "Correspondingly, no version [of a trait] is a disease unless it depresses some function far below the group mean" (Boorse 1977, 563). The "far below" here is a comparison of the trait's functional efficiency with the mean functional efficiency and suggests that Boorse is defining a comparative notion of the pathology or health of parts and processes. On the other hand, Boorse also writes, "As long as the efficiency of all functions

[5] It might be apparently uncharitable to attribute this interpretation to Schroeder. I think it is a common misreading, and it was in fact my own interpretation until recently.

[6] See Hausman 2012a. It is ironical that this interpretation derives in part from studying Schroeder's views (2012a, 535).

exceeds a minimum, any value of these traits is as healthy as any other"? One might interpret this, as Schroeder does, as committing Boorse to a notion of healthier part function that differs from more functionally efficient part function, at least for levels of functional efficiency above the median. Alternatively, one might take the beginning of the sentence, "As long as the efficiency of all functions exceeds a minimum," as suggesting that Boorse is thinking about how differences in part functioning affect practical judgments concerning whether people are healthier overall. Regardless of how one reads this passage, part of which favors Schroeder's interpretation, there is no way to make good sense of Boorse's overall view without recognizing that he defines "healthy" in terms of a comparative notion of greater functional efficiency which plays the same role as comparisons of how healthy parts and processes are. If Boorse did not start with such a comparative notion, he could not define levels of functional efficiency or talk about the frequencies of those levels, and it would be meaningless to maintain that pathology is species-subnormal efficiency of part function.

In defining healthy part function as part function whose efficiency is not much lower than what is statistically normal, Boorse is defining healthy part function as part function that is not much less healthy than what is statistically normal. He writes, for example, "In general, whenever one knows the goal [function] of a process, one knows what is more or less function, and *"deficiency," in the context quoted, simply means much less than average*" (1997, 21 [italics added]). Knowing the function of a part, one can evaluate its functioning (determine "what is more or less function"), which is precisely what it is for the part to be healthier or less healthy. Just as one defines something as tall if it is taller than the median in the reference class, so Boorse defines a part or process to be healthy if its functional efficiency is not much below the median level. If Boorse's account did not rely on a comparative view of health, there would be no reason to mention statistical normality. Nothing would depend on it.

By offering a comparative view of healthy part function in terms of functioning whose efficiency is not appreciably worse than the median, Boorse gets into hot water, because some pathologies, such as dental caries may be statistically normal[7]; and Hausman (2012a) has recently argued, in effect that Boorse's account is faulty precisely because its view of health is entirely comparative rather than sensitive to other relevant considerations such as design maxima like the maximum visual acuity of the human eye or the complete absence of dental caries. But this is not the occasion to offer a general appraisal of Boorse's theory. The point is rather that, despite the passage Schroeder quotes, Boorse's account of health is thoroughly – perhaps too thoroughly – comparative.

In conclusion, let me return to *overall* comparisons of health or overall judgments of whether someone is healthy. Schroeder's arguments in favor of regarding single-dimension health comparisons as fundamental do not establish that overall health judgments also derive from health comparisons. For example, for some

[7] Boorse is aware of this difficulty from his earliest publications. Schwartz (2007) argues that the problems extend to statistically abnormal but nevertheless common diseases, on the grounds that the distinction among subnormal states that are diseases and those that are not is not a statistical matter. On the interpretation defended here, the position Schwartz is criticizing is not Boorse's.

purposes, the most useful characterization of overall health might be something like the capability to engage in any of the common activities in one's society without significant difficulty, pain, or distress. For some purposes, such as appraising the cost-effectiveness of alternative policies, this concept of health would not be useful. But there may be other purposes that this concept of health serves. There is no way to know whether a comparative or a non-comparative concept or measure of health is preferable without specifying what one seeks to do with the concept or measure and without considering how well alternative concepts of health serve those purposes. In particular, a solid case for a comparative notion of health with respect to particular parts, processes, or dimensions does not by itself translate into a case for a comparative notion of overall health.

I also have some doubts about whether there is a fully general case to be made for a comparative notion of health with respect to individual parts, processes, or dimensions. If there are parts and processes that, given the "design" of the organism, have maximum levels of functional efficiency and that are in addition readily attainable in relevant environments, they would define perfect health without any reliance on a prior comparative relation of "healthier than." I think that some parts and processes in organisms have readily attainable maximal functional efficiency and that some parts and processes do not. Accordingly, I suspect that while Schroeder is right to maintain that many single-dimension health judgments are fundamentally comparative, not all of them are. Be that as it may, systems of health-state classification such as the HUI(3) rely on a comparative view of health, as does Boorse's biostatistical theory.

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Chapter 5
What a Naturalist Theory of Illness Should Be

Thomas Schramme

Abstract Christopher Boorse, the leading naturalist philosopher of medicine, used to interpret *illness* as a practical concept that involves normative or evaluative elements, which have to do with the undesirability of medical conditions. Later he changed his mind and has since regarded *illness* as a value-neutral concept, just like *disease*. An illness, according to his most recent point of view, is a "systemic disease, affecting the organism as a whole". Yet, his account of illness is still fairly undeveloped. In my contribution I want to scrutinize the notion of illness from a naturalist point of view. I will first draw on Boorse's theory and point out problems with it. I will then discuss the crucial question about the logical relation between the concepts of disease and illness, especially by discussing Bill Fulford's "reverse view". A naturalist account of illness holds that the extension of the concept of illness is restricted by the scope of the concept of disease, hence that a condition qualifies as a putative illness only if it is a disease. I do agree with normativists, though, in claiming that the concept of illness is evaluative; it refers to pathological conditions that are bad for the affected person. Finally, I hint at a way as to how a distinctively naturalist theory of illness can draw on a naturalist theory of disease. We seem to gain knowledge about the basic elements of a good human life in virtue of developing a theory of basic biological functions. Hence, there is an interplay between value-neutral and evaluative points of view.

Keywords Illness • Disease • Boorse • Fulford • Naturalism • Normativism

The concept of illness does not feature prominently in naturalist theories concerning the basic medical concepts. Christopher Boorse, the most prominent naturalist philosopher of medicine, has not much to say about illness, as opposed to disease. In this paper, I would like to develop a specifically naturalist approach towards illness. I take the concept of illness to be an evaluative concept, stating that a particular condition is harmful to the person affected; so far I agree with normativists. In contrast to many normativists, however, I see the scope of the concept of illness to be

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restricted by the concept of disease. Hence, *illness* is subordinated to *disease* and only pathological conditions can be possible instances of illness.[1] This is the main element of a naturalist account of illness I develop here. I proceed by first discussing Boorse's sparse discussion of the concept of illness. Then I discuss the logical relation between the concepts of disease and illness, specifically by way of scrutinizing Bill Fulford's influential "reverse view" regarding this relation. Finally, I will briefly touch on the question whether *illness* is a subjective or objective concept. The extension of the concept of illness might be wholly determined by individual evaluations, so that *illness* would be any pathological condition disvalued by the affected person, or the concept might contain objective elements in that there are aspects of the good for human beings that justify a diagnosis of illness, even were there is no subjective disvaluation of the condition. I hint at an interplay between a naturalist account of biological (dys)function and an evaluative stance regarding prudential goods. To appreciate this interplay between disease and illness to me is the distinctive mark of a naturalist theory of illness.[2]

5.1 The Concept of Illness in Boorse's Theory

As is well known, Boorse distinguishes two concepts: *disease* and *illness*. Disease, according to his theory, is any pathological condition, more specifically any impairment of organismic functional ability. Biological functions of an organism and the threshold of normal efficiency of any function are determined by a combination of biological and statistical considerations and findings. *Disease* is therefore a value-neutral concept. In contrast, *illness* is, according to Boorse's original account, a value-laden concept in virtue of its reference to evaluations of a pathological condition of a person. It is important to acknowledge that according to Boorse, the logical relation between the concepts of disease and illness prescribes that *illness* is a subclass of *disease*. That means that there can be no illness without disease; disease is a necessary but not a sufficient condition of illness. I will return to the topic of the logical relation in a later section, but want to focus now on the definition of *illness* in Boorse's initial theory: "A disease is an *illness* only if it is serious enough to be incapacitating, and therefore is (i) undesirable for its bearer; (ii) a title to special treatment; and (iii) a valid excuse for normally criticizable behavior" (Boorse 1975, 61; italics in original).

Strictly speaking, the three clauses express consequences of illness, whereas the main criterion of illness is that it is a pathological condition which is incapacitating.

[1] I follow common practice in putting concepts that are mentioned, as opposed to being used, in italics.

[2] In philosophy of medicine, the distinction between naturalism and normativism has become somewhat unfashionable. Although I share some of the reservations regarding these labels I nevertheless find them helpful for the purposes of my paper (see also Chap. 2 by Giroux and Lemoine in this volume, regarding to what extent Boorse's theory is naturalistic).

Boorse is not explicit about what *incapacitating* means. Surely the notion is related to the capacities of a person, but one might ask, for instance, whether these are supposed to be general capacities of human beings, such as walking and memorizing, or individual capacities of a particular person, such as playing the piano. This ambiguity can lead to different verdicts about illness. A person who has a facial rash might not be incapacitated in one sense, because he or she can still use all basic general abilities, but he or she might not be able to perform as an actor. So *incapacitating* can be an individualized notion, leading to incongruences in illness ascriptions between different people with the same disease. In other words, according to this reading, illness would be an individual phenomenon.

There is an important consequence of such an interpretation that is worth mentioning. Boorse claims that an illness is incapacitating and *therefore* undesirable for its bearer. Now, if illness really were an individual phenomenon, then the subsequent evaluation would also be individual. Whether a pathological condition would be undesirable – and, we can add, would cause clinical concern – would be determined by the individual circumstances of a person, namely whether the condition would be incapacitating *for that person*. Certainly I do not want to claim that such a result would alone undermine Boorse's original account of illness, but it still allows for certain examples of illness that were very likely not intended by him. Supposedly, Boorse wanted to focus on somewhat serious cases of disease, which would then justify the label of illness, including the mentioned consequences.[3] But if *incapacitating* were an individual notion, almost any pathological condition could be a case of illness, due to the individual circumstances of the affected person. This seems intuitively right as an account of illness, but is probably not what Boorse intended.

There is another awkward aspect of the cited definition of illness that is to be highlighted. As I have explained, Boorse maintains that illness leads to negative consequences or implies undesirability. But there are certainly pathological conditions that are incapacitating, yet are not necessarily undesirable from the point of view of the affected person. I do not here mean undesirability all things considered. It is a fairly trivial point that, for instance, a soldier might find it desirable to be injured and hence to be unable to participate in a suicidal attack of his battalion. Cases such as these of so-called secondary gains of pathological conditions can be ignored. Still, some people who are incapacitated do not even find this fact as such undesirable. Consider deaf people who claim not to be harmed by their missing capacity for hearing – certainly an incapacitating pathological condition on Boorse's account.[4] One might want to say that they might not *find* it undesirable to be incapacitated in that sense, but that it is, after all, undesirable for them. They would, in a sense, be wrong about their own well-being. Undesirability would then be transferred into an objective notion. Hence, we might want to say that there are certain

[3] Boorse says that "illnesses are serious diseases that incapacitate at the level of gross behavior" (Boorse 1975, 65).

[4] For the sake of my argument I disregard the fact that we would normally not call a disabled person "ill" (Boorse 1997, 12). My main point here is about a feature of the practical medical notion.

forms of illness, which always generate a verdict of undesirability, but that there are also other forms of illness that are determined by individual cases of incapacitation and hence lead to individualized evaluations about their undesirability. The former, more general, cases of illness would probably be related to basic capacities of human beings, in contrast to the latter, individual cases of illness, which go along with particular incapacities.

Be that as it may, Boorse later changed his mind about his original definition of illness, perhaps due to concerns such as the ones mentioned before.[5] He now says that *illness* "refers to systemic rather than local disease, to disease which in some sense incapacitates by permeating the whole organism" (Boorse 1997, 12). The three clauses quoted earlier, he now holds, are rather related to the social role of being ill, the so-called sick role that Parson's discussed (Parsons 1981). Since I have already pointed out that the three aspects mentioned by Boorse, i.e. undesirability, title for special treatment, and excuse for normally criticizable behavior, are strictly speaking not conditions of his definition of *illness*, but consequences of conditions of existing illness, it seems that his account of *illness* has not changed significantly after all. The main criterion is still incapacity, although in later writings Boorse has specified this criterion in a sense that refers to a systemic level of the whole organism. According to his recent view, this implies that illness is not a value-laden notion, just like disease, because whether disease incapacitates an organism on a systemic level – hence whether it is an illness – is a scientific question, according to Boorse, determined by physiology and pathology (Boorse 1997, 12).

I do not find Boorse's more recent account of illness convincing. He gives a few examples of conditions that are pathological but not illnesses, because they involve no systemic incapacitation: Athlete's foot, myopia, intestinal polyps, and bursitis (Boorse 1987, 365 f.). I suppose that he wants to claim that illness is affecting a person as a whole; that it incapacitates the person more globally than some part dysfunction, where the latter constitutes disease. Yet it seems unconvincing to assume that, say, a pool attendant is not ill (if suffering from a disease), because he has Athlete's foot, which is not incapacitating on a systemic level, or that a professional sharp-shooter with myopia does not have an illness.[6] This is because we usually see *illness* to refer to disvalued states that people want to, or should, get rid of. A person is ill if he or she *suffers* from a medical condition, i.e. if she is negatively affected in her well-being or flourishing by a pathological condition.

[5] The change was first mentioned in an appendix to a reprint of his paper "On the Distinction between Disease and Illness" (Boorse 1981; cf. Boorse 2011, 28).

[6] I do not want to assert that one cannot reasonably deny that the mentioned conditions are cases of illness, in contrast to, for instance, clinical conditions that ought to be treated. Whether the mentioned examples of pathological conditions would normally be called illnesses is an empirical question about the usage of the term in common English. Boorse often sounds as if he is merely aiming at a descriptive analysis. Yet even if there were a case for pursuing such a methodology, there would still be a need, I claim, for having an evaluative concept that refers to the practical aspects of pathological conditions. We sometimes want to know what disease means for people, and it seems to me that the concept of illness can address this problem. And it seems unconvincing to me to claim that Athlete's foot etc. do not have practical impact because they do not involve systemic incapacitation.

So although Boorse is right in saying that not every pathological condition constitutes illness, he ignores the individual aspects of incapacity I have mentioned earlier in his recent account. He also completely abandons the evaluative aspects of the notion of illness. But it seems to me that a vital aspect of our notion of illness is exactly the fact that it can lead to different individual evaluations of the same pathological conditions in different persons, depending on their specific interests, goals, and circumstances. It will not suffice to answer that this difference can be captured by other notions, such as *therapeutic abnormality* – something that Boorse seems to suggest (cf. his Grades of Health scheme; Boorse 1987, 365). After all, alternative notions cannot capture the required individual aspect of the evaluation of disease, because they are based on general criteria. We need, in other words, the practical or life-wordly concept of illness in addition to the theoretical or scientific concept of disease.

5.2 The Logical Relation of the Concepts of Disease and Illness

One of the main features of naturalism in contrast to normativism about the medical concepts is naturalism's commitment to the logical priority of the concept of disease over the concept of illness. *Disease* is regarded as a value-neutral concept in that it does not presume any evaluation of the condition but merely constitutes that something is the case with an organism. It states that the condition of an organism does not fulfill certain biological criteria of normal functioning. There is of course a huge debate whether such a natural norm of health, and criteria of a lack in this respect – hence criteria of disease or pathological conditions – can be set without itself referring to certain non-descriptive ideas (see, for instance, Chaps. 6 and 7 in this volume). Much of this debate between naturalism and normativism is confused and confusing because obviously a naturalist theory of disease presupposes something normative, namely a norm of health. But this norm is set by natural features of human beings and not "our own making", except in the trivial sense that we do have a choice how to conceptualize the basic medical concepts (See Etxeberria, Chap. 8). Surely we could call anything we do not like about our bodies and minds instances of disease, but, once we have decided (for good reasons) to conceptualize disease according to a natural norm, what this natural norm consists of is not due to us but determined by the kind of organisms we are. It is also not a norm about the good for human beings. Naturalists therefore do not assume that this foundational medical concept involves any judgment about the well-being or flourishing of a person. Whether someone has a disease is a factual question based on an assessment of the biological (and psychological) condition of an organism against certain criteria of medical normality – usually drawn from a theory of biological function and dysfunction.

I have already hinted at the need for an evaluative notion in addition to the value-neutral concept of disease, and I have claimed that the concept of illness can serve

as an umbrella term for such an evaluative perspective. This seems to refer us to the normativist analysis of illness. Yet I want to develop a naturalist account of the concept of illness. There is no contradiction, of course, in taking a naturalist stance and still insisting on the existence of an evaluative medical concept, i.e. *illness*. But what is distinctive about a naturalist account of illness? One of the decisive features of a naturalist theory of illness has already been mentioned: It deems the evaluative concept of illness to be logically subordinate to the concept of disease. Only conditions that are deemed pathological on grounds of a natural norm are putative cases of illness – there is no illness without disease. As is well known, normativists often see the evaluative concept as logically prior. Occasionally there is again some confusion about priority, for instance when it is claimed that illness is epistemologically prior, because before we acknowledge a disease a person has to feel ill (Nordenfelt 2007; Schramme 2007). We can illustrate the difference in perspectives between naturalism and normativism by using two schemes, where the first is *disease*-based (Fig. 5.1) and the second *illness*-based (Fig. 5.2). The main point is that naturalism, in endorsing the *disease*-based point of view, restricts the extension of the concept of illness to cases of disease.

Maybe at this point it is also worth stressing again that this is a claim about a conceptual relation, not about the real world. Hence a naturalist does not need to maintain that there can be only illness where we know about the existence of disease. Surely we will often have problems in establishing whether the criteria of disease are fulfilled in a particular case, and hence whether we have a possible case of illness at hand. Yet we cannot simply, from an evaluative point of view, conclude that an illness is present merely because the affected person suffers, or on grounds of similar normativist criteria. As long as we have not identified a pathological condition, a person can only be in a condition of putative illness, according to the naturalist theory. Hence there is no established case of illness where there clearly is no disease, according to this perspective.

I have identified the logical priority of *disease* over *illness* as a first feature of a naturalist perspective. Therefore, a naturalist theory of illness would state as one necessary criterion that illness is a disease, or a pathological condition. The concept is yet to be determined in its specific features. For instance we might want to say that *illness* is a pathological condition that is detrimental to the well-being of the affected person. But be that as it may, I have already hinted at the fact that there is a debate in philosophy of medicine regarding the credibility of the fundamental naturalist assumption regarding the logical relation of the concepts of illness and disease. In the following section I will scrutinize Bill Fulford's critique of naturalism in this respect.[7]

[7] I have briefly dealt with Lennart Nordenfelt's similar objections in an earlier paper (Schramme 2007). Nordenfelt sees the positive concept of health as logically prior to the negative ones, i.e. the concepts of disease and illness (see also Nordenfelt Chap. 12, this volume). Fulford's account is more pertinent to my purposes here, because he explicitly sees the concept of illness as logically prior to the concept of disease.

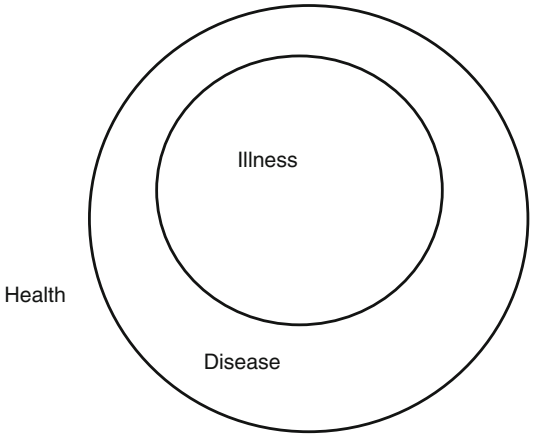

Fig. 5.1 Disease-based theory (naturalism)

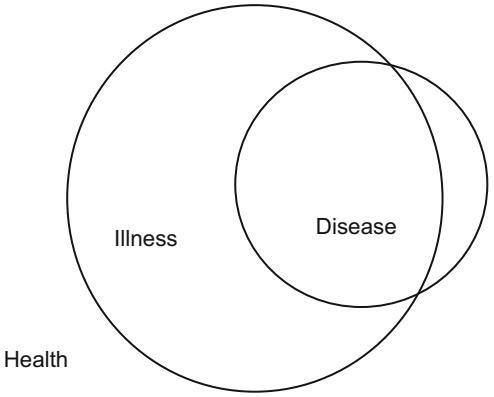

Fig. 5.2 Illness-based theory (normativism)

5.3 Bill Fulford's Objections to the Logical Priority of *Disease* Over *Illness*

In his important and influential book *Moral Theory and Medical Practice* (1989) Bill Fulford attacks the naturalist account of the logical relation between the concept of illness and disease. He reverses the relation; for him *illness* is prior to *disease*. This is mainly because he believes that even the allegedly value-free science of disease is actually value-laden and, in addition, that the starting-point of a theory of illness should not consist in a focus on the, as it were, faulty human machine but in the person-centered experience of illness.

Fulford objects to the naturalist subordination of the concept of illness to the concept of disease in two different ways. One route is to show implausible consequences of this logical relation. Another way is to argue that *disease* cannot – contrary to the naturalist view, especially Boorse's – be defined without reference to values. As we have seen, in Boorse's original theory value judgments were only

involved in statements concerning illness, not disease. In his more recent writings he even claims that the concept of illness is value-free. Fulford questions the relation of *illness* and *disease* by aiming to show that the concept of disease is value-laden after all.

Concerning the first route of objections, Fulford points out implausible consequences of the "conventional" approach (his term), which bases the concept of illness on the concept of disease. The first consequence is that there is no illness without disease. Fulford refers to some examples that seem to reject this view: hangover and migraine. In these cases the ascription of a disease is obviously not easy and maybe impossible, but we would still want to ascribe illness. And even if the conventional theory might come to terms with these particular examples, he claims that it cannot explain the even more common cases where a patient is regarded as ill although there is no disease diagnosed.[8] A second consequence, according to Fulford, is that the theory is inconsistent with the actual usage of the terms in medical and common linguistic practice. In Boorse's theory, in which disease is regarded as impairment of functional ability and illness is regarded as subcategory of disease, the alleged consequence would be to say that someone who is ill is not functioning properly (Fulford 1989, 32). Yet we usually talk of persons as ill and of bodies as not functioning properly, hence Boorse's account seems to be in conflict with the actual linguistic usage. A third consequence of the naturalist point of view, Fulford claims, is the neglect of ethical issues. This is supposedly due to the fact that it stresses the allegedly value-free realm of medical theory.[9]

The second route of objections against the "conventional view" is concerned with the supposed value-free definition of the concept of disease. Fulford's arguments focus mainly on the foundation of Boorse's definition, its reference to functions. If disease is a state of impaired functional ability and the thesis of value-independence is to be maintained, then dysfunction must be ascribable independently of evaluations of any kind. If disease turns out to be a value-laden concept, however, we lack a vital reason to give it conceptual priority. Fulford's reasoning against assuming the concept of disease to be value-free is lengthy and slightly complicated. I shall introduce it only briefly.

First of all, Fulford embeds his ideas in a broader framework, the debate between descriptivism and non-descriptivism. These theories were important in the context of meta-ethical questions, especially during the 1950s and 1960s. Briefly put, the

[8] According to Fulford another difficulty for the conventional approach is to capture the specific value judgment, which is involved in an ascription of illness. As we have seen, Boorse – who is the main target of Fulford's critique – defines illness as disease that is "serious enough to be incapacitating". But then, Fulford says, even animals and plants should be designated as ill, according to Boorse's account. Yet, this would not be done in the English language. I do not discuss this objection, because, if at all convincing, it merely speaks against Boorse's specific definition of illness and not against his account of the logical relation of the concepts of illness and disease. In fact, considerations about the application of the concept of illness to animals were part of the reason why Boorse changed his mind about the concept of illness (see Boorse 1997, 11 f.)

[9] "[T]he main practical effect of Boorse's theory is to marginalize medical ethics" (Fulford 1991, 83; see also Fulford 1987).

debate was concerned with the language of morals, more specifically with the question whether moral language describes the world, hence shares this feature with factual statements. Fulford supports the non-descriptivists, whose theory, applied to the concept of disease, results in the following claim: The ascription of a dysfunction is a value judgment, which contains both descriptive and evaluative elements, i.e. is not reducible to facts (cf. Hare 1986). As it happens, in the case of some value judgments, the descriptive elements may be widely accepted in society as a criterion backing the evaluation. Therefore, in many cases of judgments about functional ability there will be a broad convergence in individual assessments, and the evaluative element of such a diagnosis regarding functional ability will be somewhat hidden. But in other cases the evaluative elements will be decisive and hence the individual judgments will vary.[10] According to Fulford, the specific value that is expressed in a judgment about functional ability is contained in the purpose of a function. And because these purposes of functions do not have to be accepted as purposes, unless they are positively valued, assertions about functional ability contain evaluative elements. To be sure, Fulford does not imply that ascriptions of purposes to biological functions were arbitrary. Yet a positive evaluation is included when a purpose is to be determined as purpose of a function. For Fulford, Boorse's determination of purposes of functions by reference to the overarching goals of survival and reproduction does not offer escape from this critique. So Fulford's critical conclusion is that both *disease* and *illness* are evaluative concepts.

[10] Admittedly I do not fully grasp the point of referring to the debate between descriptivism and non-descriptivism, which itself is full of contested presuppositions. Nevertheless, I include it to describe the way Fulford's argument develops, not merely because it seems to be important to him, but also because I believe that some of the misunderstandings, which I return to later in my analysis, are already visible in Fulford's reference to semantic theories. In a word, I believe that Fulford is led by this framework to a discussion of particular judgments regarding disease, i.e. to diagnoses. But diagnoses are not statements of the form "You have a disease" – which seems to be the kind of judgment that is involved in the application of the general concept of disease – but "You have 'X'", where 'X' stands for any particular diagnostic entity, such as 'arthritis', hence ascriptions of disease-names or kinds of diseases. Fulford is therefore led from the general concept of disease to specific concepts of disease. In addition to this, I would like to stress that the debate between descriptivists and non-descriptivists was about the meaning of *moral* judgments. In order to show that this discussion can be useful for an analysis of medical concepts, Fulford would have to show that medical judgments are significantly similar to moral judgments. He indeed seems to assume that the debate between descriptivism and non-descriptivism has resulted in general findings about value judgments, not restricted to moral judgments. This can be inferred from a documented discussion: "Mitchell (discussant): I would like to have clarified the relation between what you have said about terms in medical usage being value-laden and what you were saying in the main part of your paper about descriptivism and non-descriptivism. […] [I]t does not seem to be an ethical question whether or not that person is medically ill. […] Fulford: Thank you. I was really talking about evaluation when I was discussing descriptivism and non-descriptivism. Certainly, medical value judgements differ not only from ethical and moral value judgements, but also, for example, from aesthetic value judgements. And the next step, in the approach that I am suggesting, is to focus on what is involved in specifically medical value judgements. First you explore how far you can get by considering medical usage in the light of what is known of the logic of value-terms. Then you go on to consider how medical value judgements are marked off from value judgements of other kinds" (Fulford 1987, 148).

In developing his own theory, Fulford introduces the concept of illness as basic. In a first approach it covers all somatic or mental conditions that are negatively valued (Fulford 1989, 58). But this surely would be too broad a definition of illness; hence in the course of his analysis Fulford specifies several additional conditions, which determine whether a disvalued condition is a case of illness. According to his account, considerations about illness start from the experience of the failure of common activities. Later he specifies this criterion as failure of intentional action in the absence of obvious obstacles and constraints. Therefore he excludes as symptoms of illness any failures of actions that are beyond the abilities of a person. In cases of mental illness failed actions are to be understood as mental actions. This analysis, according to Fulford, should not be regarded as a clear-cut definition, but as a starting-point for further considerations concerning the concept of illness. Still, statements about disease and dysfunction are subordinate to the experience of illness. The concept of disease refers to conditions that happen to be widely regarded as illness and therefore merely seems to be value-free. The value-laden character of the concept of disease is not obvious, because the involved value judgments are almost universally shared.

In Fulford's analysis, *disease* can be used in different ways. First of all, Fulford divides the concept in its evaluative and its factual elements. The evaluative element is determined by a negative evaluation in relation to the experience of illness. As mentioned, in cases of "universal" or widely shared illnesses the evaluative element of *disease* coincides with judgments about illness. Fulford then divides factual usage into three subcategories (Fulford 1989, 69). The first possible usage consists in a description of what is wrong with the patient. Fulford restricts this category to symptomatically defined diseases. The second way of usage contains statements about the causes of a disease. Here there is a possibility of disease without illness, since the cause of a disease may be instantiated without the experience of illness, i.e. in cases of asymptomatic disease. Diseases defined in functional terms also fall into this category. The third category contains diseases that are defined by using statistical means. So altogether Fulford's reversal of the naturalist perspective on the logical relation between *disease* and *illness* results in the following thesis: The starting-point of a judgment regarding illness is failure of action. From this the evaluative concept of illness follows, and finally the concept of disease, which is also value-laden, in virtue of being based on the concept of illness.

> "Illness has the more overtly evaluative connotations (partly) because it can be used for any condition that may be negatively evaluated as an illness; disease has more descriptive connotations because it refers to the subcategory of illnesses that are uniformly evaluated in its way (i.e., by most people in most contexts). (…) [T]he essential point is that the flow of meaning throughout is from the patient's experience through to derived disease concepts, not vice versa. Disease concepts, in this view, thus presuppose the meaning of illness. Hence if it is the logical structure of our classifications with which we are concerned, we should be focusing not, with the science-based view, on disease, but, directly, on the concept of illness" (Fulford 1994, 220).

Like at other occasions, Fulford refers here to disease concepts in the plural. I take his statements to mean that a judgment of disease is not realized unless a condition is identified as illness. First a particular failure of action is disvalued by a person, and then the question is raised of what disease underlies this condition. According to Fulford the usages of the concept of disease can vary, since diseases can be defined symptomatically, causally or statistically. But now Fulford does not refer to disease in the intended sense of the term. Boorse examines the nature of disease, the so-called general concept of disease, and thereby raises the question what the distinguishing features of disease are. But Fulford here refers to other criteria, which lead to specific disease concepts.[11] For example, a symptomatic definition of a disease is given in the case of "Chronic Fatigue Syndrome".[12] So in the final analysis Fulford's theory seems to result in a kind of historical theory about the genesis of disease-kinds from the experience of illness. This might be a convincing account, but it is firstly not a conceptual thesis, and secondly it is not inconsistent with the thesis of the naturalist view, according to which illness is only present in the case of disease.

Similarly, as regards the three consequences Fulford ascribes to the naturalist view, he does not seem to be able to plausibly justify his opposition. As mentioned, the first alleged consequence of the "conventional theory" was that it cannot explain illness without reference to an underlying disease. This might indeed be a problem for the naturalist approach, but only if convincing examples were identified, where there is a clear-cut case of illness despite obvious absence of disease. To regard hangover as illness, as Fulford does, is not very plausible. Migraine seems to be a more convincing counter-example, yet it seems likely that there is an underlying pathological condition after all, which we simply do not yet know much about. Fulford's additional point, stating that on the basis of the naturalist account one cannot ascribe illness unless the specific underlying disease is diagnosed, rests on a misunderstanding of what is meant by disease in the relevant context. According to naturalism about illness and disease we can only ascribe illness if there is an

[11] This change from the general concept of disease to classificatory or nosological concepts regarding specific disease entities can be found at several occasions. "For 'disease' itself is inexact. […] [T]here are many different kinds of disease, many varieties of disease category, as well as historical and diagnostic shifts between them." (Fulford 1989, 60); "'Disease', however, as a term distinct in meaning from 'illness', is used more in technical contexts. It is used to express what is wrong, to describe, by way of clearly defined objective bodily changes in so far as it is possible, the condition from which a patient is suffering, and thus to identify that condition with one or more of the categories in some mutually agreed classification of diseases." (ibid., 30).

[12] Again one can see the difference to the general concept of disease. In Boorse's analysis a merely symptomatically defined disease-kind would not be a "real" disease, unless there is an underlying dysfunction, which causes the symptoms. Boorse does not say anything about whether we should define specific disease concepts symptomatically, causally, or functionally, although one may try to infer a view about this issue from his writings. But even in the case of an etiologically defined disease-kind, which might be the best model for nosological classification – because it seems to the secure the best possible therapeutic results – it is not the cause of the disease that determines whether a specific condition is a disease, but the dysfunction. A cause is a cause and a symptom is a symptom, but disease is dysfunction, or more correctly, inefficient part-function.

impairment of functional ability, i.e. a disease. This can be done independently of any particular diagnosis, i.e. without ascription of a particular disease-name. For example, it is possible that there is not (yet) a particular disease-kind for a type of illness. The assertion of the naturalist theory is that there must be an underlying disease in order for a condition to count as illness. The assumption is not that in a judgment of illness this basis must be categorized into a nosological classification, let alone that it must be stated explicitly.

According to Fulford, the second consequence is that in terms of the conventional view ill persons have to be designated as not properly functioning, since the concept of illness follows from the concept of disease. Here I can only speculate what Fulford wants to say. In a way, I fail to understand the sense of this assertion. But in the end I think that it involves again a misunderstanding about what the thesis of the naturalist view – that illness is a subcategory of disease – implies. Fulford seems to interpret this thesis as involving the idea that statements about disease and illness must be made in the same kind of language, as it were. But why not simply say that illness is a disvalued dysfunction? Even if we agree with Fulford in assuming that *illness* is a concept that refers to the whole person, this does not imply that we have to apply the language of dysfunction to the person as such.

The third consequence, the alleged neglect of ethical issues, has, in my view, nothing to do with the problem of the logical relation between the concepts of illness and disease. It might be a consequence of disregarding any evaluative aspects of all medical concepts, but Boorse never did this of course. He simply claims that evaluative aspects are not part and parcel of the basic medical terms. Indeed, ethical questions have only a minimal status in the scientific attempt to identify disease, although they have of course a significant status concerning the practices of therapy and research.

In sum, I believe that Fulford's objections to the naturalist approach and that his own theory are based on a misreading as to what is really meant by the thesis that disease is the basis of illness. He apparently interprets the claim that illness is a subcategory of disease to be a thesis about conceptual deduction. This can be seen in a description of his own account: "The priority afforded to 'illness' is a conceptual priority only. 'Illness' is prior to 'disease' only in the sense that the meaning of 'disease' is derived from that of 'illness', not vice versa" (Fulford 1989, 8). But the naturalist thesis is not that the meaning of *illness* is derived from the meaning of *disease*, but that the extension of the concept of illness is restricted by its subordination under the category of disease. When Boorse defines the meaning of *disease* as 'impairment of functional ability,' he implies nothing about the meaning of *illness*. The thesis that cases of illness must be, at the same time, cases of disease is not determined by a conceptual deduction. It is a theoretical thesis about the logical relation of concepts, which can of course be contested on theoretical grounds, but not on grounds of semantics.

Fulford believes that the inversion of the relation between *disease* and *illness* can be backed by his analysis of *disease* as a value-laden concept. But even if we did agree with this analysis, it would be inconsequential as regards the relation of the concepts of illness and disease. Finally, I would like to agree with Fulford when he

stresses that the evaluative concept of illness essentially belongs to a complete theory of medical concepts. Boorse's theory indeed does not provide a sufficient clarification in that respect. It seems to me that without a description and explanation of the individual experience of illness medicine falls short of its practical aspects. Fulford's theory of illness as failure of intentional action provides resources for new and illuminating explanations of many illnesses, such as delusion or compulsion. Yet his objections to the priority of the concept of disease are not convincing.

5.4 *Illness* as Subjective and Objective Notion

So far I have only discussed one feature of a naturalist theory of illness, namely that the concept of illness is subordinate to the concept of disease. I would like to finally explore a bit more positively the defining features of illness from a naturalist point of view. I have already agreed with normativists, and against Boorse, that the concept of illness is evaluative. It refers to pathological conditions that are disvalued. Now, the most interesting question seems to be whether the respective evaluation is wholly subjective or whether it allows for something like an objective element. Are there certain pathological conditions that always have to be regarded as cases of illness, whatever the affected persons themselves feel or believe? It seems to me that exactly as regards this possible objective aspect of the concept of illness, the naturalist perspective has benefits that are sadly neglected in the relevant literature. The naturalist account of function and dysfunction bears some relation to the evaluative stance that we need to take when focusing on the concept of illness. Prudential values, or elements of the good for human beings, are based on the kinds of beings we are, and naturalism about health and disease can help us in understanding these fundamental elements (cf. McLaughlin 2001).

It seems to me worth stressing, though, that this idea about basic human functions that can be "translated" into basic human prudential goods and hence partially determine the extension of the concept of illness is a restricted thesis. I believe that generally speaking *illness* refers to pathological conditions that are bad for the affected person. In this respect, the concept of illness is subject-relative. This allows for individual evaluations of disease. As I have said earlier, not every instance of disease is a case of illness. Yet, my thesis is that there is a point where it is not simply up to the affected person to determine whether a pathological condition is an illness. These are cases where persons, who have a disease, might not subjectively disvalue this condition and yet where they should still be deemed ill, on grounds that basic elements of a good human life are affected.

Consider a person with severe anti-social traits, a person who does not show any interest in the welfare of fellow human beings. Even in a case where this person lacks significantly in terms of social capacities, he or she might not be prone to disvalue this condition. Yet, many other people would say that this person lacks in terms of a basic element of the good human life, namely sociability. Note that this external evaluation does not normally base on an evaluation of the quality of an

antisocial person's life in respect to external features of this life, for instance in terms of the possible negative consequences of antisocial acts. We usually deem the antisocial person's life as lacking in intrinsic aspects of the good life. The antisocial person herself falls victim to such a deprivation, even if she would not harm others or suffer negative consequences. She misses out in terms of significant prudential values, because she lacks in sociability. So what I try to develop with this example is a notion of basic prudential goods for human beings that are based on an account of a minimally good human life. This is not a new idea, but goes back to Aristotle's account of *eudaimonia*, or flourishing, and it has allies in modern Aristotelian theories, such as the one developed by Martha Nussbaum (Nussbaum 1995; cf. Griffin 1996). Yet, the theory of illness I would like to develop is a naturalist theory.

The naturalist bent in thinking about the core elements of a good human life comes into play when considering the relation of disease and illness. Severe diseases partially determine common evaluations regarding the good human life, hence common views regarding illness. Now, it is definitely wrong to therefore underestimate the significance of subjective evaluations in determining illness. Still, it seems that there are certain pathological conditions that affect more basic biological functions than others. There is a difference between losing mobility due to dysfunction and, say, losing one's hair. Surely losing one's hair can be quite a significant individual harm. But here the point is that it would not normally be regarded as a general harm to humans; yet this seems to be the case with losing (all) mobility. Some biological functions are basic in that they enable us, in combination with the circumstances we find ourselves in, to live our own lives. So we do have support regarding an evaluative perspective in the value-neutral perspective of biological function and dysfunction; there is an interplay between the perspectives. In other words, I believe that an account of our common human nature, which is at least partly determined by our biological design, has some influence on our understanding regarding what is good or bad for us as human beings.

5.5 Conclusion

I have developed a version of the concept of illness that interprets it as an evaluative concept. I have done so in opposition to Christopher Boorse's specific account of illness. Yet I have defended the naturalist perspective. The main feature of this outlook, as regards the concept of illness, is that *illness* is subordinate to *disease* and that hence there can be illness only in case of disease. I have defended this account of the logical relation between the concepts against the "reverse view" developed by Bill Fulford. Illness, according to the theory put forward in the present paper, is a disvalued pathological condition. This obviously allows for disease without illness, a phenomenon I have not said much about in this paper (but see Schramme 2002, 2014). Here, I have focused, if only briefly, on the aspect of possible objective elements in determining illness. There seem to be basic elements of the minimally good life for human beings that determine what is bad for human beings without relying on subjective evaluations. Hence, there are certain cases of illness that are

illnesses because of the kind of biological dysfunction they involve. Our knowledge about pathological conditions has a bearing on our evaluative stance; there is an interplay between our concepts of disease and illness. It seems to me that to be able to acknowledge such a connection between science and our life-world is a distinctive benefit of the naturalist theory.

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Part II
Health, Normativity and Naturalism

Chapter 6
Contextualizing Medical Norms: Georges Canguilhem's Surnaturalism

Jonathan Sholl

Abstract One of the key criticisms of understanding health in terms of adaptation to one's environment is that medical judgments should be able to apply across environments. If we say that a condition is pathological 'for person X in environment E', then we quickly run into problems of desirability and social values. However, many key concepts in biology entail an inability to separate the organism from its environment. In other words, it is precisely by referring to 'organism X in environment E' that we can determine what is 'normal and natural'. In this chapter, I will argue that the role of this inseparability of organism and environment for understanding medical norms has been misunderstood and the implications of it for naturalistic theories of health and disease have gone largely unappreciated. To better understand this contextualist approach, I will discuss the ideas of John Ryle and Georges Canguilhem, focusing primarily on the latter. In Canguilhem's work we find some key arguments for why organismic norms need to be understood relative to environments and how this can help to clarify the concepts of health and disease. I will explore his peculiar form of naturalism that was based on the dynamism and variability of organisms, show how it can be clarified through more recent biological research, and mention some of its limitations.

Keywords Contextualism • Surnaturalism • Health and disease concepts • Variation and variability • Georges Canguilhem

In his well-known 1977 essay, 'Health as a Theoretical Concept', Christopher Boorse criticizes various theories of health (and disease), one of which is that of approaching health via the biological concept of adaptation. He quickly sets aside the claim that 'adaptation' would here be understood in terms of 'Darwinian fitness' as this would imply the problematic conclusions that reproduction ensures health or that healthy traits are ones that result in large families. He then focuses on two claims, one positive and one negative, coming from this health as adaptation

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viewpoint. The positive claim is that health becomes a 'positive ideal of maximum enhancement of the abilities useful in each person's unique circumstances' (1977, 548), whereas the negative claim is that what is intolerable for one individual could be tolerable or even beneficial to another as conditions change. He argues that both fail to provide a naturalistic or value-free account of health.

He finds the negative claim at work in a few authors, e.g. in John Ryle's 1947 essay 'The Meaning of Normal' where Ryle argues that the concept of normality should be understood in terms of normal variability precisely because 'organism and environment are indivisible' (1947, 3). In other words, because what is normal in one environment could be pathological in another, 'normality' has no absolute meaning and thus should be better understood in terms of variations whose medical value largely depends on the environment in which they occur. Boorse finds this claim problematic since while something like myopia could be advantageous (i.e. desirable) in one environment but not another, it remains a disease in any environment because medical judgment 'mentions no particular environment' (1977, 549). Consequently, Ryle's account cannot provide the naturalist with a value-free concept of normality, but only with a practical account seemingly based on desirability. Regarding the positive claim of health as maximally enhanced abilities, Boorse argues that this would imply a problematic conclusion regarding disease. While the lack of many abilities that could help individuals adapt to particular environments might be bad, i.e. undesirable, this lack is not in itself pathological. As medicine simply does not make the claim that a condition is pathological for 'person X in environment E' (1977, 549), health as adaptation cannot work. He concludes that while the 'relativity of adaptation to environment' is the main attraction of such an approach, it is 'also what makes it unpromising for an analysis of disease' (1977, 549). By relativizing medical judgments to particular environments, we cannot arrive at the value-free account that naturalism is after.

Robert Woolfolk (1999) echoes this criticism of environmental relativity in the context of biological functions by arguing that such relativity struggles to prevent the pathologization of what is socially disvalued. In other words, if we define biological function relative to environmental conditions, e.g. in a 'propensity' account, and if we consider that conforming to social norms is fitness enhancing, then we seem led to label those traits that do not allow an individual to conform, and thus partake in fitness enhancing behavior in a given environment, as dysfunctional. Consequently, this 'relativistic' view seems unable to prevent diagnostic misuses such as drapetomania (Woolfolk 1999, 665).

However, in biology it has been argued for quite some time that in order to understand organismic norms we cannot separate the organism from its environment: 'Just as there is no organism without an environment, so there is no environment without an organism' (Levins and Lewontin 1985, 99). In other words, it is precisely by referring to 'organism X in environment E' that biologists determine what is 'normal and natural'. More recently, the importance of this organism-environment indivisibility has been discussed in terms of understanding evolutionary dynamics, e.g. niche construction (Laland et al. 2007), as well as determining how physiological norms are a function of organismic responses to changing environmental demands, as illustrated by the properties of phenotypic

plasticity or flexibility (Gilbert and Epel 2009; Piersma and van Gils 2011) and allostasis (McEwen and Wingfield 2003, 2010). If organisms and their functions cannot be fully understood without a reference to the environment in which they occur (Lewontin 2001), then a contextualist approach – relating health judgments to a given environment – might have more biological support than is suggested by Boorse's (and Woolfolk's) critiques.

In this chapter, I will argue that this contextualist approach has been largely misunderstood and, as a result, the implications of it for Boorse's and other naturalistic theories have not been fully appreciated.[1] To explore the implications of this contextualist approach, I will first briefly return to Ryle's 1947 essay to highlight his central claims regarding normal variability. I will show how very similar insights were also at work in an often-overlooked philosopher of medicine, Georges Canguilhem.[2] Contra Boorse, Canguilhem's 'ecological' approach suggests that it is precisely relative to a given environment that health and disease should be determined: 'It is the relation between the environment and the living thing that determines what is normal in both' (1994, 354). After discussing some of the implications of contextualizing biological norms, I will then go further into Canguilhem's unique form of naturalism that has much in common with the aforementioned biological theories, e.g. phenotypic flexibility and allostasis, and show how it guides his views on health and disease. I will conclude by mentioning some possible limitations to Canguilhem's approach.

6.1 Contextualizing Normality: Ryle and Canguilhem

As mentioned above, the main aim of Ryle's 1947 essay is to show how the concept of normality can be understood in terms of normal variations: 'In man, as in all animals, variation is so constantly at work that no rigid pattern – whether anatomical, physiological, psychological, or immunological – is possible' (1947, 1). Ryle locates this variation on two levels: the individual and the species. For the individual, functional or physiological variations, e.g. in heart rate, blood pressure, body temperature, physico-chemical constitution etc., are what allow for bodily equilibrium to be maintained amidst changing demands. For the species, the variation which differentiates one individual from another is that which aids a species' adaptation to environmental changes, 'fitting' individuals to their environments and distributing functions throughout a population. In both instances, variability is

[1] Many of the arguments made in this chapter echo previous critiques of naturalist theories of health and disease, e.g. van der Steen and Thung (1988), Ananth (2008), Kingma (2010), and Dussault and Gagné-Julien (2015), all of which point to the problem of understanding environmental or situation-specific aspects of medical judgments. This chapter will also extend some claims made in Sholl and De Block (2015).

[2] While much has been written about Canguilhem in France (e.g. Giroux 2010), he is still largely in the margins when it comes to the English-speaking 'analytic' discussions in philosophy of medicine. His ideas are mentioned by Nordenfelt (2007), Lemoine (2009), and Méthot (2009, 2013) in this context, but a more in-depth engagement with his ideas is still wanting.

necessary for survival such that 'there could be no adaptability without variability' (1947, 2). Moreover, both instances show the inseparability of organism and environment such that these changes are always with respect to environmental conditions, which in humans are thoroughly social and cultural.

What normal variation and variability, either for the individual or the species, reflect are the tasks the organism performs, 'the work required of the organism or its parts and to the medium in which they have their being' (1947, 4). 'Normality' is a function of the organism's relation to its environment. One example that Ryle gives to illustrate this claim is that of enlarged thyroid glands (hyperplasia) relative to different populations (1947, 4). In populations where iodine is low or absent from the diet, it is statistically normal to find such enlargements (also resulting in more cases of goitre), whereas in other populations where iodine is regularly consumed enlargements are statistically rare. The question, then, is when to consider an enlargement the sign of a disease and when it is simply the body's adaptive reaction to the environment. This question is posed precisely because not all instances of enlarged glands, i.e. not all deviations from the norm, result in disease. While Boorse claims that such examples simply point to a 'medical truism' such that some symptoms might be 'adaptive responses to environmental insult' (1977, 549), he seems to miss the point. For Ryle, what is 'normal' (in the statistical sense) depends on the environmental factors relevant for a given population, not only because variations reflect environmental conditions (e.g. lack of iodine causing enlarged thyroid glands), but also because some genetic variations resulting in hyperplasia may only become pathological in certain conditions. In other words, since variation is expected within any population, it is not merely the individual's deviation from population or even species-typical norms that determines whether hyperplasia is pathological, but *the effects of this variation for the individual in its environment*. Consequently, explaining what the disease *is* requires a consideration of this mix of individual 'predispositions' and environmental triggers.

This would seem to make disease judgments problematically relativistic. Boorse (1977) picks on Ryle's example of a miner who is short and stocky as a result of heredity, childhood malnutrition, and stress, and who consequently is better adapted to work as a miner rather than being a policeman (Ryle 1947, 3). The question for Ryle, however, is not whether we should disqualify the judgment that something is a disease simply because it helps one's job and is therefore desirable,[3] but instead whether we can understand the concepts of normality and pathology without referring to individuals' 'environments, their work and upbringing, their food, and special hazards' (1947, 3). In order to understand adaptation we need to know the conditions and behaviors to which one is adapted. While these minors may have less robust levels of health due to their heredity and upbringing, it might also be that their current living and working conditions prevent further bodily degradations, thereby maintaining their functional levels. For other individuals with different bodily constitutions such conditions may produce various physical malfunctions.

[3] It should also be noted that Ryle never says that these bodily changes seen in miners are the result of the job, but that they are what allow one to better perform that job rather than another. As such, he is not even making the claim regarding desirability that Boorse (1977, 549) claims he is.

Again, the claim is not about desirability, but that *in those conditions* subnormal variation need not be pathological: it is not despite but because of the environment that the line will be drawn. Similarly, with the thyroid example the point is not that environmentally-induced instances of hyperplasia are not pathological, but that the line between normal and abnormal variation is better clarified when the environment is taken into consideration since in some environments an enlarged thyroid can be adaptive, whereas in others it can be pathological. Claiming that a condition is normal or abnormal thus requires that we answer: abnormal relative to what conditions? Microbiologist René Dubos (another author Boorse mentions) expresses a similar idea when he writes:

> it is not possible to define health in the abstract. Its criteria differ with the environmental conditions and with the norms and history of the social group. The criteria for health are conditioned even more by the aspirations and the values that govern individual lives. For this reason, the words health and disease are meaningful only when defined in terms of a given person functioning in a given physical and social environment (1965, 351).

Consequently, Boorse's focus on the 'positive' and 'negative' claims suggested by this 'health as adaptation' approach seems to misrepresent the arguments being made by Ryle and thus he misunderstands the role of environmental relativity for clarifying medical concepts.

Following a commentary on the very same essay by Ryle, another philosopher of medicine, Georges Canguilhem, arrives at a rather different result.

> In dealing with human norms we acknowledge that they are determined as an organism's possibilities for action in a social situation rather than as an organism's functions envisaged as a mechanism coupled with the physical environment. The form and functions of the human body are the expression not only of conditions imposed on life by the environment but also of socially adopted modes of living in that environment (Canguilhem 1991, 269).

Canguilhem argues that we cannot understand whether a given biological mechanism has a function (let alone whether it could be said to dysfunction), especially in humans, without referring to the relevant sets of imposed and chosen environmental demands. In the remainder of this section, I would like to explore what I will call Canguilhem's 'eco-organismic' view of biological norms – determined relative to given organisms in their environments – and show how it provides some interesting arguments in favor of contextualizing medical judgments.

Canguilhem's general approach rests on a Darwinian understanding of organismic behavior in terms of what he calls 'biological normativity' (1991, 127), which he defines as the biological ability of an organism to establish a norm in a given environment. While much of his work focuses on the concept of 'norm' and its relation to averages and ideals, he does not give a precise definition of it.[4] However, norms may be best understood as the behavioral and physiological patterns or regularities occurring within a given range that organisms establish and maintain in relation to their environment. It is because organisms are not indifferent to their milieu that they will respond to 'external perturbations by making physiological

[4] Le Blanc (1998), for example, provides a rather lengthy discussion of 'norms' in Canguilhem, and while he mentions the ideas developed here he never strays very far from Canguilhem's own terminology and thus does not provide much clarification.

adjustments with more or less success' (Méthot 2013, 118). Canguilhem goes on to add that as biological norms reflect that which helps or hinders an organism's activity, they are inherently linked to valuation, e.g. maintaining the organism's current range of physiological functioning through energy consumption and utilization. By linking the concept of 'norm' to biological processes he could be said to provide a naturalized account of valuation.[5] He also calls this the 'hedonic' character of biological norms: the negative valuation of what is called disease arises from organismic responses to infections, lesions, mutations or pain through altered functioning, self-repair or self-medicating behavior (1991, 126). Human values, while clearly more complex, are seen as an extension of this biological non-indifference.

Canguilhem's concept of biological normativity seems quite relevant to contemporary issues in philosophy of biology in that it captures the same basic idea as expressed in 'phenotypic plasticity', or the organismic property to produce varying phenotypes as a function of environmental demands or triggers (Pigliucci 2001; West-Eberhard 2003). The idea that organisms are fundamentally responsive, or non-indifferent, to their conditions of life, as is demonstrated by the property of plasticity, permeates Canguilhem's philosophy. This can be seen in his discussions of how a given genotype can produce a range of 'values' in different environments (2008, 127) and how organisms are capable of adjusting their morphology and behavior throughout their life history in response to changing demands (2012, 48). It is the responsiveness of organisms that allows for new norms to be established, that allows for their normativity.

This inseparability is further developed when Canguilhem argues that organisms are not only shaped by their surroundings but also create and structure their environment according to their needs and activities: 'the environments in which the living beings find themselves are carved out by them, centered on them' (1991, 284). Through this 'niche construction' (Odling-Smee et al. 2003), organismic behaviors – from unicellular organisms enveloping foods and excreting waste, to plants altering soil chemistry, to human technology and culture – can also be seen as value-laden in that they express the organism's non-indifference towards its environment.[6] Again, it is because Canguilhem begins with such biological properties that he can then argue that organisms and environments are inseparable along naturalistic[7] lines, and it is this non-indifference that suggests a biological or naturalistic account of valuation. This environmental and organismic relativity is what constitutes his 'eco-organismic' approach.

[5] Here, his view comes quite close to what Etxeberria describes as 'vital normativity' or the claim that norms are intrinsic to organisms through the interactions among their organization, agency and their environment (see chapter 8 of the current volume). It is also quite close to Lennox's claim that health is an objective value based on 'biological value concepts' (1995, 503).

[6] Michel Morange (2008, 161) also mentions Canguilhem's similarity to niche construction, but goes on to lament the proximity of Canguilhem's ideas with Lamarckism. For a recent 'defence' of Lamarckian ideas see Jablonka and Lamb (2004).

[7] Élodie Giroux (2010, 20) describes Canguilhem's approach to biological normativity as 'anti-reductionist naturalism', a phrase borrowed from Céline Lefève. This view can also be found in Malcolm Nicolson's materialist reading of Canguilhem (1991, 356).

First, similar to the claims made by Ryle, Canguilhem argues that there is no absolute meaning to 'normality' because of this environmental relativity. 'A living being is normal in any given environment insofar as it is the morphological and functional solution found by life as a response to the demands of the environment' (1991, 144). Organismic morphology and function reflect environmental demands rather than an underlying 'fixed' species design (Boorse 1975). Canguilhem also claims that this relativity helps to distinguish anomalies (i.e. normal variations distinguishing one individual from another) from abnormalities (i.e. pathological variations). For Canguilhem, this distinction ultimately turns on *whether the anomaly or variation affects the viability of the organism in its environment*. For example, given the right conditions, a mutation leading to a wingless insect could be beneficial, whereas in other environments such a mutation might not survive (Canguilhem 1991, 142). This is often a problem that troubles biostatistical approaches like Boorse's since an extreme variation, such as a genetic mutation, that produces a viable phenotype may be labeled both healthy (or normal) insofar as it is viable and pathological insofar as it is a significant deviation from the species type (Sholl and De Block 2015). Canguilhem's view suggests that mutations that produce novel functions should be considered functional based on their effects on the organism, regardless of their rarity or novelty.[8]

With this in mind, one could see in Canguilhem an implicit 'ecological' account of function. On the one hand, his account shares with ahistorical accounts of function the idea that biological functions are hierarchically organized and contribute to the behavior of the organism as a whole: 'in the living organism all functions are interdependent and their rhythms coordinated' (Canguilhem 1991, 84). He would also agree with Boorse that to understand what a function is and the significance of a dysfunction, one must place the given function within the 'whole of functional totality' (1991, 87), a view both received from Cannon's work on homeostasis and the (then) newly emerging field of cybernetics[9] (Sherrington in the case of

[8] As Wouters (2005) points out, a proper account of biological function should be able to account for so-called 'instant organisms' whose parts can have functions even if they have no selection history.

[9] This similarity breaks down, however, when Boorse compares organisms to a car's design that can be described in purely functional terms without reference to a designer's intentions, e.g. 'perfect working order' as conforming to a 'fixed design' (1975, 59). He adds that this mechanistic analogy seems 'exact' when health ideals are determined empirically with reference to a species design. This supposed exactness seems to claim either that there is no fundamental difference between mechanistic and organic functioning or that there is something 'fixed' about species design. This can also be seen when he describes disease as a breakdown of the typical, naturally selected 'physiological machinery' (1977, 550). Canguilhem, on the other hand, was very critical of importing mechanistic metaphors into biology. While he provides rather strong philosophical and historical arguments for why this is problematic (2008, ch. 4), he also provides biological ones. For example, he mentions the 'vicariousness of functions' and the 'polyvalence of organs', i.e. functions can be taken over by other organs in the vicinity of one which fails and organs can take on multiple functions (2008, 89–90). While this variability is not infinite, it is sufficient to undermine these machine metaphors. For some recent critiques of mechanistic language in biology see Dupré (2012) and Nicholson (2012).

Canguilhem (2008, 72) and Sommerhoff for Boorse (1976, 78–79)). As such, Canguilhem takes up a similar stance as the ahistorical account in seeing organisms as goal-directed and functionally interconnected complex systems.

On the other hand, Canguilhem's claim that organismic normality can only be determined in relation to the environment would distance him from the tendency of ahistorical accounts, such as Boorse's, to bracket the environment in favor of species ideals or plans. For Canguilhem, the living being and its milieu cannot be considered normal in themselves since 'it is their relationship that makes them such' (1991, 143). This has two important consequences regarding functions. First, a biological process or system would only be considered normal, no matter how rare, if it is capable of providing a solution to the demands of a given environment (1991, 144). Or, in Canguilhem's terms, it would only be normal if normative, i.e. capable of finding or creating those conditions in which it is viable. Second, functions are not fixed by any underlying species-typical design, but are plastic and capable of changing: 'functional constants are habitual norms. What habit has made, habit unmakes and remakes' (1991, 169). Even if we take a species-level view, we are still led to the claim that functions are labile and plastic, insofar as they are dynamically related to environmental demands: 'for each function and set of functions there is a margin where the group or species capacity for adaptation comes into play' (1991, 170). While this 'functional plasticity' (1991, 174) is admittedly not something that can be changed at will, it would entail that Canguilhem can accommodate the claim that what has a function in one environment, could have a different function in a different environment as organisms adapt to the changed conditions. Walsh (1996) provides the example of a mouse with large ears which in a warm environment have the function of heat dissipation, whereas if transplanted to a wet environment in which the ears happen to resemble certain plants, they can be used to attract flies which the mouse eats as its primary food source. Canguilhem would likely have agreed with the claim that in such an example the function is determined by the role the trait plays in a given environment. It is the trait's functional plasticity that allows for its adaptability.

It should be noted that one rather important difference between Canguilhem and typical accounts of function is that most rest on a statistical account of fitness: fitness is a property of populations, not of individual organisms. While survival and reproduction are important biological and physiological processes, Canguilhem's concern is with how a trait allows/hinders a *given/token organism's* ability to establish a stable and flexible norm in its environment: 'the normal does not have the rigidity of a fact of collective constraint but rather the flexibility of a norm which is transformed in its relation to individual conditions' (1991, 182). This seems to imply that for Canguilhem a rare mutation only found in one organism, e.g. the morphological changes involved in a goat without forelegs (West-Eberhard 2005) or the one big-eared mouse that happens to find itself in a new environment, could very well play some role in that organism's life, helping it to survive *in that environment*, and its failure to perform this function could then be said to be pathological *in that environment*.

With this last suggestion regarding a focus on individual conditions, Canguilhem takes the environmental or ecological relativity further by arguing that normality is also relative to individual organisms: 'from one individual to the next the relativity of the normal is the rule' (2008, 130). Here he takes up what Boorse calls the 'negative' claim regarding health as adaptation. Like Ryle, Canguilhem locates this individual relativity both between and within individuals. For example, in some individuals hypoglycemia poses little to no problem, whereas in others such low blood sugar levels could be fatal (1991, 171). Some individuals have genetic mutations such that consuming various foods, such as those with lactose, gluten, or some proteins found in legumes (e.g. lectins), can produce serious allergic reactions, whereas in others with the same mutation there can be no problem or even a possible benefit depending on their environment (1991, 282).

Moreover, this individual context implies that demands and capacities change throughout an individual's lifetime, in part because one's behaviors and environments change, and also simply because aging entails new physiological norms. He claims, for example, that myopia would simply be part of normal variation in an agrarian society, whereas it can become abnormal in more technologically-based societies (1991, 201). His position is thus opposed to Boorse's claim (1977, 549) that myopia is a disease regardless of the environment. Here the claim is not that its abnormality rests on its being undesirable, but rather on the fact that it puts the individual into a qualitatively different relation with the demands of the environment. The variation can hinder the individual's way of living in a new environment regardless of whether this is desired. I will further clarify what such a hindrance entails below. Similarly, an individual with hypertension could live without any difficulty in one environment (e.g. low altitude), while experiencing constrictive symptoms such as fatigue, heart palpitations, chest pains or nausea in another (e.g. high altitude). This helps to explain why for other individuals such a change in altitude might pose no problem, e.g. someone with hypotension. In these examples the individual's condition does not change, but the value of it does as a function of the environmental demands. Similar variations also come with aging. What is normal for an older individual could be considered a deficiency for a young adult (1991, 284). This does not imply that one should compare current norms with previous ones in terms of life history, such that the incapacities associated with aging would themselves become pathologized in relation to previous norms. Rather, this is simply to stress how normality changes as a function of one's life history: 'This recognition of the individual and chronological relativity of norms is not skepticism before multiplicity but tolerance of variety' (1991, 284).

This individual context implies that the individual organism provides its own norms relative to changing conditions or demands (Canguilhem 2008, 129). It is thus relative to the individual organism in its environment that the transition from normal to pathological variation becomes clearer: 'It is the individual who is the judge of this transformation because it is he who suffers from it from the very moment he feels inferior to the tasks which the new situation imposes on him' (1991, 182). In both Ryle and Canguilhem, then, the central question to be answered

is that of the distinction between normal and pathological variation and this is clarified by focusing on an individual's way of living in its environment.

Together, these two aspects (eco-organismic relativity) constitute what could be called Canguilhem's 'contextualism', to borrow a concept from the philosopher of medicine Lawrie Reznek (1987, 168–170). Contextualism is the view that truth conditions can be applied differently depending on the context in which a proposition is used because the terms are relational, as is the case with 'disease'. In this view, we

> …cannot decide whether a judgment about disease-status is true without considering the relation of the condition to the organism, and the relation of the organism to the environment. One organism's disease is another's adaptation, as is one environment's disease another's adaptation (1987, 169).

Since the conditions for determining the truth of a proposition are relative to an environment, the same trait could be said to have pathological effects in one environment but not in another. A contextualist approach is supported by the above claims regarding the responsiveness and plasticity of organisms: the very existence and viability of biological norms are inseparable from the context in which they occur (Pigliucci 2001). In other words, it is because organisms can be normative or plastic, adapting to changing demands, that normality and pathology are relative to environments and individual organisms.

There is one interesting difference between Reznek's approach and Canguilhem's. Reznek sees 'harm' or being worse off as inescapable for understanding disease, thus supporting the normativist view that disease is inherently value-laden, relating to questions of the good life (1987, 153). While 'harm' and value do play some role in Canguilhem's account (e.g. the '[p]athological implies *pathos*', (1991, 137)), I mentioned above that he actually allows for a way to naturalize value. In other words, if we accept the claim that organisms and their parts are responsive to their conditions of life, then biological norms are already an expression of value or preferences, with disease being negatively valued[10] as a restriction on or reduction of the organism's ability to maintain itself amidst changing demands.

While other differences could be found, Reznek's contextualism seems to be a useful way to think about Canguilhem's eco-organismic view of normativity. The preceding discussion suggests that if biological norms have an environmentally and individually relative character and if we are in search of a way to understand health and disease along biological lines, then a naturalistic view should also incorporate this relativity. If so, then this would challenge Boorse's claim that such contextualized judgments are not helpful for medicine.

[10] This does not necessarily mean that health and disease are a matter of what the individual thinks, since clearly one can have a problem without knowing it. Rather, it means that these phenomena are relative to the dynamic relation between *individual activities* and the environment. Valuation is thus more a function of physiology than representation.

6.2 Canguilhem's Surnaturalism: Towards a Biological Theory of Health and Disease

It is within this eco-organismic view of biological norms that Canguilhem develops an interesting theory regarding health and disease. I think it can be argued that his account of biological normativity as discussed above, which is more an account of adaptability than adaptation, allows him to view these concepts as referring to biological properties of organisms in their environments. As such, he can be said to provide a biological *theory* of health and disease, as opposed to a conceptual analysis (Lemoine 2013; 2015). As I will show, this theory can be understood in terms of a peculiar kind of naturalism, what I will call 'surnaturalism', which is based on the dynamism and variability of biological norms. After discussing his ideas, I will suggest some ways that they could be supported with more recent biological research.

While he does not provide one fixed definition, and despite some variation throughout his writings, the following examples can be used to capture the core of Canguilhem's position. Health, he argues, can be defined as 'a margin of tolerance for the inconstancies of the environment' (1991, 197). More completely, health is characterized by 'the possibility of transcending the norm, which defines the momentary normal, the possibility of tolerating infractions of the habitual norm and instituting new norms in new situations' (1991, 196f). In this view, then, there are two sides to health: (1) the capacity to *tolerate variations* within what is typical for a given organism and (2) *being able to adapt* and establish new physiological or behavioral patterns/norms (transcending old ones) to meet changing demands (2008, 132). It is this latter aspect that shows there to be an intimate relation between health and normativity. Organisms are healthy insofar as they are normative relative to environmental fluctuations (1991, 228). The behavior and functioning of healthy organisms thus entails the capacity for persistent or maintained adaptability. 'Health [for Canguilhem] is not defined by the doctor but by the person, according to his or her functional needs. The role of the doctor is to help the individual adapt to their unique prevailing conditions. This should be the meaning of "personalized medicine"' (Horton 2009, 781). For Canguilhem, the question of what a given deviation means for an organism's flexible capacity to meet environmental demands does not involve an a priori determination, but can only be determined by the individual organism in its particular environment. Due to the individual variations mentioned above, statistical accounts will always be insufficient to determine the line between health and disease.

Conversely, disease is 'a reduction in the margin of tolerance for the environment's inconstancies' (1991, 199), involving qualitatively different and constricted pathophysiological patterns/norms (1991, 222). Following the ideas of Kurt Goldstein (1995), Canguilhem argues that an organism is diseased when it is 'obliged by its incapacity to confront the demands of new milieus' and is thereby forced 'to live exclusively in this shrunken milieu' (2008, 132). In relation to the two aspects mentioned with health, disease entails a qualitatively reduced capacity for tolerating variations and for adapting to changing demands: the narrowing of normativity. Disease is thus characterized by a reduction in physiological and behavioral capacities, requiring a narrowed environment in order to survive.

Disease can also be understood as involving a threshold effect whereby a quantitative variation produces qualitatively new physiological or behavioral functioning. Some examples that Canguilhem gives are how diabetes alters not only the kidneys but also the endocrine system and the organism's overall behaviors, the effects of hypertension on various vital organs, systemic immune reactions to infections, and the behavioral effects produced by neurological damage (1991, 80–86). The pathological condition entails pathophysiological effects that are not witnessed in healthy organisms. As this transition can entail more or less of a reduction of the organism's 'innovation possibilities' (1991, 196), there are various degrees to which one can be diseased. To return to the example of myopia, the reason Canguilhem claims that its abnormality is relative seems based on the degree to which one is short-sided (individual variation) and the degree to which this would involve a narrower range of functioning in a given society, hindering the individual's ability to adapt to its demands. In those societies where there is no narrowing of the individual's adaptability in order to survive, myopia need not be seen as pathological.

Moreover, Canguilhem's ecological or 'holistic' approach entails that health and disease are properties of the 'whole' organism,[11] not its parts, since 'in the living organism all functions are interdependent and their rhythms are coordinated' (1991, 84). While medicine has to localize in order to provide treatment, he stresses that we should not allow this therapeutic necessity to negate the integrated and dynamic structure of organisms. Similar to the property of 'life' (Nicholson 2014), health and disease are not to be found in the separate parts or matter comprising organisms, but in their total *organization* relative to a given environment.[12] This implies, then, that it is based on variations in how biological organization allows for external perturbations to be tolerated and how a dynamic physiology involves adjusting to changing demands that health and disease are to be understood. This approach would help to account for why not every variation, be it morphological or functional, is pathological, but can become pathological when it reduces the organism's capacities to meet the demands of its milieu.

One way of conceptualizing how this view differs from the standard naturalist account whereby health is value-free 'normal' functioning could be to see it in light of Canguilhem's interest in surrealism.[13] Similarly to how some surrealists appealed

[11] For some critiques of this view, see Giroux (2008) and Morange (2008).

[12] Here Canguilhem's view could be aligned with the one developed by Saborido et al. (see chapter 7 of current volume), i.e. an organizational account according to which the systemic regulation of the organism determines whether a trait is functional depending on its contribution to this self-organization. Canguilhem's eco-organismic approach is quite close to what they say about normativity and 'adaptive regulation', as is the claim that the pathological entails a narrowed range of organismic viability for a given organism in its milieu. For both theories, disease judgments can be made relative to token organisms and their environmental demands.

[13] This is suggested by Canguilhem's evocation of surrealism when discussing the history of the concept of monstrosity (Canguilhem 2008, 143), his reference to the surrealist poet and playwright Antonin Artaud in *Writings on Medicine* (Canguilhem 2012, 49), or his reference to the work of French social theorist Roger Caillois (Canguilhem 2008, 186). In *The Normal and the Pathological*, Canguilhem also cites a 1957 essay by François Dagognet entitled 'Surréalisme thérapeutique et formation des concepts médicaux' which was dedicated to Gaston Bachelard whose work on the imagination was quite influential for Canguilhem and whose ideas were close to those of the surrealists. Finally, Dagognet also describes Canguilhem's work as 'vitalisme surrationnel' (2007, 24), explicitly referring to the surrealist focus on how art can transgress conventions and rules.

to the transgressions of dreams and the role of the imagination for opening up new possibilities for thinking about and perceiving reality, Canguilhem's view could be called *surnaturalist* as it challenges what we take to be 'normal and natural'. It is naturalistic in that it defines health and disease as two distinct biological norms, and is *sur*naturalistic by acknowledging the plasticity and variability of living beings. Biological normativity implies that biological norms are characterized not by how they conform to what they ought to be, but by how they show what organisms are capable of in different circumstances. This surnaturalism suggests that as life continually creates novelties anything can be 'normal' insofar as it is viable in its environment, and that normality is not a matter of stable essences or regularities, but is better understood in terms of 'equilibrium and adaptability' in an environment with changing demands (1991, 269). What is 'normal and natural' is not to conform, but to transgress the temporary norm.

Possibly the most direct expression of this view can be found when, after referring to the surrealist poet Antonin Artaud, Canguilhem describes health as 'the capacity to surpass initial capacities, a capacity to make the body do what initially seemed beyond its means' (2012, 49). To be healthy is thus to be 'more than normal' (1991, 200, 2008, 132), as it involves the assurance to take risks and test one's capacities[14]: to establish new norms as conditions change. This implies that being able to abuse one's health and the threat of disease are part of healthy functioning. Saying that health is being 'more than normal' is to suggest, then, that the organism maintains its functional norms by flexibly adapting to changing demands. With such a view, health is not determined relative to unknown or hypothetical future demands, but is determined based on whether the organism actually surpasses previous capabilities so as to maintain itself when 'tested' by a given set of demands. Conversely, disease is not a failure to obtain ideal functioning, but can be said to have its own norms; it is normal 'under certain conditions and in its own way' (1994, 351). To be diseased is not to lack a norm, but to live according to a new norm with its own constants and unique mechanisms (1991, 188). Thus, disease entails a reduction in what one is capable of doing in a given environment, whereas health involves going beyond previous capacities. Anyone who has been sick or injured has surely experienced the transition from the restrictive norm of disease to the expansive norm of health as one convalesces. If there is a qualitative difference between health as being more than normal and disease as involving its own constricted norms or regularities, then this suggests that they should be understood as involving distinct biological processes or mechanisms (Nervi 2010). This would

[14] He even suggests that the fact that organisms have redundant parts allows for risks to be taken, for variations to be tolerated (Canguilhem 1991, 200). This is the same idea captured by the concept of 'robustness', which I will explain shortly.

seem to provide a more biologically coherent way to contextualize health judgments.

Moreover, the organizational and physiological properties that Canguilhem appeals to could be given some further biological support. Canguilhem's claim that organisms alter their behavior and morphology to meet changing demands could be supported by the concept of allostasis, which is defined as achieving physiological viability through change (McEwen and Wingfield 2003; Schulkin 2004). This concept is meant to better account for the dynamic and anticipatory character of biological norms that can be occluded when thinking in terms of homeostasis[15]: 'Homeostatic regulation is too passive a notion for the resources required to maintain long-term viability and reproductive success' (Schulkin 2011, 2). The insight of this view is that the very maintenance of biological norms is achieved through flexible and anticipatory biological responses. Another way of formulating this is by arguing that the variability of bodily parameters is more fundamental for understanding health and survival than the constancy of essential functions (Sterling 2004). In this view, the values of essential functions are not 'normal' because statistically common, but common because they reflect shifting demands. Canguilhem similarly argues that biological traits are normal not because they are frequent but frequent because they are normative or viable under given conditions (1991, 160). While regulatory mechanisms were likely selected to function within a given range, the point is that it is their variability, rather than their average value, that explains how shifting demands are met in a given environment. 'This is true for all states and all parameters: average values are useless. *The essential need is to occupy distinctly different states and move flexibly between them*' (Sterling 2004, 25; emphasis added). Conversely, it is the rigidity characteristic of pathological mechanisms which prevents demands from being met.

Similar to what is captured by the concept of allostasis, phenotypic flexibility also refers to the physiological variability that occurs within an organism's lifetime and which is 'reversible' or temporary[16] (Piersma and van Gils 2011). This entails that the so-called bodily 'constants' can fluctuate depending on changing demands. Examples of flexibility can be seen in how some animals alter their organ size, body size, internal temperature, basal metabolic rates, and even their sex depending on the time and demands of the life cycle, as well as changing food conditions (Piersma and Lindström 1997; Piersma and Drent 2003). Flexibility can be seen as an 'organismic adaptation, at the level of the individual' (Piersma and Lindström 1997, 137)

[15] A quick glance into the history of the concept of homeostasis shows that it has always struggled to deal with such variability. This is witnessed in the various concepts that have been proposed to capture this phenomenon over the years from 'predictive homeostasis' and 'rheostasis' to 'homeorhesis' (Schulkin 2011, 2). For attempts to provide a naturalistic account of health in terms of homeostasis see Ananth (2008) and Dussault and Gagné-Julien (2015).

[16] The reason Piersma and others prefer a separate term is to distinguish flexibility from other kinds of plasticity which refer to variations within a population that are irreversible, e.g. developmental plasticity or polyphenism. With the latter, plasticity reflects various pathways taken in response to early environmental triggers that are either difficult or impossible to undo.

whereby morphological and physiological changes produce behavioral changes or vice versa.

Coupled with this physiological property, we can also find support for Canguilhem's claim that biological normativity, establishing norms, is achieved as organisms are capable of *tolerating* variations. This can be captured in the concept of biological robustness which has been generally defined as the organizational property of biological systems that allows them to maintain their functions or performance despite internal or external perturbations (Kitano 2007). As this organizational property is systemic, it can even be understood as a property pertaining to the organism as a whole (Kitano 2004). While robustness could be seen as opposed to flexibility (or plasticity in general), with the former bringing out a system's sturdiness and the latter its malleability, what is interesting is that when dealing with complex biological systems these properties seem to reinforce one another, as when 'plasticity enables organisms to robustly adapt to a changing environment' (Kitano 2004, 828). Moreover, not only does plasticity generate robustness, but plasticity is also regulated by robust systems (Bateson and Gluckman 2011, 46). Being characterized by their responsiveness to environmental conditions, organisms maintain their robustness amidst perturbations by being capable of flexible (or allostatic) responses. Together, flexibility and robustness illustrate two adaptive properties of living beings: the one physiological, the other organizational. As these properties allow the organism to adapt to changing demands they could be used to better explain the nature of health and disease. The interesting consequence would be that in order to do so, medicine would have to make use of precisely that which Boorse seems to bracket: the organism-environment relation.

With these considerations in mind, we are better equipped to understand the contemporary relevance of Canguilhem's contextualist and surnaturalist approach to health and disease. Recall that his contextualist approach implies that health and disease are to be made relative to a given organism in its environment, while his surnaturalism suggests that 'normal' functioning is a matter of dynamism and adapting to the changing demands that an organism faces. With these properties, organisms are characterized by their 'experience, that is to say, improvisation, the utilization of occurrences' (Canguilhem 2008, 90). Consequently, it is from within Canguilhem's theoretical framework that robustness and flexibility could become relevant for medicine, potentially allowing for a new biological theory of health and disease which would help to naturalize the 'positive' aspect of Boorse's discussion of health as adaptability.

6.3 Consequences and Conclusions

I have argued in this chapter that Boorse largely misunderstands what making health and disease relative to a given environment would entail. I have suggested some ways to understand this relativity by looking deeper into Ryle's and Canguilhem's ideas. While this reframing of Canguilhem's biomedical philosophy suggests an

interesting way to understand his ideas, I will conclude by discussing two limitations. The first is that of distinguishing between failures to adapt and failed adaptations, and the second deals with the difficulty of operationalizing such an approach.

Regarding the first problem, if health is relative to the organism's ability to meet the demands of its environment, then is the failure to do so pathological or simply undesirable? According to an etiological account of biological functions (e.g. Wright 1976; Wakefield 2011), one could argue that if humans have not evolved an ability to carry out some behavior in certain environments, then the inability to do this behavior need not be the sign of a dysfunction or disease. For example, while freezing and suffocating when exposed to lunar conditions might certainly be an instance in which an organism fails to meet environmental demands and is clearly undesirable, it need not be considered a disease precisely because there is no malfunction involved. The organism is simply unlucky.

Such examples appear to challenge a contextual account, but they also seem to harbor a misunderstanding about biological norms that Canguilhem's approach could clarify. As I mentioned above, Canguilhem claims that organisms are viable not because they are selected, but they are selected because they are viable under given conditions. On the other hand, organisms are not selected because they live in 'normal' environments, but rather an environment becomes normal because organisms are viable in it, in part because organisms can alter their environments (Canguilhem 1988, 120). Again, organism and environment are inseparable. If it is the relation between an organism and its environment that determines whether the organism is normal or not, then it actually seems biologically accurate to claim that failures to adapt or to tolerate environmental conditions are indeed pathological.

This could be understood in the following way. First, without having to appeal to past selection history it is clear that in certain environments an organism's physiology would function in a rather restricted way, e.g. the gasping for air and rapid slowing of cellular and metabolic activity that a human would experience on the moon (or under similarly extreme conditions). It is this restriction that is the variation from the organism's norms that would be experienced as pathological (and hence 'negatively valued') *in that environment*. This claim is trivial in that it is unlikely that anyone would object that such conditions are harmful for humans. However, Canguilhem's concern is not to clarify the class of things that are considered 'diseased' (in this sense he is not doing traditional 'conceptual analysis'), but rather to describe what disease is. As such, it is not a matter of classifying humans as having a disease characterized by their being unable to adapt to those conditions, but a matter of arguing that it is the *disruption of* the organism's ability to meet environmental demands that constitutes disease. Whether or not this theory is adequate to explain disease will depend on empirical findings, not philosophical counterexamples. Furthermore, such extreme examples seem to be on the far end of a continuum regarding environmental relativity, as was discussed in the above examples of someone with hypertension moving to high altitudes or someone with a genetic mutation struggling to eat certain foods. Again, no organism or environment is normal in itself, but normality describes the relation between organisms and their environment.

In some sense, then, it is intuitive to claim that if we have never evolved to tolerate certain demands, such as living on the moon, then our inability to perform them should not be considered a dysfunction. However, an ecological or contextualist view might force us to rethink these intuitions. If health and disease are properties affecting the relation between organisms and their environments, then an inability to meet the environment's 'inconstancies' can result in a pathological condition in a given environment, regardless of the rarity of that environment. The point here is not that we have a disease simply because we are incapable of meeting certain hypothetical demands, but that this incapacity becomes pathological *under those conditions*.

The second problem is that of operationalizing these definitions. In other words, while Canguilhem's approach seems promising as a way to bring to the fore different biological properties to clarify health and disease, his definitions remain difficult to measure. This difficulty is particularly acute since health and disease are not biological states, but involve dynamic relations that can vary between and within organisms and even across environments. Furthermore, since health pertains to what organisms are capable of tolerating and doing as demands change, it is a property that in some sense defies analysis and objective determination. That being said, one way to operationalize this account could be to appeal to 'ecological fitness', which is the more traditional idea of fitness as how an organism 'fits' its ecological niche. This can be defined in terms of 'those traits, dispositions, and *properties of organisms* that tend to suit them for (and are thereby explanatory of) survival', with survival being 'not *merely* reproduction' (Peacock 2011, 102; emphasis added). As ecological fitness is defined as an organismic property that is not necessarily linked to reproduction and which helps to explain an organism's survival under dynamic environmental conditions, it seems like a good candidate.

Understood in this sense, then, health could be determined in terms of how various traits (from the molecular to the psychological or behavioral) contribute to the organism's maintenance of its organizational and physiological capacities, and thus its survival, in its environment.[17] Since an organism's survival depends on flexibly responding to environmental demands, an organism will be ecologically fit and thus healthy as long as these capacities are maintained in a given environment. While in general this suggestion is quite in line with Canguilhem's approach, what it gains in consistency it loses in being somewhat vague. More work would be needed to

[17] A similar claim is made by Nicholson (2014, 355), following Mossio et al. (2009), regarding the maintenance of organization: 'The very existence of an organism depends on the effects of its own activity. This means that an organism's activity is intrinsically relevant to itself. Such intrinsic relevance generates a naturalized criterion for determining what norms the organism *should* follow. An organism (as well as its parts) *must* act in accordance to the particular operational norms that enable it to maintain its organization through time. If it stops following these norms, it ceases to exist. It is therefore possible to speak of what is intrinsically "good" or "bad" for an organism by evaluating its activities and actions according to the contribution they make towards the maintenance of its organization'. See the essay by Saborido et al. in the present volume (Chap. 7) for more on how this organizational view can clarify health and disease.

provide a quantitative approach to understanding health as a form of ecological fitness.

Ultimately, Canguilhem's approach provides a way to contextualize a naturalistic account of health and disease. In doing so, some of the usual problems plaguing naturalistic approaches might be mitigated. As research into niche construction, phenotypic flexibility and allostasis suggest, organisms are quite responsive to their environment and if we are going to have a more biologically accurate account of health and disease then we need to understand how this responsiveness is a function of the environment. In other words, we need a form of 'eco-organismic medicine' that is capable of clarifying in what ways 'X is pathological for organism O in environment E'. The question, then, is whether the resulting 'relativism' is really so hard to swallow.

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Chapter 7
Organizational Malfunctions and the Notions of Health and Disease

Cristian Saborido, Alvaro Moreno, María González-Moreno, and Juan Carlos Hernández Clemente

Abstract In this paper we develop a systemic-organizational account of the notion of biological malfunction and present the implications of this theoretical model for the philosophy of medicine. We try to ground the theoretical notion of biological normativity, interpreting it as an inherent feature of biological systems. We then develop a theoretical account of malfunctions, based on the adaptive mechanisms of living systems, which explains the ways in which, and the reasons why, a biological trait is malfunctional in terms of current organization. According to our account, the organizational closure – i.e., the web of mutual constraining actions of the material structures on their boundary conditions that collectively self-maintain the whole organization of the system – provides a naturalistic grounding of the concept of normative functions from a systemic framework and constitutes the causal regime in which biological functions (and malfunctions) appear and can be identified. To illustrate this, we consider some significant medical examples. We claim that our definition of biological malfunction provides the theoretical resources for a naturalization of the notion of biological normativity with relevant implications for a naturalist conception of notions of health and disease.

Keywords Malfunction • Normativity • Organization • Health • Naturalism

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7.1 Introduction

The aim of this paper is to offer a theoretical characterization of the notion of organizational malfunction. This notion depends on the recent organizational approach to the notion of biological function (Collier 2000; McLaughlin 2001; Christensen and Bickhard 2002; Mossio et al. 2009; Saborido et al. 2011) and has important implications for a naturalistic approach to the notions of health and disease.

When a function is attributed, a rule is postulated at the same time, and that rule is applicable to the behavior of what we consider functional. Although there are some exceptions (see, for instance, Davies 2001 or Cummins 2002), there is a general assumption in the philosophy of biology that the notion of biological function is normative, since it refers to some effect that is supposed to take place (Price 1995, 2001, 12–15; Hardcastle 2002, 144). In Wouters' words:

> The dominant view (…) starts from the intuition that functions have a peculiar feature: a function is not necessarily something an item does, but rather something that it should do. For example, my pancreas is said to have the function to produce insulin despite the fact that it actually does not do so. Function attributions are, in other words, not descriptive (they do not tell us what is the case) but normative (they tell us what should be the case). (Wouters 2005, 124)

As McLaughlin (2001, 2009) notes, functions exhibit a particular type of relation between certain means and goals in a system, which goes beyond the standard concept of causality and has a normative flavor: in order for some systemic goals to happen, some effects need to occur, and these effects are referred to as "functions". This normative sense of the notion of biological function would appear to be crucial for the philosophy of medicine (see Etxeberria, Chap. 8). However, a complete characterization of the normative dimension of biological functions relevant to the theoretical definitions of health and disease is still to be formulated. In contemporary philosophy of medicine, discussion of the theoretical definition of the terms "health" and "disease" is usually presented as a debate between the normativist and naturalist approaches (Kovács 1998; Khushf 2007). On the one hand, normativists (Margolis 1976; Engelhardt 1986; Nordenfelt 1987; Fulford 1989) consider that our conceptions of "health" and "disease" necessarily imply value judgments. Thus, healthy states are those states we desire to be in, and diseased states are those states we want to avoid. On the other hand, naturalists (Boorse 1977, 1997; Scadding 1990) give a definition of "health" and "disease" which attempts to highlight what is biologically natural and normal for humans. The naturalist project in the philosophy of medicine searches for an "objectivist" definition of disease, a definition based on scientific theory that does not include personal or social values.[1]

[1] There are also some "hybrid" approaches consisting in different combinations of aspects of naturalist and normativist perspectives (Reznek 1987; Caplan 1992; Wakefield 1992). These approaches claim that both biological and value-laden factors play important roles in the conceptualization of health and disease. In this paper, we shall explore the scope and limitations of the naturalist-objectivist project and, since these hybrid approaches defend the necessity of including external values, we shall consider them as "non- naturalist" views and, therefore, we will not focus our analysis on them. The philosophical debate between the so-called "normativist" and "naturalist" approaches is described in Kovacs 1998; Boorse 2002 and Ereshefsky 2009.

In a recent paper, Schwartz (2007) has labeled naturalist theories of health and disease as "dysfunction-requiring accounts" because they include the presence of biological dysfunctioning in their definitions of disease. According to naturalist theories, for a pathological condition, it is necessary for some part of the organism to fail to perform one of its biological functions. Therefore, by appealing to biological dysfunctions, naturalist formulations attempt to avoid observer-dependent external values in their definition of "health" and "disease".

According to the influential Bio-Statistical Theory (BST), championed by Christopher Boorse, "disease" is defined in terms of statistically abnormal functioning of a specific trait in comparison with the average functioning of the traits of the same type in individuals of a concrete "reference class" (members of the same species, gender and age), and health is simply the absence of disease. Significantly, Boorse defines a diseased state as "a type of internal state which impairs health, i.e., reduces one or more functional abilities below typical efficiency" (Boorse 1977, 62). This so-called naturalist theory is supposed to be an objective and value-free approach and, in fact, has been the mainstream naturalist position in philosophy of medicine for the last four decades.[2]

Ereshefsky has recently argued that naturalist approaches based on bio-statistical analyses, such as Boorse's, lack a basis in biological theory and, therefore, cannot be considered genuinely "naturalist" approaches (Ereshefsky 2009, 227). In this work we shall focus on this biological basis and suggest a bio-functionalist approach able to draw the frontier between "right" and "wrong" functioning from a more empirically grounded perspective. We do not appeal to bio-statistical criteria in order to draw the line between the normal and the malfunctional. Our account is built upon a formulation of the concept of malfunction based on the organizational properties of living beings as self-maintaining systems, and connects the notion of biological function with a non-observer-dependent natural normativity. This approach has relevant consequences to the theoretical approaches to the notions of health and disease. We consider that an objectivist solution to the "line-drawing problem" (see Schwartz 2007), i.e., one able to classify cases into appropriate versus inappropriate rates of functioning, requires an approach which is well grounded in biological and medical science.

As Lennox argues, "health" and "disease" are value concepts with "empirical and biological foundations" (Lennox 1995, 502). According to Lennox, "health" is a state of successful performance of the biological functions necessary for life. A "healthy state" is one in which these vital functions are performed well and biological self-maintenance is preserved. Consequently, "unhealthy states" are those in which the biological self-maintenance is frustrated or threatened. In view of this, Lennox proposes a theoretical grounding of the notions of health and disease,

[2] For a review on BST, its virtues and weak points see Nordenfelt (1987), Kovacs (1998) or Kingma (2010). Boorse himself has offered revisions of his theory and responses to many criticisms in Boorse 1997 and 2002. See also Hausman (2012) and Garson and Piccinini (2014) for recent developments of the bio-statistical approach.

claiming that the functional features of concrete organisms as living beings allow us to evaluate their physical states normatively from an objective perspective:

> The *fundamental* alternative faced by living things, then, is life or death, and the standard by which one judges whether a biological function is appropriate is, therefore, life. How organisms act and function determine whether they maintain themselves as organisms, and all other biological goals are ultimately defined, in part, by their contribution to maintenance of life. This, finally, underwrites the *objective evaluation* of biological processes. (Lennox 1995, 506–507)

It is worth mentioning that the relation between the notions of "natural norm" and "biological function" can be found in many recent theoretical characterizations of the constituent features of living agency (Barandiaran et al. 2009; Birch 2012; Christensen 2012). In this paper, we hold that the recent O*rganizational Approach* in the philosophical debate about biological functions is the best strategy to obtain a theoretical justification for the ascription of functions and norms to living systems' behaviors. Within this framework, we propose a definition of "organizational malfunction" based on the biological features of "adaptive regulation" and "functional presupposition". This organizational definition is, at the same time, objectivist and evaluative, and has relevant implications for a theoretical approach to the notion of "disease" as understood in the real practice of healthcare.

In sum, functional discourse in biology and medicine seems to imply that it is possible to ascribe biological dysfunctions and malfunctions (i.e. "wrong functioning"). For example, to state that the function of the heart is to pump blood appears to imply that a heart *should* pump blood. When a heart is not doing so, it is not functioning correctly. But functions may be performed well, defectively or even not at all. Saying that something can function well or poorly implies the assumption of a norm that may be satisfied in different ways and with different levels of efficiency. Malfunctionality is a matter of degree (Krohs 2010, 342). A malfunction can be lethal or just a mild inconvenience. A trait is malfunctioning when it is performing its function in the wrong way and this can happen with different degrees of relevance to the system. It is necessary to develop a naturalist theory of biological malfunctions able to address the idea of "adequate level of functional performance" in order to obtain a definition of biological malfunction relevant to the theoretical definitions of health and disease (see Hausman 2012). The goal of this paper is to draw an outline of this theory drawing on the Organizational Approach.

7.2 Organizational Malfunctions

7.2.1 The Organizational Approach

The Organizational Approach (OA) is a new perspective; which has been developed within the philosophical discussion of the notion of biological function.[3] The different formulations, recently proposed, among others, by Schlosser (1998), Collier

[3] This new approach has been introduced as an improvement and an integration of the well-known "etiological" and "systemic-dispositional" approaches (Mossio et al. 2009, 816–821). For a critical survey of these two mainstream perspectives in the philosophical debate on functions, see McLaughlin 2001; Mossio et al. 2009, 816–821, and Saborido 2014.

(2000), Bickhard (2000, 2004), McLaughlin (2001), Christensen and Bickhard (2002), Delancey (2006), Edin (2008), and Mossio et al. (2009), ground functional attributions in the fact that biological systems embody a specific kind of causal regime in which the actions of a set of parts are a condition for the persistence of the whole organization through time. Biological systems are self-maintaining systems and, within a self-maintaining organization, functions are interpreted as specific causal effects of a part or trait, which contribute to generating a complex web of mutual interactions, which, in turn, maintain the organization and, consequently, the part itself. Thus, organizational theories argue that there is a causal loop, based on the processes of self-maintenance, that allow us to state that a trait has (or serves) a specific function, to the extent that, due to that function, the trait contributes to the maintenance of the biological organization to which it belongs.

Organizational theorists claim that the function explains the very existence of the functional trait. The reasons for the existence of a functional trait are naturalistically grounded in the organizational features of biological systems. And biological systems are self-organizing and self-maintaining entities. The organizational approach claims that a trait's effect that contributes to the self-maintenance of the organization is a normative function. For instance, Schlosser (1998) affirms that organizational functions are inherently normative because a functional effect is necessary for the persistence of the system in which the functional trait exists. If a functional trait fails to produce its function, then it will not be around for very long, because it cannot be re-produced by the system. And McLaughlin uses a normative terminology when he argues that a trait's effect that leads to the self-reproduction of the system is something *good* for that system (McLaughlin 2001, 191). In McLaughlin's words: "if the characteristic activity of an organism is its self-reproduction, then '*good* for the characteristic activity of X' and '*good* for X' is the same" (McLaughlin 2001, 203).

Other organizational theorists explicitly subscribe to this idea, such as Christensen & Bickhard, who affirm that "a function *is normative*: [a functional trait] can succeed or fail in supporting the system, and this makes a distinct difference to the system, and to the world" (Christensen and Bickhard 2002, 16). Organizational functions are norms *imposed by the system itself.* Functional norms are not external "observer-dependent" values because they appeal to the *conditions of existence* of a living organization. As Saborido et al. argue: "the *conditions of existence* of the system are here interpreted as the *norms* of its own activity: a functional trait must behave in a specific way, *otherwise* it would cease to exist" (Saborido et al. 2011, 584).

In order to analyze this organizational strategy in more detail, let us focus on the organizational formulation proposed by Mossio et al. and Saborido et al.[4]:

[4] The reader can find a complete description of this definition in Mossio et al. 2009 and Saborido et al. 2011. For a comparison between that formulation and the other organizational approaches, see Saborido et al. 2011, 587–599, and Saborido 2014.

> A trait T has a function if and only if:
>
> C1. T contributes to the maintenance of the organization O of S;
> C2. T is produced and maintained under some constraints exerted by O;
> C3. S realizes organizational closure. (Saborido et al. 2011)

The "organizational closure" of C3 is realized when a web of material structures is able to exert mutually constraining actions on its boundary conditions, such that the whole web is collectively self-maintaining. Whereas each constraint is not *per se* able to achieve self-maintenance, the whole web of constraints can do so, insofar as it is subject to organizational closure, for it can thus compensate its own decay, due to its far-from-equilibrium nature, by constraining its own surroundings in such a way as to recursively assure the replacement of the different components. Thus, the close association between complexity and integration accomplished by organizational closure is a mark of biological self-maintenance. Biological self-maintenance implies integration among the different processes and structures of an organism's traits. If we consider, for instance, the classical example of the function of the heart, this definition would imply that the heart has the function of pumping blood since pumping blood contributes to the maintenance of the organism by allowing blood to circulate, which in turn enables the transport of nutrients to, and waste away from, its cells, as well as the stabilization of body temperature, pH, and so on. At the same time, the heart is produced and maintained by the organism, whose overall integrity is required for the ongoing existence of the heart itself. Lastly, the organism realizes organizational closure, i.e., it produces numerous other structures that contribute in different ways to the maintenance of the organizational closure of the system (Mossio et al. 2009, 828). Therefore, this formulation defines a function as a trait's contribution to the biological self-maintenance of the systemic organization.

7.2.2 Adaptive Regulation

According to this organizational approach, the specific regime of self-maintenance that grounds functionality is the "organizational closure". This concept has become increasingly important in theoretical biology and the philosophy of biology (see Chandler and Van de Vijber 2000 and Mossio and Moreno 2010) and it is a key notion for understanding the specific kind of organization of living beings. In Mossio et al.'s words:

> Biological systems generate a network of structures, exerting mutual constraining actions on their boundary conditions, such that the whole organization of constraints realizes collective self-maintenance. In biological systems, constraints are not able to achieve self-maintenance individually or locally: each of them exists insofar as it contributes to maintain the whole organization of constraints that, in turn, maintains (at least some of) its own boundary conditions. Such mutual dependence between a set of constraints is what we call closure, the causal regime that, we claim, is paradigmatically at work in biological systems (Mossio et al. 2013).

However, in Mossio et al. 2009 it is explicitly recognized that a breakdown in a specific form of organizational closure does not necessarily imply the death of the organism. According to these authors, a trait is functional, not because it is indispensable for the organism's life, but because it contributes to the organizational closure of what they call "a concrete regime of self-maintenance":

> We call *regime of self-maintenance* each possible specific organization that an individual member of a class can adopt without ceasing to exist or losing its membership of that class. Each class may thus include several regimes of self-maintenance. In organizational terms, if a trait is subject to closure (and thus has a function), then *the specific regime of self-maintenance* that the system has adopted requires the said trait as an indispensable component. Nevertheless, not every functional trait contributes to all possible regimes of self-maintenance of a given class, which means that an individual system can sometimes compensate for the breakdown of a component by shifting to a different regime of self-maintenance, in which the defective trait is no longer required. In contrast, some functional traits are indispensable, in that they are required for all regimes of self-maintenance that a member of a class could possibly adopt. (Mossio et al. 2009, 829–830)

To illustrate the way an organism can "compensate for the breakdown of a component by shifting to a different regime of self-maintenance", Mossio et al. compare two different cases of biological functions: the heart's pumping of blood and the eyes' transduction of light. According to these authors, a failure that prevents the first function necessarily implies the death of the system but, in the case of the function of eyes, the system can instantiate a new organization in which the malfunction does not threaten global self-maintenance and the risk of collapse of the causal closure is thus avoided.

We argue in this paper that the capacity of living systems to maintain themselves is the key to interpreting the concept of malfunction from an organizational perspective. A biological trait can malfunction without necessarily causing the collapse of the circular process of self-maintenance because biological systems show plasticity in their organization. And this plasticity is possible because living beings are paradigmatic examples of adaptive systems.

Adaptive systems are those entities that are able to continuously *regulate* their internal states and interactions with the environment in order to preserve the organizational self-maintenance:

> [Adaptivity is] a system's capacity to regulate, according to the circumstances, its states and its relation to the environment with the result that, if the states are sufficiently close to the boundary of viability, 1) tendencies are distinguished and acted upon depending on whether the states will approach or recede from the boundary and, as a consequence, 2) tendencies of the first kind are moved closer to or transformed into tendencies of the second and so future states are prevented from reaching the boundary with an outward velocity. (Di Paolo 2005)

In other words, adaptive regulation implies normativity because it attempts to avoid the loss of the function, that is, it is dedicated to anticipating the loss of the function (more exactly, the degree of risk that the function may be lost). This means that the adaptive nature of biological organizations requires a certain hierarchy in the dynamics of living systems, such that a subsystem could functionally modulate the low-level functions, which in turn constrain the underlying processes constituting the system.

Regulation is, therefore, a crucial feature of a living organism.[5] If we analyze living organisms from the perspective of their adaptive capacities, we must therefore consider functional traits/organs to have a range of activity, subject to adaptive modulation, and their adaptive (sub)system to be that which specifies their particular range of activity. When environmental conditions change, the adaptive system triggers actions in order adequately to modulate the functioning of the organs, namely, to set them in those specific regimes of functioning that satisfy the adaptive norms. This is precisely an *adaptive reaction*.

Functional processes need to be "adequately" modulated in all organisms because they live in changing environments. If biological systems did not actively regulate their interactions with their changing environment, they would perish, and that is why the specific regime to which each function contributes is significant. For example, in a situation of danger

> "the heart beat accelerates, blood pressure rises, blood vessels in muscles dilate, increasing the flow of oxygen and energy. At the same time, blood vessels in the gastrointestinal tract and skin constrict, reducing blood flow through these organs and making more blood available to be shunted to skeletal muscle. Pupils dilate, improving vision. Digestion in the gastrointestinal tract is inhibited; release of glucose from the liver is facilitated and multiple other smooth and cardiac muscle adjustments occur automatically to increase readiness to fight or to flee" (Powley 2003, 913–914).

Thus, the idea of adaptive regulation implies that some selective and metafunctional operation modulates an underlying range of functional operations in the structure of each trait. The specific way that this regulation works depends on the regulatory system, *but each trait should be able to operate within a specific range*. If a particular trait cannot, in a given situation, attain the range that the regulatory subsystem requires, because it can only operate in a more limited range, we say that the structure is deleterious. In other words, if in this process of adaptive modulation, the functional trait is unable to adopt the specific range of functioning required (say, because of a difference in its structure), this trait's behavior does not fit with the functional regime adopted by the remaining organs. For example, a human heart can pump blood within a certain range of flows, and the same applies to the lungs, the kidneys, and other organs. The specific rate of functioning of each organ is specified by the regulatory system according to the environmental (and also, internal) conditions.

To illustrate this, we can examine the case of aortic stenosis. In patients with aortic stenosis, adaptive mechanisms can overcome structural and morphofunctional alterations for years, and the systemic functioning of the body appears normal. However, with time, malfunction becomes clear, presenting symptoms belonging to a specific morbid entity. Let us consider this alteration in more detail.

In some cases, patients are born with normal tricuspid aortic valves but thickening and calcification can lead to stenosis when these patients are in their 60s or 70s. The reason why this occurs in some patients with normal valves and not in others (predisposition to disease) is unknown. The normal aortic valve area is 3–4 cm^2 and

[5] Bich et al. (Forthcoming) offers a nice overview of the notion of biological regulation.

virtually no hemodynamic disturbance (i.e., malfunction) occurs until the orifice is reduced to less than 33 % of its normal size. At this point, a systolic gradient between the aorta and the left ventricle is apparent. Normally, the pressures between the left ventricle and the aorta are similar at the time of systole. However, in aortic stenosis, left ventricular intracavitary pressure increases with respect to aortic pressure in order to overcome the resistance to blood flow from the stenosis. A geometric progression thus arises: as the valve surface area diminishes, the magnitude of the gradient increases. The gradient may increase to 10–15 mmHg with valve areas from 1.3 to 1.5 cm^2 or even 70 mmHg with stenosis of 0.6 cm^2 (cfr. Kasper et al. 2008).

The progress of the stenosis is highly variable from individual to individual; one patient may remain stable for many years with a steady gradient and another may show the gradient increase at a rate of 15 mmHg/year. Despite the malfunction of the valve, normal function of the left ventricle is maintained by a compensatory mechanism: concentric myocardial hypertrophy of the left ventricle. This hypertrophy helps to maintain ejection fraction and cardiac output in spite of the aortic transvalvular pressure overload. This is a clear example of organ malfunction compensation in order to meet the blood flow needs of the body. In this way, malfunction (demonstrated by symptoms) may be avoided for a long period of time, even if the adaptive reactions will ultimately not be able fully to make up for this alteration in the aortic valve.

From an organizational perspective, the valve is malfunctioning because the way this trait functions does not fit with what many or all the other functional parts of the system do, following the regulatory rules of the adaptive (sub)system. In other words, it is unable to do what the regulatory (sub)system tells it to do, because of the particular structure of this trait limiting its range of modulation, and this is why we say that the trait is malfunctioning.

In sum, because malfunctional traits are structurally different from normal traits, and because this structural difference is the cause of its more limited range of modes of functioning, a system with malfunctions cannot recede from the boundary of the range of essential variables (even in conditions that the adaptive mechanism should control). However, this is not a failure of the adaptive system as such, but of the capacity of this particular trait/organ to work in the adequate regime.

7.2.3 Functional Presupposition

Due to its structure and organization, the set of functional traits in a system requires a specific regime of self-maintenance: this means that the structure of a given trait is such that it "presupposes" that it will enter in a regime of interactions not only allowing a generic viability, but also the appropriate regime of interactions, namely, one which is in accordance with the current conditions of the regime of adaptive regulation of the system to which it belongs. In turn, the regime of functioning of the regulatory (sub)system should fit the structure and organization of the organs of

the system as a whole. More specifically, each trait in a system, thanks to its structure, allows a range of forms of contribution, which is defined by the regime of self-maintenance of the system.

Hence, for the organizational approach, "F is a function of T" means "the organization O of a biological system S, which produces and maintains the trait T, presupposes T performing the effect F". Biological systems are characterized by the complex functional integration of their components. There is a precise tuning among all the functional elements and the demands enforced by the environment. Thus, there are interdependent causal relationships between the systemic organizational properties and the effects of specific traits that ground what we call a functional presupposition (Christensen and Bickhard 2002, 17).[6]

It can be argued that, ultimately, the "standard" regime of any organism is established through a collective-historical process of trial and error (natural selection) which shapes the species to which it belongs. A consequence of this is that the norm ontogenetically precedes the adaptive compensation, but not phylogenetically (because, of course, evolution is not an intentional design). It is thus at the populational level that a given normative regime of adaptive regulation can be set: one that is capable of ensuring a stable existence (and by this we mean one which takes place throughout a long time span, namely, many generations) in a given niche. Natural selection eliminates those regulatory regimes that we call malfunctional. The particular norm that establishes the right regime of regulation for a type of organism is one which ensures a stable situation (at the populational scale) for this class of organization, namely, its indefinite viability in its specific niche. Thus, it is because of its contribution to the self-maintenance of this class of organisms that this particular normative mechanism exists.

The mechanism of adaptive regulation of a given organism is set through a historic-collective process of trial and error; only those forms of modulation that ensure viable organizations (in specific environments) can be selected. Ultimately, the regulatory mechanism itself would not exist if it did not make a contribution to the self-maintenance of the specific ancestral organisms that it helped regulate. However, and even more importantly, although the origin of the norm according to which something is deemed good or malfunctional is ultimately an evolutionary matter, this does not mean that we cannot define, in the present organization of each individual organism, whether a given trait is functioning correctly or not and even

[6] It is worth noting that there are important similarities between our conception of "functional presupposition" and the conception of this idea proposed in Bickhard 2000 and Christensen and Bickhard 2002. According to these authors, a functional presupposition is a structural property that allows us to conclude the existence of a concrete part or trait of a system and its function by considering the whole set of the remainder of parts or traits. Our interpretation of functional presupposition allows us to postulate, by considering the functional behavior of the whole system and its parts, a *range* of functioning of a trait that is determined by the regulatory system. Thus, by considering the structure and dynamic components of a system it is possible to postulate the "necessary" existence of a functional trait, the range in which the function of that trait has to be performed, and, therefore, certain aspects of its structure.

whether the very norm embodied in its regulatory mechanism is appropriate or not. As Christensen has recently pointed out:

> The etiologist may point out that [living] systems have infrastructure for self-perpetuation largely as a result of an evolutionary history. […] Nevertheless […] the key perspective for normative evaluation of function is the current system rather than past selection. Regulation does not succeed by making parts function as they did in the past, it succeeds by making the system work well in present conditions. (Christensen 2012, 108)

Accordingly, a trait that malfunctions is, first of all, a functional trait, in the sense that it contributes to the maintenance of a self-maintaining organization; but this contribution is not adjusted to a certain norm and this is why we say that it contributes poorly. The effects of a functional trait are deemed "good" or "bad" according to an embodied norm that lies in the action of the regulatory subsystem that the whole organism presupposes.

7.2.4 An Organizational Definition of Biological Malfunction

We are now in a position to propose a definition of biological malfunction. From the organizational perspective, a malfunctional trait is a functional structure unable to display the range of functional processes that the other functional traits of the system presuppose, and therefore the system is acting within a narrower range of viability than the range of viability that the system's organization presupposes. Accordingly, a malfunction happens when the effects of a biological trait fail to fulfill its functional presupposition in a way that is not fully balanced by the adaptive regulations of the organism (see Saborido and Moreno 2015).

This definition implies four conditions for the ascription of organizational malfunctions to biological traits:

C_1. A biological trait T has the function F, i.e., the organization O of an organism S "presupposes" T performing the specific effect F (in a range of activity).
C_2. In a given circumstance, some internal or external conditions disrupt the functional integration of T in O, i.e., T cannot perform F in the range of activity presupposed by the organism as a whole.
C_3. As a consequence of this failure, an adaptive reaction is triggered by the regulatory (sub)system of S.
C_4. The failure is not fully compensated for by the adaptive reaction.

Accordingly, for instance, a heart failure is an organizational malfunction because: (1): the heart (according to the organizational definition described in Sect. 7.2.1) has the function of pumping blood, which is required for the functioning of the rest of the parts of the organization of the body and, consequently, for the self-maintenance of the organism. (2): the heart in question is unable to provide blood at the rate that the living organization presupposes. (3): this failure is detected by the organism, and the organism thus regulates its internal states and its interactions with

the environment to compensate for it. A body with a very arrhythmic heart shows many reactions of other traits to adapt themselves to the functioning of the heart, for instance, limiting mobility. And (4): these adaptive reactions do not completely fix the situation caused by the heart failure and the living system has a more limited range of viability. An organism with heart failure cannot perform some of the activities (for instance running or hunting) that it could perform with a normal heart. If, due to its adaptive capacity, an organism is able to make up for a failure in a way that additional adaptive reactions are not required to preserve the current regime of self-maintenance, the malfunction disappears.

By aligning "healthy" and "unhealthy" behaviors with those that are "correct" or "incorrect" according to an organizational notion of biological malfunctionality, our account aims to establish a non-observer-dependent distinction for "healthy" and "diseased" conditions. To fulfill a biological function would be equivalent to following a natural norm and a disease would be a disruption of a functional mechanism.[7] Thus, our notion of *organizational malfunction* entails a normative distinction between "healthy" and "unhealthy" biological states grounded in the distinction between "correct functioning" and "malfunctional behavior" that does not depend on psychological or social values, but on the organizational properties of biological mechanisms.

In the remainder of this section, we will discuss some relevant implications of C_3 and C_4 above.

C3: Detecting the functional failure

This account reclaims Leriche's *dictum*, "health is the life lived in the silence of the organs". An organizational malfunction is a biological behavior of an organ triggering a response that modifies the normal functioning of the organism as a whole. There is no malfunction without this "cry of the flesh", i.e., the adaptive reaction of the organism to a biological state that it considers to be negative. In fact, if the organism were unable to detect the behavior of a trait as unfit, there would be no organizational criteria to define that biological behavior as malfunctional.

However, there are cases of functional traits that fail to perform their organizational functions. Such a failure is not detected as "incorrect" by the organism and, consequently, it does not cause any adaptive reaction. This is, for instance, the case of the functional redundancies of some biological traits. Some traits may not perform their biological function without thereby necessitating a reaction of the adaptive system, since their function is performed by other traits (see, for instance, the case of "genetic redundancy" in Pearce et al. 2004; Kafri et al. 2009).

[7] Functional analysis proposed by the Organizational Approach corresponds to a systemic view that considers that living beings' dynamical organizations can be decomposed into mechanisms that serve specific functions. As Garson argues, organisms instantiate "functional mechanisms", i.e., mechanisms that serve functions and whose norms should be characterized in terms of their functional properties: (…) mechanisms serve functions. Moreover, that mechanisms serve functions places substantive restrictions on the kinds of activities 'for which' there can be a mechanism. Although the heart is a 'mechanism for' circulating blood—or it is part of such a mechanism—it is not a 'mechanism for' heart disease. Heart disease is something that happens when this mechanism is disrupted. (Garson 2013, 318)

A medical example of morphofunctional alteration that does not produce a compensatory adaptive reaction is Gilbert's syndrome. In Gilbert's syndrome, present in up to 10 % of the Caucasian population, there is an alteration in the metabolism of bilirubin which is detected by laboratory tests as total bilirubin levels which are elevated at the expense of unconjugated bilirubin.

This is the result of a genetic predisposition; its result is a reduction in the transcriptase of the UGT-1 bilirubin gene (HUG -Br1), which in turn gives rise to the mutation of a promoter region. This causes a decrease in the activity of a liver enzyme, UDP-glucuronosyltransferase, responsible for the correct metabolism of bilirubin. It also means that the uptake (in order to conjugate and eliminate) of bilirubin is slow. There is a slight increase in hemolysis in up to 50 % of patients (a fact which increases unconjugated bilirubin). All these facts together cause the alteration of the mechanism of conjugation and excretion of bilirubin in the liver and abnormal elevation in blood analysis. But even though the levels are altered, they are not enough to cause hepatic or systemic dysfunction.

We therefore have an abnormal functioning of a biological trait, which does not imply a malfunction. This would be a case of morphological alterations, (structural abnormalities) and altered morphofunctioning, however the needs of the organism as a whole are met. Therefore we cannot talk of a malfunction according to our definition.

Failure detection by the regulatory subsystem is a requirement for an attribution of malfunction to a biological trait. The cited cases of traits with redundant functions and the Gilbert syndrome are not cases of malfunctions, to the extent that, according to the embodied normativity of the biological system, there is no "incorrect" behavior. Of course, these kinds of failures are interpreted in many cases as diseases but, as we shall argue in the section IV.2., our definition of malfunction is only one dimension among others within the complex conceptual distinction between healthy and unhealthy states. Therefore, our account is perfectly compatible with the existence of biological states that are considered as undesirable or unhealthy without implying malfunctionality according to the embodied normativity involved in our definition.

C4: Compensating for biological failure

A malfunctional trait is, by its own structure, unable to exhibit the range of functional processes that the other functional traits of the system presuppose, and consequently the system is acting within a range of viability which is more limited than the range of viability presupposed by the organization of the system. Of course, acting in this more limited range can endanger the system, and the adaptive mechanism attempts to counterbalance this situation. But, despite any modification in the other traits, the malfunctional trait precludes the eventuality that adaptive regulation is able to restore the norm. Thus, we speak of malfunctions when the risk situation cannot be resolved. This is an important point, because if other parts were capable of fully compensating for the operations of an "abnormal" trait, this trait would not be considered malfunctional according to our definition.

This can occur, for instance, in most cases of mitral valve prolapse, in which the compensatory adaptive mechanisms maintain the normal functioning at the systemic level. Mitral valve prolapse is an example of structural alteration within an organ. The gradient of morphofunctional alteration (of said lesion) is what will take us from an absolutely asymptomatic alteration, which causes no physiological alteration to the functionality of the heart as a whole, to the extremes of severe mitral insufficiency arising from the tearing of the chordae tendinea, and thus the need for valve replacement surgery.

That said, we should bear in mind that mitral valve prolapse (also known as primary form of myxomatous degeneration of the mitral valve, floppy mitral valve syndrome, or Barlow's syndrome) can be caused by several mechanisms; but the best known and most widely recognized is due to excess and redundancy of valve tissue arising from a degenerative myxomatous process with a large concentration of mucopolysaccharides. Although it may be associated with other syndromes such as Marfan syndrome, in general there is no other clinical or pathological manifestation. In some cases, the gradual process of the mitral valve extending towards the interior of the left atrium at the point of ventricular systole increases, to the point of excess, the tension of the papillary muscles (which attach the valve to the cardiac muscle). This provokes an onset of ischemia of the said muscle and the underlying ventricular myocardium, and in turn leads to malfunction in the process of ventricular systole. If the heart, the circulatory system, and the body as a whole, are to maintain their functionality, to perform their tasks without leading to symptoms, compensatory mechanisms are required. These compensatory mechanisms, in spite of the malfunctioning process, manage to avoid the onset of a clear, symptomatic mitral insufficiency.

As greater stresses occur in the valve due to the accumulation of mucopolysaccharides, and as the papillary muscles tighten further, the risk of a tear in the muscles heightens. There also arises the threat of thickening and/or calcification of the mitral annulus, and the emergence of symptomatic mitral insufficiency - a clear alteration of cardiac functionality. This case is significant because, using cardiac imaging techniques, we can visualize the correlation of the adaptive changes of the left ventricular myocardium including the gradient of morphofunctional alteration of the cardiac valve and the extent of the prolapse.

It should be noted that a person with a malfunctioning prolapsed mitral valve (as can be demonstrated by imaging) can remain asymptomatic and with excellent cardiac function throughout all of his or her life thanks to myocardial adaptation mechanisms. These adaptations, in turn, can cause adaptive changes in other organs and systems. We are thus dealing with primary and secondary structural alterations (adaptive changes) as well as alterations of part of an organ which do not involve malfunction of either the cardiac organ or the vascular system as a whole.

The adaptive reaction can eliminate malfunctionality within the same organizational regime, as illustrated by the former example of mitral valve prolapse, but this can also be done through the establishment of a new form of organization that makes the organism perfectly viable without eliminating the "incorrect" behavior. A biological system can shift to a different biological organization (different

"regime of self-maintenance" in the words of Mossio et al. 2009, 829) in which this biological behavior is no longer detected as malfunctional by the regulatory subsystem, but perfectly integrated with the other traits according to this new regime of self-maintenance. We argue that this view is perfectly compatible with Amundson's criticism of the notion of "normal function". Amundson (2000) distinguishes between the *level* of an individual functional performance and the mode by which that performance is achieved. He considers several examples of abnormal functioning from a statistical viewpoint that nevertheless allows the abnormal function bearer to live in a fully viable manner (Amundson 2000, 39–43). In fact, functional diversity among organisms of the same class is present in the same ontogenetic development of living beings. The organisms' ontogeny shows a remarkable plasticity in the ways it preserves the inherent functional integration of the biological organization:

> The processes of ontogeny bring about the functional integration of the organism. As various body parts and systems develop, they adjust to each other. This integration occurs during the development of every organism, whether the organism is destined to be statistically typical or atypical of its species. The lens of the eye is not determined to develop in the location it does by its position on some genetic blueprint. Rather, the already-formed optic vesicle induces the ectoderm that overlays it to differentiate into the lens (after an earlier and more complex series of tissue interactions). If some trauma happened to relocate an optic vesicle to an unusual position on the head, lens induction would still proceed and result in a functioning eye. A more familiar aspect of developmental plasticity is the ontogenetic adaptation of an organism to its external environment. Development of use-enlarged muscles and protective calluses are customary examples of this kind of phenomenon. (Amundson 2000, 39)

Our definition of organizational malfunction takes into account this functional variation. The organizational interpretation of "correct functional behavior" is very different from the concept of "normal function". The normativity related to our notion of malfunction appeals directly to the *level* of functioning, and not to its *mode* or *style*. Nor do we need to appeal to a "reference class" or to an "idealized type", as the BST does, to justify when an organism is functioning incorrectly. The normativity of organizational malfunctions is based on the organizational properties of each token living being.

7.3 Implications for the Philosophy of Medicine: State Descriptions and Normative Claims

Emphasizing the impossibility of a strictly biological characterization of disease, Ereshefsky (2009) has recently proposed a distinction between state descriptions and normative claims. State descriptions are "descriptions of physiological or psychological states" and normative claims correspond to "explicit value judgments concerning whether we value or disvalue a physiological or psychological state", which are beyond the realm of biological science (Ereshefsky 2009, 225). Ereshefsky holds that a naturalistic characterization of the notions of health and disease is not

possible because these concepts necessarily involve the value judgments of an external observer. Significantly, Ereshefsky considers that external value judgments are present even in the ascription of biological malfunctions: "state descriptions make no claims about whether a physiological or psychological state is functional or dysfunctional" (Ereshefsky 2009, 225).

However, the proposal presented in this paper affirms that it is possible to ground the ascription of malfunctions in naturalistic terms, i.e., it is possible to identify when an adaptive and self-regulated biological organization is malfunctioning. Biological organizations instantiate natural normativity. And this normativity does not include any reference to value judgments of an external observer, but it is rather the living organism's capacity to respond to the changing demands of the environment. Organismic behaviors are normative since the preservation of life presupposes the organism's ability to establish and follow stable and flexible norms. In Canguilhem's words:

> [L]ife is in fact a normative activity. The normative, in philosophy, includes every judgment which evaluates or qualifies a fact in relation to a norm, but this mode of judgment is essentially subordinate to that which establishes norms. The normative, in the fullest sense of the word, is that which establishes norms. And it is in that sense that we plan to talk about biological normativity (Canguilhem 1991, 126–127).[8]

In a similar vein, Lennox (1995) claims that the notion of health is an "objective value". Health, in the sense of "absence of dysfunctionality", is a *biological value concept* and

> *biological value concepts* apply in the context of action, as tools for referring to the contributions activities make to continued living -some make positive, and some negative, contributions. This is, if anything, an empirical fact. (…) The concepts of health and disease are in place to characterize that connection, and in so far as continued life is, as a matter of fact, conditional on successful biological function, such concepts are both evaluative *and* biologically grounded. (Lennox 1995, 503)

Health is thus an evaluative concept, but it does not depend on subjective considerations external to the systemic organization of organisms. As Garson argues, the current theory and practice of biomedical sciences shows that a biofunctional and normative interpretation of organismic mechanisms is ubiquitous and useful (Garson 2013, 325–329). In this paper, we share with Lennox the interpretation of health as an evaluative and biologically grounded value, which is related to Canguilhem's conception of life as a normative activity. The very fact of life implies the establishment of norms according to objective values. Our definition of biologi-

[8] According to Canguilhem, organisms are healthy insofar as they are normative relative to environmental fluctuations. Therefore, health implies the organismic capacity to tolerate variations within what is typical for a given organism, and the living system's ability to adapt and establish new behavioral patterns in order to meet changing demands (Canguilhem 1991, 132). For an exposition of Canguilhem's ideas on natural normativity and its implications for the theoretical definition of health and disease, see Sholl (*This volume*, Chap. 6). As Sholl maintains, Canguilhem's approach provides an eco-organismic strategy to contextualize a naturalistic account of health and disease. The approach we develop in this paper can be seen as a contribution to this naturalistic project.

cal malfunctionality should be understood as a "state description" of biological behaviors that refers to this embodied normative dimension of living beings, which is of paramount importance for the debate about the concepts of health and disease.

We do not, of course, deny that subjective values related to social, cultural and personal phenomena play a fundamental role in the conception of health and disease of patients and professionals of healthcare systems. In fact, we consider that a fair analysis of how the affected persons interpret and use the health/disease conceptual distinction with respect to humans needs to be made from a pluralistic perspective that accounts for a great diversity of non-biological factors. We only claim that the notion of malfunction we have developed serves, at the very least, to characterize an important dimension of the medical notion of *disease*, understood as "a negative bodily occurrence as conceived of by the medical profession" (Hofmann 2002, 670).

As Lennox has argued:

> Biomedicine is partly in the business of determining, for each aspect of human anatomy and physiology, what the proper range of operation for each system and sub-system is, and designing diagnostic means of monitoring systems to determine whether or not they are so operating. (Lennox 1995, 502–503)

We consider that the notion of organizational malfunction we have introduced in this paper helps in clinical practice and, therefore, can be interpreted as a characterization of an important dimension of the professional sense of *disease* in the frame of a pluralistic conceptual analysis. Additionally, organizational malfunctions underline an important aim of medical practice: one of the principal goals of medical treatments is to help the natural adaptive capacities of living systems to counterbalance those biological states that threaten the preservation of the organizationally closed processes of self-maintenance. By helping to avoid organizational malfunctionality, medicine contributes to the preservation of that state of successful performance of biological functions that which we call "health".

7.4 Conclusions

The biological properties of functional presupposition and adaptive regulation allow a theoretical grounding of the concept of biological malfunction from an organizational approach. We want to underline that this approach to malfunctions is independent of the subjective criteria of any external observer. What matters is what operationally happens within the system. This is obviously the case when the action of a trait does not fit the norms of the regulatory subsystem; but it is also the case when the regulatory system fails, because it should work according to the actual structure and organization of the organs under its regulation. In other words, the regulatory norm is embodied in the specific structure of the parts as well as in its hierarchical organization. In sum, to state that a trait is malfunctioning requires that its effects be detected as non-fitting with regard to the functional presuppositions of other traits.

Accordingly, the norm embodied in the adaptive subsystem of a given organism does not refer to its adequacy with respect to a "type" organism, but can rather be assessed in terms of the present organization of the organism, by looking at the adequacy or inadequacy between the structure of its functional traits and the regime of regulation at work.

The implications of an organizational characterization of malfunction are still to be explored but we believe that this notion of organizational malfunction is a promising basis for a different "naturalistic" conceptualization of the notion of disease. This way of understanding the concept of malfunction is also quite different from the most predominant notion of dysfunction used in philosophy of medicine, i.e., the bio-statistical conception presented by authors such as Boorse (1977, 1997). In this sense, we endorse Canguilhem's words:

> It is life itself and not medical judgment which makes the biologically normal a concept of value and not a concept of statistical reality. For the physician, life is […] a polarized activity, whose spontaneous effort of defense and struggle against all that is of negative value is extended by medicine by bringing to bear the relative but indispensable light of human science (Canguilhem 1991, 131).

To summarize, we think that the essential feature of the pathological stems from the incapability of a functional trait to fulfill the norm that the adaptive subsystem prescribes. Since this incapability is linked to certain aspects of the functional traits, our view of the pathological corresponds to a non-observer-dependent sense of health and disease in medical practice. For this reason, we claim, this organizational account of malfunctionality is the key notion for the construction of a naturalist approach in the philosophy of medicine, one which is well-grounded on biological theory. As the Organizational Approach emphasizes, life is a precarious equilibrium in natural matter and health is a precarious equilibrium within the precarious equilibrium of life.

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Chapter 8
Biological Organization and Pathology: Three Views on the Normativity of Medicine

Arantza Etxeberria

Abstract Medical knowledge aims to identify different diseases as wrong conditions of biological organization. One main issue within the field of the philosophy of medicine is the question of just how confident we can be that what we know about biological organization will help us to identify diseases and propose cures or treatments for them. The concept of biological organization is a complex abstraction which requires the coexistence of constitutive, interactive and experiential aspects; while the main attempts at naturalist descriptions of the concept (functional, mechanistic and systemic) fail to be fully comprehensive. Different arguments have supported a naturalist normativity in medicine; the strongest such perspective contrasts the normal or typical state of organizational elements with their "broken" versions. However, the complexity of biological organization suggests that there are multiple ways of being healthy or diseased. Thus, the normative goal of medicine of identifying diseases encounters two fundamental questions: (1) Is biology itself normative and can it define the "natural" state? (2) Can medicine rely on knowledge other than biological knowledge to identify what goes wrong? As a normative discipline, medicine comes into conflict with the multiplicity in the very ontology of diseases, which needs to be complemented with epistemic pluralism. Philosophy of medicine therefore needs to explore the sources of that normativity.

Keywords Naturalism • Constructivism • Normative and descriptive • Functional approach • Normal–broken framework

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8.1 Introduction

Debates concerning the concepts of health and disease involve the issue of whether pathologies can be identified according to explanations of the biological organization of living systems or not. Although ideally the practice of medicine aims at being grounded purely in biology, differences in how biological organization is conceived influence confidence in the authority that biology confers on medicine when it comes to identifying diseases.

The hypothesis of this chapter is that medical knowledge is normative, rather than merely descriptive or explanatory. This is because one of the goals of medicine is to identify and evaluate the state of an organism with respect to how a given harmful or negative condition will progress and how it might affect the life of the organism. Deciding which biological conditions should be considered to be diseases requires an evaluative judgement that they are bad or undesirable. Although it has other social, legal and economic consequences, the normativity inherent in medicine emerges from the very need to diagnose conditions and propose treatments and cures. This normativity is supported by science; but medical knowledge cannot be value-free, unless biological knowledge is also considered to be normative. Yet, the argument contained in this chapter is that medical knowledge is normative in a way that biological knowledge is not.

In debates concerning naturalism and normativism within the philosophy of medicine, the two perspectives are sometimes regarded as incompatible.[1] From a strong normativist perspective, health and disease depend on values at many levels—individual, social and medical values being the most salient. However, such a perspective fails to grasp the factual or inevitable aspect of disease. If all diseases are perceived as constructed according to cultural practices, preferences and prejudices, including those that arise within the scientific domain, then they appear to be arbitrary to a large extent; devoid of any reality that is inevitable (although of an unknown nature). If diseases are conceptualized as socially constructed, they become ontologically subjective[2]: they lack an objective reality although they can be very real in the minds of people (Hacking 1999, 22). So, a strong normativist perspective sees disease as contingent upon a social matrix of ideas, and thus not inevitable. However, that is not the way diseases are always perceived. In fact, in their personal experience, many people understand the conditions called diseases as something factual, objective and to some extent inevitable. Even mental illnesses share this feature to a certain extent. Thus, the main argument against forms of strong normativism is derived from the sense of objectivity or inevitability present in at least the most paradigmatic cases of diseases; something that scientific medicine has tried to make explicit by appealing to biology.

[1] For naturalist accounts, see Boorse 1977, 1997, 2014, and Chap. 9. For normativist positions, see Nordenfelt 2007 and Chap. 12.

[2] Following Searle (1995), Hacking characterizes social constructions as "ontologically subjective but epistemologically objective items" (Hacking 1999, 22).

By adopting a post-positivist view of science—according to which it is recognized as an activity that aims at objectivity, but in which knowledge is not reducible to facts that are considered to be neutral or free from interests and values—a weaker normativist position with regard to health and disease can be grounded in science. From such a perspective, scientific knowledge is motivated by what we want or need to know; and the outcome is related to activities and practices. Accordingly, the scientific character of medicine is not so different from that of other disciplines such as physiology or evolutionary biology. Yet the goal of medicine is normative in a special way, as it is based on descriptions of facts that are considered to be undesirable or harmful. Unlike strong normativism, weak normativism holds that scientific knowledge and technology crucially form part of the process of identification of diseases.

An important aspect of the discussion on this issue revolves around how scientific theories and methods help us to identify diseases, and the relevant kinds of normativity we have at our disposal. In principle, diseases are conditions that are initially evaluated negatively by the subject who experiences them and later identified as pathologies by medical knowledge (Nordenfelt 2007); although in some situations related to highly technological settings, pathologies identified as crucial deviations from the statistical norm may be previous to experience (Giroux 2010). In the former scenario, subjective experience is the more immediate component, while the objective biological explanation may be practically unknown or unobtainable in full. In the latter, medical knowledge relies fully on biological or laboratory tests; the experience of the subject is vanquished from the concerns of scientific medicine and displaced to a different realm of inquiry (for example, medical ethics, counselling, etc.).

Naturalism regards medical knowledge as descriptive; whereas strong normativism conceives it as being based on subjective and cultural values. The goal of this chapter is to examine how the normativity of medicine is compatible with methodological naturalism. I hope the proposal will allow us to gain an understanding of the real and objective ontological status of diseases; even if that can only be known through subjective evaluations of the related costs in terms of quality of life.

To this end, in Sect. 8.2 I consider the tensions between descriptive and normative attitudes towards biological organization within different fields of biology. I suggest that the normative versus descriptive discussions within biology are fundamentally methodological, as in fact, biology has historically alternated between both views.

In Sect. 8.3, the ways in which those perspectives can be employed in the task of evaluating deviations as pathologies are examined. It might be excessively optimistic to identify disease with dysfunction or a broken mechanism if what goes wrong in a given situation has to do with organizational aspects that are poorly understood or if their complexity proves particularly challenging.

In Sect. 8.4, three different rationales that have been espoused to justify the normativity of medicine in the context of biological descriptions are presented. In the first, descriptions of the normal or typical are expected to ground evaluations of deviations. In the second, there is scepticism grounded on whether scientific

knowledge may specify what is natural or normal; therefore normativity becomes heuristic. In the third, the strong experiential and lived component in any normative assessment is underlined.

In the conclusions, I reconsider the statement that medicine is a normative discipline. Medical knowledge aims to judge that certain conditions are objective and real diseases, inevitable from the biological perspective; but this knowledge is not entirely value-free. Pathologies cannot be described as such without presuming that they have negative consequences for the life of the subject. Thus, it is necessary to postulate a multiplicity of ontological ways of "going wrong" that may be considered diseases, and to adopt pluralism in our epistemological means of evaluating them. As a consequence, the normativity of medicine is to a certain extent grounded in biological descriptions of what is wrong in a living organism; but they need to be contextualized within the experience and the opportunities of patients.

8.2 What Is Biological Organization? Descriptive and Normative Conceptions of Biology

Living organisms are individual material systems[3] characterized by the way their life processes are arranged to persist: by their *organization*. The notion of biological organization is an abstraction[4] the aim of which is to grasp how parts or material elements and processes are arranged in an individual system to display the phenomena associated with being alive. This concept has played an important role in the history of biological thought but, as was also the case with the notion of organism,[5] it has been left out of the theoretical vocabulary of the most reductionist perspectives of molecular and evolutionary biology. Organisms are complex and their parts are themselves also organized; the phenomena that emerge from the organization can be seen as resulting from a mixture of constitutive, interactive and experiential dimensions. Biological organization has been conceived as a domain in need of descriptive and explanatory research, for example in morphology or physiology; but it has also been endowed with normative components. This is the case of, for example, the biological organization that is responsible of a system being alive.[6]

[3] Not all biological individuals are organisms; organisms are characterized by the properties that provide their capacity to persist.

[4] Understood as an account that does not provide all the detail, or leaves things out in some respect in relation to the domain of full material realization of a system, but which still provides a literal perspective, without falsity, that is relevant for some purpose. In contrast to abstraction, idealization deviates from the literal perspective and introduces false assumptions, such as infinite population numbers (Godfrey-Smith 2014, 21).

[5] The notion of organism has been brought into question in several ways in the past and considered not to be theoretical; but it has acquired a new relevance in more recent biology and philosophy.

[6] The theory of autopoiesis considers organization as a criterion to demarcate life from non-life.

In Francois Jacob's influential history of biological thought (1973), organization "assembled the parts of the organism into a whole, enabled it to cope with the demands of life and imposed forms throughout the living world"; it was conceived as "an unusually complex arrangement of the component parts of the visible structure" (74). The concept is close to being normative, as through "its organization the living could be distinguished from the non-living." (74). For his part, Jacob considered that such an understanding of organization had been overtaken by the biology of the twentieth century, which transferred most of its power to the notion of genetic information (understood in purely descriptive terms). However, the organicist tradition in biology and the philosophy of biology has always preferred the stronger, or normative, understanding of the notion of organization. In medicine, the biological organization of an organism has sometimes been conceived as an expression of order or health, associated with values or norms, such as beauty (see Efstathiou 2013; Harrington 1996). In this case, medicine would import a theoretical framework which is already normative in biology itself.

In contrast, descriptive approaches to biological organization are being pursued in the systemic, holistic and integrative approaches developed by biological fields such as systems biology. In Moreno et al. (2011), organization appears as an entanglement of processes at different levels, including parts that can be described as distinguishable mechanisms or functional contributions, together with holistic or integrative regulatory processes controlling the interactions among them. As regulation is described at a separate, higher level, in this perspective low-level mechanisms or functions cannot explain biological organization by themselves.

Biological organization is also examined within the mechanistic research programme, in which mechanisms, instead of scientific laws, constitute explanations (Machamer et al. 2000; Bechtel and Abrahamsen 2005). From such a perspective, organization is considered as the way parts and processes are arranged, in multiple dimensions (temporal, spatial or contextual) and levels (or epistemic zooming effects); but the particular form of organization behind a particular phenomenon is a matter of empirical discovery (Illari and Williamson 2010). This approach's stance is not normative, but naturalist, as it aims to describe biological organization via operational mechanisms.

In short, questions regarding the origins and constitution of biological organization, its evolution, its mechanistic or generative character, individual identity and interactions, or how experience and subjective norms are involved in its maintenance, influence explanations in medicine. In all these aspects, there is a tension between descriptive and normative approaches: the latter may not be fully scientific whereas the former has been said not to be "philosophy enough" (Moss 2012). As I aim to explain in what follows, some consider that normative views are already required in biology; whereas descriptive approaches are generally favoured by those who adopt naturalist perspectives. I now continue to consider some of the issues that show the tension between the normative and the descriptive with regard to biological organization, namely: the difference between design and organization; the problem of complexity; and the interactive or ecological dimension of organization.

8.2.1 Design vs. Organization

Recent attempts to naturalize biological organization reconsider Kant (1790), who viewed organisms as self-organized entities that cannot ever be the object of scientific knowledge.[7] Kant's appeal to an intention was answered by Darwin, who explained how design can be conceived without a designer. Yet, Kant's pessimism regarding the prospect of a (descriptive or naturalist) science of the living, is motivated by his own view of the self-organization of organisms. In contrast, the Darwinian tradition relies on an atomistic conception, compatible with considering that the organization of living beings and machines is analogous; something that Kant denied and with which the Darwinian tradition still struggles.[8]

The Darwinian and the Kantian traditions are examples of descriptive and normative approaches to biological organization. The former comprises arguments concerning design, and aims to find a natural explanation of how it can emerge without appealing to intentions; but the analogy between organisms and machines (such as watches) is not considered to be problematic for biology. The Kantian approach, on the contrary, stresses a fundamental difference between machines and organisms: whereas a watch is formed of fixed components, produced beforehand and later assembled, in an organism all the parts are formed in interaction with the other parts, so that they are causes and effects of one another. That is why the system is self-organized.

From the viewpoint of evolutionary biology, many contend that biological organization may not be "optimal" from a rational point of view, as it is the result of many contingent events. Then, Jacob's notion of "tinkering" suggests that, in evolution, natural selection has merely led to improvements of the materials originally available: thus, perfect design should not be expected (Jacob 1977). O'Malley (2010) uses a similar concept, "kludging", also to underline that biological systems are suboptimal and complex products of evolution. All these aspects might be overlooked if biology focuses too narrowly on normative aspects.

8.2.2 Complexity: Reductionism and Closure

Another difference between descriptive and normative approaches to biological organization has to do with embracing a reductionist or a holistic approach. Within this framework, the main epistemological problem concerns whether we should

[7] "[I]t would be absurd for humans even to make such an attempt or to hope that there may yet arise a Newton who could make comprehensible even the generation of a blade of grass according to natural laws that no intention has ordered; rather, we must absolutely deny this insight to human beings." (Kant 1790, §75).

[8] Recent evolutionary biology has addressed the issue of "organismality," as an account of different kinds of organization produced by evolution. Meanwhile, evo-devo has pursued generative explanations by including developmental processes in evolutionary accounts.

adopt a top-down perspective, in which upper-level phenomena shape the detailed mechanisms in the parts, or a bottom-up one, in which the properties of the parts and the relations between them characterize the whole. In the former holistic approach, formal, mathematical or abstract models are elaborated to account for living organization, understood as the operation of parts that produce an individual identity by achieving closure of processes. Organismic phenomena are characterized by the mutual, organizational relations between the components: spatiotemporal relationships, feedback and control, the role of constraints, self-organization, and emergence or downward causation. The latter constitutes a more reductionist approach in which research is often experimental and the characterization of system phenomena is based on the descriptions of properties of the parts.

While holistic views of biological organization emphasize generative and ecological dimensions, mechanistic or internalist perspectives tend to leave them aside. This is relevant for pathology, since such complexity of different dimensions, or "multi-levelness" is: "a hallmark of disease-relevant processes, which challenges conventional dynamic systems theory" (Wolkenhauer and Green 2013, 5939).

8.2.3 Ecological and Interactive Views of Individuality

Another aspect of current debates concerns how biological organization is generated and preserved as individual identity. Ecological studies of living organization consider organismal traits to be the result of a continuous interaction of living processes with their environment. From such an interactive perspective, all organic processes take place in a continuous "dialogue" with an environment, which includes other organisms. This challenges the view that organizing principles are internal; and calls into question the common-sense notion of what a biological individual is, as it is not at all clear that we can simply identify the internal with whatever belongs to the self: to think that living entities are enclosed in strict boundaries that separate the internal from the external may be too simplistic.

Thus, complaints are raised concerning an "individualistic bias" in biology and medicine, and claims emerge that most organisms are composites, just as lichens are; symbiosis "is replacing an essentialist conception of 'individuality' with a conception congruent with the larger systems approach" (Gilbert et al. 2012, 326). Many different aspects suggest that organisms are not confined individuals, but heterogeneous and interactive, akin to ecological systems in which the boundaries between the self and others are not fixed. Many organic processes that occur in animals (including humans) are realized in symbiotic collaboration with organisms that belong to other species; they are chimeras from the anatomical perspective: they develop in relation to microbes and possess many genomes, while the immune system is configured in collaboration with the resident microbiome.

Thus, descriptive explanations of how biological phenomenology is actually realized enter into conflict with the normative views of organization as an arrangement related to goals in current biology. However, tensions between normative and

descriptive approaches in biology and in medicine surface in different ways. In the domain of biology, the confrontation is mainly methodological about how best to study biological phenomena. In fact, historically, biology has alternated between teleological holistic views and mechanistic reductionist views; which can, nonetheless, be considered to be complementary to a large extent. However, in the case of medicine, the knowledge required is inherently normative, because the relevant characteristics or interactions described by physiology or anatomy are instrumental to the main task of judging when a given condition is undesirable or harmful.

8.3 How Are We to Identify Diseases?

According to Canguilhem, there are two main conceptions of disease: ontological theories try to localize disease as something that can enter or leave the body (germs, tumours, etc.); whereas dynamical theories are not "localizationist, but totalizing" and they refer to functioning and processes. Canguilhem says that both are optimistic in their hopes of grounding the normative authority of medicine on a theoretical scientific framework based on descriptions of what there is.[9]

In the remainder of this section, some reasons for qualifying that optimism when identifying diseases are discussed about (1) functional approaches and the main criticism directed to them; (2) the normal–broken paradigm and its relationship to the functional approach via mechanistic accounts; and (3) the challenges posed by systemic accounts in medicine.

8.3.1 The Functional Approach

When biological organization is characterized as the functions or contributions of parts to overall capacities, such as reproduction, survival, fitness, or self-maintenance, the function of a part or process is what it does or should do, and pathologies stand out as (total or partial) failures to contribute. The organization or design of each species specifies which functions or roles are typical for it. Within a functional approach, medicine distinguishes disease from health by viewing biological organization as an abstraction according to which: (1) parts ought to serve functions; (2) biology is responsible for saying which parts and which functions exist; and (3) medicine will understand diseases as deviations from the first premise: situations in which, in some individuals, parts do not serve the expected functions.

[9] "Medical thought has never stopped alternating between these two representations of disease, *between these two kinds of optimism*, always finding some good reason for one or the other attitude in a newly explained pathogenesis. Deficiency diseases and all infectious or parasitic diseases favour the ontological theory, while endocrine disturbances and all diseases beginning with dys- support the dynamic or functional theory." (Canguilhem 1991, 40–41).

The literature on biological functions has offered several concepts of disease. The most influential account, Boorse's biostatistical theory (Boorse 1977, 1997), derives "disease" from a goal-directed account of biological function as contributing to the survival and reproduction of an individual organism, in relation to the corresponding statistically normal contribution in other individuals of the same reference class (same age and sex). Accordingly, the natural functioning of the subsystems of the body corresponds to statistically normal functioning in members of a corresponding reference class. Functions are evaluated according to the design of the species; and diseases are deviations from those evolved functions. As a consequence, there is no essential optimum or ideal functioning: diseased organisms are those whose functioning is below the statistical normal of the reference class to which the organism belongs (See Chap. 3, Forest and Le Bidan further discuss Boorse's functional account).

The functional approach to identifying diseases is criticized on at least four points. The first three critical claims have to do with the scientific standing of functions, as there is no justification for them being seen as value-free, and suggest that there is a plurality of ways of conceiving functional explanations and identifying diseases. The fourth is directed at the alleged naturalism of functional accounts of diseases: it is discriminatory to try to associate the normal with the natural and scientifically tested.

First of all, functional accounts of health and disease do not question the division of the whole into parts serving functions, but consider that science can grasp a "natural" decomposition of the organism into its functional parts. Critics complain that functional descriptions "presuppose a vantage point on the causal structure of the world, a stance taken by intentional creatures when they single out certain preferred behaviours as worthy of explanation" (Craver 2013, 134). This analytical procedure casts doubts on the naturalist claims of medicine, as it is not value-free: "while it is true that function is a term of art in biology (which is a science), it is a teleological rather than (purely) causal term; and teleology […] can be connected conceptually through purposes and intentions to values" (Fulford 2001, 83).

Second: in fact, different notions of biological function have been used in medicine, each considering the contributions of the parts differently and suggesting different grounds for the normativity of medicine; within a pluralist framework, they may be considered to be complementary.[10] According to etiological function accounts—the main alternative to Boorse's—the function of a part is what it does

[10] For instance, Wouters (2003) distinguishes four notions of function in biology. One of them views function as the activity a part or organ performs or is capable of performing, without considering the use of this activity. For many authors, this is the most neutral concept of function; but as it does not support multiple realizability, it is a rather unusual concept. The other three notions view function as use or role, because they attempt to identify the role or roles of a given structure or part, understood as its contribution to survival and reproduction (in the case of function as biological advantage), to a selected effect (in the case of the etiological function) or to a complex activity (in the case of function as causal role).

that explains its having been selected in the past. In the biology literature, this notion has been conceptualized as normative, since it distinguishes the "natural" or "proper" function of a part from its other possible effects. Within such a framework, disease occurs when an organ does not realize the function that allowed it to become the norm via natural selection. One of the major problems of this type of account is that, as it does not take into account the current adaptation of organisms to their environment, but the past, it evaluates health and disease according to how organisms adapted to their conditions in the past (Valles 2012). Forest and Le Bidan (Chap. 3) also consider this issue.

Third, it is assumed that if a functional part fails to work (or does not work so well), the organization will cease to exist or pathology will appear. However, the functional organization of organisms is generative: causal processes generate (sometimes ephemeral) parts, integrate them into the organization, and both the parts and the integration of the whole are transformed in development and evolution. For instance, donors of certain vital organs, such as kidneys, do not see their overall functionality diminished by half, because the remaining organ is often capable of adapting to the situation and takes on more work. Meanwhile, the functional contribution of a certain part is substituted if it is made by another part that contributes similarly, even though the new part operates through a different mechanism. For example, many prostheses do not work in exactly the same way as the organs they replace; but they make a similar contribution to the organization of the overall system. Internal adaptation between parts and processes can occur at many levels. Developmental approaches raise awareness of the importance of the plasticity of biological organization.

Fourth, a final criticism of the functional approach is that we cannot theorize about disease from a prejudiced notion of normality. Amundson (2000) argues that normality is not objectively grounded in biology and biomedical science; biology does not ground a concept of functional normality that allows us to distinguish between normal and abnormal function, because different people can achieve similar levels of performance without having to use the same "modes" of functionality. Kingma (2013) observes that reference classes are not value-free, objective, homogeneous groupings, but social constructions. Accordingly, even if the functional component of Boorse's concept of disease was naturalist, the normal statistical part would be socially constructed, not natural. In short, such a line of argument claims that in medicine, naturalist accounts cannot rely on biology, because biology does not define what a natural state is. Ereshefsky (2009) argues that biological functions, as they appear in medical textbooks, are idealizations for teaching purposes, and do not serve to conclude that their variants or deviations are necessarily pathological.

8.3.2 The Normal–Broken View

The functional approach to disease relies on a "normal–broken" view (as do some mechanistic accounts, if they are linked to functions). According to such a view, knowledge of malfunctioning mechanisms stems from knowledge of "normal" or "healthy" states and operations (Moghaddam-Taaheri 2011; Garson 2013). The normal–broken paradigm is the most obvious scheme from which pathologies can be identified as deviations from conditions that are considered to work correctly; but it may be too narrow, depending on our view of what biological organization is.

Nervi recently questioned the normal–broken view by arguing that malfunction should not be understood as "a mirror image of function" (Nervi 2010, 216), because knowledge of pathologies does not necessarily arise from knowledge of how physiological mechanisms are impaired. Accordingly, pathology (or malfunction) and physiology are independent of each other; he claims that it cannot be assumed that a pathological mechanism is the negation of a physiological one, because pathological mechanisms are often considered as "separate theoretical entities"[11] in medicine. Likewise, Nervi's claim suggests that pathologies may have independent organizational principles or at least that medical knowledge of diseases does not rely only on knowledge of positive contributions to biological organization.

Moghaddam-Taaheri (2011) analyses the problem raised by Nervi as a discussion concerning whether diseases can be seen as "broken mechanisms" or not. According to her, viewing pathologies as broken mechanisms is a practical and relevant approach to finding therapies; she argues that that is in fact the procedure used when developing drugs. According to this framework, disease is related to some contribution that has not been accomplished; either because a part is damaged, because it is prevented from fulfilling its role by some internal or environmental cause, or because it was an evolutionary adaptation that is no longer adaptive. Although Nervi thinks that knowledge of the physiology of the system should be valuable to inform us negatively of the disease (what is "broken") and positively of its cure (how to repair or regenerate the contribution), he defends the notion that sometimes pathologies are not identified in this way.

For Nervi, the mechanism of the malfunction may be independent of and different from the malfunction of a physiological mechanism. Within the mechanistic camp, a number of authors follow Cummins's descriptive approach to causal role functions and maintain that the notion of mechanism is not committed to it being functional in an organism. As causal role functions do not appeal to natural or intrinsic normativity, mechanistic explanations have no commitment to evaluations of the utility or the validity of the proposed mechanisms.[12]

[11] The question of the ontology of diseases will not be pursued here.

[12] According to Bechtel and Abrahamsen (2005, 423), a mechanism is "a structure performing a function in virtue of its component parts, component operations, and their organization" so that the orchestrated mechanism is responsible for one or more phenomena. This approach is considered to be as useful to understand pathological phenomena as it is physiological ones, insofar as both can be described as mechanisms. In this respect, Nervi follows Craver (2001, 67) who explicitly maintains that his account of functions "does not appeal to any sense of adaptiveness in an environment; instead it appeals only to roles in contextual systems […which] may be adaptive or destructive."

Mechanisms are purely conventional and devoid of normativity when it comes to distinguishing the pathological from the physiological. Nervi criticizes the "implicit agreement about the fact that a mechanism must be valuable for the organism" (217) and that therefore "malfunction is conceptualized as a failure in one or more steps in the physiological sequence of events"; but he is also aware that what is pragmatically wise sometimes, cannot be generalized to all medical knowledge. Thus, he maintains that pathological mechanisms might be independent, especially when the natural history of the disease is of primary importance and it is necessary to describe "causal chains of pathological events that lead from the initial aetiology (if known) to the possible outcomes of that particular disease" (218). For example, those causal chains are taken into account when describing different kinds of diabetes, so that therapies can interrupt them at the best possible point. Furthermore, pathological phenomena can affect sets of organs that are not considered to be physiological systems.

Another position, closer to Boorse's naturalism, defends that mechanisms must be understood functionally, because only in this way is it possible to say how a given mechanism breaks: "a broken mechanism is just one that is not performing its function" (Garson 2013, 330). As suggested in the previous section, one premise involved in this position is the uniformity and correctness of the healthy biological organization; thereby making it a reliable standard for comparisons with pathologies.[13] Another premise is the function–failure dichotomy. Mebius (2014, 46) says that "the distinction between 'function' and 'failure' is inadequate because mechanistic phenomena are primarily situated in a continuum between these two extremes and, most often, not circumscribed (bound) by either."

Nervi distinguishes between the "malfunction of a mechanism" (within the normal–broken paradigm) and the "mechanism of malfunction". The advance of medicine was not only made possible by the former; the latter had to be examined and understood too. Medicine needs to understand the mechanisms involved in malfunction in order to be able to search for adequate therapies: pathologies are independent of physiological mechanisms. From a systemic perspective on biological organization, there are principled reasons founded on systems biology to adopt this approach (Nervi's "independent entity"), because from such a perspective diseases appear to be "caused by network perturbations and might correspond to network states that themselves exhibit organization and robustness" (Gross 2011, 490–91).

This question is relevant for another issue. From the perspective of the normal–broken paradigm, a cure has to re-establish the "normal" or healthy state, at least partially. Often, however, a cure (in terms of restoring lost capacity) does not mean that the primitive physiological mechanism returns or that the function is re-established. Marcum (2011) argues that, for example, type-1 diabetes is generally treated by injecting insulin into the patient whose pancreatic cells are unable to secrete this hormone. Although this treatment saves lives and provides relative quality

[13] We are told, for example, that "there are many more states of an organ or organ system compatible with disease than with health. […] The same point can be made about function. There are many more states of an organ or organ system compatible with its failing to perform its function than with its performing its function." (Garson 2013, 326).

of life, it is not at all clear that it constitutes a cure of the disease; rather it only seems to restore the patient to the state in which the disease can be ignored as such.

8.3.3 How Systemic Views Challenge the Normal–Broken Framework

The systemic approach that is being developed these days challenges both the functional approach and the normal–broken view, and introduces new perspectives from which to develop a naturalist understanding of health and disease. It intends to overcome the analytic approach through the use of dynamical systems. For Ahn et al. (2006a, b) the systemic approach will overcome the Cartesian analytic perspective of "divide and conquer" which aims to explain properties of complex systems through simpler units. The authors characterize reductionist practices in medicine as paying attention to a single dominant factor (which does not make it possible to contextualize the circumstances of patients sufficiently) and an excessive emphasis in homeostasis, so that complex and chaotic phenomena are ignored. They further claim that such practices lead to an inadequate treatment of risk, so that only high risk is considered important and low-risk conditions are ignored; and little attention is paid to how sets of conditions interact in different patients. For those authors, there is excessive optimism in thinking that complex conditions can be suitably treated using additive treatments and interventions that were designed for more simple ones (see also Varela et al. 2010). The network approach favours the view that diseases are caused by perturbations of robust complex networks which change their dynamic states. For instance, when discussing the example of metabolic syndrome, Gross (2011, 487) comments that in some cases "there is no component in the system that is actually broken […] the disease is characterized by the emergence of a qualitatively new behaviour that deserves to be described as a different mechanism". This example reveals the risks of trying to reduce a complex phenomenon to simpler parts.

Structural differences between healthy and diseased organisms are not necessarily relevant to understanding diseases (Gross 2011). Pathological states must overcome the robustness ("self-healing" or repair attempts) of the organism. In accounts of cancer attractors, states of the system appear which are not usually accessible.

Systemic approaches consider personalized medicine in a special way and see human organisms as biopsychosocial systems (Engel 1977; Vogt et al. 2014). Some views focus on the intrinsic autonomy and vulnerability of organisms; as in Canguilhem (1991), they link biological organization with the intrinsic normativity of living systems: the capacity of an autonomous agent to distinguish what is preferred or valuable (Di Paolo 2005). From this perspective, organisms have precarious living conditions which they continuously negotiate by interacting with their environments; disease and death are an enduring challenge in their lives. Biological organization is precarious, complex and in permanent flow; it simply cannot be grasped empirically as an arrangement of parts. A living organism continuously generates the network of its relations through material change and replacement of

components. Organization is thus associated with complexity and holistic systemic properties, which are normative.

We might use Gould's image of the "left wall of complexity" in relation to issues of health and disease. Gould (1994) argued that progress does not rule the evolutionary process. Life arises in what he drew as a left wall of the simplest conceivable and persistent complexity, which he thought was bacterial life, the most common and successful of all form of life on earth. A few creatures occasionally move to the right, thus extending the tail in the distribution of complexity. Many always move to the left, but they are absorbed within the space already occupied. Similarly (but with the due differences) we could say that the limit and most important reference for medical thought when thinking on health and disease is death. Following this idea the normative task of medicine could be seen as a drive to separate from the left wall.

Besides, as mentioned above, new insights into the ecological interdependence of living forms suggest that living organization is not individual in an essentialist sense, but intrinsically related to other forms of life. As a consequence, medicine may be entering a post-Pasteurian age (Dupré 2011, after Paxson 2008). Many facts concerning biological organization seem to enter into conflict with the germ theory of disease, according to which many conditions are due to the attack, invasion or parasitism of organisms from other species. In contrast, systemic approaches emphasize the role of interactions between biological organization and food, pollutants and the effects of different drugs or treatments.

Relational or interactive factors should be taken into account in order to change received views of biological organization and the traditional understanding of how the individual identity of organisms is defined. Evidence provided by systemic studies not only questions the boundaries between the self and the external, but also between healthy and diseased.

To sum up, much of the contemporary discussion of health and disease has been concerned with functions and failures of functions, often within the normal–broken view; but new issues are emerging in medicine which question the corresponding received views of health and disease.

8.4 Three Kinds of Normativity

In discussing whether biology can be reduced to explanations in physics and chemistry or not, both Dupré (2010) and Keller (2010) introduce several problems of interest when it comes to defining the place of biology among the sciences. For Keller, functions bring up in biology a concept that is absent from physics or chemistry. For Dupré, biology needs to be conceived of in a relational way which obliges us to avoid previous essentialist characterizations of living entities. In a similar way, medicine is characterized by its normative endeavour of judging when something goes wrong in an organism and challenges its life; a task which is beyond the scope of biology. Yet that normativity is contextualised, and to a large extent moulded according to the social and cultural perceptions of biological reality.

Descriptions of facts are necessary, but even in the most naturalist or descriptive setting, medical knowledge cannot only provide descriptions of facts; its role is to judge whether something is wrong (for another view on this issue, see Lemoine and Giroux in Chap. 2). Although the conceptualization of a phenomenon as a disease necessarily introduces normativity, the evaluation that something is wrong may be performed in at least three different ways, which I characterize in what follows. *Naturalist normativity* relies entirely on the assumption that biology describes "normal" states; *heuristic normativity* introduces scepticism towards this and proposes pluralistic methodologies; and *vital normativity* takes intrinsic norms into account.

8.4.1 Naturalist Normativity

This perspective relies on the assumption that biological theories describe typical or statistically normal states (within a range of heterogeneity) and pathologies represent deviations from the basic principles of biological organization; in general, in accordance with the normal–broken framework. Naturalists defend the view that this normativity is supported by scientific theories, and claim that the identification of diseases is objective and value-free (Boorse 1977). They further argue that naturalism only analyses and draws conclusions concerning the medical usage of the term "disease"; that is to say, it does not invent or propose—it does not normatively say what medicine should think or how it should evaluate what diseases are—but proceeds by conceptual analysis. As Boorse tells us:

> Interestingly, many objections seem at bottom to be attacks on the concept of disease, not on my analysis of it. The serious philosophical issues between the BST and its critics are not, I think, about the correct analysis of 'disease.' Rather, they are about the prospects for a genuine concept of health—individual, non typological, positive, or some other kind—that could differ from the absence of disease, and about what medical theory, practice or social institutions might be based thereupon. (Boorse 1997, 6)

Philosophers such as Grene (1976) and others consider that descriptions can be normative to a certain extent, as do other essentialist or realist philosophers, who consider that an adequate description/explanation of an anomaly or a disorder, such as those that appear in medical textbooks, can and does very often play a normative role and can be an aid to the medical practitioner who is trying to classify a condition as disease. This is related to the conception of diseases as natural kinds; an approach that aims to characterize them correctly and unambiguously (see recent work on mental illnesses as kinds in Kendler et al. 2011).

8.4.2 Heuristic Normativity

Methodological naturalism can help produce normative judgements in a way that is different from how naturalism of the previous type does so. Biological theories authorize normative judgements in medicine; although different approaches will be

more or less appropriate in each case. So this type of normativity is not fixed or straightforward, but mediated by some heuristics grounded on the best available scientific evidence.

Against the naturalist normativity framework, the "science as practice" view challenges the role attributed to theory in traditional accounts. According to this view, scientific work in medicine aims to provide normative judgements that something is bad; and the pragmatic goal is to find cures. Deflationary approaches to the role of theory in science in general and medicine in particular challenge naturalist normativity; including the belief that medicine requires a definition of disease and a clear delineation of specific diseases. As Kincaid says:

> The paradigm of that delineation is a localizable failure of healthy functioning of the body that distinguishes one disease from others. According to this line of thinking, successful medical research would provide a full theory of causes of disease, its course and its severity, in terms of failures of biological functioning. (Kincaid 2008, 368)

Contrary to such a view, Kincaid goes on to argue against attempts to conceptually analyse the notion of disease, maintaining that biomedical science can make significant progress without precise definitions or theories of disease and normal functioning, and without having to consider diseases as natural kinds.

This pragmatic claim that medicine does not require a delineation of specific diseases is supported by two arguments in Ereshefsky's account (2009): (1) the extent and degree of variation within the human species; and (2) the fact that descriptions are idealizations.[14] According to the former, biology cannot account for what is "natural" or "normal" for all members of a biological species, because the category of species is only genealogical and cannot specify traits that are "natural" for all its members. With respect to the latter argument, Ereshefsky contends that "physiology texts provide idealized and simplified descriptions of organs, not descriptions of their inherent natures". Similarly, those descriptions can be considered as "tools for building more detailed models of organs or systems, not descriptions of natural states" (Ereshefsky 2009, 223).

This position maintaining that biology cannot provide a theory that delimits natural from non-natural states may be seen as eliminativist, in the sense that the naturalist foundations for the concepts of health and disease are not found in biology (Ereshefsky 2009, 227). Biological theories are neutral with respect to whether the phenomena studied are valuable or not; hence they do not define what is natural or healthy, or what is pathological. After examining Boorse's account of disease as dysfunction, Ereshefsky (2009) states that biology cannot define pathological states in a neutral way, as it can only provide descriptions that need to be interpreted under the adequate circumstances.

However, the eliminativist position still has to answer a question. Where do medical practitioners obtain the evidence to produce the normative claims affecting judgements concerning health and disease? According to Ereshefsky:

[14] See footnote 4 above.

> normative claims are explicit value judgments concerning whether we value or disvalue a physiological or psychological state. We often make overt value judgments when deciding which states to avoid, diminish, or promote. For example, we disvalue the rupturing of blood cells, we value having legs that can walk, and we are indifferent, at least from a medical perspective, whether people are gourmets. When these value judgments are made explicit they fall under the heading 'normative claims'. (225)

The distinction between state descriptions and normative claims is important, according to Ereshefsky, to clarify controversial cases such as whether deafness is a disease. That case illustrates very clearly how diseases do not depend on descriptions of dysfunctions, but on judgements that something is wrong or bad. Indeed, even if medical knowledge can evaluate a certain condition as pathological, the social context still has a lot to say. If the affected person does not consider a given condition to be negative, and there are reasonable cultural arguments to defend such a point of view, why should the physician consider it to be negative? Thus, eliminativism rejects the idea that there is a naturalist normativity that can define diseases, as it removes judgements of deviations, dysfunction, malfunctions etc. from the realm of science, which is considered to provide only descriptions of facts. Eliminativism can, however, be compatible with methodological naturalism.

Methodological naturalism considers that scientific descriptions can help produce normative judgements in medicine. Biological theories provide the authority for normative judgements; but different approaches will be more or less appropriate in each case. This implies that the normativity is not fixed or straightforward, but mediated by a complex heuristics, as different theories and/or evidence such as clinical trials can be applied to the task at hand. According to this view, although there is no naturalist normativity grounded in biology, the normativity of medicine stems from the best available scientific evidence. The kind of normativity appealed to here is *heuristic normativity.*

8.4.3 Vital Normativity

In the two forms of normativity I have considered so far, the judgement is "external" to the domain being identified as pathological: in the former, the normal–broken framework is invoked; whereas the latter presupposes a pragmatic actor who takes into account all the available evidence. Yet, a third form of normativity has a long tradition in the philosophy of medicine; it is related to the normativity intrinsic to any living being, both organic and experiential.

This third form of normativity embraces the normative perspective of biological organization at the constitutive, interactive and experiential levels. From this perspective, normativity is intrinsic and every living being follows norms inherent to its agency and to its dynamic coupling with the environment. The idea is that every biological system has its own norms, which are materialized in its preferences; organisms have a vital normativity, according to which they distinguish disease as some condition that is undesirable. In the case of Canguilhem, this idea stems from

a conception of life as an evolutionary process of adaptation, grounded on a basic plasticity that can depend on the environment in many different ways. The organism actively maintains its norm and also continuously adjusts that norm in accordance with the environment; the norm expresses the margins of tolerance of the environment. From this perspective, organisms have a *living normativity*, according to which they distinguish disease (See Saborido et al., Chap. 7, and Sholl, Chap. 6, for further views on this).

In a way, this third source of normativity is the most demanding: it tries to naturalize normativity itself, so that it is identified as an object of scientific knowledge which is itself normative, the task being to explain scientifically how norms originate and act in living beings. Yet, to naturalize normativity in this way, it is also necessary to question the notion of the individual as fixed and essential. In fact, scientific views of individuals as mosaic, heterogeneous and intrinsically related to others, may cast doubt on the claims of living normativity as related to the self-image of humans as autonomous and self-sufficient. The goal of explaining scientifically how norms originate and act in living beings has its own limits. Can we scientifically capture what it is like to be a healthy or ill agent according to intrinsic norms? Apart from the fact that science as we know it might have difficulties grasping subjective experience in a descriptive way, the kind of normativity that is being appealed to here may be deceptive if facts concerning the radical social nature of subjective experience are taken into account. Among the many challenges faced by this view, one is related to the epistemic authority involved in judging when an agent is healthy or ill. This authority may well be distributed across a triad consisting of the agent, healthcare professionals, and other social agents (Casado and Etxeberria 2013); and this obliges us to situate vital normativity within a wider context.

The previous discussion demonstrates that biological individuals cannot be reduced to a single characterization. Mol (1998) explores the multiple ways of being ill in the context of actual medical practice. This multiplicity is related to biological descriptions of the pathological condition and also to social and experiential ways of living with a given disease. Thus, pluralism needs to be taken into account when we conceive of medicine as normative knowledge concerning the ways in which something goes wrong and how to deal with it (Sect. 8.4).

8.5 Conclusions: Ontology, Normativity and Medical Practice

In this paper, I consider diseases to have a real and objective ontological status, even if they can only be known through evaluative judgements. Thus, cases in which diseases can be claimed to be "social constructions"—as is often the case, for example, with attention-deficit hyperactivity disorder (ADHD)—are not considered. If a condition is called a disease but does not have an objective reality, we could say that it is not really a disease, such so-called diseases are indeed social constructions.

Medicine is normative in that it needs to offer judgements as to whether conditions are diseases or not; and those judgements are based on scientific evidence. Thus, the normative or evaluative component of medicine is not in opposition to the merely descriptive or neutral; any description of a disease is only possible after some evaluation.

This way of looking at disease, I claim, helps us to understand previous contributions to the debate in an integrated fashion. Canguilhem thought that the attempt to factually describe diseases is "optimistic"; but did not have a pessimistic attitude towards the hope of advancing medical knowledge through scientific means. Naturalist approaches, such as Boorse's, enjoy the advantages of the normal–broken view, but I have reviewed many arguments according to which that view is not always useful or applicable.

Therefore, the following six points are my conclusions.

1. Medicine is a normative discipline; it evaluates when something goes wrong in a given living being and identifies diseases. Scientific (biological, experiential, social, ecological, etc.) descriptions guide this identification, but they are not normative in the same way as medicine is.
2. For medicine, diseases are objective and real: they are negative conditions of the biological organization of a living organism. The objectivity and reality of diseases cannot always be traced from medicine back to biological facts, but they are assumed to exist (otherwise the conditions are falsely identified as diseases).
3. Biological organization is the subject of biology, but its broad nature cannot be completely known. On the one hand, the debate about functions in biology is on-going; on the other, medical knowledge is based on evaluations of when something goes wrong in a living organism, but the entities involved are complex in their constitutive, interactive and experiential dimensions.
4. Naturalism with regard to concepts of health and disease suggests that medicine always relies on theories that are well established in biology and that according to them, it is possible to demarcate what is wrong in a living organism. From this position, the normativity of medicine is wholly based on science; but it fails to consider many difficulties inherent to medicine. Epistemically, this position holds a view that is *too optimistic* concerning how descriptive knowledge of biological organization motivates the normative judgements of medicine.
5. Strong normativism concerning concepts of health and disease suggests that medicine does not rely on biological theories to normatively identify diseases; but wholly depends on social, cultural, or economic factors. Therefore, all diseases are somehow subjective or socially constructed. Epistemically, this position holds a view that is *too pessimistic* concerning how descriptive knowledge of biological organization motivates the normative judgements of medicine.
6. Weak normativism is compatible with methodological naturalism. According to this view, the normativity of medicine is pluralist; the same kinds of evidence are not always invoked, and diseases are characterized by an ontological multiplicity of ways of being. In many aspects, medical knowledge is not conclusive; it can

change over time, especially when conditions previously considered to be diseases are shown not to be (because they are not objective). Conversely, we might discover that something previously not considered to be a disease really is one (because there are arguments and evidence for its objectivity). This position avoids both the excessive optimism and the excessive pessimism present in naturalism and strong normativism.

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Part III
Implications for Healthcare

Chapter 9
Goals of Medicine

Christopher Boorse

Abstract This essay examines two questions. First, does some list of essential goals of medicine define an internal, or professional, medical ethics? Second, does our medical tradition bar physicians from treatments not aimed at fighting disease or improving health? The answer to the second question seems clear. As a matter of historical fact, not only are many such treatments accepted today, but some have been since the dawn of Western medicine. If our tradition begins with Hippocratic medicine, then from the start it accepted contraception for no health-related purpose. If it begins instead in the second half of the nineteenth century – the only other plausible era of origin – then obstetrical anesthesia is an original treatment not aimed at health. Either way, no historically-based internal morality of medicine can limit physicians' legitimate uses of biomedical knowledge for patients' benefit to health promotion. This removes a typical argument against such controversial treatments as assisted suicide, voluntary euthanasia, and human enhancement.

Keywords Medical ethics • Internal morality of medicine • Enhancement • Health • Disease • Pathology • Hippocratic medicine • Contraception • Obstetrical anesthesia • History of medicine

Some say that certain acts by physicians, though not in themselves immoral, violate the nature of medicine. That is, an "internal morality of medicine" (9.2) is thought to restrict doctors independently of general morality. Such internal ethics is usually grounded on a list of goals believed to define medicine as a profession. Acts not aimed at, or damaging, these goals are forbidden to the ethical physician – or, at least, violate *prima facie* internal duties that external morality must overrule. In the first category, forbidden acts, many writers put doctors' participation in torture or in executions, even if capital punishment or torture is justified by general morality. Some writers also put contraception, sterilization, cosmetic surgery, and

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"enhancements" (9.6) in the same category. Others accept them on balance despite seeing a moral conflict with the nature of medicine (9.3). This idea of an internal medical morality (IMM), like that of an ethics specific to law, education, and other professions, is not so implausible. Still, there are various reasons for skepticism, and I shall stress two points not yet fully appreciated. One is the ambiguity of the key concepts of 'physician' and 'medicine', and the obscurity of their relations to each other and to 'health'. The second is the indeterminacy of the Western medical tradition.

My main thesis, however, is simple. As a matter of history, whenever one supposes the Western medical tradition began, physicians from the start have done things other than to fight disease and promote health.[1] In 9.4, I examine two key examples at length: Hippocratic contraception and Victorian obstetrical anesthesia. For any internal morality well-grounded in tradition, these and other examples prove one of two things. Either, contrary to the usual view, medicine has no essential connection to disease or health. In that case, there are no distinctively medical goals, only distinctively medical means. Alternatively, physicians, *qua* physicians, may properly practice something besides medicine. But either way – whether one says that medicine is not limited to health, or that physicians are not limited to medicine – our tradition does not, in fact, limit physicians to promoting health. There never was a classical golden age of purely pathocentric, or even sanocentric, physicians. Consequently, no IMM offers good reason to ban many controversial activities by doctors, including voluntary euthanasia and human enhancement – though such activities, even if acceptable in principle, may be dangerous in practice.

A few conceptual clarifications are wise. First, by 'health', I mean theoretical health as understood by Western scientific medicine for at least the last 150 years: namely, the total absence of disease, or, in better terminology, of all pathological conditions. So my historical claim is that, *e.g.*, Hippocratic contraception did not aim at health in this contemporary sense, regardless of what any corresponding classical Greek word embraced. Second, I always rely on my own analysis of a pathological condition as a state of statistically species-subnormal biological part-functional ability, relative to sex and age (1977, 1987, 1997, 2014). Still, my arguments presumably work on any other "dysfunction-requiring" view, such as Wakefield's "harmful-dysfunction analysis" (1992, 1999a, b). If a medical treatment does not treat biological dysfunction at all, it does not treat harmful biological dysfunction. And my final conclusion, that IMM does not limit how physicians may use their expertise for patients' benefit, is probably reachable even faster on some

[1] In this essay, I use 'fighting disease' as an abbreviation for any of three things: (1) preventing pathological conditions, (2) reducing their severity, and (3) mitigating their bad effects (*cf.* 9.5).

In line with my (1977), 'promoting health' might embrace not only all these, but also creating "positive health," in the sense of unmixed improvements of normal part-function – one kind of "enhancement." But for clarity, I ignore the concept of positive health below. It is unnecessary to this paper's arguments: *e.g.*, both examples in 9.4 (contraception and obstetrical anesthesia), and most of the other examples in 9.1, are outside positive health as well. Still, it is natural to imagine an independent argument, specifically for enhancements, based on positive health. I thank Jean Gayon for alerting me to this connection.

non-dysfunction-requiring analyses of health, such as Nordenfelt's (1987). So the arguments of this paper are of interest to those who do not share my view of health and disease.[2]

9.1 Some Conceptual Analysis

A physician, *The Oxford English Dictionary* tells us, is "a person trained and qualified to practice medicine, *esp.* one who practices medicine as opposed to surgery." Medicine, in turn, is "the science or practice of the diagnosis, treatment, and prevention of disease." These simple, natural definitions face a host of difficulties. On analysis, it is hard to maintain a conceptual relation even between 'physician' and 'medicine', let alone between either term and 'disease' or 'health'.

9.1.1 Physicians

Who is a physician? The answer is at least a bit obscure even in the contemporary West, and far more so in historical or cross-cultural context. Nowadays, in advanced countries where medicine is strictly regulated by law, we think of a physician as someone who has earned a certain degree and has officially qualified to practice medicine. At least in lay usage, surgeons are included under the term, though during much of Western medical history they were a separate, rival guild. What degree is legally acceptable varies with jurisdiction. Not only M.D.'s, but also D.O.'s usually qualify, while some US states treat a chiropractic degree on a par. What of podiatry, which has a separate degree "Doctor of Podiatric Medicine," and whose practitioners often work on a medical team? Some would exclude podiatrists on the grounds that their training is less extensive and rigorous than medical school. As regards difficulty of training, however, three degrees comparable to the M.D. are the D.D.S., D.M.D. (Doctor of Medicine in Dentistry), and V.M.D. Are dentists physicians? Most dentistry is clearly health care; is it also medical care, given by a special kind of physician? Perhaps one should deny the label 'physician' to podiatrists and dentists on the ground that, having not studied the whole range of human disease, they are unqualified to supervise patients' overall health. That does not apply, however, to veterinarians, who supervise the overall health of patients of many species. So, even in Western society, there is at least mild uncertainty about whom to call a physician, and that is so even if we wholly exclude practitioners of "alternative" or "complementary" medicine such as homeopaths, iridologists, acupuncturists, herbalists, chelators, and foot reflexologists.

[2] One influential analysis of health with which this paper is inconsistent is that of Clouser et al. (1981, 1997); see 9.3 below. I also presuppose, of course, that Veatch is wrong about the infinite elasticity of health, a concept he finds "so vague as to be virtually meaningless" (2001, 629).

Either cross-culturally or historically, degrees are hopeless for settling who is a physician. Medical practitioners in India, Singapore, and many other countries lack an M.D., yet are clear local counterparts to Western physicians. Nearly all primitive societies have shamans, who are central to cultural life. Probably most medical-ethics writers exclude magical or religious healers as outside any relevant tradition. But notice, first, that significant parts of the history of post-primitive Western medicine are also usually excluded, beginning with the various rival non-Hippocratic schools, some religiously based, in classical Greece. And until the late medieval period, none of history's revered physicians had anything like an M.D.[3] Nevertheless, viewing this vast panorama of quasi-medical history, writers normally select some practitioners as paradigm physicians, while rejecting others. Hippocrates but not Thessalos joins the canon, Celsus but not Paracelsus, Charcot but not Mesmer, based on our admiration, or otherwise, of their work. And such value-based selection seems inevitable. History is objective. But what part of history counts as "the Western medical tradition" is not, and obviously cannot be if that tradition is to exercise moral authority over contemporary practice.[4]

To illustrate the importance of this value-ladenness thesis, note how forcefully it can be argued that our own medical tradition – Western *scientific* medicine – actually begins two millennia after Hippocrates, in the mid-nineteenth century. In his superb book *Bad Medicine*, the first scholarly work to tell the truth about medical history, David Wootton finds that "[b]efore 1865 all medicine was bad medicine, that is to say, it did far more harm than good" (2006, 26).[5]

> Hippocratic medicine was not a science, but a fantasy of science; and in this it is much more like astrology than it is like Ptolemaic astronomy… (11) [M]odern medicine is no more a development of ancient medicine than modern astronomy is a development of medieval astrology. (70)

Even after major progress in physiological science, medical treatment was unchanged: it remained essentially Hippocratic until the rise of the germ theory and antiseptic surgery circa 1865. But if "real medicine begins with germ theory" (23), then "the very idea that there is continuity" between ancient and modern medicine "is profoundly misleading" (70).

9.1.2 Physicians and Medical Care

The above points mostly apply equally to 'physician' and 'medicine', but we may now begin to separate these categories. It is surprising how many reasons there are to doubt that either is definable via the other. First, it seems clear that a great deal of

[3] Wootton (2006, 50) says that the first medical degree was awarded in 1268.

[4] As Beauchamp says, "*Medicine* is a vague and inherently contestable concept" (2001, 604).

[5] Later, Wootton makes a stronger claim. The appropriate standard of harm, he says, is this: a harmful treatment is one worse than a placebo, such as a sugar pill, or homeopathic or magical healing. Hence, though he allows that many patients did benefit from Hippocratic therapies like bloodletting, he calls nearly all standard treatments harmful because they also weakened the patient and gave only a placebo benefit.

actual medical care, perhaps most, is now given by nonphysicians. Even if we exclude the alternative practitioners mentioned in 9.1.1, it is implausible to deny that many treatments given by nurses and other standard members of a health-care team are medical. Nurses commonly give drugs by mouth, by injection, or by IV, and monitor vital signs; phlebotomists draw blood samples; emergency medical technicians maintain or resuscitate patients on the verge of death. These are jobs that physicians would do themselves if such professionals were unavailable – as they sometimes are. It seems silly to claim that a given treatment is medical if and only if it is actually performed by physicians. Nor can one escape this point by observing that all other members of the team are under physicians' supervision. In some situations this too is untrue. If a nurse or EMT is in a group of hikers on a remote mountain, and an injured hiker needs anything from first aid to an emergency procedure, no physician may ever be involved in the process. Yet it seems natural to describe such treatment as medical care. We should also note that when laboratory diagnosis is needed for treatment, many kinds of diagnostic workers play an essential role. Some of these are physicians (*e.g.*, pathologists, radiologists), while others (laboratory workers, ultrasound technicians) are not. And the work of a pathologist, say, is the same whether done by an M.D. or a Ph.D.

Since we habitually think about who is a physician in legal terms, it is worth adding that when health law bars certain conduct by non-physicians, it is called "unauthorized practice of medicine" (Furrow et al. 1995, 59–67). Thus, if a man drops out of medical school, hangs out a shingle as Dr. Welby, and begins treating patients in medically normal ways, he is still giving medical care. His offense is not "attempted" or "pretended" practice of medicine, or "practice of pseudo-medicine." Rather, he is practicing medicine without a license. *A fortiori*, if a qualified nurse or physician assistant did the same thing, he or she would surely be giving medical care. At least for philosophical purposes, unlawful medicine is still medicine, if it conforms to prevailing standards.[6] In sum, whether a treatment is medical cannot depend on who administers it.

9.1.3 Physicians, Medical Care, and Health

Reacting to points like these, Veatch goes so far as to propose to "use the terms *medicine* and *health* interchangeably."

> Some, including Pellegrino, tend to limit the use of the word *medicine* to the physician's role. I think this is wrong on two counts. First, medicine is an institution that involves both professionals and lay people (…) Second, even on the professional side (…), there are many professional roles including that of nurse, pharmacist, dentist, and social worker, in addition to that of physician. All are, as I use the term, medical professionals. (…) In the real world, *medical* and *health* are often used interchangeably. (…) [T]he fact that a school of nursing or dentistry can be in a medical center makes clear that at least some uses of the term *medicine* clearly refer to more than the physician. (…) [But] nothing I say here hinges on this

[6] Indeed, one of history's most celebrated medical treatments was unlawful: Pasteur's 1885 inoculation with Roux's anti-rabies vaccine of a boy bitten by a rabid dog.

> usage. If the reader prefers he or she can substitute the word *health* so that the internal morality thesis involves analyzing the ends of health rather than the ends of medicine. The issues will be identical.[7] (2001, 640–1)

With some of this, however, I disagree. That patients are the objects of medical care does not, as Veatch suggests, show that the practice of medicine extends beyond physicians, any more than the need for an audience at a concert makes the listeners musicians.

But the key point of this paper is that, contrary to both Veatch and the *OED*, a great many generally accepted[8] ways in which physicians (and other health-care professionals) treat patients clearly do not aim at those patients' theoretical health, in the sense of freedom from pathological conditions. We just noted obstetrical anesthesia: pain in childbirth is normal for the human female (9.4.2). Two other examples often cited are contraception and cosmetic surgery. Fertility, even if undesired, is normal; indeed, a suppressed menstrual cycle is presumably pathological, and certainly tubal ligation or vasectomy produces a pathological condition. Typical cosmetic surgery removes body features which are normal for the patient's age, at the cost of tiny scars. And there are many more examples rarely noted. Removing a donor's kidney aims to treat the recipient's pathological condition, but none of the donor. On the contrary, again, it produces a pathological condition, and one of considerable gravity. Except for the gravity, the same is true for various other donations of organs, tissues, and, of course, blood. Finally, one of Brody and Miller's (1998) goals of medicine, reassuring the "worried well," likewise does not aim at protection from pathological conditions. An imaginary disease is not a disease. Rather, once again, the physician is simply using expert medical knowledge to serve the patient's well-being. For convenience, I list these and other examples:

Some Generally Accepted Medical Treatments Not Aimed at the Patient's Health

- contraception and sterilization
- obstetrical anesthesia
- other obstetrical activities during normal childbirth
- relief of discomfort from other normal conditions (teething, menstrual cramps)
- adjustments to sleep cycle (*e.g.*, to help compensate for air travel)[9]
- treating typical dysfunctions of old age[10]

[7] Actually, Veatch does not consistently view medical care and health care as identical in his essay. On the contrary, he allows several times that justified medical treatment might not aim at "health and healing" (639; *cf.* 633). What is true is that he does not restrict medicine to physicians.

[8] Because I am sticking to fairly uncontroversial examples, I omit nontherapeutic abortion. Still, there is at least one case of abortion that only very conservative ethicists would oppose: abortion of an anencephalic fetus, or any other with no chance at sentience. Pregnancy with an anencephalic fetus does not seem to be a pathological condition of the mother; the pregnancy may be perfectly normal. Rather, the defect is in another organism.

[9] For the menstrual and sleep-cycle examples, I thank Elselijn Kingma.

[10] According to my analysis of health, a functional level typical of an age group cannot be pathological. *E.g.*, after a certain age presbyopia is normal; yet no one objects to its correction as

– cosmetic surgery
– anesthetic drug injection in sports[11]
– organ, tissue, blood removal for donation
– reassuring the worried well

9.1.4 Medicine More Broadly, and Health Promotion

For completeness, we must also mention broader categories, though they have no role in my analysis below. First is wider senses of 'medicine'. Even within the mainstream of patient care, Nordenfelt distinguishes four expanding senses of the term. 'Medicine 1' is medical care; to this 'medicine 2' adds medical disease prevention; 'medicine 3' adds nursing care and rehabilitation; and 'medicine 4' adds psychological care and health education (1996, 50).[12] These are useful distinctions. In a still more comprehensive sense, medicine extends beyond patient care. Physicians may work in epidemiology or public health, promoting health at the population rather than the individual level. Then there is forensic medicine, beginning with the coroner or "medical examiner," and continuing through physicians' expert testimony in court cases both civil and criminal. Finally, 'medicine' is sometimes used very generically, as in "alternative medicine," "complementary medicine," "primitive medicine," and so on, for practices which many wish to exclude from a genuine tradition of scientific Western medicine to which contemporary physicians belong.[13]

We should also note many activities and institutions aimed at health promotion which are not medicine. They include paternalistic legal or institutional restrictions on people's behavior, such as taking drugs (heroin, tobacco) or wearing seatbelts. There is also a vast body of environmental law to assure a healthful environment, pure-food-and-drug laws to guarantee safe products, and so on. Although physicians may take part in such activities – *e.g.*, testifying in support of new laws, or even administering a government health agency – it is doubtful whether in so doing they are practicing medicine, since non-physicians who played the same roles would certainly not be.

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unmedical. Many similar examples could be found. I thank Kate Rogers for the example and the general point. These examples would vanish, however, on a revised analysis that judges all adults by the standards of young ones. For brief discussion, see my (2014), 714.

[11] According to Sherry and Wilson (1998), local or intraarticular injections during competition of anti-inflammatory drugs (corticosteroids) or anesthetics (*e.g.*, procaine) are permissible, if reported.

I have not yet found evidence of physicians acting as trainers to help athletes achieve peak performance. But if biomedical knowledge were used in this way, would anyone object? In ancient Greece there were two main kinds of trainer, *paidotribes* and *gymnastes*, neither of whom was a physician (Kyle 1987, 142). But there was a school of "medical gymnastics," and the term *iatroleiptes* may indicate that some practitioners combined medical and athletic roles (Golden 2008, 149 n 83). An early example may be Herodicus, alleged teacher of Hippocrates.

[12] It is interesting to note that Nordenfelt assumes medicine to be "a species of health enhancement."

[13] Wootton's title, *Bad Medicine*, coupled with his claim that "real medicine" begins with the germ theory, shows an ambiguity of usage reminiscent of a common fallacy in aesthetics: confusing the questions "What is art?" and "What is good art?"

9.2 Internal Morality of Medicine: A Survey of Views

Is there an internal morality of medicine (IMM)? A recent symposium[14] shows near-total disagreement about the existence and scope of one. Recall that such a morality, based on the defining ends of medicine, is meant to decide controversies in medical ethics, especially by showing certain practices by doctors to be wrong because unmedical, as opposed to being wrong by ordinary "external" moral rules. Recent influential sources for this idea are Leon Kass (1975) and John Ladd (1983), with further inspiration from the work of Alasdair MacIntyre (1981) on practices.

The most robust conception of an IMM is the Thomistic essentialism of Edmund Pellegrino (1983, 2001; see also Pellegrino and Thomasma 1981, 1988, 1993). Clinical medicine[15] as a human activity has an essential nature determined by a single end, or intrinsic good, that it serves: "healing."

> Medicine exists because being ill and being healed are universal human experiences, not because society has created medicine as a practice. Rather than a social construct, the nature of medicine, its internal goods and virtues, are defined by the ends of medicine itself, and therefore, ontologically internal from the outset. (2001, 563)

The specific "medical good" of health is "the return of physiological function of mind and body" and "the relief of pain and suffering." (2001, 569)[16] Medical care that does not aim at this basic good is not truly medical, and so forbidden to the ethical physician. Presumably, then, Pellegrino's view condemns contraception, abortion, cosmetic surgery, and physician-assisted suicide, to name only a few current practices. Pellegrino also requires pursuit of the medical good to harmonize with three other, higher aspects of the patient's good: his perception of it, the good for humans, and spiritual good (2001, 569–71). These four levels of good are in strict order of moral priority from lowest to highest (2001, 575). Analogously, other helping professions – law, education, and ministry – each have a different basic level of "technical good," like health in medicine, but are likewise further bound by the same three higher-level goods.[17] A derived set of professional virtues completes the theory in each case.

A different theory of internal medical morality is Miller and Brody's evolutionary view, discussed at length in 9.3. They reject the idea of a fixed eternal essence of medicine.

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[14] *Journal of Medicine and Philosophy* 26 (2001). One essay in the symposium (Arras 2001) includes an analytical survey of the full spectrum of views.

[15] Pellegrino's theory applies only to clinical medicine, not to other "branches" such as preventive or social medicine or medical science (2001, 564).

[16] Since Pellegrino believes that 'health' means "making whole again" (2001, 568), it seems unclear how pain relief, which is merely blocking a sensation, is a case of it, and similarly for suffering in general.

[17] For the analogy, see 573–5. It is weakened by the fact that "[e]ach profession operates most directly on one or other of the four levels" (573). *E.g.*, ministry "has its moral dimension most specifically at level four" (574) – not level one, as with medicine.

> [T]he goals of medicine are not timeless and unchanging; of necessity they evolve along with human history and culture. At least some [such] changes (…) represent positive evolutionary changes. Therefore, in debating a question that arises under the IMM, it is insufficient simply to argue that the proposed practice would alter the traditional goals of medicine. (2001, 585)

In general, they say, such changes

> will be one of two types: (1) new goals of medicine or internal duties of physicians may be seen as properly within the scope of medicine; and (2) traditional goals or duties may become subject to new interpretations.

As we shall see later, such evolution, for Miller and Brody, can result either from adaptation of the internal morality to new social facts, or from its dialogue with changing social values. As an example of (1), new goals or duties, obtaining informed consent might come to be viewed as an internal, not external, duty (2001, 587). As examples of (2), reinterpretation, some acceptance of physician-assisted suicide (PAS) might come from reinterpreting the Hippocratic duty not to give a deadly drug (1998, 397), and acceptance of a doctor's role in cost containment in managed care may involve reinterpreting the duty of fidelity (1998, 402–5). Finally, Miller and Brody hold that the IMM creates only *prima facie* duties, which can be outweighed by external morality. We shall see the Miller-Brody view in action on more examples in 9.3.2.

These two internalist views, essentialist and evolutionary, are sharply criticized by other writers. To Pellegrino, Arras (2001) makes several objections. His theory, Arras thinks, cannot account for the rise of the duty of informed consent. It also cannot fix the limits of duties like confidentiality (*e.g.*, in psychiatry) or resolve conflicts between internal norms, such as the ban on active killing and the duty to alleviate suffering (651). Beauchamp complains that

> Pellegrino's vision of medicine (…) lacks a principled basis to exclude alternative accounts and disregards many benefits that physicians can and do provide that are of great importance to society and patients (…). (604)
>
> If beneficence is a general moral principle (and it is), and if physicians are positioned to supply many forms of benefit (and they are), then there is no manifest reason to tie physicians' hands or duties to the single benefit of *healing*. Patients and society may, with good reason, regard cosmetic surgery, sleep therapies, assistance in reproduction, genetic counseling, hospice care, physician-assisted suicide, abortion, sterilization, and other actual or potential areas of medical practice as important benefits that only physicians can safely and efficiently provide. These activities are not forms of healing (…). (603)

Beauchamp's own view is that "[a]ll internal medical morality is community-specific," though its ultimate justification rests on a universal "common morality" (613).

As to Miller and Brody, Arras and Beauchamp argue that their theory is internalist only in a very weak sense. Beauchamp notes that

> the major shifts in moral perspective in the last quarter-century in medicine – such as new guidelines for informed consent, care of the dying, and (…) protections for human subjects of research – have come primarily from external groups and external standards. (606)

Arras says that Miller and Brody "avoid the traditional pitfalls of internalism by abandoning internalism itself." That is for two reasons:

> (1) Evolutionary internalism has given up any claim to being a comprehensive method of bioethical problem solving, and (2) the substantive content of internalism proper has become virtually impossible to identify. (2001, 658)

The explanation of the latter point is that, on the evolutionary view,

> the precise determination of what's internal and what's not in any moral analysis will be extremely problematical. This is because what at any given time physicians consider to be the proper goals and duties of medical practice will itself *already* be the product of a dialectical interaction of internal and external social forces (2001, 659).[18]

Arras concludes that all the internalist theories he surveys either are of no use in bioethical controversies, or, when they are, are no longer internalist. He proposes a far more modest IMM, partly analogous to Fuller's internal morality of law, which can help give physicians a professional identity, but not resolve moral disputes (660–1).

Finally, Veatch argues that no internal morality of medicine is possible. He lists

> three reasons why morality cannot be derived from reflection on the ends of the practice of medicine: (1) there exist many medical roles and these have different ends or purposes, (2) even within any given medical role, there [exist] multiple, sometimes conflicting ends, and most critically, (3) the ends of any practice such as medicine must come from outside the practice, that is, from the basic ends or purposes of human living (2001, 621).

As to the first point, even among doctors, Veatch thinks the goals of pediatricians differ from those of internists (*e.g.*, the latter but not the former require the patient's informed consent), and the goals of all physicians may differ from those of other health professionals, such as nurses, pharmacists, or medical researchers. As to the second point, Veatch names "four goods of medicine": to prolong life, cure disease, relieve suffering, and prevent disease and promote health (631). These goals can clash, but no reflection on the nature of medicine can resolve the conflict.

Veatch's argument for his third thesis uses a striking hypothetical case: a society in which a key cultural role, of supreme status, is that of priestly *castrati* who are cantors of religious chants. Nothing about the nature and goals of medicine, Veatch thinks, can settle whether it is moral for this society's surgeons to castrate boys eager for this honor. The issue is whether the society can legitimately create this role in the first place. "The rightness or wrongness of the surgeons' actions depends not on any goals of medicine, but rather on the correctness of the society's broader cultural beliefs and rituals" (634). Veatch maintains that the same is true of any medical procedure: its status depends on general external morality, not any internal one.

Some other writers, of course, would condemn surgical castration on the internal grounds that adult male sexual characteristics are normal, not pathological. Miller and Brody reply that in Veatch's example,

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[18] To this I would add my impression that, when fully stated, Miller and Brody's theory is too complex to yield any definite answers in disputed cases. (*Cf.* their 2001, 594–7, and discussion below in 9.3.2.) For other criticism of Miller and Brody's view, see Wreen (2004).

> it is clearly and unambiguously the case that the medical profession is being hijacked, as it were, by an external sociocultural belief system. These castrations serve no medical goal and have nothing whatever to do with health or treatment of disease. (593)

But any such reply must face our examples of justified surgery on normal organs such as *vasa deferentia*, oviducts, and small breasts, not to mention the nonsurgical items on our list. And just for that reason, Miller and Brody do not regard their point as dispositive:

> The IMM creates a prima facie case that physicians should not perform the castrations, but by invoking the external morality, one might conclude that the physicians ought to participate, all things considered. (594)

9.3 Goals of Medicine: Two Proposed Lists

Like several writers in 9.2, I restrict my focus from now on to the core of medicine: medical care of patients. A list of goals intrinsic to and constitutive of such medicine, able to generate an internal morality, should presumably have several features. First, they must be distinctive of medicine, as opposed to other professions and practices and to human activity in general. We do not want goals like "doing the right thing" – though I shall argue in 9.5 that this is, in the end, nearly the best we can do. Second, the goals should be as independent as possible of one another. If physicians cannot pursue G_2 except in pursuing G_1, then G_2 is not a genuinely separate goal and does not belong on our list. Third, they should be as ultimate as possible given the first two constraints.[19] We do not want to list "maintaining an airway" or "restoring the ability to walk" as goals of medicine, since, however distinctive of medicine, these are obviously subgoals of something more basic. At the same time, we should avoid conflating importantly different activities, such as cure and prevention. Two things that we should not require are these. First, we should not insist on goals that cannot conflict. On the contrary, goal conflict is common in medicine: for example, the best drug or other treatment to cure one disease often raises the risk of others, causing a conflict between curing disease and preventing disease. Second, I believe that trying to say how to resolve goal conflicts, *e.g.*, by prioritizing some goals over others, is unnecessary for our purposes and has led to confusion in some essays.[20]

[19] Fleischhauer and Hermerén (2006, 11, 427–31) propose a hierarchy of medical goals: intrinsic goals, overarching operational goals, and specific operational goals.

[20] The Hastings Center report mentions a "consensus" that it is "not helpful, nor really possible, to set fixed priorities" among medical goals (Callahan 1999, 20). Unfortunately, its own text often uses a distinction between "primary" or "core" goals of medicine and "secondary" ones (11).

In an earlier essay, I too used the terminology of core and peripheral medicine (1987, 382–4), though "therapeutic" and "nontherapeutic" might have been better. I was clear that both were permissible, so the present essay changes no doctrine. But in its light, such statements as "Peripheral medical treatment is medical only in that physicians do it" (383) may need revision.

Let us examine two influential lists of medical goals and then see if we can improve them. Both lists assume, *contra* Pellegrino, that "medicine is too complex and diverse in its legitimate scope to be encompassed by any single, essential goal, such as healing or promoting health."[21]

9.3.1 The Hastings Center Project Report

One important proposal is in the Hastings Center's consensus report (Callahan 1999) on its international project on this topic. After an opening nod to *Dorland's Medical Dictionary's* definition of medicine and list of traditional goals (4–5), the report settles on a list of "four goals of medicine":

1. the prevention of disease and injury and the promotion and maintenance of health
2. the relief of pain and suffering caused by maladies
3. the care and cure of those with a malady, and the care of those who cannot be cured
4. the avoidance of premature death and the pursuit of a peaceful death

Unfortunately, this list, I will argue, is disorganized, includes a serious moral error, and is set within a framework rife with inconsistencies. Fortunately, for other reasons it turns out not to be interpretable as the basis of an IMM anyway.

The term 'malady' in goals 2 and 3, along with most of a specific definition of it, is borrowed without attribution from Culver, Gert, and Clouser. A malady is "that circumstance in which a person is suffering, or at an increased risk of suffering an evil (untimely death, pain, disability, loss of freedom or opportunity, or loss of pleasure) in the absence of a distinct external cause" (Callahan 1999, 20)[22]. Thus the term "is meant to cover a variety of conditions, in addition to disease, that threaten health," including "impairment, injury, and defect" (20). Yet the authors do not, as one might expect, say that health is the absence of malady. Rather, they define health as "the experience of well-being and integrity of mind and body," and say that "it is characterized by an acceptable absence of significant malady" (20). This is unsatisfactory for several reasons. One is that a person can have a false experience of well-being and integrity, despite an undetected disease like coronary atherosclerosis or early cancer. Health, on my view, is neither a good experience nor the lack of a

[21] Miller et al. (2000, 354). Miller and Brody (1995, 11) had already made a similar statement.

[22] For Culver, Gert, and Clouser's original discussions, see Clouser et al. (1981, 1997) and Culver and Gert (1982). For my criticisms of this definition of malady as a general account of medical abnormality, see (1997, 43–4).

The Hastings writers make two changes in the Culver-Gert definition. An unimportant one is from "sustaining" cause to "external" cause. The important one is from 'death' to 'untimely death', a change I criticize below. Obviously, for a person's death to be an "evil," it need not be untimely.

bad one; it is not an experience at all. A second problem is that the writers fail to distinguish between theoretical or perfect health, the complete absence of pathology, and practical health, the absence of "significant" or "unacceptable" pathology (Boorse 1997, 44–51).

In any case, in this conceptual framework, presumably "the prevention of disease and injury" is one part of "the promotion and maintenance of health." This suggests that goal 1's description should just be the second phrase. And since maintenance seems to be part of promotion, one might think that term better omitted, as it was on page 19. On the other hand, the authors apparently wish to exclude curing maladies from health "promotion," since cure is part of goal 3. On the whole, then, given that health is to be the acceptable absence of significant malady, it would have been clearer to make goal 1 simply "the prevention of malady."

As for goal 2, a well-known defect in the Culver-Gert definition is that, as they concede (Gert et al. 1986), pregnancy, like menstruation and various other normal conditions, is a malady. Eliminating all pregnancy is, of course, not a goal of traditional medicine, and that poses a problem for goal 3 (cure of maladies) and also for 1 if revised to prevention of malady. The obvious fix is to restrict 1 and 3 to unwanted maladies. But the same restriction would make goal 2 (relief of pain and suffering from maladies) unduly restrictive. As I constantly note in this paper, anesthesia in childbirth aims to eliminate normal pain. And, of course, much else that obstetricians do is "care" (also in goal 3) of desired pregnancies. Note that the obstetrical objections remain even if one replaces 'malady' by 'pathological condition', as I do.

Goal 3 unnecessarily combines two very different activities, cure and care. I will not quote all of the authors' description of care (26–7), but its unifying theme seems to be that care is "helping a person cope effectively" with maladies, especially the "nonmedical problems" which they cause. Thus care covers some of rehabilitation, advice on finding "supportive social and welfare services," and help for the chronically ill in "making personal sense" of their new situation. An emphasis on this goal is commendable, though I would not call it "healing" (26). But care, so defined, needs to be separated from cure. Also, care seems to overlap with goal 2, especially if "suffering" in goal 2 is "a state of psychological burden or oppression" (21).

Goal 4 is the most objectionable on this list. It seems to consist of two superfluous elements, already covered by earlier goals, plus a shocking, morally indefensible limit on proper medical care. First, on my analysis of health, death is always pathological. Although I count diseases typical of an age group as normal, only living members are in the reference class. Any aspect of a disease that kills you is atypical of live human beings of your age. And this approach seems essential to biomedical thinking; otherwise, no one could have any disease after the age by which most human beings are dead, which, in 2010, was about 67. But, if so, then preventing death is just a subgoal of preventing maladies (better, pathological conditions), and "the humane management" (29) of the dying process is just a subgoal of goals 2 or 3.

What is not superfluous in goal 4 is either confused or appalling: the limitation of death prevention to "premature death." What is premature death? The authors define it disjunctively. First, it may

> take place when a person dies before having had an opportunity to experience the main possibilities of a characteristically human life cycle: the chance to pursue and gain knowledge, to enter into close and loving relationships with others, to see one's family or other dependents safely into their own adulthood or independence, to be able to work or otherwise develop one's individual talents and pursue one's life goals, and, most broadly, to have the chance and capacity for personal flourishing. (28)

Alternatively, "within an individual life cycle a death may be premature if, even at an advanced age, life could be preserved or extended with no great burden on the individual or society" (28). Still,

> The pursuit of increased life expectancy for its own sake does not seem an appropriate medical goal. The average life expectancy in the developed countries allows citizens a full life, even if many of them might like longer lives. This is surely not an unacceptable personal goal, but given the costs and difficulties of achieving significant additional gains through technological innovation, it is doubtful that this is a valid global or national goal, or a goal for medical research more generally. (28–9)

The kindest thing one can say about these passages is that they confuse two questions: what is a legitimate goal of medicine, and how much medical care of a patient other people ought to pay for. The authors seem to assume a system of socialized medicine, whereby society at large buys a limited array of medical resources that physicians must ration out ethically. But socialized medicine is a very recent phenomenon, not yet victorious even in America. On any view of our medical tradition, for most of its history, patients paid for their own medical care. Even in nearly all countries today with socialized medicine, patients can still buy medical treatment in a private market. And the writers sometimes seem to accept this possibility.[23]

Surely everyone has an incontestable right to spend his own money in self-defense against death, either directly or by buying a suitable insurance policy. What use of one's own money could possibly be more a matter of right? So, even if someone has already had what the Hastings authors judge a full life, if he wishes a still longer one "for its own sake" – *i.e.*, he is enjoying life and unwilling to die – it would be absurd to suggest that a doctor whom he pays to keep him alive is practicing improper medicine. Whether such life–prolonging treatment is too great a "burden" is, normally, up to the patient or his surrogates. Of course, insofar as end-of-life treatment decisions fall to a doctor, they face the general limitation on all medical care that it should be in the patient's best interest. But I fail to see how considering whether the patient's life is "full" yet is necessary or relevant in private medicine. Perhaps the authors do not mean the implications I find in their text, but I think

[23] They write: "[E]very civilized society should guarantee all of its citizens a decent basic level of health care, regardless of their ability to pay for it. Beyond that basic minimum (…) patients should be free to spend their own money to gain additional benefits". (40) Yet does not this statement contradict the writers' demand for "an equitable medicine" which is "affordable to all" (51)? Given the patient freedom in the quotation, inequality of wealth guarantees inequality of medical care.

they do.[24] At any rate, someone who calls life-saving treatment of a paying patient improper medicine because he has already had a Hastings-approved life deserves the name neither of ethicist nor of physician. Likewise, when medical research is publicly funded, various goals must compete for public money. But to deny that extending the human lifespan is an appropriate goal of medical research at all – private or public – is a moral travesty.

Besides their four goals of medicine, the authors also recognize four categories of "potential misuses of medical knowledge" (30), which they also sometimes call "nonmedical uses" (31). Acts in the first category are "unacceptable under any and all circumstances," such as the use of medical skills for torture or capital punishment. The second is uses that "fall outside the traditional goals of medicine," yet are acceptable to serve "social and individual purposes" other than health. Besides cosmetic surgery and contraception, this category includes forensic medicine. Third is "uses of medicine acceptable under some circumstances"; here is where growth-hormone treatment of healthy short children, and all other kinds of "enhancement," fall. Fourth is uses unacceptable except for "the most compelling social reasons." Although the ideas of this section are unclear, some uses of genetic and other predictive information are in this category, as well as "the coercion of people by medical means," as in forced abortion or forcing people to change unhealthful habits.

Again, in this part of the report, we see a fairly high level of conceptual confusion, or at least ambivalence. One problem is that the authors sometimes substitute "uses of medicine" for "uses of medical knowledge." But many other phrases, too, suggest indecision about whether the practices in question are part of medicine, or not. The section's title includes "mistaken medical goals" (30), which suggests that the condemned activities are part of medicine, but should not be. Similarly, the introductory paragraph refers to pressure to "move medicine beyond narrowly medical goals" (30), a phrase which, though confusing, suggests an expansion of medicine itself. Now if acceptable new practices, like cosmetic surgery and contraception, are forms of medicine, then their goals are by definition medical. In that case, the Hastings list of goals is too narrow. But if such practices are not forms of medicine at all, why would they need to be "compatible with the primary goals of medicine"? The writers seem torn between two modes of description: (1) medicine is evolving to include some new types of acceptable activities, not aimed at its original health-related goals; or (2) new "acceptable nonmedical uses of medical knowledge" (31) are not part of medicine. On neither interpretation, however, can the writers' list of goals be seen as generating an IMM. On view (1), the goal list is incomplete; on view (2), it does not morally limit physicians.

[24] For example, their "equitable medicine" will not "continually develop drugs and machines that only the affluent can afford…" (51). Such drugs and machines, of course, are privately funded and so should be acceptable by pages 40 and 28. Regrettably, the Hastings chapter often contradicts itself.

9.3.2 *Miller and Brody*

Some authors who do explicitly want their list of goals to define an internal morality binding on physicians are Miller and Brody (1995, 1998, 2000, 2001). Here is their list:

> The goals of medicine are directed to a variety of ways in which physicians help patients who are confronting disease or injury. These include (1998, 386–87):
>
> 1. Reassuring the "worried well" who have no disease or injury;
> 2. Diagnosing the disease or injury;
> 3. Helping the patient to understand the disease, its prognosis, and its effects on his or her life;
> 4. Preventing disease or injury if possible;
> 5. Curing the disease or repairing the injury if possible;
> 6. Lessening the pain or disability caused by the disease or injury;
> 7. Helping the patient to live with whatever pain or disability cannot be prevented;
> 8. When all else fails, helping the patient to die with dignity and peace.[25]

These admirably clear, and mutually exclusive, categories seem nicely to separate many conceptually diverse goals. The list is superior to many others in including not only 3 and 7 (which fall into the Hastings project's "care" category), but also cognitive goals: diagnosis and prognosis (2, 3). It is usually forgotten that a major goal of Hippocratic medicine was not therapy, but prognosis – above all, to predict whether and when the patient would die. It is partly by adding other cognitive goals of the treatment of patients that I hope to improve existing lists. Still more important, however, is to eliminate Miller and Brody's limitation of medicine to "disease or injury," a phrase which I presume amounts more or less to "pathological condition." (Observe that the authors fail to notice that the "worried well" are not, in fact, "confronting disease or injury" at all.)

Miller and Brody add to their list of goals a category of "internal standards of performance" in pursuing those goals, with four examples of such duties (1998, 387).[26] Then, like the Hastings writers, Miller and Brody offer examples of activities that do not fit their IMM. First are "relatively straightforward violations," such as treating family members, having sex with patients, prescribing anabolic steroids for athletes, and executing convicts by lethal injection (1998, 389–90). Steroid prescriptions are wrong not just because they are dangerous, but also because "no true medical goal is served," since mediocre athletic ability is not a disease (389). Miller and Brody do not explain why this objection does not also condemn obstetrical anesthesia and any other relief of normal painful conditions. Somewhat similarly, their additional objection to medical execution – that it is not "the remorseless progress of some disease which has declared that the patient is to die at this time"

[25] This list improves their earlier shorter one: "healing, promoting health, and helping patients achieve a peaceful death" (1995, 12).

[26] In a later essay, they also recognize a set of "clinical virtues" (2001, 582). I shall not discuss either of these aspects of their view.

(390) – applies equally to physician-assisted suicide (PAS) and voluntary active euthanasia (VAE).[27]

More important for our purposes are Miller and Brody's examples of "borderline medical activities" (390–92), such as cosmetic surgery and contraception. They write:

> Besides medical activities which are fully consistent with medicine's internal morality, and those which violate that morality, there may be a third category – activities which are considered morally permissible for physicians, but which occupy a borderline status in relation to internal morality. (1998, 390)

A first question about this category is whether it is coherent. What would a partial "violation" of, or "inconsistency" with, medicine's internal morality be, and how could such an act, if medical (391), still be morally permissible for physicians? The concept of a permissible partial violation of duty makes no sense. No permissible act can violate an actual duty, only a *prima facie* duty. And that is just what Miller and Brody say in 2001. Also changing "borderline" to "peripheral," they say that medical treatments which have no relation to health and disease are *prima facie* violations of physicians' internal ethics. But they can be legitimized by their acceptance by society (2001, 594). This is, at first sight, a mysterious view. It is hard enough to understand the basic internal-morality idea, that certain acts are not immoral *per se*, but immoral for certain professionals to perform. It is still harder to grasp how society could give valid permission for the otherwise impermissible. One might think the answer is that Miller and Brody's "evolutionary" view, as described in 9.2, assumes a sort of cultural relativism for socially created roles. But that is not what they say. Instead, as we noted, their view is that, *e.g.*, religious castration by physicians clearly violates the IMM, but may still be justified by external morality.[28]

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[27] Miller and Brody's original IMM essay (1995) has more on the contrast between VAE and medical execution. They object that in medical execution, (i) the doctor is an agent of the state, not of the patient; (ii) execution does not serve any "medical goals"; (iii) lethal injection is not "a medical treatment or procedure"; (iv) it does not "aim at responding effectively to the patient's medical condition"; and (v) it is not intended for the benefit of the patient. Therefore even if capital punishment is justified, doctors must not take part in executions (1995, 15–16).

Yet consider these writers' own scenario (16). An inmate asks his own prison doctor for a lethal injection in lieu of electrocution, and the state agrees. It does not seem that Miller and Brody's reasons can condemn such an action. Contra (ii), as to VAE, Miller and Brody count "peaceful death" as a medical goal sometimes justifying lethal injection (12). Presumably, then, lethal injection can be a "medical procedure," contra (iii). Contra (i) and (v), in the prison story the doctor does seem to act as the prisoner's agent, at his request and for his benefit. That leaves only (iv), which seems circular: why isn't impending painful death a "medical condition," here as elsewhere? In my view, as noted in 9.5, if a horribly painful death is otherwise inevitable, for a doctor to grant a competent euthanasia request is not just permissible, but obligatory.

[28] Miller and Brody had already stated that the IMM creates only *prima facie* duties in their original essay (1995, 16). But only in 2001 are they clear about how this view of disputable cases differs from a "borderline" view of them. The borderline view is that such cases do not clearly violate IMM. On the *prima-facie* duty view, IMM is clearly violated, but overruled by external morality.

> The IMM creates a prima facie case that physicians should not perform the castrations, but by invoking the external morality, one might conclude that the physicians ought to participate, all things considered. (594)

On contraception, another example, Miller and Brody say that, like steroids and executions, it "arguably fails to promote any medical goal, since fertility is not a disease" (391). This recognition that fertility is not a health defect is to their credit, as it is to the Hastings authors'. Unlike the Hastings team, however, they think this fact means that a justification of doctors' involvement in contraception and sterilization "is rather hard to provide on a principled basis" (391). Such justification rather comes from three "practical" considerations: (1) the means to contraception, such as drugs and surgery, are similar or identical to other medical treatments; (2) society has given physicians "a virtual monopoly" over these techniques; and (3) reproductive matters are "intensely personal." Given these three points,

> [w]e could envision a hypothetical negotiation between the medical profession and the larger society. Imagine that everyone agreed that contraception and sterilization are social goods, everything being equal. When push comes to shove, there seem to be two ways to provide this good. Either physicians will stretch a point and agree to provide this service despite the potential compromise of their professional integrity.... Or, society will somehow create a new set of professionals or technicians who will learn these skills .... All might readily agree that the first course of action is a much wiser use of all sorts of social resources than the second. (392)

Cosmetic surgery is a similar "borderline practice," but may be "more problematic" for two reasons: it may be "an inappropriate and dangerous increase in the power of the medical profession," and it "seems more driven by market forces than by any true desire to aid suffering humanity" (392).

Confusingly, in a longer essay on cosmetic surgery the previous year, Miller and Brody, joined by Chung (2000), revised their IMM by adding the Hastings report's term 'malady.' We have seen that the original Clouser-Culver-Gert definition of this term counts many conditions as maladies, such as menstruation and pregnancy, that are perfectly normal in medical thought. But Miller, Brody, and Chung do not repeat either version of that definition, and in fact deny that pregnancy is a malady (356). The closest they come to a new definition is this: "'Malady' in the medical context suggests an objectively diagnosable condition calling for medical treatment" (358). But, in the first place, 'malady' is not a medical term. In the second place, since the issue is what medical treatments are justified, the only noncircular content of this formula is "objectively diagnosable." The authors argue that, *e.g.*, a large port-wine stain meets this test, but not typical complaints of cosmetic-surgery patients, even those of racial appearance. That is false. Many targets of cosmetic surgery, such as jowls, wrinkles, eyebags, and small breasts, are identifiable by objective observers. There is also wide agreement on who looks black, Jewish, etc. For that matter, given before-and-after photos of any surgery patient, anyone can identify which way the patient looks today. In all three cases, an individual patient's preference for the "after" look exactly parallels an individual pregnant woman's preference not to be pregnant. In a remarkable passage, Miller, Brody, and Chung suggest that the latter means she would have been healthier with contraception.

> Although not a disease or a malady, pregnancy is a condition that in our society brings women under medical attention. Unwanted pregnancy can be understood as a disability, which interferes with the ability of women to function normally in social life. This suggests the conclusion that contraception promotes the health of women. (2000, 356)

Suddenly, quite apart from disease, injury, and malady, disability is now a fourth type of "medical condition" (357), and whether pregnancy is a disability depends on whether the woman likes it! The authors make continual ad-hoc adjustments to their health concept to get the results they desire.[29] Their invented category "malady" is already tendentious and ill-defined. But on a proper definition of health, I argue, Miller and Brody are wrong to think that traditional medical care has ever been restricted to health promotion. Hence, there need be no threat to "professional integrity" when physicians go beyond health-related goals. Let us now try to nail this point down forever.

9.4 Some Lessons of History

Two key examples – Hippocratic contraception and Victorian obstetrical anesthesia – argue that whenever our own medical tradition began, doctors were willing from the first to go beyond promoting health.

9.4.1 Ancient Contraception

As recent scholarship[30] reveals, contraception can "be regarded as a universal phenomenon, to be found at different times and in the most diverse of societies" (Jütte 2008, 4). In particular, ancient physicians, who were often also pharmacists, dispensed many remedies to block or abort pregnancy. One medical historian counts 413 such techniques (Fontanille 1978, 78*ff.*). After the earliest birth-control recipes in Egyptian medical texts and in the Talmud (Jütte 2008, 29–31), an expanding list

[29] The rest of the quoted paragraph raises further questions. The authors say that female contraception differs from vasectomy because "[u]nwanted paternity, unlike unwanted pregnancy, does not qualify as a medical condition to be prevented" (357). What makes pregnancy a "medical condition" is apparently that it "brings women under medical attention" (356). But so, for vasectomy patients, does male fertility. Moreover, the "disability" argument cannot excuse vasectomy, so it seems to be outside even their newly expanded list of the goals of medicine. Still, the authors consider it "an acceptable peripheral medical practice that does not threaten or violate professional integrity" (357). Yet three pages later, they say: "All peripheral medical procedures and practices challenge professional integrity, since they are at best weakly supported by the goals of medicine" (360).

[30] The pioneering work on the history of contraception was Himes (1936). It is much extended and improved by Noonan (1966), Riddle (1992, 1997), and Jütte (2008). An excellent source on ancient abortion is Kapparis (2002).

of them becomes a staple of Greek and Roman medical literature, with 125 references in the Hippocratic corpus and over 30 references each in Dioscorides, Soranus, Oribasius, and Aetius (Fontanille 1978, 124). Although the empirical difference was often obscure to ancient science, Soranus and others distinguished clearly between abortives (*phthoria*) and contraceptives (*atokia*) (Jütte 35). Moreover, although many prescriptions were wholly or partly magical (48–50), recent scientific testing has shown that a long list of ancient remedies – especially plants such as pomegranate, pennyroyal, artemisia, rue, Queen Anne's lace, juniper, aloe, birthwort, and willow – have powerful contraceptive or abortive effects (Riddle 1997, 40–63).[31] In fact, Riddle and some other writers believe that folk knowledge of such remedies had dramatic demographic results in various eras.

Admittedly, the ancient world embraces a wide variety of moral views on contraception and abortion. As an illustration of the range, Augustine's first religion, Manicheism, held sexual intercourse permissible only if non-reproductive – the opposite of his doctrine as a Christian (Noonan 1966, ch. 4; Jütte 2008, 25). A rough generalization is that pre-Christian attitudes were very tolerant of contraception, abortion, and even infanticide. Riddle states that before 300 B.C., "the evidence is clear that birth control was acceptable so long as a man's asserted right to have a child sired in wedlock was protected" (1997, 81). A god, Hermes, gives contraceptive advice (pennyroyal) in Aristophanes' play *Peace* (Jütte 2008, 39). Both Plato and Aristotle implicitly endorse contraception for population control.[32] Even the Talmud allows some contraceptive use by women, though commentators disagree about what situations qualify (Riddle 1992, 19–20; Jütte 2008, 19–20). On the other hand, a comprehensive moral ban on all forms of birth control emerges by the first century B.C. in some Greek cults (Riddle 1997, 81), and later among such leading Stoics as Musonius Rufus (c. 25-?? A.D.), teacher of Epictetus (Jütte 22). By the fourth century, major Christian authorities, such as St. John Chrysostom and Augustine, are fiercely opposed to both contraception and abortion (Jütte 2008, 24–5).[33]

At various times, these moral disagreements within society were reflected in ancient medicine. Noonan's conclusion may be correct for much of antiquity:

[31] The efficacy of ancient contraceptives, while fascinating, is irrelevant to my argument. If we are to use historic physicians as moral exemplars, what matters is not so much what they were doing, but what they thought they were doing.

Also of interest is what canonical doctors would have done if they had thought that they could. *E.g.*, during much of medical history, physicians might well have done cosmetic surgery if it had been feasible at the time. That is especially plausible for eras, including classical Greece, when ideals of health and beauty were closely linked. Chapters 185–191 of the Hippocratic work *Diseases of Women II* are, in fact, cosmetic recipes (Totelin 2009, 11).

[32] See Plato, *Laws*, 5.740; Aristotle, *Politics* 7.16.15.1335b19-26 (cited by Riddle 1997, 14).

[33] Riddle finds these Christian views "not much different from prevailing Judaic, Hellenic, and Roman values (1997, 82), which would mean that by then a large change had occurred in the attitudes of the ancient world at large.

> Some physicians may have taken an ethical stand against any use of contraceptives, others probably following the ideal of not prescribing contraceptives in aid of criminal or frivolous purposes. (…) Other doctors must have known no restraints. (1966, 19)

But two points are crucial for my argument. First, because contraception on demand was far from universally condemned, we can erase it from our Western medical tradition only by expelling all ancient physicians who prescribed it. If this is not to be a circular use of history to decide medical ethics, other grounds must exist for such expulsion. Second, even if there are good reasons to view Hippocratic medicine alone as canonical, as is usual, it does not seem to have placed any moral limits on contraception at all.

We have seen that Hippocratic doctors knew and dispensed many anti-fertility drugs. But did they perhaps dispense them only to prevent some form of pathology, such as the effects of especially dangerous pregnancies? The two passages in the *Corpus Hippocraticum* most often quoted state no such limitation:

> If a woman does not want to become pregnant, give to her in a drink of water moistened [or diluted] copper ore [*misy*] in the amount of a *vicia* bean, and she will not become pregnant for a year.[34]

The word "want" suggests that the decision was up to the woman, with no moral proviso binding the Hippocratic physician. And, according to historians I have asked, no such proviso appears anywhere in the Hippocratic corpus. On the contrary: at least two passages concern birth control for *hetairai*, a group of high-class female courtesans whose work would be blocked by pregnancy.

For example, in a famous story, one Hippocratic doctor was consulted by a "musician" *(mousoergos*), who could not work if visibly pregnant. He recommended the Lacedemonian leap, a jump that makes the heels strike the buttocks. The woman's seventh leap expelled an embryo, which the author describes in detail.[35] This passage is about abortion, not contraception; but there can hardly have been stronger moral restrictions on the latter than on the former. And this woman clearly wishes to avoid pregnancy to preserve her attractiveness (*hokos me atimotere eie*, "afin de ne pas perdre de son prix" [Littré 491]). She asks for, and is prescribed, an abortion for the sake of her work, not of her health.[36]

As for what is usually called the "Hippocratic Oath," it bans one method of abortion – by pessary – but says nothing about contraception. Anyway, most modern scholars conclude that this oath was not written by Hippocrates and does not reflect the

[34] *On the Nature of Women*, ch. 98. I quote from Riddle (1992), 74. An almost identical passage, with the heading "Contraceptive" [*atokion*], appears in *Diseases of Women* (I, ch. 76).

[35] *On the Nature of the Child*, ch. 2 (Littré 1962, 490–1). Another reference to birth control by *hetairai* is in *On Fleshes*, 19, though no doctor is mentioned there.

[36] There is no textual basis for John of Alexandria's fantasy that this doctor (whom John believes to be Hippocrates himself) prescribed abortion to keep the woman from suicide after losing her looks (*Commentary on Hippocrates' "On the Nature of the Child"* 18 [2, 216], quoted by Kapparis 2002, 79). John suggests the idea only to resolve the clash between this story and a corrupt version of the Hippocratic Oath that bans all abortion (see note 38, *infra*).

norms of Hippocratic medicine.[37] So there seems to be no evidence of any pathology-prevention limit on either contraception or abortion in classical Greek medicine. Much later statements to the contrary are by writers, such as Scribonius Largus and Soranus, who are wrong both about the text of the oath and about its authority.[38] In sum, we must side with Riddle above: contraception by doctors for no health-related purpose was routine at what is usually seen as the dawn of Western medicine.

9.4.2 Victorian Obstetrical Anesthesia

On the other hand, just before the time that Wootton considers the dawn of Western scientific medicine, anesthesia for labor in a normal pregnancy achieved rapid, near-total acceptance.

During childbirth, a typical human mother suffers intense, repeated labor pains. The root cause seems to be the unusually large comparative size of the human fetus, especially of its cranium and torso. In sharp contrast with nearly all other mammals, an average human fetal head is in one dimension 110 % the size of the maternal

[37] This conclusion of Edelstein's famous essay (1967, 3–63) seems to be the dominant current view (Riddle 1997, 38–9), though Edelstein's claim that the oath is wholly Pythagorean is rejected. The oath may have been written long after the classical period (von Staden 2007, 427). Leven states flatly that it "was unknown to Greek physicians of the classical age and cited only rarely in later antiquity" (1998, 15). On one of several conflicts (*ibid*., 11) between the oath and the Hippocratic corpus, see note 38.

[38] In the first century A.D. (four centuries after Hippocrates), Scribonius Largus sees the oath as prohibiting all abortion, and possibly contraception too. He says that Hippocratic medicine had the goal of "healing [*sanandi*], not doing harm [*nocendi*]," and therefore that it protected even potential persons (Riddle 1992, 8). A bit later, Soranus reports two schools of moral thought about abortion and contraception, endorsing the more liberal one. "For one party banishes abortives, citing the testimony of Hippocrates who says: 'I will give to no one an abortive,' moreover, because it is the specific task of medicine to guard and preserve what has been engendered by nature. The other party prescribes abortives, but with discrimination, that is, they do not prescribe them when a person wishes to destroy the embryo because of adultery or out of consideration for youthful beauty; but only to prevent subsequent danger in parturition if the uterus is small and not capable of accommodating the complete development, or if the uterus at its orifice has knobby swellings and fissures, or if some similar difficulty is involved. And they say the same about contraceptives as well, and we too agree with them." [*Gynaeciorum libri* IV, ch. 60] (Jütte 2008, 35).

Three points can be made about these passages. First, contraception is not "harm," nor does it destroy anything already "engendered by nature." So these writers mention no objection of principle to medical contraception except that it is not "healing." Second, both writers are working from a corrupted text, since it is now clear that the original oath explicitly bans only abortion by pessary (Riddle 1992, 7–8; 1995, 38). (But see Kapparis 2002, 71–75, for arguments that a general ban was intended.) Third, since the Hippocratic corpus contains books like *Diseases of Women* with many recipes for abortive pessaries (Riddle 1992, 76–7), either the oath or these books are inauthentic. The most likely conclusion is that the oath is atypical of Hippocratic medicine.

Note, too, that once we reject the oath's authority, physician-assisted suicide is a second example, besides contraception, of an accepted ancient treatment by physicians not aimed at health. I thank John Riddle for this point.

pelvic inlet. Consequently, a typical baby must first rotate before passing through, and it must rotate again to accommodate its shoulders – two of the "cardinal mechanisms" of human labor.[39] As a result, human birth requires very strong uterine contractions, as well as wide distention of the cervix, vagina, and other areas. All of this can cause severe pain, especially in a woman's first pregnancy – pain largely unrelieved by childbirth training.[40] Even proponents of "natural childbirth," such as Dick-Read (1959), view labor pain as normal, and its cross-cultural universality is not in anthropological dispute.[41] In sum, painful childbirth is inherent in the human design, either as a design defect or, as some have suggested, as serving some physiological, psychological, or social function.[42]

As to anesthesia, after the 1846 Boston discovery of the effects of ether, its use in surgery as a general anesthetic spread like wildfire in America, Great Britain, and Europe[43] – though even surgical anesthesia was not without its critics, who saw many benefits in pain.[44] Only months after the first surgical uses of ether, James Young Simpson, a Scottish obstetrics professor, began giving it routinely during childbirth (Duncum 1947, 176). Within a year, however, he had switched to chloroform. Decades of practical debate ensued over these two agents' relative merits and the proper ways to administer them, partly because of the mounting toll of chloroform

[39] O'Brien and Cefalo (1996) describe these mechanisms as "changes in position of the fetal head during passage through the birth canal. Because of the asymmetry of the shape of both the fetal head and the maternal bony pelvis, such rotations are required for the average size fetus to accomplish passage through the birth canal." The classical stages are (1) engagement, (2) descent, (3) flexion, (4) internal rotation, (5) extension, (6) external rotation, and (7) expulsion (1996, 372–3).

[40] For some data on intensity of pain and its relation to training, see Melzack et al. (1981, 357). A scholarly review of labor pain is Lowe (2002).

[41] I thank Karen Rosenberg for anthropological information, as well as for the 110 % figure. For a lively evolutionary and comparative discussion of human childbirth, see Rosenberg and Trevathan (2001, 2002).

[42] Rosenberg and Trevathan (2001, 2002) note a beneficial effect of pain in discouraging women from the anatomically difficult task of giving birth alone, though they do not claim it evolved for this purpose. Psychoanalytic writers have seen labor pain as aiding the mother's emotional bonding with her baby. During the Victorian controversies, W. Tyler Smith, a prominent obstetrician, claimed a number of physiological benefits of pain in assisting labor – though he conceded that anesthetized women could give birth, or even be "ecstatic" (1847, 595).

[43] A very detailed account of the history of anesthesia is Duncum (1947). Poovey's chapter (1988, 24–50) also has a wealth of historical information, though thickly encrusted with feminist and postmodernist claptrap. One might expect a feminist writer to give some credit to pioneers in relieving women of agonizing pain. But since men always act from the worst motives, Poovey is unsparing in her criticism.

[44] Some quotations collected by Simpson (1849, 38) are as follows. In the opinion of the famous physiologist Magendie, "pain always has its usefulness." A Mr. Nunn says: "Pain should be considered as a healthy indication, and as an essential concomitant with surgical operations, and … it is amply compensated by the effects it produces on the system, as the natural incentive to reparative action." A Dr. Pickford believes that "pain during operations is, in the majority of cases, even desirable, and its prevention or annihilation is, for the most part, hazardous to the patient." Simpson (39) calls these views "eccentric" since both doctors and laymen had earlier agreed unanimously with Galen: *Dolor dolentibus inutilis est* (pain is useless to the pained).

deaths. Our concern, however, is only with one of the several purely moral objections to obstetrical anesthesia in general. And it is amusing how quickly these were overcome, partly by a royal example.

> By the middle of the year 1848 the practice of administering an anaesthetic during labour was well established. In 1850, discreet enquiries on behalf of Queen Victoria herself about chloroform anesthesia were made of John Snow, before the birth of Prince Arthur. Three years later, in April 1853, the seal of perfect propriety was set upon it when Snow was summoned to give chloroform to Her Majesty during the birth of Prince Leopold. (Duncum 1947, 177–78)[45]

The most vigorous defender of obstetrical anesthesia was Simpson himself. In one chapter (Part II, ch. III) of his 1849 book, he rebuts two major objections to it besides its alleged risks. One was the "religious objection": that God himself, in *Genesis*, cursed women with labor pain as punishment for Eve's sin. Simpson's demolition of this argument is a joy to behold, but irrelevant to our topic.[46] Highly relevant, however, is what Simpson describes as the main moral objection:

> The principal moral "objection," as it has been termed, against the employment of anaesthesia in midwifery, amounts to the often-repeated allegation, that it is "unnatural." "Parturition," it is avowed, is a "natural function," the pain attendant upon it is a "physiological pain" (Dr. Meigs), and it is argued that it is impossible "to intermeddle with a natural function;" and to use anaesthetics is a piece of "unnecessary interference with the providentially arranged process of healthy labour" (Dr. Ashwell). The above is, perhaps, the most general and approved of all the objections entertained and urged at this moment against the practice of anaesthesia in midwifery. But it certainly is a very untenable objection; for, if it were urged against any of our similar interferences with the other physiological functions of the body (every one of which is as "providentially arranged" as the function of parturition), then the present state of society would require to be altogether changed and revolutionized. For the fact is, that almost all the habits and practices of civilized life are as "unnatural," and as direct interferences with our various "providentially arranged" functions, as the exhibition of anaesthetics during labour (182–3).

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[45] Victoria also took chloroform for her last baby, Princess Beatrice, in 1857 (21).

[46] In brief, Simpson argues that (1) in Eve's curse ("In sorrow thou shalt bring forth children"), the Hebrew word *etzebh*, translated in Victorian Bibles as "sorrow," actually means work or effort throughout the Old Testament, which uses other words for pain (*hhil, hhebel*); (2) anesthesia blocks only the pain of labor, not the muscular effort; (3) in the same passage Adam too is cursed, with arduous farming and eating, yet no one makes religious objections to farm implements, draft animals, and cooking; (4) Jesus died for our sins, including original sin; and (5) God himself was the first anesthetist, when he put Adam to sleep to extract a rib to make Eve. Simpson also recalls religious objections to previous medical discoveries like vaccination.

The fourth objection in his 1849 list was that it is always wrong to destroy consciousness. Simpson replies that no one considers it immoral deliberately to go back to sleep.

W. Tyler Smith and others vocally made one more criticism to which Simpson later replied: that anesthesia during birth evokes signs of sexual arousal in women, like those seen in animals (Poovey 1988, 30–33, 38*ff*). Smith suggested that labor pain has the natural benefit of "neutraliz[ing]" any such "sexual emotions" aroused by birth, and he believed that Englishwomen would prefer even the worst pain to exhibiting lewd behavior (31). As for Simpson, he denied having ever seen such a phenomenon, saying that the sexual excitement was probably "in the minds of the practitioners" (33).

As examples, Simpson cites walking with shoes, riding on horseback or in carriages, and cooking food.

Simpson here replies to an unnaturalness objection which, for some of his critics, is not based purely in medical ethics nor free of religion, just as one would expect a decade before Darwin. But one critic he mentions, the American physician Charles D. Meigs, had clearly stated our topic thesis: that medicine should never treat normal conditions.

> (…) I have been accustomed to look upon the sensation of pain in labour as a physiological relative of the power or force; and (…) I have always regarded a labour-pain as a most desirable, salutary, and conservative manifestation of life-force.
>
> (…) There is no reasonable therapia of health. Hygieinical [*sic*] processes are good and valid. The sick need a physician, not they that are well. To be in natural labour is the culminating point of the female somatic forces. There is, in natural labour, no element of disease – and, therefore, the good old writers have said nothing truer nor wiser than their old saying, that "*a meddlesome midwifery is bad.*" (Meigs 1848)[47]

Actually, even Meigs's objections are more practical than moral. He calls a "therapia of health" unreasonable and unnecessary, not unethical. And in other passages he emphasizes both the danger of chloroform and the diagnostic value of labor pain to the obstetrician.

At one point in Simpson's long reply (1849, 230–48), he addresses Meigs' claim that labor pain is "physiological."

> Now (…) I entirely doubt if we should look upon the severe sensations of pain endured by our patients as truly "physiological," for, as I have just stated, they are *not* essential to the mechanism and completion of the process in the white races of mankind, and they are absent, to a great degree, in the black. The severity of them could, I think, be easily proved to be the result of civilization, and, as I believe, of that increased size of the infantile head which results from civilization. Parturition is always physiological in its object, but not in some of the phenomena and peculiarities which attend upon it in civilized life.
>
> But, waiving this point, or the discussion of it, let me state, that even if I allowed all the intense pains of parturition to be "physiological pains," I cannot conceive that to be any adequate reason for us not relieving women from the endurance of them. Because nature has fashioned any particular physiological function in any particular manner, that, I opine, is no reason why the science and art of civilized life should not, when possible, alter and amend its workings. (1849, 235)

Simpson has three points in this passage. First, labor pain is not truly physiological since, in anesthetized patients, childbirth can easily occur without it. Here he seems to use 'physiological' in an unusual way: not as a synonym for 'normal', as Meigs seems to intend it, but rather as meaning "essential to a physiological function." Second, Simpson comes close to calling labor pain pathological in his remarks on childbirth by primitive women, who, "if we may believe various authorities," suffer much less pain or none (234). He thinks that "woman in a

[47] Another critic who, like Meigs, calls labor pain "physiological" is Robert Barnes, in contrasting surgical with obstetrical anesthesia: "The pathological pain of surgical operations is not to be compared, in its effects, to the physiological pain inherent to parturition" (1847, 678). I would emphasize, however, that pain in surgery is normal, not pathological. The surgical wound is pathology; the pain reaction to it is a normal defense mechanism.

savage state, (…) where she enjoys a kind of natural anaesthesia during labour" (186), "more truly shows us the true method and types of nature, than the female in a civilized state" (185). But he stops short of calling the supposedly larger heads of civilized babies pathology, which would be an odd claim indeed. Third, Simpson is clear that even if labor pains are physiological, that is no reason not to relieve them if we can. He proceeds to argue this general point to Meigs at length, using his favorite examples of civilized improvements on natural functions, such as clothes, horseback riding, and trains.

Thus, the acceptance of obstetrical anesthesia rested on no claim by its pioneers that labor pain is pathological. On the contrary: against critics like Meigs, Simpson is adamant that medical treatment of normal conditions is proper. So Western medicine's rapid embrace of obstetrical anesthesia as ethical, a view unchallenged today, is a second firm historical rejection of any limitation of medicine to pathological conditions.

9.5 Goals of Medicine: A Better List

I shall now offer a more comprehensive list of medical goals, embracing everything in our previous lists, and more besides. But to emphasize the most important conceptual boundaries, I merge some of our previous writers' goals. Like them, I count only goals in the medical care of individual patients. Other kinds of medicine or applications of medical knowledge are excluded. Thus, we will continue to ignore experimental research, public health, forensic medicine, and so on, though, as noted in 9.1, such activities by doctors could also be considered part of medicine. Adding two new cognitive goals to Miller and Brody's example of diagnosis, I separate the goal list into two parts: benefit to patients and scientific knowledge. Otherwise, besides changing their term 'disease or injury' to 'pathological condition', I make only one significant change. But that one destroys the crucial part of the list.

Goals of Benefit to the Patient

I. Preventing pathological conditions
II. Reducing the severity of pathological conditions
III. Ameliorating the effects of pathological conditions
IV. Using biomedical knowledge or technology in the best interests of the patient

Knowledge Goals

V. Discovering the diagnosis, etiology, and prognosis of the patient's disease, including its response to various treatments
VI. Gaining scientific knowledge about the patient's disease type and disease in general, including their response to various treatments
VII. Gaining scientific knowledge of normal body function.

Naturally, goal II includes total cure, partial cure, and slowing the progress of a disease, and could be so subdivided if one wished. The Hastings authors' "care,"

which includes Miller and Brody's goals 3 and 6, I have absorbed into III, as well as their 7, "death with dignity and peace." Reassuring the worried well I see as part of IV. Since goal V is required for Miller and Brody's 3 (helping the patient understand the disease), the list is not as independent as I would like. But since V may also be pursued for the sake of VI, I do not see how to fix this problem.

Goals VI and VII redress the curious omission, by other lists, of general scientific goals in medical treatment. I see no basis for this omission. From the beginning of medicine, whenever one supposes that to be, physicians have used evidence from patient care to construct theories of disease. Most knowledge of specific diseases and of disease in general is based on patient records, not on experimentation with humans or animals. Moreover, the desire to gain such scientific knowledge is a powerful motive for many physicians. And much of our knowledge of normal physiology came from doctors' observations of patients with abnormal conditions. The first understanding of digestion resulted from Dr. William Beaumont's study of a patient with an opening to his stomach. In neurology, virtually all initial knowledge of the localization of brain function came from physicians' cataloguing the effects of diverse head injuries. We could multiply these famous examples to establish a typical pattern: biological and medical science cooperate to understand normal function. Yet even the goal of disease knowledge is seldom mentioned in medical ethicists' lists, and knowledge of normal function virtually never is. Why? Are such goals thought illegitimate because they do not serve the interests of the patient? But one can easily pursue two goals in a single action. As long as a patient's service to medical research is of no or slight burden to him, to use his treatment, especially the records thereof, to serve two ends at once, one in his own interest and one in others', should not violate medical ethics. One may add a consent requirement if one likes, but the point remains. Purely scientific goals of medical care are not only acceptable, but basic to the history of medicine and biology.

Goal IV, using medical knowledge or technology in the patient's interest, is supported by our many examples in 9.1 and 9.4, such as obstetrical anesthesia, contraception, and cosmetic surgery. Since the last two of these remain controversial for Miller and Brody, one might think my evidence for goal IV slim. But even pain relief alone is a powerful case. It seems obvious that the morality of relieving pain cannot depend on whether the pain is due to disease or injury. In fact, since the pain of disease or injury is a normal reaction to it, one might expect a true purist about medical goals to condemn nontherapeutic pain relief as not true "healing." Yet no one takes this position. Surely the truth is that it is always permissible (except when it is inadvisable) to relieve undeserved pain.[48] And as long as doctors have a legal monopoly on the most efficient means of pain relief, it is they who must

[48] Miller, Brody, and Chung claim that "The central goal of relief of pain and suffering is confined to conditions that qualify as "maladies." … [I]t is not within the purview of physicians to attempt to relieve any and all pain and suffering that may afflict human beings" (2000, 354). But since, as we saw in 9.4, pregnancy for them is not a malady (356), this rule bars obstetrical anesthesia. Moreover, they offer no authority for the restriction of medicine to maladies except the Hastings Center panel, nor any definition of the term, since that panel's own definition of 'malady' covers pregnancy.

administer it. For them to do so in suitable circumstances is, I believe, not just permissible but obligatory, and regardless of whether the pain is from a normal or a pathological condition. Near the end of the movie *Braveheart*, Princess Isabelle visits William Wallace to offer him an analgesic against the pain of his execution the next day. In my opinion, a physician who could safely offer not just an analgesic, but a lethal poison, to a man who he knew would soon be tortured to death, yet failed to do so, would be a moral monster. The best that one could say for such a doctor is that he was struck blind by a primitive, obtuse professional ethic.

Also, the example of obstetrical anesthesia generalizes in another way. A great deal else in obstetricians' work is not treatment of any pathological condition either. An obstetrician is, of course, valuable in any pregnancy to watch for abnormality, and it is vital for one to be available during delivery for emergencies. But during a normal birth, the obstetrician's role combines the jobs of physician, midwife, and doula, with most emphasis on the latter two. Traditionally, a midwife gives advice and mechanical assistance with delivery, while a doula gives sympathy and encouragement. Yet no one finds it contrary to medical ethics for a physician to perform such functions during a normal birth.

Once we accept my goal IV, however, the patient-benefit part of the list collapses into one goal. For it is undisputed that the pursuit of all the other goals is justified only when it is in the patient's interest. If one can cure a disease only by a treatment with even worse effects, or at an excessive cost of time or money to the patient, everyone agrees that such a cure is wrong.[49] There is no medical imperative to eliminate all pathological conditions at any cost. The same limit applies even to diagnosis, as we have recently found out for prostate cancer. While PSA screening reveals a lot of early, otherwise undetectable prostate cancers, it is at the cost of a painful biopsy, followed, for many of those with cancer, by the choice between probably unnecessary and often damaging treatments, on the one hand, and many years of life-destroying dread on the other. Hence it is no longer recommended. Even the goal of "helping the patient to understand the disease" is limited to whatever understanding fits his or her interest. One can hardly send every diabetic to lectures on pancreatic hormones and their receptors. Indeed, the limitation to action in the patient's interest is not unique to medicine: it also restricts every other profession, such as law or investment management, that includes a fiduciary duty to clients. So goal IV in fact subsumes all other noncognitive goals on anyone's list.[50]

[49] Miller and Brody (2001, 583) view this limitation as part of physicians' duties, not the goals of medicine.

[50] Bengt Brülde seems to reach a similar conclusion, in an essay (2001) that I discovered too late to include in 9.3. I am puzzled by his claim that his seven goals of medicine (5–6) are "irreducible" to one another (1,5,8), since five of them are only "instrumental" (6) to the "final" two: "a long life and a good life" (7). Then it would seem that those five can be eliminated, as he earlier suggested about the goal of health for just that reason (4). Moreover, since a long life is valuable only insofar as it is also good (9), Brülde seems in the end to be left with only one goal of medicine: total well-being, or my goal IV. He does not use his framework to draw conclusions about controversial practices, such as VAE or enhancements.

9.6 Physicians Unbound?

If so, then only three positions seem to be tenable. One is to retreat, and reject as unethical all our examples of physicians' justified treatment of normal conditions. The second is to endorse these examples as ethical acts by physicians, but not medicine since not directed at health. The third is to accept them as medicine, embracing an IMM containing, on the patient side, only the single goal of using biomedical knowledge and technology for patients' benefit. The first option, as we saw in 9.4, sharply rejects medical history. If we do not wish a revolution in medical ethics, then we must choose between the second and third options. But this choice cannot affect controversial medical practices such as VAE or biomedical enhancement. For such practices, if they are in patients' best interests, will either be genuine medicine, or something besides medicine that physicians can permissibly do – in either case acceptable.[51] So all objections to such practices based on IMM collapse, and we are left only with objections based on general external morality.

Apart from any internal ban on physicians killing, which can obviously conflict with their duty to relieve suffering, the case against PAS or VAE rests mainly on a general ethical doctrine, basic to Catholic ethics, that forbids intentionally killing innocent human beings. Besides the argument from this disputed moral principle, many writers argue that PAS and VAE are too liable to abuse to be allowed by law. This kind of argument is relevant to law, but cannot show such practices immoral in themselves, except insofar as it shows that physicians cannot reasonably rely on their own judgment about cases.

As for enhancement – the use of biomedical technology to improve people in ways other than eliminating disease – as Wilkinson (2010) notes, it comes in two different kinds. One kind merely raises an individual's level for a given function within the human range, as when disease-free short children are given growth hormone. A stronger kind of enhancement gives a person superhuman powers, like the Bionic Woman's. Especially regarding the second kind, a host of moral objections have been raised. Much attention has been given to Sandel's complaint (2007) that the pursuit of enhancement shows an unseemly desire for perfection, inconsistent with a proper appreciation of life as a gift. Other writers express concerns about the effects of enhancements on inequality. Buchanan (2011, 21) finds six other main types of objections. If replies to these objections by Buchanan and others succeed, then external morality does not forbid enhancement to the ethical physician. I have argued that no internal morality can do so either. In that case, there is no good theoretical reason against enhancement.

Thus, it may seem that, starting with what some view as an ultraconservative view of health, I reach an ultrapermissive view of medical treatment. This impression is unjustified, for two reasons. First is a practical caveat. In the near term, I am

[51] Actually, for any medical practices requested by patients in their interest, there are two views worth distinguishing: that they are (1) permissible, or (2) obligatory, to the ethical physician. As to enhancements, like most of the literature, I concentrate on (1), but my arguments for it may support (2) just as strongly. I thank Jodi Arias for calling my attention to the distinction in this area.

deeply skeptical of the value of proposed enhancements. I suspect that for a long time, feasible genuine enhancements will be few. Start with the general excellence of biological designs, coupled with our limited knowledge even of normal physiology, let alone of genetics and the neural basis of psychology, about which we are massively ignorant. Besides these points, the history of medicine and surgery also makes me doubt that doctors will soon be able to be trusted to improve on normality. Unnecessary surgeries like tonsillectomy have enjoyed near-universal popularity. Enhancements are most likely to be done first by pioneering enthusiasts. But many of these pioneers will turn out like the Victorian surgeons William Arbuthnot Lane and Isaac Baker Brown, who likewise preached the benefit of improving humanity by removing normal organs – colon and clitoris, respectively (Comfort 1967). Even today there are obvious treatment fads, like the grotesque overprescription of psychiatric drugs for normal conditions like boyhood, or Szasz's "problems in living." Far too many contemporary physicians continue to drug immature or credulous patients or castrate or mutilate psychotic ones. All of these treatments are harmful, which leads to the second point. My argument leaves intact two canons of medical ethics: the duty of doctors not to harm their patients, and their duty to use their own judgment in deciding what is harm.[52] So, if I am right that, in the near future, almost nothing billed as an enhancement will actually be one, an ethical physician will have little of the sort to perform or prescribe. Rather, for some time, I expect the benefit of enhancements to be dwarfed by that of the familiar medicine of normality promotion.[53]

[52] These duties are not limited to medicine. In all fiduciary relationships, as opposed to "arm's-length" transactions, the professional has a moral and legal duty to act in the client's interest, consistently with his own best judgment. Thus, if the client demands an action that the professional is sure will damage him – a terrible investment, the amputation of two healthy legs – he must refuse. As Miller and Brody say in the medical case: "The physician is an independent moral agent, committed to the internal morality of medicine, not a tool at the command of the autonomous patient" (1995, 14).

To forestall confusion: I have argued in unpublished work that there is no such thing as pure exploitation, *i.e.*, exploitation without deception or coercion. All consensual, mutually beneficial exchanges are moral. As for a consensual exchange in which A harms B, a libertarian may say that A cannot suffer legal punishment for it. But political libertarianism still allows moral condemnation of A for profiting by hurting others, even with their consent. And that is uncontroversially wrong in a fiduciary relationship.

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Chapter 10
From "Better than Well" to "More than Human"

Jean-Yves Goffi

Abstract The enhancement medicine problem has been well documented. But the transhumanist utopia considers the possibility and desirability of something beyond enhancement: radical enhancement. The aim of radical enhancement is to transcend natural evolution as implemented by a rather inefficient Mother Nature. This paper will recall the arguments of the transhumanists and their foes, focusing on three points: philosophy of technology, philosophy of mind and the concept of health.

Keywords Transhumanism • Posthumanism • Bio-conservatism • Health • Enhancement

10.1 Introduction

John Harris finds fault with the definition of disease allegedly proposed by Christopher Boorse and Norman Daniels, according to which disease is "a departure from normal species functioning or species-typical functioning" (Harris 2007, 44). As Harris sees it, those who hold such a definition cannot give a proper account of the difference between treating a disease, which is repairing a dysfunction, and enhancing a function. They take it to be a difference between two types of action, which Harris thinks is not the case. His argument runs as follows: on the view attributed to Boorse and Daniels, diseases are put on the same footing as enhancement, as they both consist in a departure from species-typical functioning. But in fact "most of what passes for therapy is an enhancement for the individual relative to her state prior to therapy" (Harris 2007, 44). This underscoring of the relative character of the Therapy-Enhancement distinction has sweeping consequences: the same treatment may be a therapy in some particular circumstances or an enhancement in other circumstances. For example, regenerative stem cell treatments would count as therapy for people with brain damage; but the same treatment would be an

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enhancement for people with an undamaged brain. There is no normative relation, nor any conceptual tie between treatment, on the one hand, and species-typical functioning, on the other. Departure from species-typical functioning is neither a necessary, nor a sufficient condition for treatment. Let us suppose that we are able to switch off the aging process in cells and to regenerate tissues, using stem cell therapy: then we would be able to treat most of the diseases of old age and we would live much more longer than what is species-typical for us now. But such an intervention would not count as a therapy according to the followers of Boorse and Daniels, because the diseases of old age are species typical.[1] The followers of Boorse and Daniels are bound to consider it as enhancing only; but in fact, such an intervention in our natural process would be both therapeutic (we would cure diseases of old age) and enhancing (we would live much longer and in a much better condition than we do now).

The point, of course, is that the Enhancement-Therapy distinction does not depend at all upon a conception of normalcy. We usually speak of therapy when we want a treatment to avoid harm, bodily or other. But we can avoid harm by enhancing a function. And normalcy is a useless concept if one wants to define harm: we do not consult a doctor because we suspect that some function of ours no longer matches the species standard for our group or reference. We consult a doctor because we are unusually tired or because we have swollen feet after our working day or because we cough and have a sore throat or because we feel dizzy or because we have difficulties with hearing or seeing. So, normalcy plays no part in the distinction between therapy (supposedly aiming to restore a function to its normal level) and enhancement (aiming to reach beyond this normal level). I think that Harris' argument is important, indeed. I also wish to underscore that he does not say, like many others, that a BST inspired definition of health and disease is useless to physicians. He rather claims that it supports a distinction (between treating and enhancing) where there is no difference indeed (because every treatment is *ipso facto* an enhancement, it is not possible to set apart treating and enhancing). Yet some ambiguity remains about its target and significance. I shall not deal with the target as Boorse himself has clearly stated that "doctors are sometimes justified in serving other values than health" although "we must simply bear in mind that their nontherapeutic efforts are usually more controversial than their therapeutic ones" (Boorse 1997, 98; also Boorse, Chap. 9, in this volume). That means that John Harris has rather pointed out the weaknesses of a possible use of a Boorse's inspired definition of health and disease rather than to weaknesses in the definition itself. But one can also suggest that the conclusion drawn by Harris, namely that "there is an overwhelming moral imperative for both therapy and enhancement […] to prevent harm and confer benefice" (Harris 2007, 58), may be disputed.

Harris has shown that most treatments have an enhancing effect, so that one cannot say that treatment and therapy are the same; as a consequence, one cannot draw a clear and precise line between treatment (supposed to bring therapeutic benefits

[1] "It is species typical and a part of normal functioning that we cease to function in old age and that we die" (Harris 2007, 45).

only) and enhancement (supposed to confer more than therapeutic benefits). But one could still hold that even if most therapies have enhancing effects, an enhancement sought for its own sake is still morally dubious. In other words, one can admit that medicine cannot reach its goal to restore health without, at the same time, having the side effect of enhancing functions, and still hold that merely enhancing functions when health is not restored is a "dubious end" if not an "ignoble purpose" (Kass 2003, 24 & 9). Leon Kass too is skeptical about the Therapy-Enhancement distinction; he thinks that it obscures the proper question: "What are the bad and good uses of biotechnological power?" (Kass 2003, 13). But having proposed this reasonable question, he adds:

> "[…] it is worth noting that attempts to alter our nature through biotechnology are different from […] medicine […]. It seems to me that we can more-or-less distinguish the pursuit of bodily and psychic perfection from the regular practice of medicine. To do so, we need to see that it is not true, as some allege, that medicine itself is a form of mastery of nature. When it functions to restore from deviation and deficiency some natural wholeness of the patient, medicine acts as servant and aid to nature's own powers of self-healing" (Kass 2003, 18–19).

It is surprising to find such a judgment in an author who thinks that the Therapy-Enhancement distinction is inadequate for moral analysis, because the distinction between the regular practice of medicine and the pursuit of bodily and psychic perfection seems more or less to duplicate the Therapy-Enhancement distinction. In fact, by setting apart medicine from biotechnological power, Kass probably wants to underscore the difference between those biotechnologies "whose aims are continuous with the aims of modern medicine and psychiatry" (Kass 2003, 11) and those whose goals have nothing to do with them. In other words, because there are objective goals of medicine, there are also internal limits to the practice of medicine; the acknowledgement of these goals and limits is the condition for building a proper internal morality of medicine, which excludes enhancement sought for its own sake.[2]

It is only on the surface that the debate between Kass and Harris is about a proper definition of health, or about the goals or internal morality of medicine. This is obvious if one takes into account Harris' considerations about transhumanism (Harris 2007, 38–39). He rightly claims that he has no transhumanist program or agenda himself; but he wants to show that there are overwhelming moral reasons for enhancing our capacities, our health and our lives. If the consequences of such an enhancing are that we become transhumans, so much the better: "It is difficult, for me at least, to see any powerful principled reason to remain human if we can create creatures, or evolve into creatures, fundamentally "better" than ourselves" (Harris

[2] Though the two issues are obviously related, the question of the goals (and limits) of medicine is conceptually different from the question of the internal morality of medicine. One could avoid any reference to the end(s) of medicine and nevertheless figure out a morality of medicine (for example, by assuming that the physician-patient relation is simply an instance of a contractual relation). Recently, they have been dealt with in different editorial and institutional contexts. See, for example, Hanson and Callahan (1999) and Nordenfelt and Tengland (1996) for the goals and limits of medicine issue; and Arras (2001), Beauchamp (2001), Miller and Brody (2001), Pellegrino (2001), Veatch (2001) for a discussion of the internal morality of medicine.

2007, 40). If we want to appreciate the enhancement issue, we should rather turn to an evaluation of the transhumanist program, that is, to an appraisal of a radical enhancement program. As long as we stick to a piecemeal approach of enhancing this or that function or this or that capability, we shall miss what is actually at stake in the debate.

10.2 The Transhumanists: Where Do they Belong?

First, I shall try to answer the question: where do the tranhumanists want to lead us? The September-October 2004 issue of the magazine *Foreign Policy* featured a special report entitled "The world's most dangerous ideas". Eight prominent intellectuals were asked to name the idea which, in their opinion, would be the most destructive in the years to come. In a post 9/11 context, some answers were rather predictable: Fareed Zacharia, for one, rated first hatred of America; Martha Nussbaum, religious intolerance; Robert Wright the war on Evil; Eric Hobsbawn spreading democracy. Some were much less expected, such as the one proposed by Francis Fukuyama. Fukuyama thought that transhumanism was the idea that would pose the greatest threat to the welfare of humanity. He saw transhumanism as the ultimate liberation movement. But it was a very peculiar liberation movement. The liberation movements of the twentieth century were premised on a rejection of colonialism or imperialism; of discriminations (racism, sexism, speciesim); of social injustice or patriarchal society at large. The intention – if seldom the actual practice – of the leaders of these movements was to free colonized people from their (mostly European) masters; poor people, black people, women or animals from prejudice and oppression; and so on. But transhumanism was the most radical of all, as it was supposed to liberate the human race from its biological constraints.

Some words of explanation are needed here. The condition of the human body is not always optimal: tiredness, diseases and aging come immediately to mind; it is also obvious that human intellectual and sensory performances are not always satisfactory: there are many things people do not generally understand – quantum mechanics or fuzzy logic; there are many things they too easily forget – appointments or important data; there are many things they do not even perceive: ultrasonics, ultraviolet or infrared rays; there are many moods, emotions and feelings they do not control: hostility and love directed towards the wrong people, depression, and so on; their life-span is rather limited, and so on. All these facts are generally accepted as part of the human nature. True, we can mitigate their worst effects, but only within rather restricted limits. Thanks to medicine, to hygiene, to philosophy (a kind of medicine of the soul), to technological devices, to religious beliefs and to the practice of virtues, we can alleviate certain aspects of the human condition. But we cannot avoid being, so to speak, embedded in this human condition which is supposed to continue indefinitely. That means that all the aforementioned imperfections are not, actually, limitations; rather they make up the frame for a common experience: the experience of being human. Nietzsche, for example, argues that it is

impossible to lead a human life without forgetting, unlike the happy animal which adheres to the present moment (Nietzsche 1874). Some go as far as saying that these imperfections are not only a burden, but also a blessing (Jonas 1992). This is precisely the kind of discourse the transhumanists reject. They argue that these imperfections are actually limitations, to be removed once and for all by the new biotechnologies – and the sooner the better. In short, they wish to liberate the human race from its biological constraints. Such liberated entities would be posthumans: having benefited from such a radical enhancement, they would no longer be truly human.

Here, a word of caution is necessary: some people[3] use the word "posthuman" to denote a postmodern condition in which the basic beliefs of traditional humanism are no longer tenable. It is not easy to understand what is meant by "traditional humanism", but let us briefly say that it is a view of human beings (or humankind) as constituting an island of freedom and rationality (both theoretical and practical) in a sea of determinism and unreason; this latter situation is supposedly the hallmark of the animals and the machines. So, in order to refer to the post-modern blurring of the frontiers between animals, artifacts – especially machines – and human beings, the term "posthuman" is often employed. Someone who no longer believes in the values of humanism, because of this blurring, is a posthuman, or maybe a posthumanist. Those who put the word "posthuman" to such use do not generally claim to be themselves transhumanists; quite the contrary, they reject in the strongest terms such a program (e.g. Marchesini 2002, 510–538). To sum up, they use the word "posthuman" simply as a *metaphor* about our present condition, not as a *prediction* about a more or less remote future.[4] I shall not focus on their arguments and views; rather, I shall be interested in the arguments and views of those who want to reach a posthuman condition in the future and hope technology will allow the fulfillment of this dream. To summarize: we can understand "posthumanism" as meaning either "after humanism" (a sense retained by postmodern thinkers) or "after human beings or humankind" (a sense retained by transhumanists). Now that we know what the aim of the transhumanists is, I shall ask: "Where are the transhumanists standing on the political spectrum ?". In other words: what kind of political agenda are we dealing with? Transhumanist writings are often rather marginal: they are seldom written by bioethicists and even less by philosophers. How, then, can one get one's bearings? I suggest[5] a classification be made according to the familiar political distinction between conservatives and progressives. Usually, one can be a conservative or a progressive on economical or cultural issues. Economic conservatives (EC) support free enterprise, dislike welfare state and trade unions and they consider economic justice as adequately carried out by free-market mechanisms. Economic progressives (EP) favour redistribution, taxation and do not believe that justice is carried out by the "invisible hand". Cultural conservatives (CC) adhere to traditional

[3] Among many: Besnier (2009); R. Marchesini (2002).

[4] The metaphor/prediction difference is very nicely expressed in Graham 2002, 15–16.

[5] After Hughes (2004). James Hughes is himself a transhumanist, … and a Buddhist monk! He borrows these concepts and their interpretation from Maddox and Lilie (1984).

values as embodied in national communities and usually expressed by religious beliefs; they distrust individual liberties, which are considered destructive of the social order. Cultural Progressives (CP) are secular and cosmopolitan; they support individual and minority rights (for example, they favor sexual liberty, a disgusting promiscuity according to their CC foes). So we have the following combinations:

EC + CC = New Right;
EC + CP = Libertarians;
EP + CC = Populists;
EP + CP = Social Democrats.[6]

James Hughes wants to extend these categories to biopolitics. By "biopolitics", he does not mean – *à la* Michel Foucault – the style of Government that is most concerned with acting on populations by regulating mortality. Rather, he means a spectrum reflecting diverse positions towards the social and political consequences of the so called "biotech revolution". Biopolitical Conservatives (BC) distrust biotechnologies and wish to implement strong restrictions on their use and even on their development. Sometimes, but not always, this attitude is tied to a stance of defiance towards technology in general. Biopolitical progressives (BP), far from expressing this kind of technophobia are much more in favor of technological interventionism. They consider that, far from jeopardizing values, technologies and especially biotechnologies open new fields for new values. The important point is that one can be a conservative or a progressive in any of the three issues: economical, cultural, biopolitical, so that there are eight possible combinations between the different criteria. Some denote only very remote theoretical possibilities so only the following five will be considered:

EC + CC + BC = hard bioconservatives
EP + CP + BC = democratic bioconservatives
EC + CP + BP = libertarians transhumanists
EP + CP + BP = democratic transhumanists
EP + CC + BC = bioLuddites[7]

To end with, let us now proceed to details: by what means do the transhumanists wish to carry out their program? There is a well known definition of transhumanism by Max More (2009):

> Transhumanism is both a reason-based philosophy and a cultural movement that affirms the possibility and desirability of fundamentally improving the human condition by means of science and technology. Transhumanists seek the continuation and acceleration of the evolution of intelligent life beyond its currently human form and human limitations by means of science and technology, guided by life-promoting principles and values.

[6] These categories are not necessarily in line with common usage; this point will not be developed here.

[7] This is the terminology coined by Hughes and it is obviously value-laden and perhaps not fully adequate. One should take it as a crude color chart, omitting many fine shades, rather than a crystal-clear picture of reality.

This typically is the kind of definition which needs to be fleshed out. First of all, where does the word "transhumanism" come from? The term seems to have been coined by Julian Huxley (Huxley 1957, 13–17).[8] Like his fellow countryman Herbert Spencer the century before, Huxley held that biological evolution leads somewhere. He sees evolution as "a self-operating, self transforming process which in its course generates both greater variety and higher levels of organisation" (Huxley 1957, 43). This process features three phases or sub-processes: the inorganic or cosmological; the organic or biological; the human or psychosocial. According to Huxley, in the human phase the universe is becoming conscious of itself: man has been, so to speak, appointed managing director of the business of evolution. Transhumanism is the expression of this new responsibility and credo: "man remaining man, but transcending himself by realizing new possibilities of and for his human nature" (Huxley 1957, 17). Of course, this formula is not a model in clarity; nevertheless, the important point is that in the Huxlean version of transhumanism, man remains man. Man-made evolution is but a continuation of natural evolution and the transcendence he alludes to is realized mainly by cultural means. To quote him at length:

> Natural selection, as operative in biological evolution, depending on the differential survival of types with different genetic endowment, has ceased to be of major importance. It still operates, but in a quite subsidiary way, and it is no longer the prime agency of change. The prime method of change is now change in cultural traditions. (Huxley 1957, 30)

As one can see, Huxley seems to admit that an access to new modes of existence will permit "the full humanization of man" (Huxley 1957, 88). Of course, the human species to come will be as different from ours as ours is from that of the Pekin man. But it is only a matter of succession of generations within the same family.

Contemporary transhumanists are much more radical: they are ready to jettison our evolutionary past and when they use the term "transhumanism", it is supposed to mean "transitional human(s)". Max More, for one, wrote a notorious letter to Mother Nature (Max More 2013). He blames her for having lost interest in further human evolution 100,000 years ago. He then suggests a set of 7 Amendments designed to move individuals from a human to an "ultrahuman" condition. Simon Young hammers out formulas such as: "we have existed in a condition of biological servitude – slaves to our selfish genes – for too long. It is time to free ourselves from enforced subjugation" (Young 2006, p. 17). David Pearce characterizes the aim of his own version of transhumanism as "freeing ourselves from the nightmarish legacy of our evolutionary past" (Pearce 1995, Introduction 03). So, the motto and trademark of contemporary transhumanism is: "Natural evolution is hell!". Or as Young says in a striking formula: "Man is not born free, but everywhere in biological chains. People of the world, unite. You have nothing to lose but your biological chains" (Young 2006, 32).[9]

[8] I do not intend here to give a history of the transhumanist/posthumanist movement. One can consult C. Christopher Hook (2003) for such a short history. Those who read French read will find very useful, Marina Maestrutti (2011, 184–229).

[9] Of course, the first part of the formula is a parody of Jean-Jacques Rousseau's *Second Discourse*; the second part is a parody of the last sentences of the *Communist Party Manifesto.*

Once admitted that our evolutionary past has to be transcended, what will the ultrahuman or posthuman condition look like? With a view to answering this question, let us consider Max More's amendments[10]: the tyranny of death and aging will not be tolerated anymore; perceptual range will be expanded and will exceed the perceptual abilities of any other creatures; neural organization and capacity will be improved, intelligence and memory will be enhanced; the neocortex will be supplemented by a "metabrain"; mastery over biological and neurological processes will be achieved and individual and species defaults left over by natural selection will be fixed; primitive emotions will be reshaped so that rational self-correction rather than irrational taboos will regulate human conduct; people shall integrate their advancing technologies into their bodies: posthumans will have a silicon based organism as well as carbon based organism.

At this point, two comments are in order. More dreams of posthuman perceptual abilities exceeding those of any other creature. Taken literally, that means not only that present human abilities will be enhanced: posthumans will have a better sight than the proverbial eagle. That means also that new abilities will be added, then enhanced: posthumans will use a wider and more efficient variety of ultrasonic ranging than bats. But that implies, of course, that echolocation devices will have to be inserted, either permanently or temporarily in posthuman organisms to begin with. Some transhumanists hold a still bolder argument which goes, so to speak, the other way round: instead of a bodily incorporation of technologies they dream of an technological externalization of the mind. They think that some day it may be possible to transfer a human mind from its brain into some new substrate: a new body or, more generally, a supercomputer. This transfer is called "uploading" (or "downloading", or "brain reconstruction"). Many details are given (Humanity +, "What is uploading?"). The tranhumanists broadly describe some procedures for uploading: scanning the synaptic structure of a brain, then implementing the same computations in an electronic medium; or, alternatively, gradually replacing every neuron by an implant or by a simulation outside the body. They then survey some philosophical issues raised by these would be procedures. One is not surprised to discover that these issues are about personal identity. They point that uploads (uploaded then enhanced minds) would not necessarily lead a disembodied life as they (plural of "she"? "he"? "it"?) could have a virtual simulated body giving the same sensations and the same possibilities as a non simulated body. They then list the advantages of being an upload: freedom from biological senescence; possibility of storing back-up copies so that the life span of an upload would potentially be infinite; freedom from many physical needs (thirst, hunger, rest); ability to think much faster than someone tied to her traditional body (and, thus, capacity to enjoy much more subjective time than a "wetware" or "carbon" person)"; ability to travel

[10] Max More is much more typical in this respect than, for example, David Pearce. As Pearce sees it, the post-evolutionary condition will be one in which aversive experiences and states of mind are completely eradicated from the surface of the earth. It is a radical negative utilitarianism program.

at the speed of light as an information pattern; radical cognitive enhancement by upgrading the software and hardware of the host supercomputer.

Two questions arise: by what means will such promises from the future be kept? According to what sociopolitical principles, if any, are we to become transhumans, then posthumans? As for the first question, let us only mention the answer given by Young: "Superbiology" (Young 2006, 394).[11] According to Young, superbiology is an umbrella term denoting the emerging biotechnological methods of curing diseases, enhancing abilities, and extending life. It includes neuropharmacology, gene therapy and gene enhancement, artificial implants – and especially computer implants and nanomedecine. Nanomedicine consists of the medical applications of nanotechnologies. It ranges from the medical use of nanomaterials (drug delivery, performing sutures in the field of surgery, etc.) to the medical applications of molecular nanotechnologies (cell repair machines, nanodevices designed to aim at specific treatment sites, etc.). Young is especially sanguine about Superbiology: he thinks we shall reap many benefits over the course of the twenty-first century. But even the more pessimistic of the transhumanists typically welcome this Baconian-Cartesian program of relieving Man's estate by technological means and rendering ourselves the lords and possessors of Nature. So, in parallel to superbiology, some favor becoming posthumans through Advanced Robotics (Kurzweil 2005; Moravec 1998). Usually, however, the two ways are conceived as converging, with the typical posthuman being enhanced both ways:

> Posthumans could be completely synthetic artificial intelligences, or they could be enhanced uploads [....] or they could be the result of making many smaller but cumulatively profound augmentations to a biological human. The latter would probably require either the redesign of the human organism using advanced nanotechnology or its radical enhancement using some combination of technologies such as genetic engineering, psychopharmacology, anti-aging therapies, neural interfaces, advanced information management tools, memory enhancing drugs, wearable computers, and cognitive techniques (Humanity +, "What is a posthuman?").

As for the second question, there is considerable disagreement among transhumanists themselves. In a typically Hayekian fashion, More contrasts spontaneous and constructed orders, concluding that spontaneous orders are vital to the Extropian principles of boundless expansion.[12] It is not surprising that he ranks the Free Market as a prominent example of spontaneous order. That means that he ranks himself among Libertarian transhumanists (EC + CP + BP). One can define libertarianism as a political doctrine which ranks the sovereignty of the individual above the requirements of any social order; according to Robert Nozick's memorable formula: "Individuals have rights and there are things no person or group may do to them (without violating their rights)". In a North-American context, the archi-libertarian is Ayn Rand who is best known for having developed an apology of unrestricted capitalism; she does not give consequentialist justifications of the Free Market Economy (efficiency, growth of population or welfare and so on). Rather, she

[11] The term "Superbiology" seems to have been coined by Gregory Stock (2003).

[12] Extropianism was an early version of the Transhumanist thought.

wishes to develop deontological justifications: capitalism is based on the recognition of basic individual rights so that force is banned in principle from social relationships; it is a society of voluntary and freely chosen relations where success depends on the objective values of individual work and rational recognition of this value; it is a system which emphasizes man's most valuable attribute: the creative mind. One can easily understand why the tranhumanists have sympathy for this kind of boundless affirmation of the individual.

Democratic transhumanists (EP+CP+BP) – like Nick Bostrom[13] and James Hughes – do not follow this radical stance: while admitting that humanity will be radically changed by technology in the future, they also call for the creation of a new social order where responsible decisions can be collectively taken and implemented. They do not believe, therefore, that the Free Market Economy is an efficient principle of justice for implementing transhumanist ideals.

10.3 Bioconservatives

"Bioconservative" is an umbrella term covering several types of opponents to the transhumanist program. I shall not for the time being take any particular stance in the debate. I will simply show the directions the bioconservative arguments lead to. Only in my concluding remarks shall I suggest that most of these arguments are powerless, the reason being that they criticize only minor points of the transhumanist program.

The first thing to notice is that one can rank "among bioconservatives" people who did not actually know this program but who have, so to say, anticipated it. As early as 1970, Paul Ramsey harshly criticized the proposals made by supporters of neo-eugenics (such as Hermann Joseph Muller), the science-fiction scenarios describing the future – and hoped for – reconstruction of man (such as that of Gerald Feinberg) and the writings of some theologians (such as the Episcopalian Joseph Fletcher and the Roman Catholic Karl Rahner, a Jesuit) whom he called "techno-theologians". According to Ramsey, they all dreamed of a complete, or at least accrued, genetic control of man and they were all blind to the fact that, in their hoped for reconstruction of humankind, what really was at stake was the humanity of man. At the very least, they were blind to the fact that the "debiologized procreation" – the term "procreation" being significantly replaced in their writings by the manufacturing term "reproduction" – they enthusiastically supported implied a drastic change in the nature of human parenthood.

More generally, Ramsey assessed the utopian dreams of his opponents as a well-meaning but all the more dangerous attempt to raise human beings above their natural condition. According to Ramsey, general refabrication of individuals, coupled

[13] In 1998, Nick Bostrom has been a founder of the World Transhumanist Association; This organization has changed its name and is currently known as humanity+ (cf. http://humanityplus.org/).

with a control of the future of man through genetic manipulation and an alteration of the nature and meaning of human parenthood are likely to bring out such radical changes in humankind that they "can only be described as the death of the species and its replacement by a species of life deemed more desirable. That I take to be similar to the inner motive and action of any suicide" (Ramsey 1970, 152). The mistake he sees as common to all his opponents is to believe that there can be ethics without ultimates; or better, that human will and thought are such ultimates, without paying attention to the fact that human beings are embodied persons: "an individual's body, including his sexual nature, belongs to him, to his *humanum*, his personhood and self-identity […] To suppose so is bound to prove antihuman – sooner than later" (Ramsey 1970, 87). His not unexpected conclusion is that trying to fabricate better individuals or a better humankind is a perfectly misguided use of medicine:

> Actions whose objective is treatment and actions whose objective is the control of the future of our species are different sorts of actions, even when descriptively they may look alike. (Ramsey 1970, 121)

In other words, it is a perversion of medicine that concern for the species replaces cure for the primary patient, the sick person.

We have here the key argument of the bioconservatives: it features two aspects. First, some "limitations" are constitutive of our[14] common humanity and it is a hubristic act of transgression to try to go beyond them (a kind of "Do not play God" argument). Second, there are legitimate and illegitimate aims of medicine: healing people is a legitimate aim; enhancing their performances is an illegitimate aim.

As for the limited medical end of restoring health, an interesting and subtle argument has been advanced by Michael Sandel.[15] This analysis does not succumb to the objection raised by Harris according to which therapy and enhancement cannot be distinguished in principle, as every therapy has enhancing effects. Let us suppose, as a matter of fact, that one says, more or less following Harris: if we have an obligation to heal a sick person, then we have, for the same reason – i.e. conferring a benefit on her – an obligation to enhance a healthy one. This assertion makes sense only if one accepts the utilitarian-consequentialist thesis that health is not a distinctive human good, but rather a mean of maximizing happiness or well-being. But, to quote Sandel:

> … it is a mistake to think of health in wholly instrumental terms, as a way of maximizing something else. Good health, like good character, is a constitutive element of human flourishing. Although more health is better than less, at least within a certain range, it is not the kind of good than that can be maximized. (Sandel 2007, 48)

[14] There is an interesting rhetorical use of the word "our" in many bioconservative writings. Does the term refer to the author and his actual readers? To the author and the whole community of his possible present and future readers? To the author and humankind at large, past present and future? One is not told.

[15] Michael Sandel's argument is limited to parental obligation to children. I expand it to cover obligation to heal or enhance in general.

Sandel can fully acknowledge that there is no radical difference between therapy and enhancement and still oppose enhancement sought for its own sake, because he holds that health is a value to be honoured rather than maximized (just like friendship, or love, or sense of humour, for example). Sandel is right in that probably too much is expected from "Superbiology" (genetic engineering and so on). But some transhumanist dreams (uploading minds *à la* Hans Moravec or *à la* Raymond Kurzweil) do not have much to do with medicine as such, but rather with advanced robotics even if the two are supposed to work together towards a transhumanist future.

In view of this, it could be interesting to look into the limitations-as-constitutive argument. The most clearly articulated view on the issue has probably been developed by Francis Fukuyama (2003). As he sees it, the issue comes under political philosophy; it has to do with the existence of rights as far as rights are endowed with greater moral significance than mere interests. Interests are flexible and can be traded off against one another: this is not the case for rights. So rights are part of the moral fabric of democratic societies; but the problem of their origin immediately arises. Fukuyama's position on this issue can be described as modern. Rights do not emanate from God, nor from Nature: they emanate from Man. But they are not freely created as a pure arbitrary construction. They are based on human nature. That does not mean that some people are, by nature, intended to rule and others to obey: quite the contrary. True to classical contractarianism, Fukuyama holds that people are naturally equal (this equality, based on human nature, being defined as follows: "the sum of the behavior and characteristics that are typical of the human species, arising from genetic rather than environmental factors" (Fukuyama 2003, 130). He admits, of course, that "typical" must not be understood in too rigid a way. But the important point is the stress he puts upon (invariable and universal) genetic factors rather than upon (variable and particular) environmental traits. It is because people have a common genetic endowment – and this implies, of course, a common set of genetic limitations – that they have a common nature and a common set of rights. Modifying this genetic endowment amounts to debasing the language of political rights. Between GenRich and Natural[16] families, there would exist a kind of inequality which would have nothing to do with the already all too obvious inequality between Rich and Poor. One can sum up Fukuyama's thesis by saying that he tries to develop a normative theory of human nature. This enterprise has difficulties of its own which I shall not address here.

What is more important in the present context is that the Fukuyama's position with respect to human enhancement shows a serious weakness. Let us suppose that there exists an opportunity to increase life expectancy of 50 years through bioengi-

[16]This distinction has been coined by the biologist and Princeton Professor Lee Silver (1997). According to a dystopia he imagines, in the twenty-fourth century, GenRich families will carry synthetic genes so that their members are genetically enhanced: they will be high-level athletes, artists, scientists (or more accurately: "members of the knowledge industry") and so on. Members of the Natural Families have kept their natural genetic endowment over generations; they constitute a lower class. The polarization between the two classes is such that all or most of their members cannot crossbreed anymore.

neering. If everybody can have access to this enhancement, the human characteristics arising from genetic factors will certainly have been drastically modified. But will our common nature have been jeopardized and will the normative strength of rights have been destroyed? Probably not. Certainly, many difficulties will arise: is there a risk of establishing a Gattaca-like society[17]? Is there a risk of a re-emergence of old fashioned eugenics? But if new possibilities and new limitations are, more or less, the same for everyone, then equal rights will be preserved in principle, although their content may vary.

As one can see, hard bioconservatives can be, in fact, more or less "hard": they can adopt a religious stance (like Ramsey) or a secular stance (like Fukuyama); they can call for a ban, for a moratorium, or for strict regulations. But while instantiating the formula EC + CC + BC, they all think there is something normative in human nature, either taken by itself, or taken as the image of something else.

Jürgen Habermas (2001) is interesting in this context, for he instantiates the formula EP + CP + BC. The interesting point is not that he is a progressive where the others are conservative; rather, it may be put as follows: he is a conservative in biopolitical issues while rejecting any substantial hypothesis about a normative human nature. In fact, as he sees it, modern societies have reached a point where no general agreement can be reached about the good life; the best which can be done is to reach a procedural agreement about the rules and principles of right conduct. In other words, in modern societies, fully rational and autonomous social actors cannot agree about values, although then can agree about norms. In a nutshell, these norms and principles are those which could be admitted in an ideal dialogical situation where everyone can express his/her claims from his/her own standpoint and articulate the reasons why these claims should be admitted. This constitutes a rather intricate exercise in balancing deontological and consequentialist considerations, but that is not the point. The point is that, according to Habermas, some genetic engineering so coolly considered by transhumanists would prevent someone to have a standpoint of his/her own. Lets us imagine a child "designed" by his/her parents to develop a particular ability (excellence at chess playing, for example). He/she will not be able to be autonomous in a full sense (someone else will be from the beginning in control of his/her life); what is more, he/she will be made according to some preexisting specification, not begotten with a chance to later become this or that. So Habermas concludes with the good old conservative argument according to which genetic engineering should be limited to clear cut therapeutic situations.[18]

[17] Gattaca is a 1997 film written and directed by Andrew Niccol. It presents a future society where children are conceived according to eugenics program. A Gattaca-like society is a society in which discriminations are based on varying forms of genetic modification.

[18] This conclusion raises difficulties: either diseases are natural evils, but that goes against the Habermasian thesis that modern people cannot agree about natural values and disvalues; or diseases are considered wrong by the ideal community of rational social actors, but no one can say in advance which conditions will be clearly pathological. Anyway, there is something fundamentally flawed in Habermas's enterprise: he sees in contemporary genetic engineering practices the continuation of old-style eugenics. This is far from obvious. For an alternative position, see, for example the analysis of Nikolas Rose (2007, especially 54–64).

Important and interesting critiques of the transhumanist program have been articulated by the so-called BioLuddites (EP+EC+BC).[19] Here, some words of warning are in order. There exist actual BioLuddites and Luddites, for example Theodore Kaczynski alias Unabomber. They sometimes bomb Bio Tech Research Plants or destroy GM crops. But as Transhumanists see it, BioLuddites are those people who adopt a critical stance towards technology and the ideology of Progress. They would thus rank as BioLuddites various environmentalists (such as Jeremy Rifkin or Bill McKibben) as well as political scientists or philosophers who have not much to do with the Green Movement (such as Landon Winner).[20] Bill McKibben, for one, has argued that modern technologies proceed by trading context and meaning (social relations, sense of belonging) for individual freedom (MacKibben 2004, 47). He assesses the transhumanist program as the ultimate step from Earth 1 – the world as we have known it – to the demoralizing wastelands of Earth 2 – the world beyond meaning – (MacKibben 2004, 230). He thus tries to determinate an "enough point", and draw acceptable limits; one is not surprised to learn that this "enough point" will coincide with the therapy/enhancement distinction. At this level of generality, of course, such a project is bound to fail and the "enough point" will be unstable. Nevertheless, there are real insights in Bill McKibben's more specific analysis. For example, he argues that once parents are allowed to enhance their kids, there is a serious risk of an arms-race: if everyone has been enhanced to an 130 IQ, there will be a strong pressure to enhance the next generation to a 160 IQ, then the next to a 180 IQ and so on. What will happen with obsolete 130 IQers and their cultural world? Here, we may be nearer to Earth 2 than we think.[21]

10.4 Concluding Remarks

Boorse argues that the BST definition of health "leaves room for any imaginable controversy in biomedical ethics" (Boorse 1997, 98; also, this volume, Chap. 9). He is certainly right, but one can insist that the Transhumanist Program does not, by itself, really raise issues in the field of biomedical ethics. True, the transhumanists include in their utopian program some promises which, on the surface,

[19] Luddism was a social movement of the early Industrial Revolution in Britain. Luddites (after a more or less fictive leader "Captain Ludd") practised machine-breaking (that is, industrial sabotage).

[20] The present author may presumably also be included in this category. Langdon Winner has proposed a methodology for the critical assessment of technologies which he calls "Epistemological Luddism" (Winner 1977, 325–335). But he certainly does not share the same value system as Kaczynski. The notion of BioLuddism as used by the transhumanists has shaky foundations.

[21] Some transhumanists – Bostrom, for one – answer by distinguishing non-positional goods (valuable by themselves and positional goods (valuable only by the differential advantages they confer). But this clear-cut distinction can be rebutted: in a competitive context, most goods have a positional as well as a non-positional side. It is non-positionally good to be healthy, but if you are healthy you will have a positional advantage in the working place.

have something to do with health. Who would scorn a promise of becoming free from death, aging, decay or disease? But with mind uploading and open rebellion against biological servitude, we are beyond biomedical ethics issues as usually interpreted (Definition of health, definition and criteria of death, patient-physician-relation, allocation of health care, physician assisted suicide and euthanasia, research ethics in biological and medical sciences, reproductive issues ethics and so on). It is hardly a coincidence that the debate about Transhumanism so often moves to issues related to the philosophy of technology. But maybe it is not even a question of defining bad and good uses for our biotechnological powers, as suggested by Kass. Harris has quite rightly said that the real issue is about “the ethics of altering our nature”, not about “the means that we adopt” (Harris 2007, 215). And this time, it is hardly a coincidence that the bioconservatives so often appeal to the preservation of “our” common nature, which they think is recklessly jeopardized by the hubristic transhumanists. But means matter, nevertheless, and I shall conclude by expressing doubts about three key points of the Transhumanist Program, namely: their philosophy of technology, their philosophy of mind and – in order not to lose contact with the question of health -, their definition of health and disease.

As to the first point, one can note that in a number of interviews and in the preface to the paperback edition of *Enhancing Evolution*, John Harris draws a comparison between synthetic biology and synthetic sunshine (Firelight, candlelight, electric light).[22] As he sees it, both raise the same problems: creation of positional advantages and competitive pressures. And he thinks that the same solution can be found in both cases: regulation and improvement of access to the new technology. But this is far from obvious at it seems to depend heavily on a “means-end” model of technology. The most radical philosophical criticisms of the “means-end” model come from Heideggerian circles and are often associated with a pre-modern worldview. But the core idea is that it is a mistake to conceive large scale technologies as means that are more or less suitable to reach certain ends. They are other ways of being in the world. The argument is sophisticated but can be expressed in a commonsensical way by mean of an example: anyone who read “The Man of the Crowd” by Edgar Allan Poe immediately understood that Victorian London (or East Coast American cities of the nineteenth century) was not “enhanced” by the technology of public lightning. London and the East Coast American cities were modified by this technology, and that modification was profound. The lesson is that large scale technologies generate new ways of thinking, require new sets of social relations, engender or promote new ideas about the end of life, new representations of nature, new representations of the human body, and so on. That means that the introduction of a large scale technology deeply modifies the world view of those who use it: such people are no more in a situation where a solution has to be found for a problem met in an otherwise unmodified society; they are in a new society altogether. So we have new societies every time large scale technologies are

[22] I assume some tranhumanists would adhere to this argument, although there is also a certain technological mysticism in Kurzweil.

implemented. If one admits such considerations, card-carrying transhumanists would be in a weakened position: The "Luddite" Langdon Winner has proposed what is probably the best critical assessment of their philosophy of technology. As he sees it the modern philosophers of technological progress have until now held that the "proper beneficiary of progress was humanity as a whole" (Winner 2002). Of course, some disagreement exists about the actual content of the concepts of "humanity" and "progress"; but everybody agrees on this: at the end of the day, humanity will reap the benefits of technological progress. But for the transhumanists, the expected benefits of technological progress are so huge that only a more than human beneficiary class can reap them. In other words, human beings must be modified to enjoy the benefits they were hoping for before they were modified. The goal-setting human beings will not be the same as the benefit-reaping posthuman beings: unfulfilled expectations are bound to rise.

As to the second point, the transhumanists are far from thinking that by simply changing our self-conception, we have become or could become posthumans. They argue that radical technological modifications to our brains and minds are needed (Humanity +, "What is a posthuman?"). But if it really is the case, it means that a conception of mind-body relations – i.e. a philosophy of mind – is needed. As for the transhumanist philosophy of mind, lets us turn to the arguments of Kurzweil. He sees himself as a "patternist". As a first approximation, this theory is best understood as a form of computationalism, that is the thesis according to which the mind is an information processing system, cognitive mental processes being described in terms of computation (Rakova 2006, 32). According to Kurzweil, reasoning, that is organizing and manipulating information, amounts to the operation of pattern recognizers in the neocortex. This depends on a general ontology of patterns: to be is to be a pattern, or to be perceived as a pattern. Kurzweil directly applies this ontology to the question of personal identity: "I am principally a pattern that persists in time. I am an evolving pattern, and I can influence the course of the evolution of my pattern" (Kurzweil 2005, 388). In other words, the continuity thesis is that one can survive as long as some information pattern of oneself is conserved. But this is not the last word about continuity: "Since the material stuff of which we are made turns over quickly, it is the transcendent power of our patterns that persists" (Kurzweil 2005, 388). Some words of explanation are needed here. Kurzweil thinks that human beings are patterns among patterns: they are patterns who recognize or organize patterns in a world of patterns. But there is more to the patterns than that; patterns are powers to go beyond what they organize and manipulate: "It's through the emergent power of the patterns that we transcend" (Kurzweil 2005, 388). But a question remains: where does the transcendence come from? One is not told. To end with, it looks as if a common transhumanist thesis in the philosophy of mind has been borrowed from the functionalist tradition (especially Putnam's machine-functionalism): the multiple realisability, or Substrate-Independent Mind theory, according to which a mental property may be realized in physical substrate different from our brains

(Rakova 2005, 122). This certainly explains why the transhumanists are so sanguine about uploading or transferring minds onto non organic supports (silicon or magnetic brains). But all this looks rather speculative. One wonders if they have properly understood the nature of theorizing in the field of philosophy of mind. Theories here are certainly appropriate as long as the issue is to conceive of relations between mind and matter or between mental states and physical events, or processes. But it is much more dubious to use them as blueprints for the creation or transfer of minds, or selves.

Let us end with a brief survey of the conception of health in Transhumanism. The easiest critical target here would be their soteriologic conception of medicine: they promise the end of aging, death, decay and disease: all these are the signs sent to Siddhārtha Gautama, which, properly understood, led him to the search for salvation. I shall, however, turn instead to the positive conception of health generally advocated by the transhumanists: "Health is not simply the absence of diagnosed disease; it's a path toward ever-greater physical, emotional, and spiritual well-being" (Kurzweil and Grossman 2004, 13). This sort of definition, close as it is to the WHO definition of health, is prone to the usual arguments against an unsophisticated positive conception of health, that is, its indeterminate character. We all know the saying: "Nature abhors a vacuum"; where a definition is indeterminate, arbitrary interpretations creep in. This is obvious if one considers what Robert A. Freitas, Jr. writes about health and disease. He advocates a volitional normative model of disease. According to this model, health is the optimal functioning of biological systems, with physical condition as regarded as "a volitional state in which the patient's desires are a crucial element in the definition of health" (Freitas 2007, 167). So disease is the failure of either optimal or desired functioning; this seems to leave plenty of room to the "patient's" desires. It has been pointed out that on this model "health and disease are decided on personal values and preferences, and visions of one's own desired body are allowed to practically shape one's physical constitution since virtually anything is feasible in the engineering context of nanotechnologic medicine" (Leontis and Agich 2010, 208). Is it so dangerous to advocate a conception of health and disease which leaves room for a (admittedly large) measure of relativistic and even arbitrary interpretation? The question cannot be so easily settled. But one at least should admit that it will have consequences. These are nicely spelled out by Kurzweil and Grossman. After having said: "Health is not simply the absence of disease; rather it refers to the effectiveness of every level of your existence, something you can always improve" (Kurzweil and Grossman 2004, 377), they immediately add that it is a misleading idea to believe that the health care system will take care of individuals. There are, of course, well known limits and pitfalls to what has been called the "Diagnose-and-Treat" paradigm of medicine (Fox 1999). But it is probably a dangerous illusion to believe that one can have absolute mastery over one's own health. In this respect, we do not need to refer to "our" endangered common humanity to realize that the transhumanists promise is unrealistic.

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Chapter 11
Broadening and Balancing the Goals of Medicine: Battling Disease and Treating the Healthy

Peter H. Schwartz

Abstract Boorse provides an elegant statement of medicine's traditional goals of preventing, treating, and ameliorating the effects of disease. He also presents strong arguments that healthcare providers may ethically treat individuals when there is no disease present or threatened. To encompass such actions, he offers an additional goal of medicine: "(IV) Using biomedical knowledge or technology in the best interests of the patient." Boorse points out that (IV) threatens to subsume the other goals, since preventing or treating disease is only ethical when aimed at serving the patient's best interests. In this paper, I argue that (IV) does not subsume the other goals since sometimes healthcare workers battle disease or its effects without "using biomedical knowledge or technology." For instance, a physician may soothe a patient with compassionate attention or folk therapies. Conceiving (IV) as supplementing the traditional goals of medicine, rather than subsuming them, generates a picture of medicine where confronting disease proactively or reactively remains central, even if additional uses of biomedical knowledge or technology are ethical as well. I describe how Norman Daniels's account of healthcare justice fleshes out this picture. Finally, I argue that the ability of Boorse's Biostatistical Theory (BST) to provide useful definitions for stating the goals of medicine and for grounding Daniels's theory supports the BST's account of disease and health.

Keywords Christopher Boorse • Goals of medicine • Enhancement • Definition of disease • Norman Daniels

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11.1 Introduction

For those of us who are long-time fans of Christopher Boorse's work in the philosophy of medicine, his paper on the "Goals of Medicine" in this anthology is particularly exciting. As he says (personal communication), it is his first and may end up being his only piece of writing directly about medical ethics. But it is far from his first important *contribution* to medical ethics: His Biostatistical Theory (BST) applies to myriad areas of medical ethics and policy, perhaps most prominently grounding a key definition in a leading theory of healthcare justice (Daniels 1985, 2008).

My main goal in this chapter is to examine an additional goal of medicine that Boorse proposes. Boorse presents strong arguments that the ethical behavior of healthcare professionals cannot be limited to treating, preventing, and ameliorating pathological conditions (which I will call "disease" here, in keeping with other literature in this area), the central non-cognitive goals of medicine. He concludes that in response one can either (1) expand the goals of medicine to include at least some actions that go beyond treating, ameliorating, or preventing disease, or (2) acknowledge that healthcare professionals can act ethically when they go beyond the central goals of medicine, at least at times. He does not choose between these two options, pointing out that either option undermines a key assumption of some important objections to physicians providing enhancements: i.e., the claim that it is always unethical for physicians to intervene without targeting disease in some way.

For those who would choose option (1), Boorse provides a potential additional goal for medicine, which he states as follows:

IV. Using biomedical knowledge or technology in the best interests of the patient

Boorse points out that this goal is so broad that it subsumes the other Goals: any ethical action carried out by healthcare professionals to treat, ameliorate, or prevent disease is carried out with the intent of serving the best interests of the patient, and thus would fall under IV. Thus the central non-cognitive goals of medicine (Goals I-III in his list), which appeal to the presence or threat of pathological conditions, are not necessary. The non-cognitive goals of medicine can be reduced to a general aim of serving best interests with biomedical knowledge or technology.

In this chapter, I argue that Boorse's Goal IV fails to subsume the other goals, and I claim that this has important implications for understanding the medical aim of battling disease proactively or reactively. We end up with a picture of medicine as having a central goal (or goals) of combatting disease or its effects, and having a secondary or additional goal of acting in some cases when disease is not present or threatened.

In the second part of this chapter, I discuss an influential account of healthcare justice that also gives the treatment, amelioration, and prevention of disease a central place. The account that Norman Daniels's has developed and defended over the last three decades (Daniels 1985, 2008) shows the important role that a definition of disease like BST can play in moral theory, not just in philosophy of science.

Finally, I argue that these uses of BST help recommend its definition of "disease." The idea that the usefulness of BST or any theory of disease can help justify it violates methodological assumptions that are made by Boorse and others involved in the debate over how to define health and disease. Boorse offers the BST as a conceptual analysis of core concepts of biological science and argues for his account by showing how it fits with the correct usage of experts (Boorse 1975, 1977, 1987, 1997, 2011). Questions about how physicians can ethically practice medicine, and about healthcare justice or policy, are irrelevant to such a project of conceptual analysis. But there are significant problems with conceptual analysis as used here or in other areas of analytic philosophy, stemming from questions about the existence, definition, and use of concepts, and I have argued elsewhere that defining "disease" should not be seen as conceptual analysis at all (Schwartz 2007, 2014). Definitions should be offered not as *discoveries* about the meaning or proper use of current concepts, as in traditional conceptual analysis, but instead as proposed *new definitions* of terms that can play certain useful roles in the future. A good deal of the importance of BST, I believe, stems from its potential role clarifying and addressing questions in ethics and health policy. In this chapter, I provide an explication and example of how to apply Boorse's BST to medical ethics, and how to see its successes in medical ethics as supporting its explication of medical and clinical concepts.

11.2 Principle IV

In his chapter, Boorse provides an elegant statement of the non-cognitive goals of medicine that improves previous lists:

I. Preventing pathological conditions
II. Reducing the severity of pathological conditions
III. Amelioration of the effects of pathological conditions

The BST provides a definition of "pathological condition" that does not depend on assumptions about the ethical behavior of healthcare professionals. If such assumptions were necessary, then using these goals to assess whether the behavior of healthcare professionals is ethical would be clearly circular. At the same time, Boorse presents powerful arguments based on his careful examination of obstetric anesthesia and contraception, to show that physicians may act ethically in ways that go beyond Goals I–III. In these cases, physicians clearly act ethically even though there is no pathological condition that is being prevented, ameliorated, or treated.

Boorse concludes that we have just two reasonable options. First, we can give up the idea that goals such as I–III can define the limits of ethical behavior by physicians, or, second, we may widen our understanding of the goals of medicine. Boorse does not choose between the options, pointing out that either choice undermines the assumption that physicians cannot act ethically when they are going beyond treating,

preventing, or ameliorating disease. But he also shows how one could implement the second option, by adding the following goal to I–III:

IV. Using biomedical knowledge or technology in the best interests of the patient

Boorse points out that adding IV to the list of goals of medicine appears to make Goals I–III unnecessary. As he says, all ethical actions aimed at Goals I–III must be intended to serve the patient's best interests, and thus such actions will fall under Goal IV. This would leave us with a single goal (IV) for medicine aimed at benefiting the patient (leaving aside the goals Boorse labels as aimed at "knowledge"), which violates the sense that medicine has a central goal of combatting or responding to disease. In fact, this sense, even if inchoate, is what led many of us to our interest in the debate over how to define disease. Boorse is perfectly consistent in being unconcerned: He says throughout his writing that his goal is to explicate a key concept of biological science not of medical practice.

But somewhat closer reflection shows that Goal IV does not subsume Goals I–III. For instance, consider a physician who comforts a suffering patient by listening to him empathetically, holding his hand, and patting his back. The physician is performing ethical medical care by Goal III, but not so clearly by Goal IV. While the physician is ameliorating the effect of a pathological condition, he is not clearly "using biomedical knowledge or technology" at all. Certainly the simple caring actions are not an application of "biomedical knowledge or technology." Such caring actions are regularly used, of course, in actions aimed at Goals I or II.

How widespread are these cases that fall under Goals I–III but not IV? The answer depends in part on how one defines "biomedical knowledge or technology." But it is important to note first that the use and impact of compassionate concern may extend quite far in medicine. Some have argued that the positive impact of talk therapy on mental illness reflects just such features of conversation between therapist and patient rather than application of a scientific theory of the human psyche. Some have argued, as well, that placebo effects account for a large amount of the positive impact of all medical care, and such effects are deeply connected to human factors such as charisma, power relations, and trust, none of which appear to qualify as biomedical knowledge or technology.

Looking further, how should we classify folk remedies and naturally occurring substances that are effective at curing or treating pathological conditions but whose mechanism is not understood? One could count the use of such substances as involving "biomedical knowledge" if they have been shown to be effective in clinical trials. At the same time, a similar approach could make compassionate concern biomedical knowledge as well, as soon as a clinical trial shows it to be effective. Finally, many medications or interventions are used widely in ways that have not been formally tested (i.e., "off-label" use): do these uses count as reflecting "biomedical knowledge" just because there are other uses that involve biomedicine? One way to incorporate all such actions under IV would be to count as "biomedical knowledge or technology" any intervention that has been judged as effective by physicians. But this has the unacceptable of watering Goal IV down beyond all

recognition, since it results in counting anything physicians do intentionally as falling under it.

The safest way forward is to define "biomedical knowledge and technology" in the usual ways, as linked to specific aspects of biological science or to technology based on that science. However, when taken this narrowly, it appears that Goal IV may not even cover some of the central examples that Boorse used to highlight the limitations of Goals I–III. Ancient contraception, for instance, involved all sorts of lay experience and theories that are far from biomedical science. Hippocratic practitioners did not use « biomedical science » to determine that drinking dilute copper ore keeps women from becoming pregnant.

As long as much of ethical medical care does not involve biomedical knowledge or technology, Goals I-III will survive intact, despite addition of Goal IV, and will cover much of the practice of medicine. And if Goals I–III are not subsumed by Goal IV, then many of the actions that do fall under Goal IV – e.g. using modern equipment such as MRI machines – will fall under Goals I-III as well. We only need to add Goal IV to cover certain uses of biomedical knowledge or technology outside of the prevention, treatment, or amelioration of disease.

This picture, where goals such as I–III are central, and goals such as IV are additional, was suggested by Miller and Brody (2001) and others, as Boorse says (Chap. 9). In cases where medical professionals have specialized skills and a monopoly on using them, as for surgery and prescription of medication currently, there may be times when only medical practitioners are available to use these skills in situations where society supports their use even though there is no disease present or threatened. For instance, a society may wish to allow plastic surgery, and may license medical professionals to step beyond their usual goals to provide it. If not the surgeons, then who? Similarly, for the prescription of enhancement medications. Boorse correctly points out that a society supporting such actions could not make them ethical if one has previously concluded that transgressions of the traditional goals of medicine are inherently unethical. But this is not a problem for a view that has no such restrictive view of Goals I–III, or one that acknowledged Goal IV as well. From this perspective, Goals I–III can be seen as central while Goal IV is peripheral.

11.3 Central and Peripheral Goals of Health in Daniels

Over the last 30 years, Norman Daniels (1985, 2008) has presented and defended a picture of healthcare as focused primarily but not exclusively on the treatment or prevention of disease, where other sorts of actions are ethical and perhaps even required. While Daniels argues that certain considerations of justice make healthcare special in specific ways (as I will discuss below), other types of treatment may be ethical as well. Daniels explicitly rejects the idea that physicians can only ethically provide care with the aim of preventing or treating disease, but he argues that preventing and treating disease is central to medicine in some ways, perhaps most importantly in that it should be covered by a standard health insurance package.

Interventions that may be desirable or serve some individuals' best interests, but which do not treat or prevent disease, may be provided but generally must be paid for out of pocket, distributed by roughly free-market mechanisms.

I cannot summarize the excellent arguments that Daniels has presented for this position and the vast literature of criticisms and responses (1985, 2008, 2009). The central idea, which Daniels draws from the philosophy of John Rawls (2005), is that people in a just society should have fair equality of opportunity, i.e. should be able to compete for desirable positions on the basis of their abilities and their willingness to apply those abilities. Individuals who have the same level of ability and willingness to apply it should have at least roughly the same chance of obtaining desirable positions or other goods. This makes discrimination based on age, gender, or race unjust, and it suggests that the impact of being born to a family with limited means should be minimized as much as is reasonable as well, for instance by making good public schools available. Justice, Rawls argues, centrally involves protecting "fair equality of opportunity" of this sort.

Daniels goes a step further by pointing out that having a disease interferes with one's ability to develop and apply abilities, and he argues that protecting fair equality of opportunity thus mandates protecting health in certain ways, through public health and preventive, acute, and chronic healthcare. There will be limits to the amount of resources that a society can commit to health: choices must be made among potential interventions at least in part based on cost effectiveness, and there must be a balance between healthcare and other important areas, such as public education. But, by Daniels's account, protecting fair equality of opportunity provides the theoretical basis for the justice of providing healthcare and protecting public health (1985, 2008).

Medical enhancement – i.e. treatment in the absence of disease – is irrelevant to fair equality of opportunity. For instance, if lead poisoning from eating paint chips will impair a child's intellectual development, then removing lead paint from the home would serve fair equality of opportunity, by allowing the child to compete for desirable offices on the basis of his intelligence without the hindrance of lead poisoning. In contrast, a medication that would increase a healthy child's intelligence does not increase fair equality of opportunity, as long as the pill does not eliminate a limitation on her ability but instead just increases that ability. Note that this distinction – between treatment and enhancement – has nothing to do with the level of functioning. Even if the lead-poisoned child would have an IQ of 130 and preventing lead poisoning will raise his IQ to 140, removing the lead paint still serves fair equality of opportunity. In contrast, there is no obligation to provide intelligence-enhancing pills to healthy children. Enhancements may be ethical, but providing them is not required by considerations of fair equality of opportunity, and thus they will usually not be covered by a standard health insurance package. Daniels says that are other sorts of considerations of justice that may mandate coverage for non-disease states in a standard health insurance package. For instance, it may be morally required to cover contraception or (more controversially) abortion to protect gender equity, he argues (Daniels 2008).

Again, I cannot do more here to summarize or examine Daniels's position or the extensive literature on it. And Daniels's approach may be uninteresting to those who reject the principle of fair equality of opportunity or the liberal political theory on which it rests. But his position at least provides a clear setting in which actions aimed at Boorse's Goals I–III will be central to healthcare in a specific way, while those that answer only Goal IV may be ethical but will remain peripheral.

11.4 The Project of Defining Disease

The links between Boorse's BST and Daniels's theory are historical as well as conceptual, since Daniels's utilization of the BST in his account is the most sustained and philosophically intriguing use of Boorse's work in moral theory. Daniels was one of the first to utilize Boorse's account in moral philosophy and to evaluate healthcare ethics and policy. From the perspective of conceptual analysis, the project that Boorse says he is carrying out, such applications in other theories is not important in determining whether an account is correct. But, as I discuss in this section, there are important problems with conceptual analysis, and I have argued elsewhere that the project of defining disease should be seen as a process of re-definition rather than discovery (Schwartz 2007, 2014). Mael Lemoine (2013) has also recently described limitations in viewing the debate over "disease" as conceptual analysis, though his response differs from mine. From my perspective, the potential uses of the BST's definition of disease in stating Goals I-III and in Daniels's account counts in its favor in important ways.

Philosophers all know the rules of conceptual analysis: propose a short list of individually necessary and/or jointly sufficient conditions for the application of the term in question, and show that these conditions apply in the "correct" cases and do not apply in "incorrect" ones. Equally importantly, alternative theories must be shown to apply in incorrect cases, or fail to apply in correct cases, or do so more often. The definition of "correct" and "incorrect" vary by philosopher and project: correct usage may be determined by actual or expected responses by competent laypeople and experts, and may apply to actual cases and/or hypothetical ones. When the cases are hypothetical, philosophers' intuitions about correct usage will dominate. Boorse, for his part, is very careful to justify his claims about proper usage by appealing to accepted textbooks, though sometimes he has to consider hypothetical cases as well. And Boorse is consistent at admitting when BST differs from textbook usage.

One key problem with this sort of conceptual analysis is that multiple incompatible theories often will fit widely accepted (paradigmatic) uses but will also sanction some that appear to be incorrect. At this point, the debate becomes which theory's failings are more problematic, a question that is even more complex when hypothetical cases and philosophers' intuitions play a role. Bigelow and Pargetter (1987) characterize this sort of debate as echoing with the "dull thud of conflicting intuitions" (Biggelow and Pargetter 1987, 196), referring to disagreements about how to define the concept of function. A number of debates in analytic philosophy

have this character, ranging from epistemology's discussion of "justification" to metaphysics' discussion of "free will," which should raise concerns that something is wrong with the methodology.

The problem, I and others believe, comes from the assumption that there is a determinate meaning (or meanings) lurking behind current use or understanding that can be stated in a short set of conditions. Seminal work in philosophy of language in the twentieth Century, such as by W.V.O. Quine (1960) and Ludwig Wittgenstein (1958), counsels us to be skeptical of most claims about meaning. Further, when psychologists investigate the meaning and use of concepts, they find mechanisms such as prototypes and similarity metrics that rarely play a role in philosophical definitions (Rosch and Mervis 1975). For all these reasons, some philosophers emphatically reject conceptual analysis (Ramsey 1992; Margolis and Stephen Laurence 2012).

Quine (1960, 258–260) and Rudolf Carnap (1950, 3–8) eschew conceptual analysis and characterize their projects as something quite different. As Quine put it, the project begins when a useful expression is "somehow troublesome": "(…) it is vague in ways that bother us", he writes, "or it puts kinks in a theory or encourages one or another confusion" (Quine 1960, 260). Philosophers respond by proposing new definitions with the following goals:

> We do not claim synonymy. We do not claim to make clear and explicit what the users of the unclear expression had unconsciously in mind all along. We do not expose hidden meanings, as the words 'analysis' and 'explication' would suggest; we supply lacks. We fix on the particular functions of the unclear expression that make it worth troubling about, and then device a substitute, clear and couched in terms to our liking, that fills those functions. (Quine 1960, 258–9)

I have termed this project "philosophical explication" and argue that attempts to define "health," "disease," and "function" should adopt it (Schwartz 2004, 2007, 2014). From this perspective, accounts should be evaluated as *proposals* about how to define a term in the future, not as *discoveries* about the current meaning or criteria of application. While space does not allow a further discussion and defense of philosophical explication here, please see Schwartz (2004, 2007, 2014) for more. But here I wish to note that if the project of defining disease is taken as philosophical explication, then the usefulness of BST in defining goals of medicine and orienting a theory of healthcare justice provides important support for it.

11.5 Conclusion

In summary, Boorse's Goal IV may be an appropriate way to extend the goals of medicine while retaining the traditional goals of treating, preventing, and ameliorating disease or its effects. We end up with a picture where the battle against disease is a central activity of healthcare and treatment of the healthy is a secondary or additional area. Daniels's (1985, 2000, 2008) account of healthcare justice provides one way to flesh out and defend this structure. Finally, if the project of defining

disease and health is seen as philosophical explication, then the BST is supported by its ability to provide key definitions for articulating the goals of medicine and healthcare justice.

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Chapter 12
A Defence of a Holistic Concept of Health

Lennart Nordenfelt

Abstract In this paper I argue for the need of a positive, value-oriented, concept of health. I call it a holistic concept in that it involves looking upon health as having to do with the person as a whole. It is the person as a whole who is healthy or ill. Ill health is here taken to be the opposite of health. A distinctive feature of holistic health is that it is not identical with the absence of diseases or injuries. A concept of this general kind exists already in many areas in society. The most notable exponent of such a concept is the World Health Organization in its many characterizations of health and related concepts. But holistic analyses of health are advocated also by significant representatives of health care and public health and indeed by many theorists of medicine and nursing. A problem with many of these analyses, however, is that they are not carefully formulated and not presented within a strict conceptual theory. I will argue that my own proposal for a theory of health can do much of the work required. The paper has the following structure. First, I take a stand with regard to conceptual analysis and its role in determining the adequacy of definitions of health. Second, I make a brief survey of crucial characterizations of holistic health, both in policy documents and in the scholarly literature. In many of these conceptions the person's abilities and subjective experiences come to the fore. Third, I consider the use of the term health in the standard medical encounter and in the formulation of goals of medicine. Fourth, I scrutinize some arguments concerning priorities in medicine, where a holistic concept of health plays a crucial role. Finally, I will give a brief outline of my own conceptual theory of holistic health.

Keywords Holistic theory of health • The WHO theory of health • The concept of health in the clinic • Goals of medicine • Prioritization in health care • Conceptual analysis

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12.1 The Purpose of This Paper

In this paper I will argue for the need of developing a holistic concept of health. It is my contention that such a concept is basically also the most reasonable one, given certain criteria for conceptual analysis to be presented below. In several earlier publications I have defended a particular version of such a holistic theory against naturalistic theories, in particular the bio-statistical theory of Christopher Boorse (Nordenfelt 1995, 2000, 2001, 2007), but also the evolutionary theory of Jerome Wakefield (Nordenfelt 2003).

The characterization of disease or a pathological state according to Boorse's *Biostatistical Theory of Health (BST)*:

> A disease is a state in which one or more physiological part-functions are performed at a species-subnormal level of efficiency (Boorse 1987, 371).

Health (or theoretical health) is, according to Boorse, the absence of diseases defined in this way. Wakefield formulates himself in the following way:

> A disorder exists when the failure of a person's internal mechanisms to perform their functions as designed by nature impinges harmfully on the person's wellbeing as defined by social values and meanings (Wakefield 1992, 373).

My purpose in this paper is not primarily to oppose these naturalistic or semi-naturalistic positions. Even if there were to be a place for a naturalistic "theoretical" concept of health for certain purposes, I wish to argue that there is a great need – and a greater one – for a holistic concept and, in particular for a holistic concept that is well argued and well developed. In my view there are too many fragmentary sketches for such a concept (I will give several examples below) and there are too few attempts to make a rigorous reconstruction of them.

On the other hand, the great number of holistic characterizations shows that a holistic view – taking the whole person, with her capabilities and experiences, as a bearer of health and ill health – is prevalent in the mind of many representatives of the establishments of health care, public health and welfare in general. Moreover, and most importantly, a holistic concept of health is what most ordinary people have in mind, not least when they approach health care with their problems.[1]

12.2 Conceptual Analysis in Philosophy of Medicine

In my present defence of a holistic definition of health I will first make what I hope is a useful detour to the theory of concept analysis. I have a particular reason to do so given the recent publication of an interesting and provocative article on

[1] A note on my terminology. I will use the term "holistic" for the kind of theory that I am defending. Most writers in the philosophy of medicine prefer to call such a theory "normativist". My choice of term is motivated by the fact that a normativist theory need not presuppose that the bearer of health or ill health is the whole person.

conceptual analysis in the philosophy of medicine by Maël Lemoine (2013) where he contends that the present controversy between naturalists and normativists (as he designates them) in philosophy of health cannot be resolved by means of conceptual analysis. He claims that theorists like Boorse, Wakefield and myself have believed that this is possible but are in error. In order to resolve the controversy, he says, further theoretical means are necessary.

Let me first briefly outline Lemoine's argument. He asks what are the rules and potential achievements of conceptual analysis in this controversy. The core of his reasoning is as follows:

> A conceptual analysis of either health or disease or both starts with selecting cases from a set of uncontroversial cases of health or disease or both. This set is referred to as the extension of the terms. A definition is then set up in the form of a set of criteria. These must be expressible under the form of necessary and sufficient conditions, on the one hand, and exceptions to these conditions, on the other. Using these criteria one should be able to correctly place each case inside or outside the extension of the set (2013, 310).

He indicates that Boorse's definition cannot, for instance, account for universal diseases. If we accept that there are universal diseases, his criteria wrongly place these outside the extension of diseases. Nordenfelt's definition, he says, seems to include various kinds of inabilities, which are not normally considered to be reductions of health. If this observation is right, then Nordenfelt wrongly includes these inabilities in the extension of ill health.

This, then, is an illustration of what Lemoine considers to be the core procedure in conceptual analysis. And he summarizes the kinds of attacks that are possible:

> There are three kinds of attack against a definition. They consist in presenting (1) cases falling within the commonly accepted extension of the term but which do not satisfy the opponent's definition. (2) Cases that do satisfy the opponent's definition but which fall outside the commonly accepted extension, and (3) cases that fall clearly inside or outside the extension but which the opponent's definition fails to classify at all (2013, 310).

But can such a procedure, asks Lemoine, really decide between naturalism and normativism in the theory of health? Suppose that we were to find that Boorse's bio-statistical theory of disease and health and my holistic theory of health and disease have exactly the same extension. Then, if we merely relied on conceptual analysis, there would be no way to decide which theory is the most adequate, because conceptual analysis, Lemoine claims, does not provide us with any tool for intensional choice apart from the extensional test described above. This means that the Aristotelian definition of a human being as a rational animal cannot, merely on the basis of conceptual analysis, be preferred to the mock definition "featherless biped", if the two definitions are co-extensive in the same way.

By way of response to Lemoine, I contest the assertion that conceptual analysis does not provide tools for choosing among intensional alternatives even if these have the same extensions. I think that it belongs to proper conceptual analysis to consider common *conceptions* (in the sense of conscious ideas) of a particular phenomenon without necessarily scrutinizing their extension. If most people, introspectively, think that sensational well-being and the ability to realize important

goals, are part of the essence of health, this is a crucial fact to be taken into account for the sensitive analyst of the concept of health.

In arguing for this I would refer to the existence of lay conceptions expressed in ordinary language. In the language of everyday life we do not, in using a term, merely make use of a tool for selecting a particular phenomenon, we also have a conception of the kind of phenomenon referred to. This conception may be quite vague, as in the common conception of a human being, but it does not lack content. And, I would argue, this vague conception is closer to the definition "rational animal", than to "featherless biped".

I claim that there is a set of related conceptions of holistic health embedded in ordinary language. These conceptions are influential not only in common discourse but also in public debate, in health promotion and in many sectors of health care. If we do not recognize these conceptions and do not try to make explications of them – for instance in the way I have proposed, or in the way phenomenologists have proposed – then we turn a blind eye to this crucial phenomenon.

But my argument for a holistic conceptual theory of health (and in fact for a holistic analysis of the whole set of medical phenomena: disease, disorder, defect, injury, disability etc.) does not only rely on the existence of lay conceptions of holistic health but also on the fact that the naturalistic theories fail to account for the extension of the term "health". It is significant that the naturalists take, as their illustrative test-cases, species of diseases or illnesses and not of health. This indeed is what Lemoine does in his recent article, in particular in his final discussion about further strategies for deciding among competing definitions of health and disease. Therefore, strictly speaking, the naturalists also break the rules of conceptual analysis in the narrow sense suggested by Lemoine. They neglect the prevalent extension of the terms "health" or "healthy" in ordinary language.

It is well known that making references to instances of health is not as easy as making references to instances of disease, since health does not have *genera* and *species* in the same way as disease has. We do not have a typology of health in the same way as we have a typology of disease. Admittedly, we can speak about somatic health, mental health and, perhaps, spiritual health. But there is no standard nomenclature for referring to all the possible variants of health that exist. The explanation of this is natural. It is more crucial to list and specify problems than to list and specify instances of harmony and well-functioning.

This fact may conceal that there is also an extension for the term "health". Assuredly, we can point to healthy people and say that the state of these people exemplifies positive health. And what I (and some other holists or normativists do) do is to point to certain people who are healthy – according to common usage of the term "health" – and say that they are healthy even though they do not fulfil all the criteria for health suggested by the naturalists. These, as I would say, healthy people may very well have one or more clear-cut diseases. Indeed, most people have a host of trivial diseases – skin disease, minor tooth decay etc. Saying that they are all completely healthy then, strictly speaking, contradicts a naturalistic analysis.

The naturalists might then claim that I have misunderstood their intention. Their main task, they may say, is to analyze a scientific or theoretical concept of health;

and the examples of healthy people that I am presenting do not fulfil the criteria for the use of such a concept of health. In answering in this way, however, the naturalists would retreat from an all-encompassing theory of health to a theory of merely "theoretical health", a term sometimes used by Boorse himself when referring to his own theory.[2] Such a retreat is of course defensible, but it significantly reduces the scope of a naturalistic theory.

In fairness, this is not the whole of Boorse's theory. In Boorse (1997, 13), for example, he presents a range of "grades of health" from wellness to positive health. His notion of positive health is indeed permeated by values. It is not enough to get rid of one's diseases in order to be positively healthy, according to Boorse. Still, however, he claims that the absence of diseases is a *necessary* condition for complete positive health. This is something that I contest in my analysis.

12.3 Towards a Defence of a Holistic Notion of Health

There are two modes of possessing a concept of health. First, one can consciously subscribe to a learned definition of the concept, i.e. have a conception of health. This is what we do when we side with an explicit definition of health and claim that this is the correct definition. Second, one speaks and acts in accordance with a concept. This second mode represents in fact a much deeper form of possession – and the main aim of conceptual analysis, I wish to argue, is to catch the contents of concepts possessed in this way, i.e. the ones which are revealed in practice.[3] In my section below on the medical encounter I give a paradigm example where the involved people's concept of health is revealed in practice.

In the following, however, I will give examples of both kinds. The explicit characterizations that often occur in policy documents, although often vague and not well-argued, can play a practical role in that they may influence policies in, for instance, public health and health care. This may be the case with all the characterizations of health that exist in the documents from the World Health Organization. There are several such explicit characterizations of holistic health. But I also wish to argue that there is much practice – not least in health care – that is in accordance with a holistic concept of health.

I will here use the term "characterization" in referring to the explicit expressions. By this I wish to indicate that they can greatly vary in character: they can have very different purposes and can be very different with regard to how comprehensive they

[2] Most recently in this volume (See Chap. 9). Boorse has also claimed that his account defines a pathological concept of disease, not a practical one. It aims at a "pathologist's concept of disease, not a clinician's (…)" (1997, 11). Boorse is, however, not quite consistent on this point. Later in the same text (1997, 25) he claims that his concept of disease is "best reconstructed by medical classifications". Medical classifications, as I have shown in Nordenfelt (2001, 21–24), indeed contain several items which are not captured by Boorse's definition of disease.

[3] I introduced this distinction in Nordenfelt (1993).

are and how carefully formulated they are. Some of these characterizations are called "definitions" by their authors or by other commentators, but in my opinion most of them do not deserve this label. They are very rarely accompanied by any substantial argument and they are not compared with any reasonable competitors.

12.4 Prevalent Characterizations of Health

12.4.1 The WHO Context

It is mandatory to start, not least for political reasons, with the famous WHO characterization of health. Although it is much criticized and has very little clinical significance, this characterization has had an enormous impact on the rhetoric of health policy and it is frequently cited in various official health contexts.

> Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity (WHO 1948).

In 1996 this definition was enlarged to include spiritual health:

> Health is a dynamic state of complete physical, mental, social and spiritual well-being, and not merely the absence of disease or infirmity (WHO 1997).

The idea of identifying health with complete well-being is slightly modified in the WHO Ottawa Charter for Health Promotion from 1986. In this characterization there is indeed a reference to the basic WHO definition but there is an interesting addition:

> Health is, therefore, seen as a resource for everyday life, not the objective of living. Health is a positive concept emphasizing social and personal resources, as well as physical capacities. Therefore, health promotion is not just the responsibility of the health sector, but goes beyond healthy lifestyles to well-being (WHO 1986).

In a later document on *reproductive health* the WHO has gone further in the direction of an ability-oriented definition of health. The following characterization was adopted at the 4th International Conference on Population and Development in Cairo in 1994.

> Reproductive health implies that people are able to have a responsible, satisfying and safe sex life and that they have the capability to have children and the freedom to decide if, when and how often to do so (WHO 1994).

12.4.2 Nursing Literature and Feminist Literature

I shall now briefly also acknowledge some characterizations of health from the nursing and feminist literature on health matters. It is striking that *all* characterizations that I have encountered in this literature are of a holistic kind. Some simply adopt the WHO definition (Marriner-Tomey 1994, 382).

The following examples are ascribed to the nursing theorists Hildegard Peplau and Imogene King, respectively:

> Health is a word symbol that implies forward movement of personality and other ongoing human processes in the direction of creative, constructive, productive, personal, and community living (Marriner-Tomey 1994, 329).
> Health implies continuous adaptation to stress in the internal and external environment through optimum use of one's resources to achieve maximum potential for daily living (310).

As an example from the feminist literature consider the characterization of ill health by Judith Lorber:

> Illness as a social experience goes far beyond physiology. For patients and health care professionals, it involves all the patterns of social life – interlocking social roles, power and conflict, social statuses, networks of family and friends, bureaucracies and organizations, social control, ideas and moral worth, aspects of work and occupations, definitions of reality, and the production of knowledge (Lorber 1997, 19).

These examples indicate that the intuitions about health held in the nursing literature and at least in part of the feminist literature go in a holistic direction. I must, however, add that they are obviously deficient and incomplete as serious definitions of health or ill health.

12.5 The Standard Medical Encounter and the Goals of Medicine

12.5.1 The Medical Encounter

I will now present a simplified version of the standard *medical encounter,* the encounter between a potential patient and a medical carer (a doctor, a nurse or a paramedic).

1. *A person approaches the health service with a problem*. Liza goes to see her family doctor with a problem. She tells him that she has been ill for some time. She has had considerable pain in the stomach and this has prevented her from going to work for a week. Liza asserts that she is ill on the basis of her pain (a pain which has no obvious external cause but which is severe enough to prevent her from going to work). She believes that there is a disease that is responsible for her problem.
2. *The doctor diagnoses the problem and treats the patient.* The doctor examines Liza. When he is convinced about the nature of the problem he seeks the cause of it. Given his medical training he will in the first instance try to find the cause of the problem in the organic functioning of Liza's body. In short, he seeks some malady. It is important however to see here that he is not seeking a malady for its own sake, not seeking any old malady. He wants to find the cause of the patient's problem, primarily in terms of the disease language to be found in

medical classifications and textbooks. He is not bound to this explanation, however. He is aware of the fact that Liza's ill health may have non-pathological, for instance psychological and social, causes. Having found what he believes to be the cause of Liza's problem, he starts treating it. In the case when he has found a malady he does so *lege artis,* i.e. according to the recommendations of the contemporary art of medicine.

3. *The patient is healthy again when the problem has been removed.* The medical encounter is considered successful, and Liza considers herself healthy, when she no longer feels the pain in the stomach and can go to work as usual.

This simple exposition of the typical successful medical encounter indicates to me that the health concept used is a variant of the holistic concept of health. The establishment of the fact that Liza is ill does not presuppose any internal inspection on the organ level. Liza can herself (at least equally as well as the doctor) determine that she is in a state of ill health. Ill health for Liza is when she is in pain and unable to do something important for her, e.g. go to work, given that the circumstances are standard or reasonable.

Furthermore it is clear that health as understood by the patient, as well as normally by the health care staff, is a state of wellbeing and fitness, and not strictly connected to the absence of disease. Health has not been restored just because a malady has been eliminated, i.e. the disease has been cured. And health (even complete health) can exist even if some traces of a malady are still present.

Here then is a good argument for claiming that there is a prevalent holistic concept of health – a concept of health in the deeper sense described above.

12.5.2 The Goals of Medicine

A crucial issue in attempts to determine the concept of health is to consider the goals of medicine. In some influential treatises of the goals of medicine, health is considered to be the ultimate goal. This idea has been eloquently formulated by the American philosophers of medicine Edmund Pellegrino and David Thomasma.

> Medicine, then, is an activity whose essence appears to lie in the clinical event, which demands that scientific and other knowledge be particularized in the lived reality, of a particular human, for the purpose of attaining health or curing illness, through the direct manipulation of the body, and in a value-laden decision matrix (Pellegrino and Thomasma 1981, 26).

There are indeed other central goals, such as saving lives and contributing to the quality of life of the patient, but health has traditionally had a central role among the goals. It may be of interest to see what implications this assumption could have for the understanding of the notion of health. For instance, is health *by definition* a goal of medicine? If so, then there is a strong argument for a holistic definition of health. I will discuss this issue in connection with the task of searching for criteria for distributing health care.

The concept of *need* of health care is crucial here. It is commonly assumed that health care should be distributed according to people's needs. And it is often also assumed that need is an objective concept such that a person's need can be subjected to a value-free medical assessment.[4] A person has a medical need if he or she has a disease or a similar condition. Behind this assumption lies the idea that concepts such as disease, impairment and defect are objective concepts in the sense that they do not require the subject's assessment of his or her state. This reasoning, then, automatically brings us to a naturalistic analysis of disease.

This straightforward reasoning is open for critique. Consider the following example. A pianist has hurt her hand seriously in an accident. She is then unable to play the piano and therefore unable to do her professional work. At the same time a professor of philosophy happens to succumb to an injury which is equivalent to the pianist's from a physiological point of view. The professor, however, is not, as a result, prevented from doing her work. She can read and teach just as well as before.

According to the objectivist tradition the pianist and the professor have the same need for health care. But this goes clearly against our intuitions. The pianist has lost her professional capacity, the professor has not. Obviously, we must prioritize the pianist in a situation of choice.

If we wish to keep the link between medical need-ascription and health, there is an obvious alternative. The holistic theory of health can clearly differentiate between the two cases. According to this theory, the pianist is unhealthy, whereas the professor need not be (at least the pianist's health is more clearly affected than the professor's). This is the case, I would say, because the pianist is no longer capable of reaching one of her essential vital goals, i.e. that of playing the piano in a professional way. Thus, by definition, the pianist's health has been seriously worsened. The holistic theory of health, therefore, gives a more reasonable answer to our initial question than does, for instance, the BST.

A protagonist of the BST might then add that there are further goals of medicine than the promotion of health. In Boorse's account of the goals of medicine in this volume, a long list of such goals is presented. It not only includes the prevention, palliation and cure of pathological conditions, but also such things as using medical knowledge in the best interest of the patient. I think Boorse's list of goals is very comprehensive and I agree with most of it. Here I only wish to dispute his first point which concerns the prevention of pathology as such.

The pertinent question could here be put: Why is it self-evident to prevent pathology as such? Is pathology always a threat to people's benefits, which is the main criterion used by Boorse to select items as goals of medicine. The BST definition relates pathology to unnatural organ function. But it does not immediately

[4] For a classical formulation of this point of view, see Daniels (1985, chapter 2). A more recent exposition of substantially the same idea can be found in Hope et al. (2010). It should be emphasized, though, that this point does not strike at Boorse's views with regard to the relation between medical need-ascription and health. As he says in Boorse (1997, 12–13): "I have never doubted that medical practice is permeated by values, nor that a good doctor must have more tools than a scientific knowledge of pathophysiology."

relate it to the well-being of the patient. According to the BST view, a person with a disease can indeed be hale and hearty, and indeed remain hale and hearty, but is nevertheless, strictly speaking, unhealthy.

The question could then be asked: Why should we prevent or cure the disease of such a person as evidently does not need the cure, given that the concept of need (also in Boorse's discussion about goals of medicine) is related to the benefit of the patient? Given a holistic definition of health, the benefit of the patient is included by definition.

My conclusion therefore is that a holistic theory of health can give a simpler and more unified account of the concepts of need of health care and also of goals of medicine in comparison with the BST theory. Most of the crucial goals of medicine (in particular a person's well-being – at least in the sense of absence of pain and other kinds of sensational suffering – and ability to reach his or her vital goals) are included in the holistic concept of health (my claim is, however, certainly not that holistic health constitutes the only goal of medicine).

12.6 Different Concepts of Holistic Health

It is significant that the prevalent holistic concepts of health, both the explicit programmatic characterizations and the implicit concept in much health policy and health care, refer not only to the survival but also to the *quality of life* of the individual. According to these theories, a person can be ill, not because the probability of the person's survival has been lowered but because he or she does not feel well or has become disabled in relation to some goal other than survival. In his classical analysis of health Galen, from the first century AD, says that "health is a state in which we neither suffer from any evil nor are prevented from the functions of daily life".[5] K.W.M. Fulford says that "the patients who are ill are unable to do the things that people ordinarily just get on and do, moving their arms and legs, remembering things, finding their ways about familiar places and so on" (1989, 149–50).

The holistic concepts that have been suggested in the explicit characterizations as well as in my description of the standard medical encounter entail that health is a kind of well-being, or a form of ability, or a mixture of the two.

12.6.1 Health as Well-Being

The WHO can be said to represent a strong tradition in the philosophy of health where well-being is the central concept. Positive health is identified with well-being or happiness; illness is understood as suffering or pain.

[5] Translated by Temkin (1963, 637).

The WHO definition has indeed been highly criticized. One set of criticisms is related to the word "complete". Larson noted that this euphoric definition is readily falsified. In a 14 day period the average adult experiences about four symptoms. Viewed in this light we are all, as he says, sick! (Larson 1996, 182)

It must be admitted, though, that, however health is ultimately characterized, a set of feelings are normally related to it. The person who is healthy normally has a number of positive experiences associated with being so, the person who is unhealthy a number of negative ones. The difficult question to settle is whether these experiences *constitute* the state of health in question or whether they are just normally associated with it. The WHO in the basic documents obviously settles for the constitutional idea. So do various phenomenological accounts (see below).

It is a difficult task to characterize the well-being purporting to constitute health. If one includes too much in the concept there is a risk of identifying health with happiness. As many critics have said, health cannot reasonably be identical with complete physical, mental, and social well-being. The absurd conclusion of this conception could be that all people who are not completely successful in life are to be deemed unhealthy. A way of solving the problem concerning what kind of well-being constitutes health would be to say that it only concerns sensational well-being (that is directly connected with the person's body and mind) and not such well-being as is directly dependent on circumstantial facts. In this case, a person's happiness about, for instance, having had a baby or earned a fortune would not be a part of the person's health.

12.6.2 Feelings and the Notion of Subjective Health

To me, however, it does not seem to be a plausible strategy to *identify* health (in general) with a set of feelings. (See my arguments below in the subsequent section.) On the other hand, it is more than plausible to identify one aspect of health, viz. its subjective aspect, with a set of feelings. I have myself introduced the concepts of *subjective health* and *subjective ill health* to deal with this aspect (1993).

Subjective ill health is obviously holistic in character. Here it must be the person as a whole who is ill. Protagonists of the BST generally do not quarrel about this, though they have devoted little analysis to it. Boorse in his early writings talked about illnesses as such *diseases* (where "disease" is defined in a naturalistic way) as negatively affect people's experiences and abilities (1977). Later Boorse says that a patient is sick or ill when the pathological processes rise to a systemic level that produces global incapacitation of the whole organism (1987). For an alternative naturalist conception of illness, see Schramme (This volume, Chap. 5). Holistic health theorists would not put such restrictions on ill health. Ill health can exist without disease, impairment or defect.

Some theorists (for instance, Marinker 1975; Twaddle 1993; Young 1982 and Hofmann 2013) emphasize this element of experience strongly and wish to require it in order to use the label of illness.[6] Also in the phenomenological literature there

[6] In a reply (2013) I have argued against this assumption and I have noted cases of illness or ill health where there is no negative experience at all.

is an understanding of health and illness in terms of the person's *experiences* or at least in terms of his or her subjectivity. As Fredrik Svenaeus puts it: "To be ill means not to be at home in one's being in the world, to find oneself in a pattern of disorientedness, resistance, helplessness and perhaps even despair, instead of in the homelike transparency of healthy life" (Svenaeus 2012, 103).

12.7 How Should a Concept of Health Be Reconstructed?

I will now turn to a reconstruction of the concept of health in the light of my previous observations with regard to prevalent characterizations of health. Essentially, I will follow analyses and proposals that I have published before.[7] Here I will comment on the most central ideas in my definition of health, which runs as follows:

> *A* is completely healthy if, and only if, *A* is in a bodily and mental state, which is such that *A* has the second-order ability, given standard or accepted circumstances, to reach all his or her vital goals.

Complete Health. Observe that this is a definition of complete or optimal health. The definition allows for the fact that there is a health dimension ranging from optimal health to maximal ill health.

A Bodily and Mental State. In some shorter presentations I have omitted this clause. It is, however, essential for the complete understanding of my idea. Behind a person's abilities lie of course always certain physical and mental conditions. This becomes particularly self-evident when we consider ill health and its conditions. However, health can occur also in the presence of maladies (i.e. diseases, injuries and defects) and ill health can occur also in the absence of maladies.[8]

The Primacy of Ability and Disability. As mentioned above, two kinds of phenomena have a central place in traditional holistic accounts of health and ill health. First, a kind of feeling, of ease or well-being in the case of health, and of pain or suffering in the case of ill health; second, the phenomenon of ability, an indication of health, or disability, an indication of ill health. These two kinds of phenomena are interconnected in many ways. In the first place there is an empirical, causal connection. A feeling of ease or well-being contributes causally to the ability of its bearer, whilst a feeling of pain or suffering may directly cause some degree of disability. Conversely, a subject's perception of his or her ability or disability greatly influences the subject's emotional state.

[7] This is a summary of my ideas mainly formulated in Nordenfelt (1995, 2001).

[8] Observe that my complete theory of health also includes definitions of the concepts of disease, injury and defect, where these are related to the holistic notion of health and not defined in any naturalistic way.

Some theorists would argue that the relation between the two kinds of phenomena is even stronger, i.e. that there are conceptual links between a feeling of well-being and ability, on the one hand, and between suffering and disability on the other. According to this idea, being in great pain partly *means* that the subject is somewhat disabled. Some degree of disability is a necessary criterion for the presence of pain, so that if a person's ability is not affected, the person can be said not to be in great pain.

In my analysis, I make an assumption of a partial conceptual connection between suffering and disability, where suffering is taken to be a highly generic concept covering both physical pain and mental distress. A person cannot experience great suffering without evincing some disability. But the converse is not in general true. A person may have a disability, and even be disabled in several respects, without suffering. If we consider the following paradigm cases of illness we can see that suffering may be absent. One obvious case is that of coma, where per definition there is no suffering, the subject is unconscious. And a person with a broken leg may of course not be in pain at all. Another kind of case concerns some mental disabilities and illnesses. A person in a manic state need not be suffering, but on the contrary be in a hilarious state. Still, this person is highly socially disabled.

These observations indicate that the concept of disability, I think, has a much more central place in the characterization of ill health than the corresponding concept of suffering. If only one of these notions is essential to ill health it must be disability.[9]

Health as Second-Order Ability. To be healthy, I have proposed, is to have the second-order ability to realize one's vital goals. Consider the following situation. A refugee from, say, an African country, has just moved to Sweden. In his native country he had his own business, which he managed well enough to sustain himself and his family. When he is in Sweden he is no longer able to lead such a life. Not knowing Swedish culture or, more importantly, the Swedish language, he cannot initially make any arrangements for establishing a business in Sweden. Whereas in his home country he lived relatively well, in Sweden he is disabled. But would we say that this man is healthy in his native country, and becomes ill upon moving to Sweden? No, it seems more plausible to say that as long as he has the second-order ability to run a business in Sweden, then he remains healthy. The definition of second-order ability runs as follows:

> A has a second-order ability with regard to an action F if, and only if, A has the first-order ability to pursue a training programme after the completion of which A will have the first-order ability to do F" (Nordenfelt 1995, 49–50).

[9] In spite of this reasoning, I have declared that I am willing to reconsider the place of feelings with regard to health and ill health. The feeling element is so conspicuous and plays such a role in the identification of most paradigmatic illnesses that it should perhaps have a more prominent place in the defining characterization of ill health. A way of giving it such a place has been devised by Tengland (2007), who proposes a disjunctive characterization of ill health, using both the notion of disability and that of suffering.

This means that as long as the immigrant has the ability to learn the Swedish language and the ability to learn how to get around in Swedish society, he is a completely healthy person. In general, then, such disability as is solely due to lack of training is not an indication of illness. There is reason to speak of ill health only if the acts of training have in turn been prevented by internal factors, in which case there is a second-order disability.

Health as Ability to Reach the Subject's Vital Goals. What should a healthy person be able to do? My main issue is to specify, on an abstract level, those goals – I have coined the expression "vital goals" for them – which are constitutive for the healthy person's ability. The general idea is the following. In order to qualify as a healthy person the person must have the ability, given standard or reasonable circumstances, to reach his or her set of vital goals. As main parts of this analysis, I first scrutinized two plausible suggestions for the characterization of vital goals, but in the end I dismissed both of them. The first suggestion entails that a person's vital goals should be equated with that person's *needs.* The second involves the idea that a person's vital goals should be equated with his or her *wants*. The idea of needs is not helpful, since it is either empty – referring simply to what is necessary for the achievement of a goal or goals to be further specified – or, as in the traditional discussions of basic human needs (see for instance Maslow 1970), it already presupposes the concept of health: a basic need is one the fulfilment of which is necessary either for survival or for maintaining health.

The second idea of using the person's own wants as the criterion of vital goals fails for a variety of reasons, including the following. Highly destructive wants exist and there are people with an extremely low profile of wants. If highly destructive goals are permitted entry into the definition, one ends up with something counterintuitive. And concerning the person with a low profile of wants: if only these very minimal wants are fulfilled, the person might die of starvation. I find it strange to found a theory of health on a person's ability to commit suicide, for instance.

Vital Goals as Preconditions for the Subject's Minimal Happiness. My solution to the characterization problem rests on the notion of happiness. I propose that a person's vital goals are the states of affairs which are necessary and jointly sufficient for his or her minimal long- term happiness. In other words, a vital goal is a state of affairs which is either a component of or otherwise necessary for the person's living a minimally happy life. As a consequence of this interpretation many of the things that human beings hope to realize or maintain belong to their vital goals. More precisely, most states that have a high priority on a person's scale of preferences can be designated as vital goals. Examples of such vital goals are: passing an exam, getting and keeping a job, getting married and having children, remaining in touch with one's nearest and dearest. The range is broad.

Observe that health is not identical with minimal happiness, nor with the set of vital goals which are necessary and together sufficient for minimal happiness. A person's health is constituted by this person's second order *ability* to realize his or her vital goals (given certain circumstances).

However, certain things that people happen to want do not belong to their vital goals. First, we have trivial wants. We may casually want something, but are not greatly concerned if we don't get it. Second, we may sometimes have counterproductive wants. We may want to get drunk, but getting drunk is not a vital goal. Instead of contributing to long-term happiness, being drunk contributes in the long run to suffering and thereby unhappiness. Third, we may have irrational wants, i.e. wants that are in conflict with other, more important wants. As soon as we acknowledge that there is this conflict, we normally realize that the only candidates for being vital goals are the more important wants.

On the other hand, some things that we do not want may be contained in our set of vital goals. The completely apathetic or lazy person who does not have any conscious goals whatsoever will soon realize that this creates suffering for him or her. This will be particularly salient if the person does not even seek food or shelter. It must certainly belong to this person's long-term minimal happiness to have these basic matters organized. Therefore such basic goals are among every person's vital goals.

A crucial observation to be made here, then, is that a vital goal of *A* need not be wanted by *A* at a particular moment. The notion of a vital goal is thus a technical notion partly distinct from the ordinary-language notion of a goal.[10]

Standard or Otherwise Accepted Circumstances. A crucial criterion differentiating between my theory and the BST concerns the nature of the circumstances presupposed in the concept of health. The BST refers to statistical normality, the holistic theory refers to circumstances that are considered to be standard in a particular cultural context.

It is evident that health cannot be the ability to reach vital goals in all kinds of circumstances. If it were, *nobody* would be completely healthy. There is always some conceivable circumstance where one lacks the ability to reach one's vital goals. The outbreak of a natural catastrophe is one example. Or, to take another example, a person might be living in extreme poverty or be otherwise physically or legally prevented from performing the actions necessary for the achievement of his or her vital goals. Nor can health be constituted by ability to realize one's vital goals given merely an extremely advantageous circumstance. If it were, almost everybody would emerge as completely healthy. Consider the case where a person is almost completely dependent on the help of somebody else for the achievement of a goal. We can imagine a paraplegic person who cannot go where he or she wants without the support of a personal assistant. Given this support, the paraplegic person can be said to have the ability to go where he or she needs to go – so we should call the person perfectly healthy. This is clearly counterintuitive. Such a situation of extreme support is not one in which we can reasonably assess a person's degree of health.

So how should these circumstances be defined? A first plausible idea is that the circumstances that we normally have in mind in a health assessment are such as are in some way standard in our culture. A person who cannot walk on an ordinary

[10] For a further discussion, see Nordenfelt (2001, 63–74).

pavement is certainly disabled with regard to a standard situation. Thus the person is unhealthy.

However, what is a standard situation (in a geographical region at a particular time) may in some instances turn out to be an unreasonable or unacceptable situation. In a certain country the political and cultural situation may be such that it would be unreasonable to judge the health of its inhabitants as one might normally do. It may, for instance, at this moment (2016) be impossible to work regularly as a teacher in Syria. But it would be unreasonable to say that the trained unemployed teacher in Syria is unhealthy for this reason. The circumstances in Syria are in this case unreasonable. Thus, my definition of health needs a clause saying that the circumstances referred to in the assessment of health are accepted in the prevailing discourse.

12.8 Concluding Remarks

Thus I propose a theory of health and ill health which is essentially different from its rivals (in particular from the BST) and whose main advantages, as I see it, are the following:

(a) This theory conforms better to reasonable criteria for conceptual analysis than the naturalistic ones. In particular, it accounts for the reference class of the terms "health" and "healthy" in ordinary language.
(b) It can account for a variety of concepts of health, both implicit lay concepts of health and illness – in particular, as revealed in the medical encounter – and crucial explicit ones as formulated by the WHO, as well as by other theorists of and agents in health care and public health.
(c) This theory can better account for the concepts of need of health care and of goals of medicine than naturalistic ones. My analysis shows that neither the concept of need of health care nor that of pathology can be based merely on a naturalistic analysis of health.

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