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Taking a Naturalistic Turn in the Health and Disease Debate

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RESUMEN

Situamos el debate, ya muy trillado, sobre la definición de salud y enfermedad dentro del proyecto de una metafísica de la ciencia y su objetivo de trabajar con y para la ciencia. Hacemos uso de la 'caja metafísica' de Guay y Pradeu para replantear este debate, mostrando lo que está en juego en los recientes intentos de dar un paso más en el citado debate, revelando puntos de acuerdo y desacuerdo imprevistos entre posiciones nuevas y antiguas, y haciendo nuevas preguntas que pueden conducir a un progreso real. Posteriormente, discutimos las implicaciones de los beneficios bidireccionales entre la medicina y la filosofía cuando la ciencia médica impulsa y limita a esta última.

PALABRAS CLAVE: *filosofía de la medicina, salud y enfermedad, el giro naturalista, metafísica de la ciencia*.

ABSTRACT

We situate the well-trodden debate about defining health and disease within the project of a metaphysics of science and its aim to work with and contribute to science. We make use of Guay and Pradeu's 'metaphysical box' to reframe this debate, showing what is at stake in recent attempts to move beyond it, revealing unforeseen points of agreement and disagreement among new and old positions, and producing new questions that may lead to progress. We then discuss the implications of the two-way benefits between medicine and philosophy when the latter is driven and constrained by medical science.

KEYWORDS: *Philosophy of Medicine, Health and Disease, Naturalistic Turn, Metaphysics of Science*.

I. INTRODUCTION

For half a century, philosophers of medicine have struggled with how to define the concepts of *health* and *disease*, and this debate (hereafter HDD) has been referred to as 'one of the fundamental and most long-standing debates within philosophy of medicine' [Reiss and Ankeny

(2016)]. The most common approach has been to employ the method of conceptual analysis to search for the necessary and sufficient criteria for their application, which has resulted in several well-known positions, amongst which naturalism (scientific facts drive definitions; [Boorse (1997)]), normativism (cultural/personal values drive definitions; [Cooper (2003)]), and hybridism (facts and values together drive definitions; [Wakefield (1992)]) are typically considered the main contenders. This dissensus has prompted various responses, from eliminating these concepts in favor of explicit fact-value considerations [Ereshefsky (2009)], to looking for nuances and overlaps between the positions [Kingma (2014)], or even rethinking the philosophical tools and methods used [e.g.[Lemoine (2015), Fuller (2018)]. This has led to a converging view among many interlocutors claiming that the HDD no longer shows signs of progress, all too often resulting in a 'dull thud of conflicting intuitions' [Schwartz (2017), p. 487, Sholl (2015), Lemoine (2013), Fuller (2018)]. As there are many causes for this lack of consensus, clarifying the problems and prospects for the debate's future remains an important albeit contestable issue. We concur that too much of the HDD has been preoccupied with the loop of 'analysis-counterexample-revision' [Matthewson and Griffiths (2017), p. 450], and that something has to change for this debate to make progress [Lemoine (2013), (2015)]. Here, we suggest that recent trends in the philosophy of science can highlight what this change might look like, and how this could help to redirect philosophers of medicine to investigate more basic questions before returning to health and disease definitions.

To this end, we propose to situate the HDD within a broader discussion in philosophy of science about the project of taking a naturalistic turn, or advancing a metaphysics of science. In broad terms, this involves advancing philosophical inquiries that are in close alignment with current scientific practice and knowledge, i.e. philosophy 'motivated by and in the service of science' [Ladyman and Ross (2013), p. 109]. By connecting these two debates, we do not suggest that the traditional HDD has always been a metaphysical discussion. Rather, we claim that the ideas about 'intertwining … science and metaphysics', or philosophy, more generally, that are explicitly addressed in this debate [Soto (2015) p. 24] can help clarify the methodological and pragmatic dimensions (regarding aims and justifications) of the HDD and highlight what is at stake in recent attempts to move forward. To develop this, we first provide an outline of the metaphysics of science debate, and then make use of Guay and Pradeu's (2020) 'metaphysical box' to reframe contenders in the

HDD in order to distinguish between different questions philosophers need to make explicit when moving forward. We then suggest that taking a naturalistic turn in the HDD will have implications for not only how philosophy can contribute to science, but also shows unique benefits for philosophy of medicine.

II. The Naturalistic Turn: Situating the Metaphysics of Science

Recently, philosophers of science have begun to recognize the importance of how scientific knowledge from specific scientific disciplines, such as immunology can help to 'shed new light on philosophical questions that have been fundamental since Aristotle, such as what constitutes the identity of an individual through time' [Pradeu (2019), p. 3]. Doing metaphysics in this way involves developing 'an ontology, or worldview, based on current science' [Guay and Pradeu (2020), p. 1848] that can work both on a local level, i.e. clarifying metaphysical questions that arise from specific scientific issues like individuality or stemness in biology, immunology or oncology [Guay and Pradeu (2016), Laplane (2016)], or it can entail the broader enterprise of 'critically elucidating consilience networks across the sciences' [Ladyman and Ross (2007), p. 28]. At all levels, the aim is an 'intertwining of science and metaphysics', which, ideally, results in a 'mutual contribution' to both fields [Soto (2015), p. 26]. Moreover, this project has dual aims. Positively, it aims to show that metaphysical hypotheses or problems could be evaluated or resolved by appealing to scientific standards. Negatively, it suggests proceeds by avoiding appeals to intuition or analyses based on thought experiments, armchair speculations or a priori common sense [Ladyman and Ross (2007), pp. 10-16, Kincaid (2013), p. 3]. With the positive aspect, a 'philosophy done within science' [Kincaid (2013), p. 15] is better able to address the conceptual and metaphysical problems facing actual scientific practice. In turn, this can prevent philosophers from imposing their own concepts developed from 'refined common sense' onto science [Kincaid (2013), p. 11], which may hinder understanding and the advancement of empirical inquiry [Ladyman and Ross (2013), p. 112]. While still rather general, the aims of this project will be made more concrete when we look at how to apply this to the HDD in the next section.

Within this context, Guay and Pradeu (2020) suggest situating the project of 'metaphysics of science' with respect to other metaphysical

approaches within philosophy, resulting in a more inclusive understanding of what this project entails and how it can be distinguished from the narrower category they call 'scientific metaphysics'. To clarify such a distinction, Guay and Pradeu (2020), pp. 1857-1859, suggest a categorization along three axes (which will be helpful for categorizing the HDD's contenders in the next section). One axis divides projects into *descriptive* and *revisionary* based on their aim (or not) of revising our conceptual categories or frameworks. A second axis distinguishes *a priori* and *a posteriori* methods, that is whether the method is mainly theoretical/philosophical deduction or that of explicitly starting from the empirical methods of science. The third axis distinguishes metaphysical projects in terms of the authority appealed to for justification: *traditional* metaphysics largely appeals to notions coming from history of philosophy and conceptual analyses; *common-sense* metaphysics appeals to folk-intuitions and/or everyday language; and *metaphysics of science* is any metaphysical project 'anchored in current science' [Guay and Pradeu (2020), p. 1859]. There are many interesting implications of this categorization of metaphysical projects based on differing aims, methods, and justification, e.g. that 'scientific metaphysics' is only one (particularly strong) form of 'metaphysics of science', with the specific qualities of being a posteriori and revisionary. Also, contrary to the 'negative' aspects of a scientifically-informed metaphysics mentioned above, Guay and Pradeu's approach suggests that even a metaphysics of science could be anchored in present science while still being a priori or even descriptive. In short, there are many ways to balance the aims, authorities, and methods of metaphysical inquiry.

One suggestion made by Guay and Pradeu (2020), p. 1855, is that projects within the area of metaphysics of science will be most fruitful if they start from *one* local science and then explore generalizations across sciences. So, there is still a general aim towards *unification* of the hypotheses and theories within scientific images, but before we arrive at a full-blown elaboration of 'consilience networks across sciences,' we might first elaborate local images within a given science, e.g. investigating immunology or biogerontology instead of biology and physics, which have been the main focus of such projects. Their approach thus leaves the door open for attempts to clarify the scientific images, and their related concepts, arising from the local fields of the *medical* sciences. As we will show, doing so reveals some issues that are perhaps unique to these fields while also suggesting their broader philosophical import.

III. Reframing the HDD in Philosophy of Medicine

We suggest that reframing the HDD based on Guay and Pradeu's distinctions may help to explain what is at stake in both older and current positions, and how we might make more progress. There are three caveats to mention. First, while this in a sense imposes a "foreign" framework onto the philosophy of medicine, there is still much that we can learn from doing so; for instance, finding interesting similarities between otherwise rival positions, or unexpected differences between seemingly related ones. Second and relatedly, the point of this classification is not to suggest that participants have *actually* been engaging in metaphysics. Instead, the classification can help uncover some background *assumptions*, both metaphysical and methodological, and bringing these assumptions to light can help to formulate new questions that capture the crux of what going 'beyond' the traditional HDD entails. Finally, it can help to show that one dividing line between older and newer contributions may actually concern the convergence (or lack thereof) with ideas coming from this naturalistic turn in metaphysics of science. In short, this framework could specify what is promising about some newer approaches to advance the HDD.

The following **Table 1** is our categorization of several key positions in the HDD based on Guay and Pradeu's framework. Rather than aiming for being exhaustive, we chose to focus on some key authors who can arguably be seen as representatives of a general position. So, while there clearly are variations on the basic positions — e.g. Broadbent's general Boorsean framework (2019) or Stegenga's particular take on hybridism (2018) — the point is merely to capture the general features of these positions. Second, and more importantly, while we believe the three axes genuinely reflect distinct metaphysical (and correspondingly methodological) positions, it is less important for us whether a given author is definitively categorized. The categories are not arbitrary, e.g. Boorse is *not* carrying out scientific metaphysics and Lemoine is *not* an a priori common-sense metaphysician, but nor are our classifications dogmatic. Hence, we make use of a 'mixed' category to reflect some uncertainty, and we accept that authors may move between categories.

Name and reference	Descriptive/ Revisionary	A priori/ A posteriori	Traditional/ Common-sense/ Metaphysics of Science
Boorse (1997)	Descriptive	A priori	Traditional
Cooper (2003)	Descriptive	A priori	Common-sense
Wakefield (1992)	Descriptive	Mixed	Common-sense
Svenaeus (2011)	Descriptive	A priori	Common-sense
Schwartz (2007)	Revisionary	A posteriori	Traditional
Lemoine (2015, 2020)	Revisionary	A posteriori	Metaphysics of Science
Fuller (2018)	Revisionary	A posteriori	Metaphysics of Science
Matthewson & Griffiths (2017, 2018)	Mixed	A posteriori	Metaphysics of Science

Table 1. Reframing the HDD in terms of metaphysical/methodological assumptions.

In these classifications the first consideration was whether the author's aim in general is to revise our concepts of health and disease, that is prescribing a specific meaning for how they *should* be used, or instead to provide a description of how they currently *are used* in a particular context. In large part, this consideration follows many "classical" descriptions of central positions in the debate, e.g. Boorse and Wakefield's aims to analyze the pathologist's or the psychiatrist's concept of 'disease' or 'disorder', respectively. Interestingly, along this axis there seem to be overlaps between approaches that otherwise have been portrayed as antagonistic to one another, e.g. Svenaeus' 'anti-naturalistic' (2013) phenomenology and Boorse's naturalism, neither of which seems to aim for substantial conceptual revision, but rather to produce a coherent definition that is consistent with a specific subfield of medicine or common experience.

While revisionism is what sets several authors apart, further clarification comes from asking *what* exactly is being revised, a question not di-

rectly raised by Guay and Pradeu. Here we find an interesting difference concerning the *aims* of otherwise similar authors such as Schwartz and Lemoine. Lemoine's naturalization proposal involves reframing the HDD by focusing on gathering pathophysiological details from particular scientific models/theories of diseases in an attempt to generalize and *unify* them into a general theory of disease. Schwartz's project of philosophical explication, on the other hand, aims for 'variability and free choice' [Schwartz (2007), p. 61] in order to *diversify* and construct different concepts for distinct clinical roles. Whereas the latter project supports the normative ambition to revise 'disease' to settle *practical* issues (i.e. drawing lines between normal and abnormal), the former aspires to work out a *theorical* concept of 'disease' in the medical sciences. Furthermore, such revisionism need not be a straightforward either-or matter: Matthewson and Griffiths seem to offer a mix, since they at times call for revisionism that advances 'our understanding of what it is … to be in a normal or pathological state' [Griffiths and Matthewson (2018), p. 302], while elsewhere claiming that even a 'revisionary account must keep relatively close to the intuitive meaning' [Matthewson and Griffiths (2017), p. 450].

The second consideration concerns the degree to which authors favor theoretical deduction or a more inductive, empirical methodology, which is similar to Fuller's distinction between top-down and bottom-up methods (2018): either we analyze 'disease' into its most general features or necessary and sufficient criteria (e.g. dysfunction, harm, etc.), and then *deduce* whether a condition fits this definition, or else we *inductively* analyze specific descriptions of diseases in medical science and search for unifying properties. Importantly, as Fuller also notes, these imply entirely different questions: the former asks 'Is X a disease?', the aim being to answer practical line-drawing problems, whereas the latter asks, 'What kind of thing is disease X?', by looking for general properties the clarification of which may be of use to science. Those asking the former tend to have little to say about the latter [Fuller (2018), p. 3201]. With this in mind, what unites otherwise rival accounts like Boorse and Cooper is their shared commitment to top-down deductivism. For Boorse, while his frequent references to medical sciences suggest a bottom-up approach, his general aim seems to be that of clarifying the standard *usage of a term* like disease through conceptual analysis, not that of clarifying medical descriptions and explanations of *what this term refers to* on a pathophysiological level [Lemoine & Giroux (2016)]. By contrast, the bottom-up approach is explicitly favored by authors like Lemoine and Fuller in their search for

unifying disease properties within the scientific literature. For instance, Fuller concludes that the relevant medical literature reveals 'chronic diseases' to be bodily states or properties that are typically dispositional but sometimes categorical [Fuller (2018), p. 3217]. Wakefield apparently hits a gray area as he explicitly acknowledges that both deduction and intuition are at work [e.g. Wakefield (2000)], but he nevertheless clearly incorporates evolutionary considerations into his dysfunction account. These differences highlight that what is at stake in several recent contributions to the HDD is to *start from* current medical or evolutionary descriptions and then use philosophical methodology to answer questions such as what kind of thing a given condition is, rather than proposing a delineation of health and disease based on supposed a priori usage. Doing so suggests new insights about how philosophy can contribute to medical science, which we will discuss in the next section.

The third consideration dealt with the diverging appeals to authority and here too interesting results emerge. First, while all classical contributors, e.g. Boorse, Cooper and Wakefield, rely on the method of conceptual analysis, we feel that Boorse does so in a more 'traditional' manner than the others in that even while binding his account to the 'considered usage of pathologists' (1997, p. 53), he relies on logic and traditional methods to settle the philosophical debate, viz. analyzing how pathologists *use* terms.[1] While scientific authority does play a role, his concern is primarily *linguistic*, not scientific. Conversely, Cooper, Wakefield and Svenaeus rely more on conceptual frameworks used in ordinary life and the 'manifest image' (such as luck, harm, or feelings of homelikeness). More significant differences come out in authors like Lemoine, Fuller and Matthewson and Griffiths who are generally in line with the metaphysics of science in their aim to let their views be driven by current science, from which they then draw philosophical implications regarding disease definitions.

Moreover, as these latter positions reflect revisionary, a posteriori metaphysics of science, they overlap with Guay and Pradeu's (2020) subdivision of 'scientific metaphysics' and hereby diverge quite strongly from more classical approaches to the HDD. However, there does appear to be an interesting difference to consider. For instance, while Fuller is starting from science, his question is generally that of assessing whether medical descriptions of chronic diseases fit with traditional metaphysical concepts (is chronic disease a process, disposition, etc.?). In a recent paper on aging, Lemoine (2020) starts from what biogerontology, physiology and evolutionary theories tell us about aging before extracting

one possible overarching definition of it. This is of course a different context, but the methodological import remains. The key difference is that Fuller is trying to apply well-established metaphysical categories *to* science, whereas Lemoine is trying to develop a philosophical position *within* science (an approach shared by Pradeu (2019) in immunology). The latter, we claim, is a more radical version of scientific metaphysics than the former in that the intertwining of philosophical and scientific questions become harder if not impossible to separate.

We can draw several conclusions from this classification of the HDD. First, it suggests some interesting convergences between otherwise rival positions (e.g. naturalism and normativism, or naturalism and phenomenology), as well as unexpected differences between seemingly related approaches (e.g. Schwartz and Lemoine or Fuller and Lemoine). More importantly, this also suggests a movement towards addressing new questions to get beyond the HDD's stalemate of conflicting intuitions. To take aging as one example, this movement can be summarized as follows:

1. Traditionally, the approach has been to stipulate a definition of disease/health and then ask, "is aging a disease?" [see De Winter (2015), Schramme (2013)].
2. Similar to Fuller's metaphysical approach, a different question would be: "What kind of things are 'aging diseases'?" or asking what, if anything, age-related diseases have in common by drawing on the scientific literature and pre-existing metaphysical concepts.
3. Finally, instead of assuming any explicit metaphysical concepts or disease judgement, a more basic question in line with Lemoine (2020) is: "What is aging as described by the science(s) of aging?"

A similar shift in terms of questions pursued can also be seen in the notion of homeostasis. Instead of asking whether homeostasis in general is healthy [Boorse (1977), p. 54], another approach is to investigate what various sciences say homeostasis *is* and then ask whether *what homeostastic regulation refers to* can be unified enough to explain something specific to physiology [Sholl and Rattan (2020)]. In short, this is a shift from conceptual analysis to *referent* analysis. Notably, in both cases it seems that the more we commit to being scientifically informed the more we move away from demarcation issues in the HDD. Importantly, however, asking question 3 does not necessarily negate the others. Instead, these

questions can be complementary when asked in reverse: first striving to provide a clearly delineated object within and based on the relevant sciences before debating the health or disease status of that object.

A related conclusion, which converges with the critiques mentioned in the introduction, is that one reason the HDD has not been able to establish consensus and thereby make much progress is that it has not fully reckoned with the aims and methods used: 'concept analysis is not a method for understanding the metaphysics of diseases, but for understanding the definition of 'disease" [Fuller (2018), p. 3199]. It helps to ask what 'disease' means, but not what it is ontologically speaking. Subsequent contributions would benefit from being clearer about what exactly they aim to do, how they will do so, and what is their justification or authority. Third, it is also interesting to see that when looking at the medical sciences, the aim for revisionism can be driven by practical/normative or theoretical/empirical considerations. This difference was not mentioned by Guay and Pradeu but is perfectly in line with their insight to move from local to general. While such considerations get at the heart of the *medical* sciences, further insights could be gleaned from analyses of specific or 'local' medical sciences, such as oncology or biogerontology, and can surely be generalized to philosophical analyses of other practical or 'applied' sciences. Finally, placing the HDD within the discussion about metaphysics of science also suggests that one possible benefit of developing a scientifically informed philosophy is that it could more easily contribute to clarifying empirical questions or even advancing scientific debates. While this is surely one possible and valuable benefit to consider, what often goes overlooked are the benefits *to philosophy* for engaging more closely with science, thereby resulting in a mutual contribution. We turn now to an elaboration of what this mutual contribution could entail and what it means for the HDD.

IV. Clarifying the Two-Way Exchange Between Philosophy and Medicine

Much in line with the trends among philosophers of science to approach findings from current science to better address metaphysical questions, the inverse call for philosophy's relevance to science has recently also been voiced by philosophers. Notably, publishing in the prestigious PNAS journal, several philosophers teamed up with scientists to make a strong case for why science needs philosophy [Laplane et al.

(2019)]. Philosophers, they argued, can contribute to science by clarifying existing scientific concepts, formulating new theories or concepts, critically assessing assumptions and methods, or fostering dialogue across the sciences and to society. When successful, this results in a 'reinvigoration of science at all levels, one that returns to us the benefits of close ties with philosophy' [Laplane et al. (2019), p. 3951]. Recently, and more specifically to medicine, similar claims for philosophy's relevance have been suggested for improving medical education [Clarke, Ghiara and Russo (2019), Boon and Van Baalen (2019), Boniolo and Campaner (2020)] and scientific and clinical reasoning [Andreoletti and Maugeri (2019), Anjum, Copeland and Rocca (2020)]. Importantly, these approaches seem in line with developing a scientific metaphysics that is not only beneficial to philosophical discussions, but also aims to advance medicine. Such concerns raise the question as to whether and how this also could be achieved within the HDD.

At least part of what is at stake in overcoming the HDD's stalemate is not only to advance a philosophical debate, but also the aim to influence science, that is '*contributing* to science, by formulating as tentative theories whatever generalization the science of diseases produces' [Lemoine (2015), p. 30]. However, besides Wakefield's contributions and recognition outside philosophical circles, most other issues debated in the HDD have not had much impact on medicine. Put differently, the HDD has largely been an insular one, confined to philosophical circles, without much so-called 'radical interdisciplinarity' [Clarke, Ghiara and Russo (2019)]. Now, this is not to say that the philosophical debates as they now stand have no way of contributing to medicine. For instance, the usefulness of conceptual analysis is to help draw clearer lines for clinical reasoning, e.g. by clarifying the disease-status of grief [e.g. Horwitz and Wakefield (2007)]. However, while this is indeed a helpful contribution to medicine, such attempts are unfortunately rare and perhaps hindered by other aspects of how the HDD typically proceeds, like focusing on counterexamples, a priori reasoning and pre-scientific concepts.

Other contributions in line with scientific metaphysics build on the bottom-up approach by proposing ways of unifying knowledge claims within the medical sciences to develop *theories* of health or disease, much like the humoral or germ theories of past medical history. For instance, Darrason (2013) argues that scientific research into the genetic changes associated with various infectious diseases challenges our current disease classifications and could provide a theory to unify many, if not all, diseases. A similar idea could be at work in recent philosophical interest in whether aging research [e.g. Lemoine (2020)] can provide a theory to account for

the occurrence of many diseases by either being age-dependent or at least related to old age. In the case of health, Sholl and Rattan (2020) compiled a variety of explanations from distinct sciences such as immunology, neurophysiology, biogerontology, odontology, evolutionary biology, and public health in an attempt to look for general patterns that were *specific to* healthy physiological properties, e.g. homeostasis, homeodynamics, robustness or adaptation. While such a full-fledged theory of health remains to be developed [Sholl (2020)], and there is some doubt that medical research needs any theory of health or disease [Kincaid (2008)], this kind of skepticism could be assuaged by assessing what unites these various notions in terms of their underlying mechanisms and the biomarkers that are used to track these mechanisms.

Now, what is less discussed in these debates on the relationship between philosophy and science is the other side of the exchange. As suggested above, many aim to show philosophy's relevance for science and medicine but some interestingly argue that philosophy has neglected medicine and that the future of their relationship 'depends on the development of a positive two-way trade between them' [Fulford (1991), p. 81]. So, if either or both are to progress, we need to acknowledge this *mutual* dependence: 'Philosophy thus needs medicine as much as medicine needs philosophy' [Fulford (1991), p. 84]. But what does this entail?

This brings us back to the project of scientific metaphysics and its positive and negative aims. One thread running through this debate is that by appealing to science as the primary authority, philosophers are then forced to take certain epistemic and ontological constraints into account [Soto (2015), p. 53]. Put differently, science holds the relevant desiderata for providing the standards for what counts as relevant information/knowledge, which methods are most successful, and what is (or is not) real, which then should guide our philosophical theorizing. Surely this, by extension, holds for scientifically inclined philosophers of medicine, and this 'negative' constraint can be spelled out in two points. First, it puts limits on what a relevant, naturalistic definition of health or disease should look like, which we will return to shortly, and second it constrains what kinds of criticisms can be legitimately leveled against it. In terms of these latter constraints, claiming that naturalism falls short by "unjustly prioritiz[ing] the epistemic perspective of natural, behavioral or social sciences" over the first-person's authentic experience of illness [Svenaeus (2019), p. 466] does not undermine any scientific theory of disease. This only reveals different aims and methods and suggests that one's justifications for appealing to one or another set of desiderata are

different. To use Guay and Pradeu's distinctions, such phenomenological accounts represent common-sense metaphysics aimed at *understanding* rather than explanation, and the latter explanatory aim involves some form of commitment to a project of metaphysics of science.

Returning to the first constraint, how could science put limits on what our health or disease definitions should look like? One strong argument could be that *only* those who are in line with the aims of scientific metaphysics will have a say in our future disease definitions. A weaker, perhaps more plausible, claim could be that a blend of empirical methods and common-sense concerns may still provide helpful insights into our understanding of health and disease. We do not want to rule out either possibility. Rather our point is to highlight that with newer approaches like those of Lemoine, Darrason and Fuller which are more in line with metaphysics of science, there is a push towards developing new forms of naturalism in the HDD that do not seem to share much in common with any traditional Boorsian framework. To us, this suggests that part of the problem with the HDD has been that naturalism, as we know it, actually has not been naturalistic enough, which indeed seems to be the thrust of the argument that 'many naturalist or hybridist accounts currently on offer impose no strong *ontological* restrictions on diseases' [Fuller (2018), p. 3201, emphasis added] or that naturalism has only lingered on a "pre-theoretical" notion of disease [Lemoine (2015)].

To be perfectly clear, we can only speak in generalities of what such a naturalistic definition constrained by science could look like, since the actual demonstration of a scientific approach to health or disease is still only a promise sketched by a few authors. Nevertheless, what seems to be at stake in carrying out these inductive approaches is to find the ontological restrictions on our definitions. So, whether Fuller's account succeeds over others, e.g. Lange's (2007) or Smart's (2014), will depend on an evaluation of their proximity to the most robust scientific methods and descriptions of pathological (chronic disease) reality. We can thereby ask, for instance, whether Fuller's medical-physiological description of the ontology of chronic diseases is consilient with what evolutionary biology has to say about disease more generally [Gluckman et al. (2011)]. Likewise, whether Matthewson and Griffiths's approach holds rests on its consistency with evolutionary biology, *not* its consistency with common or dictionary usage, with the implication that counterexamples or thought experiments alone are not enough to discredit it [for a recent defense, see Veit (2021)]. Here, we could ask whether the biological criteria provided by their evolutionary account are consilient with *physiological* aspects, such as homeostasis, bio-

chemical regulations, immunological and metabolic dynamics, etc. The question would turn on whether they do in fact agree, and whether the latter aspects provide further constraints to complement the evolutionary ones. Thus, what medical science can provide to philosophers of medicine is a way to better evaluate rival accounts beyond appeals to intuitions or counterexamples. At first, filtering out what does *not* work would already be significant progress in these debates.

Now, the same holds for *any* position in the HDD, be it phenomenological, a refinement of Boorse's naturalism, or strong proponents of normativism. Taking the naturalistic turn seriously implies that there *are* scientific facts of the matter about what health and disease are, even if we do not have a complete account or theory of them (yet). These facts collectively impose constraints on one's position, meaning that some minimal form of scientific realism about health and disease could be the starting point of the HDD's future. In partial agreement with Simon (2011), the debate would then turn around how far this realism can take us in pursuing a more scientific approach to defining health and disease, which could very well be beneficial to medicine as well.

V. Conclusions: Giving Medical Science the Philosophy it Deserves

It seems, then, that philosophers of medicine have quite a bit to gain from embracing the naturalistic turn as advanced in the broader philosophy of science debates over the metaphysics of science. One overarching conclusion coming from our analysis is that *if* philosophers of medicine, whatever their position, contend to contribute to medical science or practice (i.e. not just to philosophy), they will have to be scientifically well-informed and even engage with medical scientists. Nearly every contribution to the debate is claiming to say something about what health and disease ultimately *are*, which is one justification for incorporating some metaphysical or ontological constraints. This would even apply to strong normativist stances *rejecting* that there is anything that medicine or biology can provide by means of such constraints [e.g. Cooper (2002), p. 271]. This would have to be proven, rather than supposed. However, as soon as we accept that the medical sciences provide at least *some* input, e.g. that genetics challenges our basic categories or that notions like homeostasis, robustness or adaptability point to real physiological properties or mechanisms, then we are forced to take on the minimalist constraints of consistency or consilience with scientific theories. This, in turn, leaves each account open to

evaluation based on this very consistency. By accepting constraints, philosophers of medicine too may benefit by engaging more intimately with medical scientists and in that way perhaps even helping to foster conceptual and theorical developments in science. Furthermore, what medicine provides to philosophers of medicine is a way to better evaluate rival accounts and filtering out what does *not* work, and this, we claim, could be a significant step towards advancing the HDD.

A second conclusion is that this two-way exchange need not be isolated to metaphysical or ontological questions about health/disease, but can also apply to other debates in philosophy of medicine. It could, for instance, be relevant to those developing the 'epistemological turn' towards medical evidence [Stegenga et al. (2017)] who seem to share some commitments to scientific authority, even if they are critical of that very authority. Similarly, those promoting a 'philosophy of science in practice' [Ankeny et al. (2011)] also seek to engage with science as it is actually performed, but wish to bring out the values and ideals bound up with this practice so as to have a more productive interaction with science. This might call for a different notion of "consistency" between philosophical and scientific theorizing, but the shared aim to be anchored in current science remains.[2] So, a closer engagement with science can have multiple payoffs throughout philosophy of medicine.

A final and somewhat controversial conclusion is that philosophy of medicine, or of any science for that matter, is not relevant for its given science a priori, i.e. simply because it is asking questions or making critiques of that science. This relevance needs to be demonstrated and we suggest that philosophy of medicine is most relevant when most empirically informed. The basic aim to hold different positions accountable, thereby filtering out disproven speculations or at least setting ontological constraints on them, could be the main benefit of bringing the framework of metaphysics of science into the HDD. In *Le matérialisme rationnel*, Gaston Bachelard lamented that 'science does not have the philosophy it deserves' [Bachelard (1953), p. 20; our translation]. Philosophers of medicine can provide the medical sciences with such a philosophy, but only if they are willing to engage with and *be corrected by* actual science.

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NOTES

[1] For instance, Boorse (1977) situates himself in relation to Aristotle and the history of philosophy, and aims to develop a 'lexical definition' (2014).

[2] Another philosophical approach that may benefit from these insights, but which we could not explore, is 'experimental philosophy' involving the use of quantitative methods. For differing views, see Hofmann (2017) and Veit (forthcoming).

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