EuJAP | Vol. 17 | No. 2 | 2021
UDC: 122:159.97
https://doi.org/10.31820/ejap.17.2.3

FROM ENGEL TO ENACTIVISM: CONTEXTUALIZING THE BIOPSYCHOSOCIAL MODEL

Awais Aftab[1] and Kristopher Nielsen[2]

[1] Case Western Reserve University
[2] Victoria University of Wellington

Original scientific article – Received: 15/01/2021 Accepted: 27/04/2021

ABSTRACT

In this article we offer a two-part commentary on Bolton and Gillett's reconceptualization of Engel's biopsychosocial model. In the first section we present a conceptual and historical assessment of the biopsychosocial model that differs from the analysis by Bolton and Gillett. Specifically, we point out that Engel in his vision of the biopsychosocial model was less concerned with the ontological possibility and nature of psychosocial causes, and more concerned with psychosocial influences in the form of illness interpretation and presentation, sick role, seeking or rejection of care, the doctor-patient therapeutic relationship, and role of personality factors and family relationships in recovery from illness, etc. On the basis of this assessment, we then question Bolton and Gillett's restricted focus on accounting for biopsychosocial causal interactions. The second section compares Bolton and Gillett's account with a recent enactivist account of mental disorder that tackles similar conceptual problems of causal interactions. Bolton and Gillett's utilize elements of the 4E cognition, but they combine these proto-ideas with an information-processing paradigm. Given their explicit endorsement of 4E approaches to mind and cognition, we illustrate some key ways in which a more fleshed out enactive account, particularly one that doesn't rely on notions of information-processing, differs from the account proposed by Bolton and Gillett.

Keywords: *Biopsychosocial model; George Engel; causality; enactivism; 4E cognition*

Correspondence: awaisaftab@gmail.com

"*The Biopsychosocial Model of Health and Disease: New Philosophical and Scientific Developments*" by Derek Bolton and Grant Gillett (2019) is among the most intellectually stimulating books that have been published in the area of philosophy of medicine and philosophy of psychiatry in recent years. It makes notable and substantial contributions to the literature on the biopsychosocial model as well as the nature of causal interactions. It is therefore with pleasure and admiration that we offer this critical commentary.

Our commentary is divided in two sections. In the first section we present a conceptual and historical assessment of the biopsychosocial model (BPSM) that differs from the analysis by Bolton and Gillett (B&G). Specifically, we point out that Engel's BPSM was concerned with much more than the ontological possibility of psychological and social causes. On the basis of this assessment, we then question B&G's restricted focus on accounting for biopsychosocial causal interactions, and in doing so we identify important aspects of debate about the BPSM that we think B&G have overlooked. The second section compares B&G's account with a recent enactivist account of mental disorder that tackles similar conceptual problems. There are aspects of B&G's work that strike us as being somewhat "proto-enactive", although they attempt to combine these ideas with an information-processing paradigm. Given B&G's explicit endorsement of 4E approaches to mind and cognition (Bolton and Gillett 2019, 76), we think it worthwhile to consider the ways in which a fleshed out enactive account differs from the account proposed by B&G.

1. There is More to Engel's BPSM than Causal Interactions

B&G's fundamental focus is on causal interactions in the biopsychosocial realm. They write:

> The conceptual challenge, recognised by Engel and contemporary commentary, is that there are historically deeply entrenched assumptions—physicalism, dualism and reductionism—to the effect that only material, physical and chemical causes are real, while distinctive psychological causes and social causes are impossible or incomprehensible. (Bolton and Gillett 2019, vi)

As such, the majority of their text is focused on developing an account of biopsychosocial causal interactions, the ontological space in which these interactions take place, and how the psychological and social can have genuine causal power within this framework. B&G see their account as a

general model, with the purpose of theorizing biopsychosocial interactions in health and disease. In their words:

> We focus here on the general biopsychosocial model as a core philosophical and scientific theory of health, disease and healthcare, which defines the foundational theoretical constructs—the ontology of the biological, the psychological and the social—and especially the causal relations within and between these domains. (Bolton and Gillett 2019, 19)

B&G are correct that there are historically entrenched assumptions relating to physicalism, dualism, and reductionism that have dominated scientific and medical thinking, and they are also correct that this was recognized by Engel. However, we believe that B&G misdiagnose the negative consequences of these assumptions with which Engel was concerned and which he sought to address in his BPSM. Engel's fundamental concern was not in establishing the reality and existence of psychosocial causes, but rather in the establishing that the psychosocial realm is worthy of scientific exploration and that there is no reason to exclude it from the realm of scientific medical inquiry. Engel was not primarily interested in the alleged impossibility or incomprehensibility of psychological and social causes. We believe this is a fundamental point that has gone by unappreciated not only by B&G, but also in general by commentators following Engel.

That Engel was not primarily concerned with causal interactions is apparent in Engel's seminal papers on BPSM, but becomes even more so when his other writings are considered. In Engel's classic 1977 paper on the subject, Engel is, for a large portion of the article, concerned with the concept of disease and whether our notion of disease should be restricted to biochemical abnormalities. He writes,

> Medicine's crisis stems from the logical inference that since "disease" is defined in terms of somatic parameters, physicians need not be concerned with psychosocial issues which lie outside medicine's responsibility and authority. (Engel 1977)

This statement of medicine's crisis does not indicate a fundamental concern with causal interactions, but rather the nature of our notions of health and disease, and their subsequent implications.

Engel's concerns with the biomedical way of thinking are further expanded on in other articles. In his (1997) article "From Biomedical to Biopsychosocial", Engel sees the aim of the biopsychosocial medicine as being scientific in the human domain:

> Biopsychosocial thinking aims to provide a conceptual framework suitable for developing a scientific approach to what patients have to tell us about their illness experiences (…). Biomedical education's a priori assumption that such patient-derived data and the means of their acquisition are neither teachable, nor subject to systematic study, needs to be examined. (Engel 1997)

Below are some quotations from his (1992) article, "How Much Longer Must Medicine's Science Be Bound by a Seventeenth Century World View?" (Engel 1992)

> In any consideration of a scientific model for medicine that would qualify as a successor to the biomedical model, be it the biopsychosocial or any other, the fundamental issue is whether physicians can in their study and care of patients be scientists and work scientifically in the human domain. Or is medicine's human domain beyond the reach of science and the scientific method, an art, as the biomedical model in effect requires?
>
> Medicine's adherence to a seventeenth century paradigm predicated on the mechanism, reductionism, determinism, and dualism of Newton and Descartes automatically excludes what is distinctively human from the realm of science and the scientific.
>
> Biomedicine's rejection of dialogue as a genuinely scientific means of data collection is evident in the neglect of instruction and supervision in interviewing, not to mention in clinical data collection altogether, and in the preference for the case presentation as a method of clinical teaching, one in which students may display their ability to organize and discuss findings, but not reveal the methods and skills whereby they had come by the data in the first place, least of all their interpersonal engagement with the patient.

This is recognized, to an extent, even by B&G, because they begin chapter 1 by listing what Engel identified as limitations of the biomedical model, that it fails to take into account the following:

> the person who has the illness, the person's experience of, account of and attitude towards the illness; whether the person or others in fact regard the condition as an illness; care of the patient as a person; for some conditions such as schizophrenia

> and diabetes, the effect of conditions of living on onset, presentation and course; and finally, the healthcare system itself also cannot be conceptualised solely in biomedical terms but rather involves social factors such as professionalization. (Bolton and Gillett 2019, 2)

Notably, concerns about the *causal reality* of psychosocial factors do not appear on this list by Engel, because such concerns are prominently missing from Engel's seminal writings. Given Engel's strong interest in the various dimensions of the illness experience and utilizing the clinical interview as an instrument of scientific inquiry, it is quite possible that Engel would have been dismayed to see interpretations of BPSM as having to do primarily with causal interactions.

It needs to be stated that the responsibility for this misunderstanding of Engel's thesis doesn't lie with B&G. Such a characterization of BPSM as being concerned primarily with *causes* is widespread, even among the most ardent champions of BPSM. Consider, for instance, Dr Ronald Pies, author of *Clinical Manual of Psychiatric Diagnosis and Treatment: A Biopsychosocial Approach* (Pies 1994), who wrote in *Psychiatric Times* in 2020: The biopsychosocial paradigm

> asserts that most (but not necessarily all) serious mental disorders are best understood as having a variety of causes and risk factors—including but not necessarily limited to biological, psychological and social components. (Pies 2020)

While such a formulation is not strictly erroneous, it is a more restrictive understanding of Engel's vision (Aftab 2020). The matters that preoccupy Engel are more to do with psychosocial influences in the form of illness interpretation and presentation, sick role, seeking or rejection of care, the doctor-patient therapeutic relationship, and role of personality factors and family relationships in recovery from illness, etc. Engel was seeking a framework that would bring the psychosocial and phenomenological dimensions of illness within the realm of medical and scientific inquiry. Causes and risk factors are included in it, surely, but they are not particularly privileged by Engel.

Why then has our popular understanding of BPSM been so focused on causal risk factors and causal interactions? This appears to be a consequence of the manner in which BPSM has been operationalized and taught to medical trainees. The operationalization has taken the form of a biopsychosocial formulation. This formulation is illustrated as a table in which there are three columns of "biological", "psychological" and

"social", and four rows of predisposing factors, precipitating factors, perpetuating factors, and protective factors (see Huda 2020 for an example of such a formulation). This organization urges the trainees to take into account all the various causal factors by filling in all the boxes. Furthermore, such a formulation is intended to assist in the development of a treatment plan, with the understanding that the treatment should be aimed at all the modifiable causal factors identified.

The biopsychosocial formulation, while a useful educational and clinical tool, creates a number of conceptual and philosophical problems (Waterman 2006). First of all, it encourages the reification of "biological", "psychological" and "social" as separate and distinct ontological domains. Such a reification is illusory, since there are good reasons to think that the biological, the psychological, and the social as levels of explanation are best understood as heuristic idealizations that are helpful in making certain sorts of distinctions of interest to us, but do not reflect deep ontological features of the world (see Eronen 2021 for a defense of this view). Secondly, causal factors identified have to be cleanly sorted into one or the other column, often in an arbitrary or artificial manner (e.g., is "pain" a biological or a psychological factor?). Thirdly, while all the risk factors are categorized, no weight is assigned regarding their respective causal roles, giving the (false) impression that they "are all, more or less equally, relevant". Fourthly, since a combination of bio-psycho-social factors will almost always be present, a clinician may feel justified in offering any sort of treatment that is *perceived* to address those factors, regardless of whether that treatment is backed by scientific evidence or is recommended by guidelines. Fifthly, creating a static array of causal risk factors further enhances the mystery of how these causal factors interact dynamically in the real world.

It is in the face of such an understanding of BPSM that Paul McHugh and Philip Slavney (1998) argue that the model is amorphous and vague, offering little meaningful guidance for clinical and research work. They see BPSM as analogous to a list of ingredients rather than a recipe, providing no instructions on how these ingredients are to be effectively mixed together in the process of cooking.

It is also important to understand the ideological function that BPSM has served in psychiatry. BPSM was utilized as a means of bridging the rift between the various factions within psychiatry with biological, psychological, and social orientations (Ghaemi 2010). It did so by a sort of Dodo bird verdict that all approaches are legitimate, and none shall be excluded, "everyone has won, and all must have prizes". It is this rhetorical function of BPSM that leads Ghaemi (2010) to contend that in

contemporary practice BPSM has led the clinicians into a state of lazy eclecticism.

While B&G allude to some of this, and recognize that the attitude of uncritical eclecticism is not present in Engel's original writings, they fall short in two ways: i) they don't recognize, at least explicitly, that a central preoccupation with causal interactions is also not present in Engel's writings, and ii) they don't seem to demonstrate an adequate appreciation that many criticisms of BPSM are directed at the manner in which BPSM has been operationalized and implemented. Given this targeting, such criticisms will stand as long as the practical implementation of BPSM remains the same.

While B&G highlight the criticisms of BPSM by Ghaemi and Kendler, they don't seem to make much effort at engaging with the conceptual alternatives offered by these authors. Both Ghaemi and Kendler endorse versions of "pluralism" as replacements for BPSM, Jasperian methodological pluralism in the case of Ghaemi (2010), and explanatory integrative pluralism in the case of Kendler (2005). The basic viewpoint of such pluralisms is that multiple independent methods and explanations (at multiple levels/scales) are necessary to understand and treat mental illnesses. The strengths and limits of each method or explanation need to be recognized, and that method/explanation should be utilized which is best suited for the specific circumstances based on pragmatic constraints, relevant epistemic values, and empirical evidence.

There is somewhat of a parallel here to B&G's assertion that the content of the BPSM is in the *specifics*. It can be argued that saying that the content of BPSM lies in the scientific and clinical specifics is not that much different from saying that our understanding of specific conditions and disorders should be guided by the best available scientific explanations for those disorders, explanations which will almost always include psychosocial variables in addition to biological variables, either as contributing to etiology, presentation, course, or treatment considerations. The value that BPSM offers in this regard is basically as a reminder: do not restrict your notions of scientific inquiry to exclude the human and the psychosocial realm. Aside from serving as a reminder, it does not seem to offer anything above and beyond what we would expect a good scientific explanation to offer. In other words, a good scientific explanation of a complex, multifactorial medical condition such as diabetes or depression will invariably be one that includes biological, psychological, and social variables, but that is not because the good scientific explanation will be derived from BPSM.

In a similar vein, the value of BPSM in clinical practice and medical education is that of a *reminder* not to ignore psychosocial variables. Such a reminder is necessary because of medicine's long-trenched history of focusing on the biological to the exclusion of the psychosocial. As noted by Kendler:

> [BPSM] is used widely in family medicine and is a great teaching tool, reminding the residents to consider the psychological and social influences on their cases and not just focusing on the pathophysiology. (Kendler 2010)

A philosophical account of bio-psycho-social causal interactions doesn't quite serve the same purpose. This also indicates that when it comes to BPSM as it currently exists, calling it a "model" is beyond charitable (McLaren 1998). It is more of an attitude, a mantra, a meditation, a nudge, an aide-memoire, rather than anything as elaborate as a "model", and assuming that it is indeed a model creates all sorts of conceptual problems. B&G's philosophical account of biopsychosocial causal interactions is a worthwhile philosophical inquiry, but in light of Engel's original writings, there is no good reason that BPSM should concern itself solely with causal interactions, to the exclusion of issues that were of concern to Engel: the human domain with all its quirks and colors. Even if a successful account of biopsychosocial interactions were to be provided, it does little to address the conceptual and scientific issues in contemporary practice of, in the words of Kendler, "how to integrate the diverse etiologic factors that contribute to psychiatric illness and how to conceptualize rigorously multidimensional approaches to treatment" (Kendler 2010). Establishing the psychological and the social as ontologically and causally real doesn't help us with the question of how to best integrate the etiological factors in the form of a coherent explanation and how this should inform multidimensional approaches to treatment.

In summary of section 1:

- *An interpretation of BPSM with a central emphasis to causal interactions is at odds with Engel's vision of BPSM which was focused more on bringing the human domain into the scientific realm, establishing clinical interview as a scientific instrument, taking illness experience seriously as scientific data, and adopting a non-reductionistic view of disease and health.*

- *Many popular criticisms of BPSM are targeted at how BPSM has been operationalized and implemented for the purposes*

of clinical education, and the way the rhetoric of BPSM has been used for ideological purposes. Reinterpreting BPSM as a philosophical account of biopsychosocial causal interactions will not, by itself, address these concerns.

- *The assertion that the content of the BPSM is in the specifics does not seem to offer anything above and beyond what we would expect a good scientific explanation to offer. In other words, a good scientific explanation of a complex, multifactorial medical condition such as diabetes or depression will invariably be one that includes biological, psychological, and social variables, but that is not because the good scientific explanation will be derived from BPSM.*

- *Given the historical dominance of the reductionistic scientific worldview, BPSM appears to serve as a reminder to avoid the reductionistic trappings of the biomedical mindset; its clinical and educational value appears to be as a mantra, a nudge, an aide-memoire, rather than anything as elaborate as a "model", and assuming that it is indeed a model creates all sorts of conceptual problems.*

- *Establishing the psychological and the social as ontologically and causally real doesn't help us with the question of how to best integrate the etiological factors in the form of a coherent explanation and how this should inform multidimensional approaches to treatment.*

- *B&G do not seem to pay attention to the alternatives to BPSM that have emerged in the last 2 decades in the philosophical literature, such as various forms of explanatory and methodological pluralisms.*

2. Comparison with an Embodied Enactive View

As conceptual pluralists, we see value in there being a variety of ways to view something as complex as health and well-being. However, these different views must be allowed to 'bounce off' each other—to be compared in terms of strengths and weaknesses and refined in response. It is through diversity *and* dialogue that better frameworks will emerge. In this section we compare B&G's BPSM to one such developing alternative, the embodied, embedded, and enactive view of psychopathology (3EP)

(Nielsen 2020, 2021; Nielsen and Ward 2018, 2020). As we have mentioned earlier, B&G cite the 4E framework as inspiration for their own view of embodied agency, but there are substantial differences between their model and models of health and disease that have emerged from, identify with, and operate within the 4E tradition.

Very briefly, 3EP is an approach to conceptualizing mental disorder grounded in a view of human functioning as embodied (fully material, and constituted by not just the brain, but the brain-body system), embedded (richly and bi-directionally connected to the world around us), and enactive (meaning is not out there in the world, nor is it 'constructed' by us, but rather concerns the very real relation between the state of the world and our purpose to try to keep living). While being a 'biological' position that acknowledges the importance of physiological processes for understanding behavior, 3EP places equal value on personal meaning and interpersonal scales of explanation. In this way it is a non-reductionistic position, yet does not ignore the importance of the body and its biological constitution. 3EP thus sees all the various scales of explanation relevant to understanding human behavior as different perspectival aspects of the same dynamic whole – an organism standing in relation to its environment (both physical and socio-cultural). On this view mental disorders appear as patterns existing across brain, body, and environment, keeping people stuck in patterns of behavior that are working against their own adaption and self-maintenance. To conserve space this summary has been extremely brief. For fuller accounts see: Nielsen (2020, 2021), Nielsen and Ward (2018, 2020). For a complimentary perspective on mental disorder referred to as Enactive Psychiatry see: de Haan (2020a, 2020b, 2020c).

While the BPS is a general framework of health and 3EP is a developing conceptual perspective specifically focused on mental disorder, both positions overlap in important ways. Both positions seek to move beyond purely biomedical understandings and recognize the legitimacy of socio-cultural and environmental impacts on health. Further, both do so by claiming to place biological, psychological, social, and environmental factors into a single ontological space, thus accounting for increasingly recognized interactions between these 'domains'. Both positions engage with notions of formal/organizational causality as seen through their shared talk of 'systems' and 'dynamics'. Finally, both positions seem to see such organizational causality as a way to account for the emergence of apparent purposes/teleology, against which they can meaningfully speak of function/dysfunction. There are however, important differences in how these tasks are achieved. Here we will explore two of these differences, and use the discussion to highlight areas where the current construal of Bolton and Gillett's BPS leaves us wanting to know more.

2.1. The Role of 'Information'

Following Engel, Bolton and Gillett's BPS framework views the world in terms of relatively distinct (but not ontologically separate) domains of the biological, the psychological, and the socio-political. This then presents them with somewhat of a 're-stitching' problem, and they subsequently account for relationships between these domains using the key notions of *information transfer* and *regulatory control*. At the risk of over-summarizing this view: Biological processes receive information/instructions from DNA and, through following these instructions, regulate their own physico-chemical constitution and immediate environments. Psychological processes meanwhile (embodied in the nervous system) receive and integrate information about the state of the self and the world via sensory input, and attempt to regulate the world and self in a way that meets the organism's needs through embodied agency. Finally, socio-political processes (embodied in the actions of the collective) involve the perception and recognition of others (a complex form of information transfer), and the regulatory control of resources needed by individuals.

An important question at this point however is 'what exactly is information?'. The notion of information in biological systems has generated considerable philosophical debate, and these debates are of great relevance to B&G given the central role information plays in their account. Godfrey-Smith and Sterelny's (2007) entry on "Biological Information" in *Stanford Encyclopedia of Philosophy* is a great resource for this purpose, and we'll summarize some pertinent remarks here. An uncontroversial and minimal notion of information is that of Shannon information, according to which any variable may be said to 'contain/carry/be' information about a source if it correlates with the state of that source. On this account information is said to be present in the variable in that the variable can be used to predict the state of the distal source. There is no greater commitment in Shannon information that there is any biological system designed/intended to produce that signal or to use it once produced. Biologists, however, often appear to use a notion of information that is richer than Shannon information and much more controversial, i.e. information with semantic and intentional content. Godfrey-Smith and Sterelny (2016) present readers with three options with regards to the concept of semantic information in biology:

1. Semantic information is useful as an analogy, as a metaphor, but not intended to be literally true.

2. Semantic information literally exists in biological systems, in which case the task of the philosopher is to explain how

semantic information can arise and exist in non-intelligent systems.

3. Shannon information is sufficient for biological systems and no richer concept is needed.

We don't intend to settle this debate here or defend a particular approach, but we want to point out that the philosophical validity of any particular view is far from obvious. It would appear that B&G would adopt the second view, that semantic information literally exists, but it is unclear how they would defend it. B&G do, however, demonstrate clear awareness of the contextuality of information. For example, when discussing genetics/DNA they stress that

> genes code for particular proteins (…) [where] 'code for' means: in normal circumstances, in the normal cellular environment, in a complex series of interlocking steps, such-and-such DNA sequence produces such-and-such protein. (Bolton and Gillett 2019, 54)

In making such specifications they acknowledge awareness that information is always contextual—e.g., language is gibberish to those of a completely different social-cultural context. Ultimately information is merely a flow of change within a system, change that is then used by the system in some way. This would suggest that their view is also compatible with understanding semantic information as analogy, an epistemological tool utilized by observers—a way that we can make (our own) sense of the system/s understudy. As such, information-processing is a model or metaphor, representing one possible way to understand a system. Either way, there is little philosophical clarity on this point.

No such information processing metaphor is employed under the 3EP view. Under 3EP there is no tripartite structure to the ontology. Instead, the brain, body, and environment are considered to all be constituted from material substance, and to form a complex dynamical system existing across different scales of time and space—i.e., the so-called 'brain-body-environment system'. Rather than traditional levels of ontology such as the genetic, cellular, organistic, organismic, behavioral, or social, 3EP recognizes such divisions as simply referring to increasing constitutional complexity across increasing scales of time and space, with the emergence of some organizationally closed systems along the way (Di Paolo et al. 2018; Maiese 2016; Thompson 2007; Varela et al. 2017; Potochnik 2010). Because of this there is no mysterious interaction between domains or levels to be explained by information exchange. Thus, instead of the

language of 'information' and 'regulatory control' seen in the BPS, 3EP utilizes the language of *organizational* or *circular causality* (Fuchs 2017), speaking of concepts such as *emergence*, *constraint*, and *constitution*, when navigating multi-scale interactions.

A question that may arise at this point is, what then is the psychological in such a materialist (but dynamical) worldview? In short, under the enactive approach the biological and psychological are seen as continuous. The psychological is something that is enacted through the organization and action of the biological organism (Thompson 2007). To put it another way, the enactive approach avoids substance dualism by holding 'the mind' to be a verb, not a noun. This relates to a key concept of the enactive approach known as the 'deep continuity thesis', which we will return to in the next section. On this view the organizational structures of life *are* the structures of mind and the psychological is therefore thoroughly embodied.

As one way of attempting to understand the dynamic constitution of a human being standing in their environment, the model of information processing may well be a helpful one. In essence it represents somewhat of a cognitive/epistemological short-cut via metaphor to communications equipment or computers. However, B&G reference the idea of an embodied, embedded, and enactive mind as inspiration for their framework, and these ideas apparently play a core role in their concept of embodied agency (Bolton and Gillett 2019, 76). Given that these schools of thought commonly avoid talk of information, and arguably successfully navigate similar conceptual issues to the BPS without reliance on an information-processing metaphor, the necessity of B&G's reliance on an information processing approach is not entirely clear.

2.2. The Emergence of Normativity/Functionality

One of the biggest challenges for naturalist approaches to conceptualizing health is that health is a fundamentally normative idea, and the natural is traditionally seen in opposition to the normative. In order to say that some state of the world is naturally preferable to another (e.g., not having cancer vs. having cancer) we need to be able to traverse the 'normative gap' between what is (i.e., the factual state of a person) and what we are claiming ought to be (i.e., a state of health). B&G's biopsychosocial framework claims to have crossed this divide. For example, they claim that "(…) the theory is fundamentally normative (…)" (Bolton and Gillett 2019, 35). However, as far as we can tell they do not directly and explicitly address how they see themselves as having crossed it. Within the biological domain they appear to attempt to do so using the notion of information and error. As they move into the psychological and socio-political domains

they appear to shift to a reliance on a systems-based notion of functionality and preservation of the system. In this section we compare B&G's approach to the 3EP approach which is more thoroughly systems-based and currently more specified. We argue that this systems-based understanding is preferable, and that the BPS could be improved by explicitly and more thoroughly assuming such a systems-based approach.

In chapter 2 while discussing the biological domain, B&G state that

> (…) regulation and control mechanisms keep things going *right rather than wrong*. Such normativity is not apparent in the energy equations of physics and chemistry, which always apply and never fail. It arises in biology for the first time, marking a fundamental departure of biology from physical and chemical processes alone. (Bolton and Gillett 2019, 50)

They also seem to imply that this normativity has to do with information and how it can contain errors or be misread

> (…) the information-processing paradigm in biology secures the fundamental point that the functional end of a system (…) is (…) already present in the system prior to production, as instructions and a mechanism for the production. (Bolton and Gillett 2019, 54)

It is therefore through the fact that we can see 'instructions' in biology/DNA that B&G claim we can first see normativity arising.

However, B&G also reference a different source of normativity, that of the wider functioning of the system. They state that "(…) normativity also applies at the level of the whole organism in interaction with the environment: interaction is *adaptive* insofar as it promotes continuity and functioning and is otherwise *maladaptive*" (Bolton and Gillett 2019, 51). As B&G shift to discussing the psychological and social domains in chapter 3, and the wider notions of health and disease in chapter 4, they appear to speak less about information and error as a normative basis, and more about perpetuation of the system as a basis for defining functionality. For example, in chapter 4, when they come closest to directly addressing the source of normativity within the BPS, they are clear that the logic of attributing disease is 'top-down'. They state that "[i]t is poor outcomes at the level of the whole that ultimately drives attribution of dysfunctionality downwards to the parts that serve the whole" (Bolton and Gillett 2019, 111).

The 3EP perspective has a strength in that it directly addresses this normative gap. Nielsen and Ward (2020) explore how the enactive concepts of self-maintenance and adaption, grounded in the organizational structures of life, lay the groundwork for a view of mental disorder that is both natural *and* normative. In doing so, they also draw on the work of non-enactive authors that have developed consilient arguments for the natural emergence of normativity such as Okrent (2017) and Christensen (2012). They demonstrate how the deep continuity thesis at the heart of enactivism is itself an account of natural normativity:

> Under the deep continuity thesis, all life shares an embodied "concern" (i.e., a self-perpetuating structure) for the continuation of the self (…) in the face of changing and precarious environmental conditions (…). Insofar as an organism *should* act to maintain its own life, there are states, actions, and processes that the organism *should* be in or perform. (Nielsen and Ward 2020, 8)

From these roots, Nielsen and Ward show how a view emerges where mental disorder can be seen as a pattern of behavior (including cognition and affect), enacted by an organism, that pushes significantly counter to its own self-maintenance and adaption in context.

Such a perspective aligns well with a view where organisms are understood as systems that maintain a non-equilibrium steady state, temporarily pushing back against the 2nd law of thermodynamics. Coming at the same idea from this explicitly systemic view, what is functional is what manages to serve the survival of the organism at a non-equilibrium steady state within a fluctuating environment. A similar systemic notion of functionality appears to be inherent (and potentially extended) in recent perspectives such as active/enactive inference (Ramstead et al. 2020), or the social ecological model of mental functioning (Chapman 2021). As mentioned, such a view is alluded to by B&G but is currently somewhat underspecified. Given our concerns about the role of information expressed in the previous section, we suspect this systemic approach holds much greater potential than attempting to ground normativity in the idea of information and error.

2.3. Summary

In summary of section 2:

- *B&G explicitly reference ideas of embodiment, embedment, and enactivism, and their work shares some overlap in intention with*

a 3EP approach. Their work seems somewhat 'proto-enactive' in that these ideas are referenced but do not seem to permeate their approach.

- *B&G's notion of 'information' is currently underspecified and potentially in tension with their supposed grounding in ideas of embodiment and enactivism.*

- *B&G claim to have crossed the 'normative gap', a challenge for any naturalist account of health and disease, but how they do so is unclear.*

- *At times, B&G seem to reference a systems-based/organizational notion of natural normativity. Such an approach has potential, but is significantly underspecified in their current account. Such an approach is more fully explored by Nielsen and Ward (2020).*

Acknowledgments

The authors would like to thank Hane Maung for his comments on a draft of this article

REFERENCES

Aftab, Awais. 2020. The Nine Lives of Biopsychosocial Framework. *Psychiatric Times*. Accessed July 24, 2021. https://www.psychiatrictimes.com/view/nine-lives-biopsychosocial-framework

Bolton, Derek and Grant Gillett. 2019. *The Biopsychosocial Model of Health and Disease: New Philosophical and Scientific Developments*. Cham, Switzerland: Palgrave Pivot.

Chapman, Robert. 2021. 'Neurodiversity and the Social Ecology of Mental Functioning'. *Perspectives on Psychological Science:* 1745691620959833. https://doi.org/10.1177/1745691620959833.

Christensen, Wayne. 2012. 'Natural Sources of Normativity'. *Studies in History and Philosophy of Science Part C: Studies in History and Philosophy of Biological and Biomedical Sciences* 43 (1): 104–112. https://doi.org/10.1016/j.shpsc.2011.05.009.

de Haan, Sanneke. 2020a. 'An Enactive Approach to Psychiatry'. *Philosophy, Psychiatry and Psychology* 27 (1), 3–25. https://doi.org/10.1353/ppp.2020.0001.

de Haan, Sanneke. 2020b. 'Bio-psycho-social Interaction: An Enactive Perspective'. *International Review of Psychiatry*, 1–7. https://doi.org/10.1080/09540261.2020.1830753.

de Haan, Sanneke. 2020c. *Enactive Psychiatry*. Cambridge, UK: Cambridge University Press.

Di Paolo, Ezequiel A., Elena Clare Cuffari, and Hanne De Jaegher. 2018. *Linguistic Bodies: The Continuity between Life and Language*. Cambridge, MA: The MIT Press.

Engel, George L. 1977. 'The Need for a New Medical Model: A Challenge for Biomedicine'. *Science* 196 (4286), 129-136. https://doi.org/10.1126/science.847460.

Engel, George L. 1992. 'How Much Longer Must Medicine's Science Be Bound by a Seventeenth Century World View?'. *Psychotherapy and Psychosomatics 57* (1-2), 3-16. https://doi.org/10.1159/000288568.

Engel, George L. 1997. 'From Biomedical to Biopsychosocial: Being Scientific in the Human Domain'. *Psychosomatics* 38 (6), 521-528. https://doi.org/10.1016/S0033-3182(97)71396-3.

Eronen, Markus I. 2021. 'The Levels Problem in Psychopathology'. *Psychological Medicine* 51 (6), 927-933. https://doi.org/10.1017/S0033291719002514.

Fuchs, Thomas. 2017. *Ecology of the Brain: The Phenomenology and Biology of the Embodied Mind*. Oxford, UK: Oxford University Press.

Ghaemi, S. Nassir. 2010. *The Rise and Fall of the Biopsychosocial Model: Reconciling Art and Science in Psychiatry*. Baltimore, MD: JHU Press.

Godfrey-Smith, Peter and Kim Sterelny. 2016. *Biological Information*. The Stanford Encyclopedia of Philosophy. Edited by Edward N. Zalta. Accessed July 24, 2021. https://plato.stanford.edu/archives/sum2016/entries/information-biological/.

Huda, Ahmed Samei. 2020. 'The Medical Model and Its Application in Mental Health'. *International Review of Psychiatry* (2020): 1-8. https://doi.org/10.1080/09540261.2020.1845125.

Kendler, Kenneth S. 2005. 'Toward a Philosophical Structure for Psychiatry'. *American Journal of Psychiatry* 162 (3): 433-440. https://doi.org/10.1176/appi.ajp.162.3.433.

Kendler, Kenneth S. 2010. 'The Rise and Fall of the Biopsychosocial Model: Reconciling Art and Science in Psychiatry (Book Forum)'. *American Journal of Psychiatry* 167 (8): 999. https://doi.org/10.1176/appi.ajp.2010.10020268.

Maiese, Michelle. 2016. *Embodied Selves and Divided Minds*. Oxford: Oxford University Press.

McHugh, Paul R., and Phillip R. Slavney. 1998. *The Perspectives of Psychiatry*. Baltimore, MD: JHU Press.

McLaren, Niall. 1998. 'A Critical Review of The Biopsychosocial Model'. *Australian & New Zealand Journal of Psychiatry* 32 (1), 86-92. https://doi.org/10.3109/00048679809062712.

Nielsen, Kristopher. 2020. *What is Mental Disorder? Developing an Embodied, Embedded, and Enactive Psychopathology* [PhD thesis, Victoria University of Wellington]. Accessed July 24, 2021. http://hdl.handle.net/10063/8957.

Nielsen, Kristopher. 2021. 'Comparing Two Enactive Perspectives on Mental Disorder'. *Philosophy, Psychiatry and Psychology*, 28 (3), 175-185. https://doi.org/10.1353/ppp.2021.0028.

Nielsen, Kristopher, and Tony Ward. 2018. 'Towards a New Conceptual Framework for Psychopathology: Embodiment, Enactivism and Embedment'. *Theory & Psychology*, 8 (6): 800–822. https://doi.org/10.1177/0959354318808394.

Nielsen, Kristopher, and Tony Ward. 2020. Mental Disorder as both Natural and Normative: Developing the Normative Dimension of the 3E Conceptual Framework for Psychopathology. *Journal of Theoretical and Philosophical Psychology* 40 (2): 107–123. https://doi.org/10.1037/teo0000118.

Okrent, Mark. 2017. *Nature and Normativity: Biology, Teleology, and Meaning*. New York: Routledge.

Pies, Ronald. 2020. Can We Salvage the Biopsychosocial Model? *Psychiatric Times*. Accessed July 24, 2021. https://www.psychiatrictimes.com/view/can-we-salvage-biopsychosocial-model.

Potochnik, Angela. 2010. Levels of Explanation Reconceived. *Philosophy of Science* 77 (1): 59–72. https://doi.org/10.1086/650208.

Ramstead, Maxwell J. D., Michael D. Kirchhoff, and Karl J. Friston. 2020. 'A Tale of Two Densities: Active Inference Is Enactive Inference'. *Adaptive Behavior* 28 (4): 225–239. https://doi.org/10.1177/1059712319862774.

Thompson, Evan. 2007. *Mind in Life: Biology, Phenomenology, and the Sciences of Mind*. Cambridge, MA: Harvard University Press.

Varela, Francisco J., Evan Thompson, and Eleanor Rosch. 2017. *The Embodied Mind: Cognitive Science and Human Experience*. Cambridge, MA: The MIT Press.

Waterman, G. Scott. 2006. 'Does the Biopsychosocial Model Help or Hinder Our Efforts to Understand and Teach Psychiatry?'. *Psychiatric Times* 23 (14): 12-13.