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CLASSIFICATION IN PSYCHIATRY: FROM A SYMPTOM BASED TO A CAUSE BASED MODEL?

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SUMMARY

The assumption that eventually the classification in the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders (DSM) will incorporate aspects of causation uncovered by research in neuroscience is examined in view of the National Institute of Mental Health,'s NIMH Research Domain Criteria (RDoC) project. I argue that significant advantages of maintaining the classification system, focussed on grouped descriptions of symptoms, are often undervalued or not considered. In this paper I will challenge the standard view that the transition from the purely symptom based approach is an inevitable and desirable change.

Key words: *classification – symptoms - mental illnesses - biomarkers*

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INTRODUCTION

A standard view exists in much of psychiatry that classification in the American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders* (DSM) will incorporate aspects of causation uncovered by research in neuroscience. Currently the DSM aims to minimise the influence of notions of causation and aetiology, omitting any deeper theoretical underpinning. Arguments in favour of the standard view focus on two main factors, first of all that the introduction of causation is necessary to ensure classification is stable and "carving nature at its joints" (Regier 2009), and secondly that future research will empirically demonstrate that adding aetiology into classification will bring advantages in treatment. Much of the literature addresses when and how such a shift to include causes in classification will occur. Significant advantages of maintaining the classification system, focussed on grouped descriptions of symptoms, are often undervalued or not considered. In this paper I will challenge the standard view that the transition from the purely symptom based approach is an inevitable and desirable change.

Calls for such a shift are common in the field of psychiatry. There is a desire for an alteration in the underpinnings of the DSM to more closely reflect the new research being conducted into the linkages between mental disorder and physical processes within the brain. The calls for a change are largely driven by recent technological advances in neuroscience. One of the levels this is occurring at is advances in analysing brain structure, with the increased use of computerised tomography (CT) scanning and functional magnetic resonance imaging technology (fMRI) to visualise the structure of the brain in living patients. These technologies have allowed researchers to visualise the brains of people with mental disorders such as in schizophrenia and find significant differences when compared to healthy individuals (Wright 2000). Whilst these technologies are still in their infancy, it is apparent that they have worth when it comes to identifying linkages between the physical brain and mental disorders. More new insights are occurring at the biochemical level with alterations in neurotransmitter composition being shown to be strongly linked with various mental disorders, such as dopamine with the positive symptoms of schizophrenia (Seeman 2011). These findings suggest to some that molecules can be the cause of a disease. A third level for many researchers is genetics. With the increasing ease with which a genome can be sequenced and large scale genomic analyses, genetic and genomic linkages to mental disorder are being demonstrated. Huntington's disease is the prime example of this as the HD gene has been shown to be the necessary and sufficient cause of the disease (Walker 2007). Accordingly, the introduction of new techniques for visualising the living brain coupled with subsequent findings suggesting causal linkages, have brought forward the debate around the consequences of such research for psychiatric classification.

These advances have led many prominent figures in psychiatry to advocate an increased role for such physical causal theories in the DSM. Nancy Andreason, as a member of the task force for the development of DSM-III, and DSM-IV in an editorial of the American Journal of Psychiatry suggests that, "psychiatry is not only founded on diagnoses that are validated by clinical description and epidemiological criteria, but it is challenged by the opportunity to probe more deeply into mechanisms and perhaps to reach very fundamental levels of knowledge about etiology that will have profound implications" (Andreason 1995). In a piece by the chairs of the committee developing the most recent DSM (DSM-5) (American Psychiatric Association 2013), the belief in an eventual move towards an aetiologically based classification is again stressed with a focus on investigating, "how advances in neuroscience and behavioural science over the past two decades have

both increased our knowledge of etiologies and widened the gaps in our existing diagnostic system. A primary goal for revising DSM-5, then, is to more fully incorporate research from the past two decades in an attempt to build an empirical foundation."(Kupfer, 2008) The chairs of the DSM-5 committee in their summary of the continuing evolution of the DSM emphasised the importance of advances in neuroscience prioritising, "The opportunity to evaluate the readiness of neuroscientific advances in pathophysiology, genetics, pharmacogenomics, structural and functional imaging, and neuropsychology" (Kupfer 2008). There is a clear assumption within psychiatry that classification based on description alone is simply waiting to be superseded by what is seen as an inherently superior system incorporating aetiology to produce its definitions. However, I contend that when the potential advantages of cause based classifications are weighed against the oft overlooked benefits of the description based system, it becomes clear that the description based model is the superior option for classifying the majority of mental disorders.

BACKGROUND

Current classification in psychiatry is based on description of symptoms, the descriptive or atheoretical approach. It aims to reduce the involvement of causes, an approach enshrined in the DSM since the third edition in 1980. For instance, the previous second edition of DSM had included the neuroses as one of its nine major diagnostic groups" (Kupfer 2008). These were explicitly defined in the causal terms of psychoanalytic theory as an anxiety which was, "felt or expressed directly, or ... may be controlled unconsciously and automatically by conversion, displacement and various other psychological mechanisms" (American Psychiatric Association 1968). The notion of causation was included in the core definition of what the disorder was with the reference to various psychological mechanisms which caused the manifestation of symptoms. The third, fourth and fifth editions, with their atheoretical aims, classify very differently. In the current DSM classification criteria for schizophrenia are also focussed on descriptions of symptoms, with the first requirement being the presence of at least two symptoms from a list of: "delusions, hallucinations, disorganised speech, grossly disorganised or catatonic behaviour, and negative symptoms (i.e., diminished emotional expression or avolition)" (Tandon et al. 2013). The disorder is defined by its symptoms with no attempt to classify it by any underlying processes which lead to their appearance in a clinical case.

A range of different approaches have been suggested for the incorporation of neuroscientific concepts of causation in psychiatry to create a more aetiologically based classification. These range from strong reductionist arguments (such as from Carl Hempel) (Hempel 1970) which would eventually eliminate mental state terminology and replace it with universal laws, through to less radical versions such as that of Dominic Murphy which allow disorders to be defined by causes on a variety of levels from the genetic and biomolecular through to the psychological and social. The common theme is that research evidence from studies in subdisciplines of neuroscience will eventually prove too significant to be ignored. As these views are projections into the future there is little consensus on what this would entail for the current mental disorders in DSM-5. Research may radically shift, or simply reaffirm the current classes in psychiatry. The consensus amongst the proponents of a role for neuroscientific theory in classification is that the classification systems of mental disorders will define disorders using underlying causes.

The justifications for this approach revolve around two key arguments. The broader philosophical argument states that classifications based purely on symptoms are misguided as they are not representing an aspect of the nature of mental disorders. Neuroscience holds that mental disorders are products of the brain and classification should reflect this by including some references to structure and theory linking structure to disorder. More confidence could be had in the disorder categories if they could be shown to reflect distinct causal processes. This would lead to classifications which would be more stable over time, in the sense that they would be less prone to changing across the editions of the DSM. Treatment of mental disorders would be improved if the categories were made more stable in this way as the targets for treatments would be less prone to change. The second argument arising from this is that achieving a classification based on causes of disorders would result in improved treatments available to patients acting at the level of the causes of disease. It is assumed that studying causation in neuroscience would lead to the development of new treatments acting at the causal level. By classifying disease with reference to its neuroscientific causes, such new interventions would be optimally targeted, improving the treatment of patients. The advantages of a more accurate representation of the nature of mental disorders and consequently the development of treatments acting at these levels, serves as the justification for the introduction of aetiology into classification.

The case I will present for the continuation of atheoretical classification system is tripartite. First, research in neuroscience is uncovering increasing levels of complexity in the causation of mental disorder. This complexity means that there are no clear distinctions at the causal level to "carve nature at its joints" and produce a classification based on causes which would be stable over time, thereby rebutting the first argument in favour of a cause based classification. Second, the benefits from aligning classification to best suit treatments developed from an understanding of neuroscience are often overplayed, since these often revolve around arguments by analogy and projections into the future. The complexity of causation uncovered in neuroscientific research suggests that any treatments developed will not be dramatically advantageous.

Descriptive classification, on the other hand, has been shown to improve the treatment of patients. The introduction of classification which rejected theory in the 1980s was empirically shown to improve the reliability of diagnosis, in the sense that diagnosis of patients became much more consistent across the profession. In turn this improved the treatment of patients. A reliable classification was needed to be able to conduct trials on the new psychiatric drugs in the 1970s and 1980s and then to appropriately prescribe these drugs in the clinic. Third is the key advantage of the descriptive approach which a classification incorporating aetiology could not replicate. Atheoretical classification allows many different groups aiming to improve the lives of people with mental disorders to work together. The various disciplines involved in treatment of mental disorder bring with them different understandings of the causation of mental disorders and a variety of different efficacious treatments based on those theoretical models. Consequently, the atheoretical DSM serves as a contact language, allowing disciplines to coordinate their interventions. Introducing the theoretical framework of any particular discipline threatens to fragment the world of mental health, harming the ability of patients to access a range of treatments. Even if the study of causation in neuroscience produces effective new treatments in the future, classification based on causes should not be introduced.

STABILITY

Causation as a means of stabilising classifications

A desire for psychiatric classification to represent physical causes is common and comes in response to perceived failings in the stability of the purely descriptive DSM. Stability in this sense refers to how the classifications in the DSM are subject to change across the editions. This stability problem is highlighted by David Kupfer and colleagues when discussing how the DSM should in the future achieve, "appropriate placement and alignment of disorders (e.g., generalized anxiety and major depressive disorder)" (Kupfer 2008). Generalised anxiety disorder is an example of a disorder which has seen significant discussion and changes since DSM-III when it was found to be one of the least reliably diagnosed conditions (Andrews 2010). A major change for DSM-IV was introduced to allow different clinicians to reliably produce the same diagnosis. However, since then there is a new issue referred to by Kupfer and colleagues, namely that the overlap in genetics between patients between generalized anxiety disorder and manic depressive disorder is very significant, suggesting the classification of the disorder should alter once again (Kupfer 2008). The classification of generalised anxiety disorder has been and is subject to many such pressures with the result that it alters over time. This is just one example of many showing how the current descriptive classifications are seen as too unstable. The current classification of schizophrenia in DSM-5 is demonstrating an, "absence of clear boundaries around the condition" (Tandon 2013). Clinical diagnosis of post traumatic stress disorder proves to be significantly different when using DSM-5 or the rival *International Classification of Disease* system (ICD-11) as when patients were diagnosed, "a substantial portion met one but not the other set of criteria" (O'Donnell 2014) suggesting one or both classifications may have to substantially alter (O'Donnell 2014). In response to such concerns, there is a wish in psychiatry to include an aetiological basis in order to define the boundaries of disorders.

Producing a classification which is stable over time is an important aim in psychiatry. Treatments are researched and introduced against the various classifications in the DSM. If classifications come to shift significantly over time then the previous research base and treatments become unworkable. Kenneth Kendler emphasises this point in his analysis of how classifications in psychiatry change (Kendler 2012.). If too much change occurs in classifications, "the system will spin out of control and lose its cumulative character" (Kendler 2012). Finding a basis for classifications in the physical causes of disorders is desirable as it holds the prospect of providing more stability, ensuring that previous valuable research will not have to be discarded. A classification with underlying physical processes which will not alter over time is advantageous as it is much less subject to change than a classification based on symptoms which could feasibly be grouped in other ways.

Those setting out the overall aim for the development of DSM-5 refer to Carl Hempel's work on classification, using identical terminology about a classification which serves to, "carve nature at its joints*"* (Regier 2009, Hempel 1970*).* Carl Hempel's work is a canonical example of the advantages of aetiological classification for stability. In *Aspects of Scientific Explanation(1965)* (Hempel 1970)*,* Hempel includes an outline of a process by which an aetiologically based classification system should arise, and also aims to justify holding a theory based classification as a goal. In this model the introduction of the atheoretical approach was not a desirable goal of a classification, but a necessary step before empirical evidence revealed the fundamental laws by which psychiatric classification should be organised.

Hempel alludes to a standard pattern for classification in all of science, "from an initial "natural history" stage, which primarily seeks to describe the phenomena under study and to establish simple empirical generalisations concerning them, to subsequent more and more "theoretical" stages, in which increasing emphasis is placed upon the attainment of comprehensive theoretical accounts" (Hempel 1970). The "natural history" stage of science is characterised by a focus on description of the scientific object. Empirical data is the basis of this first stage but it alone is not sufficient for a truly scientific classification. First, sufficient data is collected so that characteristics of a class can be associated universally or with high probability. Then deeper theoretical research

can begin to analyse the simple causal laws which create the described characteristics. Hempel applied his concept of science as the search for causal laws as the sole basis of study to all fields. Psychiatry qualified as a science and so the process of classification creation would see, "the development from a predominantly descriptive to an increasingly theoretical emphasis" (Hempel 1970). Hempel's notion of causation is very simple and so when such causation is identified provides straightforward answers about how classification systems ought to be organised. The simple causal laws which underlie the idealised Hempelian classification system are based around clean, clear causal links. These general laws link the preconditions to the end outcomes in simple empirically tested ways and allow for explanation of end outcome and prediction about the future. A classification system based on explicit and clear aetiology was suggested as the only way for psychiatry to create true knowledge by scientific analysis as the categories would be stable in representing fundamental causal processes.

Hempel's justification for aspiring to this pattern of classification development comes from drawing an analogy to the success of such an approach in chemistry. Here a simple narrative can be painted to fit the model created by Hempel (1970). For example, Mendeleev classified the chemical elements by first describing their characteristics, the natural history stage. Groupings based on reactions were made on the basis of empirical observation of their reactions. Predictions were then made on the basis of the empirical data which in turn were proved correct as new elements were discovered. This empirically supported, descriptive classification was then studied in greater detail. Discovery of patterns of atomic structure and how these led to the observable characteristics provided the causal laws which were the ultimate goal of Hempel's science. The classification was given a, "deeper theoretical foundation" (Hempel 1970) with the discovery of the causal processes leading to the characteristics described in the earlier natural history phase of investigation. Causation was added in to the descriptive classification producing a stable classificatory system which does not shift its categories.

The development of classification of mental disorders has followed the Hempelian pattern in isolated examples. Up to the late nineteenth century neurosyphilis had been viewed as a collection of symptoms or end outcomes with no explanation of how they arose. A single spirochete bacterium was then found to be the specific causal agent of all of the diverse symptoms (Bolton 2013). It explained how the symptoms arose, and if it was present it was a predictor of future symptoms. This idea of mental disorders having simple, singular causes fits Hempel's ideal of finding the general laws which predict and explain events. Neurosyphilis could therefore move beyond being classified by its symptoms and to its clear simple causal explanation as a disease caused by the bacteria *Treponema pallidum.* The classification of neurosyphilis has not significantly shifted as it has this basis in an intransigent physical cause.

There was much hope that the new technologies developed in neuroscience would lead to more of these clear cut findings allowing consensus on defining disorders by their causes. Again the Hempelian pattern has been demonstrated on occasions. Huntington's disease is a prime example. Since the nineteenth century it had been known that Huntington's was hereditary (Walker 2007), suggesting it had some physical basis. The development of CT scanning lead to Huntington's being shown in the nineteen eighties to have a physical manifestation in the brain, which was even reliable enough to be used in diagnosis (Stober 1986). In 1993 the specific causal agent was found for Huntington's disease. The HD gene was shown to be the necessary and sufficient cause of the disease; this was in turn proven in studies involving transgenic mice as the introduction of a faulty version of the gene was sufficient to cause the symptoms of the disease (Walker 2007). The number of cytosine-adenine-guanine (CAG) repeats in the HD gene predicts the probability and age of onset of the disease before symptoms have arisen again demonstrating that the disease has a clear physical cause. The difference in protein structure, due to the altered gene, and the physical mechanism by which this is translated into an effect on brain structure have been elucidated. The disease can be confirmed on the basis of a test for the number of repeats, "A positive genetic test is cost effective and provides confirmation for patients who have developed signs and symptoms consistent with Huntington's disease" (Walker 2007). Huntington's disease has clear parallels with neurosyphilis, with a single clear causal process explaining and predicting the expressed symptoms. It is a disease with a set of symptoms which act as signs to a fundamental causal problem. The physical cause is then the crucial defining feature in both cases.

The DSM task force was following Hempel's lead in trying to improve psychiatric classification by incorporating the causes of disorders. In aiming to use causation as a tool for telling which classificatory options are correct, Hempel and the DSM committee are alluding to making mental disorder classifications match natural kinds, in Rachel Cooper's terms, of a "kinds-in-science tradition" (Cooper 2007). This conception defines natural kinds by their utility in scientific explanations. Causal links established between brain structures and mental disorders are of this type as they are an attempt to explain the end symptoms of a disorder. Hempel and the DSM committee are suggesting that there are, or at least appear to be, natural kinds in psychiatric disorders which would be useful in psychiatric classification. Rachel Cooper presents a strong defence of the notion that mental disorders can be separated on the basis of their causes. Cooper accepts there are no indisputable natural kinds in psychiatry, but that there is strong evidence for what appear to be natural kinds in the *kinds-in-science tradition,* and no strong arguments to deny using them" (Cooper 2007). These kinds would explain the causation of diseases and so would be useful in identifying how a classification system should be arranged. Finding these causal kinds is seen by the DSM

as a reasonable goal for psychiatric classification to improve the stability of mental disorder classes and so reduce the criticisms associated with the significant changes with each new edition of the DSM. In the following section I argue that this justification for adoption of aetiology, whilst attractive in theory, is not practical when it intersects with the complexities of causation in the majority of mental disorders.

The causation uncovered by neuroscience is too complex to routinely provide such stability

Instances of simple causation which lend themselves to the creation of stable classifications continue to be rare in mental disorders. Modern techniques in neuroscience have rarely revealed simple causes. Cases like neurosyphilis, where the disorder can be classified on the basis of highly significant influence of a single specific causal agent, are still very much the exceptions and not the rule. In DSM-5 separation on the basis of aetiology is only present in a few subtypes in the new category of neurocognitive disorders. Neurobiochemistry has traced Alzheimer's disease back to build up of amyloid-beta, with its role in causation of symptoms, "almost universally accepted" (LaFerla 2007). The discovery of prions in neuroscience also added in a subtype of disorder based on aetiology (Crowe 2015). However, there are not many other such discoveries linking back to causes to be made in the field of neuroscience. Dominic Murphy describes how Huntington's disease and others sit as rare outliers, "The genetic basis of Huntington's disease captures an important sense of fundamental explanation, but very few cases like it exist in psychiatry" (Murphy 2006). The chairs of the DSM-5 committee have regularly shown support for the goal of including neuroscientific causation in classification, and the techniques hoped to deliver the insights have become well established. The fact that so few disorders in DSM-5 have any reference to aetiology under these circumstances suggests significant causal factors in neuroscience may not be found in great number.

In contrast, the vast majority of disorders are currently demonstrating patterns of causation far too complex to produce the stable classification grounded in physical causes which Hempel and others desire. The modern technologies of neuroscience are uncovering a complexity of myriad causes for single mental disorders. For example, in schizophrenia the genetic research demonstrates a huge array of genes all implicated in schizophrenia and having varying levels of effect on their own. Rare genes which have a stronger association and more common genes with a weaker association are regularly being discovered (Craddock 2007). The complexities of genetics in schizophrenia are expressed by Allen Jablensky. In his assessment of the possibility of using causes identified by neuroscience to produce a stable classification he points out that, "the present evidence is neither unequivocal nor consistent. In the light of recent findings, the genetic architecture of schizophrenia now appears to be far more complex than previously thought" (Jablensky 2011). Jablensky then goes on to demonstrate how there is no momentum towards altering the classification of schizophrenia along aetiological lines (Jablensky 2011). One study suggesting a clear distinction within the genetics of schizophrenia, "which supports at least a partial aetiological separation of the two disorders" (Mortensen 2003) is soon countered by studies highlighting no significant difference (Lichtenstein 2009). There does not appear to be a clear way to classify schizophrenia by its genetic causes. Instead, brain imagining, bimolecular analysis, and genetic studies uncover increasing levels of complexity and not reductionist simplicity. On the current research trajectory it does not appear that schizophrenia will be reducible to simple causal laws.

This is likely to be the position for the majority of disorders in the DSM as across a range of mental disorders, research into causation is discovering increasing complexity and not converging simplification. Depression is another prime example, with a literature review by Schmidt and colleagues showing that markers of its biochemical causes are not suggesting a means for classifying the disorder, "it is not clear whether putative biomarkers for MDD have sufficient sensitivity, specificity, and reproducibility ... to diagnose and treat patients" (Schmidt 2011). Continuing genetic and genomic analysis of depression is similarly not leading towards a solution as to how to classify. Jonathan Flint and Kenneth Kendler's review of genetics and genomics in major depression highlights that research has not: demonstrated a way of using causation based on genetics to separate major depression from other disorders such as anxiety (Flint 2014); found a way to subdivide major depression based on genetic causes (Flint 2014); or supported any of the underlying causal theories currently presented for depression (Flint 2014). As Derek Bolton argues, research in neuroscience over the last few decades has for the most part not produced a simplified picture of mental disorders. Such research has, "uncovered systematic complexity, rather that reductionist simplicity" (Bolton 2013). Kenneth Kendler's projection about the future of aetiological research across psychiatry encapsulates this position, "It is highly unlikely that spirochete-like big explanations remain to be discovered for major psychiatric disorders. We have hunted for big, simple neuropathological explanations for psychiatric disorders and have not found them. Our current knowledge, although incomplete, strongly suggests that all major psychiatric disorders are complex and multifactoral" (Kendler 2005). Disorders with evidence for multiple types of causation are not showing the possibility of being reducible to single, or a few major causes. Currently it does not seem likely that it will be possible to produce strong evidence for disorders being distinguishable by their causes.

The belief that classification could in future include causation to reflect causal natural kinds in order to stabilise disorder classifications is therefore problematic. Instances where disorders can be strongly linked to individual causes are rare. Most disorders currently

demonstrate sufficiently complicated patterns of causation such that it is not possible to separate and classify disorders based on their causes. Neuroscientific research is not providing a simple means of classifying disorders based on causation. The belief that it will in future is a projection which is in tension with the substantial research evidence that for many disorders the position is one of increasing complexity. The chances of finding a clear answer to the issue of stability of categories seem slim to nonexistent for most disorders. Accordingly, the DSM committee members' focus on neuroscience and causal explanation to improve classification is unlikely to offer the advantages in stability that have been hoped for.

Symptom based classification addresses issues arising from perceived instability

A cause based classification that would provide a definitive solution on how to classify disorders may well not materialise. Consequently, the problem of the stability of classification in disorders such as Generalized Anxiety Disorder will not be solved by such an approach. Definitions and limits of disorders will continue to come under pressure and there is no simple solution on how to classify by causes. Relying on description is therefore commonly framed as an unfortunate fall back option. In fact the symptom based approach does counter one of the problems associated with the concern over the stability of psychiatric classification, namely that psychiatric conditions were simply arbitrary labels.

This stability problem was a significant factor in the public mistrust of the psychiatric profession in the 1960s and 1970s. Psychiatric classification was under attack from various figures such as Thomas Szasz, R. D. Laing and David Rosenhan. David Rosenhan's famous experiment where healthy subjects pretending to hear knocking were institutionalised heightened worries amongst the public about whether psychiatric classification was arbitrary and damaging (Rosenhan 1973). Strong objections to the psychiatric profession entered the public debate with a report on Thomas Szasz speaking at an anti-psychiatry symposium, made an article on page four of *The Times* in 1977 (Ferriman 1977). Instability of classification resulting from the shifting of the labels applied, helped to undermine public trust in psychiatry.

Instability was not the only issue with psychiatric classification which led to public mistrust in the profession. The unreliability of diagnosis between practitioners also contributed to doubts over classification. Michael First demonstrates how such a reliability problem existed prior to the introduction of the description based DSM-III (First 2013). Many studies were conducted into the reliability of psychiatric classification in the 1960s and 1970s. Some of the most eye opening were the comparative studies of British and American psychiatrists using the same DSM classifications in the 1960s and 1970s (First 2013). Robert Kendell and colleagues' study of 1971 involved showing the same videos of patients being interviewed to British and American psychiatrists (Kendell et al. 1971). American psychiatrists most commonly settled on a diagnosis of schizophrenia whereas the British psychiatrists provided a range of interpretations, with manic-depressive psychosis and personality disorder also being routinely diagnosed. Subsequent research went on to demonstrate that much of the reliability problem lay with the classifications as laid out in DSM-I and DSM-II. A study by Ward and colleagues of 1962 interviewed British psychiatrists about why they felt the discrepancies occurred and found that 65% attributed the problems to a lack of clarity in the DSM (First 2013).

The descriptive approach to classification was introduced because it was shown to perform well in tests of this conception of reliability. In solving the problem by creating a classification which could be reliably applied by different psychiatrists, the DSM-III authors led by Robert Spitzer built upon other projects seeking to describe disorders based on symptoms. The Feighner criteria, an early attempt at a description based classification, produced definitions for 15 disorders in 1972 (Feighner 1972). Key to these was their high reliability as demonstrated by Helzer and colleagues in 1977. Given their success, (they were cited 1157 times in the eight years following their release) (First 2013) the criteria were built upon in the production of the more universal research orientated Research Diagnostic Criteria in 1978. This in turn informed the production of the DSM-III classifications (First 2013). The success of this approach to classification is highlighted in Endicott and colleagues' review of how all of the new classifications of schizophrenia produced by various groups compared (Endicott 1982). Whilst the different classification systems disagree on who counts as having schizophrenia usually due to other features leading to a different classification, the systems broadly correlated. More selective classifications tended to choose those individuals who fell within the bounds of the more open classification systems. The crucial finding in favour of the new method of classification was that, "the reliabilities for all systems generally were much higher than those reported in the past for routine clinical diagnosis" (Endicott 1982). The atheoretical approach was shown to empirically increase the reliability of classification, helping to alleviate the sense that psychiatric classifications were arbitrary. It served as a beneficial advance in psychiatry and not an unfortunate but necessary regression as the work of Hempel and others would suggest.

IMPLICATIONS FOR TREATMENT

The key argument for the introduction of causes in the classification of mental disorders centres on whether such an approach would improve the treatments available to those suffering with mental disorders. Dr Nassir Ghaemi is one of many voices presenting the case for incorporating causation into psychiatric classification in order to improve the treatment of patients, "it seems to me to follow clearly that the main

goal of our nosology should be to help us find out what diseases are causing the symptoms experienced by our patients" (Ghaemi 2013). These practical, treatment based arguments revolve around the belief that the exclusion of causation limits the ability to utilise treatments which target the more fundamental causes of disease. By defining disorders in terms of only their symptoms, important causal links inherent in disorders are not being combated. Treatments are developed to combat particular sets of symptoms and not the deeper processes leading to the appearance of symptoms. If disorders were classified with reference to their aetiology, effective treatments against certain causes could be developed and be optimally used in cases where those causes were significant.

Examples which favour this view include the status of treatments in schizophrenia. Pharmacological treatments for schizophrenia have good efficacy against the positive symptoms of schizophrenia, the auditory hallucinations and delusions. Various anti-psychotics are available which can diminish these symptoms. Positive treatments are in fact only one of the three broad categories of symptoms in schizophrenia. The negative symptoms, such as loss of drive, and the symptoms relating to disorganised thought are not well managed by current anti-psychotic medications and there are few treatment options for improving these categories of symptoms (Erhart 2006). This suggests that the current treatments are only picking up on individual categories of symptoms and not the pathological processes which lead to their development. The same problem is highlighted in depression, where treatments only combat certain symptoms and not the overall causal process (Flint 2014). It is reasonable to think that if underlying causal processes were found that tied all of the various symptoms together, treatments could be developed which would act against the entire range of symptoms. Classifying disorder and therefore diagnosing in the clinic by these underlying causes would allow such novel treatments to be used effectively.

Argument by historical analogy and its limitations

In investigating how the incorporation of causes into the nosology of disease can produce such advances in treatment, analogies are often drawn to the advances in treatment in nineteenth and early twentieth century medicine. Some of the most effective treatments in medicine arose when diseases came to be defined by their causes. Dr Ghaemi writes, "Psychiatry sits in the same place scientifically as medicine did at the end of the 19th century. If we are to experience the advances that medicine achieved, we would do well to study and follow the example of historical successes" (Ghaemi 2013). The inclusion of causation into the heart of how we define disease in biological medicine led to the development of highly effective new treatments; psychiatry should follow suit. In constructing this argument Michel Foucault and K Codell Carter are often referred to as key figures in defining and explaining the benefits of such a switch.

Michel Foucault's explorations of the nature of categories of mental illness occur mainly in *Madness and Civilisation (*Foucault 1967*)* and his study of the adoptions of causation into bodily medicine in *Birth of the Clinic* (Foucault 1963). *Madness in Civilisation* is in line with the current beliefs that sociologists of scientific knowledge hold, in that it describes how our classification of mental illness is a social construct. There are many potential systems for framing what Foucault refers to as 'madness'. Any current classification is dependent on complex historical conditions for its instigation and maintenance. We can and must choose how to arrange classifications to have the most positive impact. This is where *Birth of the Clinic* becomes important in the discussion as it describes how large changes in bodily medicine were set in motion, due to the incorporation of causation into the conceptualisation of disease. Ultimately these changes resulted in dramatic improvements in treatment.

Foucault describes the classification of bodily disease prior to the nineteenth century as being based on "primary spatialization" (Gutting 1989). Diseases were divided into a genealogical tree based on their expressed symptoms alone. These organisations of disease did not encode any underlying idea of causation; symptoms were the sole manifestation of having the disease with no intermediary steps, "a local inflammation is merely the ideal juxtaposition of its historical element (redness, tumour, heat, pain) without their network of reciprocal determinations or their temporal intersection being involved" (Foucault 1963). Adoption of causation into classification accompanied the advent of new technologies. Foucault describes the dramatic transformations in medicine made possible by the advent of pathological anatomy, which led to diseases being considered as having a definitive location within the body" (Foucault 1963). Dissection helped to demonstrate the correlation between symptom and local organ lesion in the dead to allow some sense of physical causation to be included in thinking about disease. Laennec's invention of the stethoscope is an example of how it became possible in clinical diagnosis to look for physical causes of disease to distinguish between tuberculosis and other kinds of pleurisy (Reiser 1978).

Once the disease model had included the notion of symptoms being caused by damage to specific organs and tissues, causes of these organ lesions were located and highly effective treatments developed. K Codell Carter attributes great benefits in treatment to the adoption of causation, "the concept of specific causes – and therefore the idea of necessary causation – is an almost defining characteristic of modern Western medicine" (Carter 1991). Robert Koch, Louis Pasteur and others isolated specific causal agents, bacteria, which were generating the organ lesions across multiple diseases. Diseases in pathology came to be defined by their specific causative agent and not by collections of

symptoms. Subsequent research produced highly effective treatments, such as vaccinations against cholera and rabies. Focussing classification on the specific causes of diseases had large benefits for treatment.

Parallels are drawn to the situation in classification in psychiatry. The current DSM classifies mental illness in much the same way as Foucault's characterisation of eighteenth century disease with its explicit aim to avoid basing its entries on theoretical or causal inferences. Pleurisy could traditionally be comprehensively described, "by its four phenomena: fever difficulty in breathing, coughing and pains in the side" (Foucault 1963). Similarly the current DSM classification criteria for schizophrenia are also focussed on descriptions of symptoms. The DSM descriptions of mental disorders match Foucault's concept of primary spatialisation of diseases. The technological advances such as the neuroimaging and genetic sequencing techniques appear to match the bodily medicine advances of dissection and bacteriology, in localising disorder and finding a causal agent.

However this historical analogy is flawed. It overestimates the historical benefits in bodily medicine. Advances in nineteenth and twentieth century medical treatment only came when specific causes were identified. Instances of specific causes and treatments actually proved to be rare in bodily medicine. Michael Worboys points out that despite its lofty ambitions, the supposed "bacteriological revolution" only delivered 18 'discoveries' in the fifteen years from 1873 and that these did not cover, "many of the most contagious and specific of diseases" (Worboys 2007). Specific causes were not found for the majority of diseases researched so substantial advances in treatment only occurred in isolated instances. In the cases where specific causes were isolated, highly effective treatments were produced but these only applied to a small proportion of the total diseases investigated along these lines.

Equivalent situations will be even rarer in psychiatry. As has previously been discussed, specific causes have proved - and continue to prove - extremely uncommon. With regards to dramatically effective specific treatments arising, only neurosyphilis has seen the development of treatment acting against a specific cause, and this the result of bacteriological work back in the early twentieth century. Once again the complexity of patterns and systems of causation identified in recent neuroscience undermines the continued calls for incorporation causation into classification. Whilst cases where highly significant causes are identified, such as Huntington's disease, may well lead to the production of highly effective treatments, in the majority of conditions there does not appear to be specific simple patterns of causation to mental disorders. Consequently there is no opportunity to classify by such simple causation and produce the "magic bullet" treatments uncovered in bacteriology. Arguments by this historical analogy simply do not provide convincing evidence about the utility of incorporating aetiology into classification.

The strongest case for the inclusion of causation in classification

The investigation of more complex patterns of causation in neuroscience is ongoing and many are optimistic about the benefits for treatment that may be uncovered. The National Institute of Mental Health's Research Domain Criteria (RDoC) project is an ambitious attempt to produce new understandings of causation of mental disease and subsequently novel treatments. It is a neuroscience project, separating investigative targets on the basis of its theory and patterns of aetiology instead of current classifications of mental disorders (National Institute of Mental Health 2014). The current atheoretical classification system is seen as a barrier as it prohibits the inclusion of the new complex research data emerging from neuroscience, "If we assume that the clinical syndromes based on subjective symptoms are unique and unitary disorders, we undercut the power of biology to identify illnesses linked to pathophysiology and we limit the development of more specific treatments" (National Institute of Mental Health 2014). To avoid this limit on what can be investigated, the project is not working from current classifications based on symptoms and working down to find causal links. Instead it serves as a tool to compare physical factors analysed in neuroscience such as genetics and neural circuits (referred to as units of analysis), against symptoms grouped into various functions such as attention and reward learning (referred to as constructs grouped in broader domains). It is hoped that by comparing these significant correlations will be found demonstrating new causal links between structure and function. This could then lead to new treatments developed to act against the neuroscientific factors and improve the end symptom.

It is anticipated that the RDoC project will have implications for psychiatric classification should it succeed in finding significant neuroscientific causes of dysfunction. The project states that, "RDoC is not intended for clinical diagnosis at the current time" (National Institute of Mental Health 2014). Nevertheless, "RDoC is agnostic about current disorder categories. The intent is to generate classifications stemming from basic behavioural neuroscience" (National Institute of Mental Health 2014). Complexity of causation is expected and accepted, "The complexity of the brain is such that circuits and constructs will necessarily have considerable overlap, and arbitrary separations are unavoidable" (National Institute of Mental Health 2014). Currently the originators of the project only describe how their project will provide insight into physical causes of the dysfunction categories which combine in mental disorders. It expects new discoveries of important links between underlying causes and symptoms to arise and new treatments, and for this to influence classification to reflect this research and treatment. What it does not cover is how the DSM and other systems could incorporate such findings.

Dominic Murphy presents the strongest case for how such insight into causation in neuroscience should be incorporated into classification in psychiatry, to improve the treatment of patients. Murphy accepts the key feature of the discussion so far. Research will not produce simple suggestions for how to organise categories except in the few outlying cases, such as Huntington's and neurosyphilis, where the influence of a single causal factor is highly significant (Murphy 2006). Most disorders have patterns of causation demonstrating "hideous complexity" (Murphy 2006). not specific causal agents, and so most disorders will not come to represent natural kinds (Murphy 2006). For the majority of disorders there are no simple ways of classifying with regards to causation and no dramatic treatments to come.

Classification in psychiatry, Murphy maintains, must still try to represent the complex causation uncovered, merging psychiatry and cognitive neuroscience into a "synthetic neuropsychiatry" (Murphy 2006). Key to this argument is that only by understanding how symptoms are caused can the best treatments be researched and then used to treat disorders in patients, "the more causal relations we understand, the more opportunities we have for therapeutic interventions in a system" (Murphy 2006). The RDoC project satisfies the first part of this goal in that the study of causation is required to open the possibility of producing novel treatments acting against the causes identified. Classification systems should then be adapted to reflect the causal linkages discovered, as the treatments developed would be most effective when utilised in disorders in part defined by their causes.

To this end Murphy's suggestion for psychiatric classification would admit as many levels of causation as possible so that treatments acting against these causes can be optimally used. The underlying principle behind Murphy's classification is that it should represent a medical model where, "symptoms should be traced to underlying causal processes" (Murphy 2006). There is no requirement for absolute reductionism to a specific causal agent. Any causal link between the physical brain and mental disorder is important as a site for treatment and should be included in classification, be it at the genetic, biochemical, structural or any other unit of analysis. The key for the introduction of aetiology in causation is whether a cause has an associated treatment, which would be optimised by including the cause in classification. These arguments in favour of incorporation are compelling to a point. It seems reasonable to presume that RDoC and other neuroscientific research will produce treatments acting against some of the causes of mental disorders. Adapting classification to more closely reflect some of the more significant causes would optimise the effects of treatments acting against those causes. This is the main advantage of a classification system incorporating aetiology from neuroscience. In tension with this are the two advantages for treatment that the current descriptive system holds over the aetiological alternative. In the following section I argue that the adoption of aetiology first requires cause based classifications to equal the reliability of the current descriptive approach.

The reliability hurdle

Descriptive classification was introduced on the basis of improvements in treatment and it is important that these should not be lost. The increased reliability of diagnosis between psychiatrists, brought about by the descriptive DSM-III and discussed earlier, led to improvements in clinical treatment. Michael First references the advantages in treatment which follow on from reliability as a catalyst for the introduction of the descriptive system in the 1980 (First 2013). A new wave of effective psychiatric drugs was being developed from the 1960s, such as chlorpromazine in schizophrenia (First 2013). A system of reliable diagnosis was vital for research into these new treatments, and the subsequent prescription of those treatments to patients. Reliability of diagnosis is crucial for treatment today. It is essential in clinical trials that subjects are reliably diagnosed to allow for comparison. Patients in the clinic must then be reliably diagnosed so that appropriate treatments can be prescribed. Any putative classification must exhibit at least equivalent reliability to the current system to be worthy of consideration as an alternative.

The prime importance of a reliable classification system is highlighted in copious examples of successful treatments introduced without understanding of the underlying aetiology. For instance, topiramate has been shown to be effective against seizures in drug resistant epilepsy (Pulman 2014). despite having no detailed understanding of how it exerts this action (Goldenberg 2010). Lithium is widely and successfully prescribed in cases of bipolar depression, since its first trial in 1949 (Phiel 2001) again without an underlying comprehension of its aetiology (Phiel 2001). Paracetamol has been in mass usage for decades in spite of the fact that consensus on its mechanism of action has only begun to arise in recent years (Graham 2013). Such cases demonstrate how reliability of diagnosis is more fundamental in the provision of treatments than possessing a solid aetiological basis. All clinical treatments must have reliable targets to demonstrate efficacy. Comprehension of causes of disorders and how treatments act against them is of secondary importance. Reliable diagnostic categories are essential in the introduction of efficacious treatments in clinical practice.

Currently the descriptive approach to classification is by far the best option. It is justified on the basis of its reliability when utilised by researchers and clinicians. This reliability was vital in the adoption of the descriptive approach in DSM-III and has since been improved upon. It ensures treatments can be effectively trialled and then prescribed in the clinic to improve people's lives. Any putative classifications would first have to demonstrate this as it is fundamental for use in clinical treatment. If a system including aetiology as the base for classifications was shown to be sufficiently reliable, it would then have to be seen if its advantages outweighed the second major strength of the descriptive classification system.

DESCRIPTION BASED CLASSIFICATION AS A CONTACT LANGUAGE

Those suggesting that current technological advances in neuroscience will produce new treatments and therefore inevitably lead to inclusion of aetiology in classification are not engaging with the deeper question of whether the change in classification should be allowed to happen. This seems to be grounded in a belief that the new technology will automatically lead to progressive change. Even taking the best case scenario presented by the proponents of this view, namely that new treatments would be discovered acting against causes of disorders and a reliable cause based classification system developed, the disadvantages of incorporating neuroscientific aetiology in psychiatric classification would outweigh the advantages from new treatments developed. These disadvantages revolve around the fact that there are many different kinds of effective treatment in psychiatry based on a range of understandings of aetiology. Adoption of a particular group's aetiology would ostracise the others and restrict the ability of patients to access the full range of effective psychiatric treatments.

Research in neuroscience could well produce highly effective treatments combating some of the more significant causes of disorders. Yet these treatments will not prove to be as spectacularly effective as the antibiotics developed from classifying bodily diseases by their causal agents. As previously research in neuroscience is not demonstrating that the majority of mental disorders can be traced back to specific causes. Consequently, the RDoC and other projects will uncover significant but not specific causal links to symptoms from genetics and neurobiochemistry. These causal links will in turn lead to the development of effective treatments blocking the expression of symptoms. The lack of specific causation shows that treatments arising will not have effects as dramatically successful as the specific interventions produced in nineteenth and twentieth century medicine. Incorporating neuroscientific theory of causation will not have equally spectacular results. Instead the case for inclusion of this aetiology is that it would optimise the effects of the good, but not highly effective treatments.

This advantage, namely that the effectiveness of neuroscience based treatments would be optimised by adoption of its aetiology in classification, is in tension with a significant advantage of the aetiology free system. Crucially an atheoretical classification acts as a psychiatric contact language a topic explored by Rachel Cooper (2007). This concept arrives at Cooper via Peter Galison's analysis of how communication can occur between disciplines in experimental physics, and originates in anthropology to describe how trade can occur between people with assigning different meanings to the objects traded (Galison 1997). More than mere language differences, these are deeper theoretical differences over the significance of the concepts involved. A contact language therefore serves as a means of communication which strips out all of each side's specific meanings to produce a theory free way of conducting trades. By this method, objects with incommensurably different significance for each side can be productively traded. The example utilised by Galison is in Colombia where landowners trade with peasants (Galison 1997). For the landowners money is viewed in cold, naturalistic terms, a commodity to be accumulated. Peasants have a completely different conception of money, assigning it intentionality and moral significance. Money is even included in a baptism ritual whereby the physical note is given the name of the child. When the note is handed over to the landowner there is a deeper connection and a hope that the money should be returned. Such a transaction has vastly different connotations for each party, yet it must occur for the benefit both sides and so a meaning free transaction must be sought.

The variety of groups using the DSM classification in treatment hold their own different theoretical frameworks for understanding mental disorders and derive effective treatments for them. The main options available to treat depression highlight the range of aetiologies involved. Current pharmacological treatments are often based on understanding depression as the product of disturbances in monoamine neurotransmitters. For instance the link between tryptophan depletion and remission of depression (Smith 1997) provides the evidence supporting the role of serotonin in depression and explains why selective serotonin reuptake inhibitors are successful (Smith 1997). Cognitive behavioural therapies for depression are a product of a very different understanding of the causation of depression and originate in Beck's cognitive model. Here depression is understood as occurring when dysfunctional assumptions developed in the individual, intersect with negative life events (Alloy 2006). The successful treatment aims to correct the underlying beliefs of the patient. These are only two of many different aetiological understandings of depression used in the treatment of depression, with other interventions such as electroconvulsive therapy (Lisanby 2007), and social interventions also utilised in clinical practice (Cooney 2013).

Atheoretical classification serves as a psychiatric contact language enabling a range of treatments, provided by practitioners with different understanding of the causation of disorders, to be coordinated. Once a patient has been classified with respect to their symptoms, the descriptive system means that the single classification can provide access to a wide range of treatments based on entirely different aetiologies. Rachel Cooper demonstrates the effectiveness of removing aetiology from diagnosis. A psychoanalyst can "bracket off" their understanding of the causes of anxiety to reliably diagnose a patient based on symptoms. They can therefore suggest effective psychoactive drugs without having a neurobiochemist's understanding of mental disorder (Cooper 2007). Descriptive classification allows disciplines to communicate by providing intermediary disorders stripped of a particular group's aetiology and based on symptoms alone.

If neuroscientific theory was incorporated into the DSM as the fundamental aetiology such benefits would be lost. All of these different disciplines in and around psychiatry would object to one system of aetiology being favoured over all others. Should the RDoC project produce substantially different categories that optimise the effectiveness of its own brand of treatment we will have lost the benefit of the valuable research demonstrating the effectiveness of other types of treatment on the old categories. Other disciplines within psychiatry would be given two choices. They could recreate their evidence base through a classification system optimised for a different discipline potentially producing worse results. Or more likely they could individually develop their own classification, based on their own understanding of what mental disorders are and how they develop.

This danger was recognised and emphasised during the creation of DSM-III and needs to be noted now. The introduction to DSM-III states that for focussing on description and not aetiology, "The major justification... is that the inclusion of etiological theories would be an obstacle to the use of the manual by clinicians of varying theoretical orientations" (American Psychiatric Association 1980). Disciplines could branch off from a classification system they opposed and create their own classifications based on their preferred aetiologies. Significant differences would naturally arise from their different viewpoints. Crucially, such a situation is not in a patient's best interests. To access a different kind of treatment, it would be necessary to be diagnosed afresh within the theoretical framework of whichever discipline provides a particular treatment. Patients with mental disorders have trouble enough seeking help and navigating the psychiatric healthcare system. Against this backdrop, an intervention which would further serve to partition mental healthcare into sub-disciplines is a serious concern.

Dominic Murphy's counterargument against the open nature of descriptive classification centres on two points. The first is that, in practice, classification is not treated as aetiology free, as different practitioners configure mental disorders through their own theoretical understanding of the causes. Interpretation of behaviour, such as language, intonation, and posture, relies on some level of theoretical inferences learnt in training to become a psychiatrist (Meehl 1993). Murphy sees a classification system which ignores this and, "that we have to try and evade" as a dissatisfying situation and a classification which represents what occurs in clinical practice as a preferable alternative. In fact this dissatisfaction is a sign that descriptive classification is working as a contact language. Atheoretical classification is designed to allow different groups to impart their understandings of causation of disorders over the top of the same disorder. All parties are slightly dissatisfied with the classification's lack of aetiology, but crucially not enough to stop utilising it. If particular groups' wishes for the inclusion of causation were satisfied, such as the neuroscientists', then other groups would likely stop using the classification system. Descriptive classification allows different theoretical understandings to be applied and this is a significant advantage, not a disadvantage.

The second counterargument presented by Dominic Murphy is that by not specifying preferred theory in the authoritative classification, treatments based on harmful understandings of causation are not suppressed. Murphy uses the example of autism where some practitioners still hold to Bettelheim's notion that autism is a product of a "refrigerator mother" (Murphy 2006). A classification which does not include reference to causation leaves open the possibility of such damaging practices. In response to this criticism the wider implications of descriptive classification leaving open multiple types of treatment should be remembered. The availability of a wide range of effective treatments based on different aetiologies is a significant advantage for patients to be weighed up against the disadvantage of rare cases of harmful practices persisting. Treatments based on damaging aetiologies can be marginalised or even eliminated from clinical practice by regulation and withdrawal of funding, significantly reducing this disadvantage of aetiology free classification. Descriptive classification and its substantial advantages in providing the opportunity to access a broad spectrum of treatments should be maintained.

There is no evidence to suggest that the RDoC and similar neuroscience based projects will produce the sort of spectacular benefits for treatment that occurred in bodily medicine in the nineteenth and early twentieth century. Good new treatments may well arise from such research, which may be optimised by producing a classification system incorporating aetiology. Proponents of this view seem to have become distracted by the new theory and technology and have not considered the considerable downsides which would arise. The introduction of an aetiology based classification would harm treatment by alienating certain disciplines and their effective treatments. If the RDoC project is successful in producing novel treatments, these should be incorporated within a descriptive classification to ensure that patients accessing care have a full range of effective treatments open to them.

CONCLUSION

The standard view amongst members of the DSM committee is that the classification system should eventually come to include some basis in neuroscience and its aetiology. This view has been a constant across three decades and three editions of the DSM. Darrell Regier and colleagues still refer back to Samuel Guze's assertions in the 1970s that a change to incorporation of physical causation would eventually happen (Regier 2009). The view survived the introduction of the descriptive DSM-III, despite it being introduced on the basis of evidence that it would significantly improve the treatment of patients. It seems to be based in a belief that the exciting new technologies being developed and

increasingly implemented in neuroscientific research, will inevitably lead to dramatic changes. These changes would produce a clear picture of how to arrange a classification based on aetiology to "carve nature at its joints", solving the problem of definitions of disorders drifting across editions and distinguishing overlapping disorders. Research by projects such as RDoC would find new treatments by configuring disorder from causes and so classification would be altered to include causation and maximise the effectiveness of these treatments. This optimistic view of the progress of neuroscience is firmly entrenched and too little attention has been placed on the deeper analysis of what such a change would actually consist of and what disadvantages it would entail.

Potential advantages of the inclusion of aetiology have been overstated. The desire to replicate an approach akin to the periodic table, with its stability based on simple causal laws, is understandable. A similarly stable classification based on unchanging causal patterns would be a distinct bonus to psychiatry as disorders would be less subject to change over time. However, it does not seem to be an achievable goal for the majority of disorders. Barring a few isolated examples, such as Huntington's disease and prion diseases, simple causal agents which can predict and explain the course of a disorder have not been uncovered in the course of decades of research utilising new neuroscience techniques. In contrast the patterns of causation uncovered in many disorders such as depression and schizophrenia are highly complex and further research simply highlights increasing complexity. There does not seem to be compelling evidence that research disorders will come to be clearly differentiated, realigned or subdivided on the basis of their aetiology. A classification of these disorders based on causation would necessarily be a simplification of the reality of causation and so would not serve to produce a stable classification to "carve nature at its joints". The Hempelian pattern, whereby descriptive classification is superseded by the addition of an underlying basis of simple causes, does not appear to be applicable in psychiatric classification.

The second justification for adopting causation is that it would improve the treatment of patients by allowing the fundamental causes of disorders to be combated and not just individual groups of symptoms. Arguments by historical analogy are often referred to as evidence supporting a change. The alteration in the conception of bodily disease from a non-localised set of symptoms to a causal process rooted in physical changes in organ lesions described by Foucault did lead on to dramatic advances in treatment. Vaccines and antibiotics produced against the specific causes of disease made classifying by causal agent an obvious choice to improve the treatment of patients. However, the problem with this analogy is that its successes rely on the discovery of specific causes. These proved scarce in bodily medicine and seem scarcer still in psychiatric disorders. For the disorders where specific causal agents are found, dramatically effective treatments may be found, but this is not applicable across the range of psychiatric disorders.

By combining the aspirations of the RDoC project and Dominic Murphy's suggestions for how aetiology may be included in future classifications, it is possible to argue that the treatment of patients would be improved by classification reflecting some of the causes in disorders demonstrating complex patterns of causation. RDoC's comparisons of various units of analysis of neuroscience against alterations in function seem likely to identify significant, but not specific, causal relationships. It is reasonable then to presume that treatments would be developed acting at the level of these causes. Aligning the categories of mental disorder in the DSM against these significant causes would optimise the effectiveness of such treatments. The advantages of such a shift would be positive but not as dramatic as in the disorders where specific causes are found.

Any potential cause-based classification arising would then have to show that it could at least match the strength of descriptive classification which ultimately led to its adoption in the DSM. Reliability has been pivotal to the success of the third and subsequent editions of the DSM. Such reliability is essential in clinical practice as it is required for the conduction of randomised control trials, and then to select patients who would benefit from certain treatments. At this point it is hard to project whether alternative classifications would achieve sufficient reliability although there is no convincing evidence to suggest this could not happen.

If alternatives to descriptive classifications do go on to demonstrate the requisite level of reliability, the advantages from optimising treatments acting against significant causes can then be weighed against a significant but often overlooked advantage of current DSM classification. Restricting the occurrence of aetiology allows the DSM to serve as a contact language between disciplines and this is in the best interest of patients. Successful treatments acting against causes uncovered in neuroscientific research would still be one of many different kinds of effective treatment. The great advantage of the atheoretical DSM is its ability to allow all professionals with an interest in improving patient's lives to adopt a coordinated approach. Many treatments with different underlying aetiologies can be accessed with a single diagnosis in a universal descriptive classification system. If a particular treatment is not suiting a patient they have the ability to opt for a different treatment. Incorporating aetiology into classifications would serve to limit patient's options for treatment as they would require different diagnoses under the aetiologies of other disciplines. Accordingly, the advantage of incorporating causes in optimising the effectiveness of treatment acting under neuroscience's aetiology is outweighed by the disadvantage of blocking access to effective treatments based on other aetiologies.

The current philosophical underpinning of psychiatric classification in the DSM, namely an aim to keep away from aetiology and focus on description of symptoms, should be maintained. This approach does not mean that the importance of advances in research in neuroscience is being denigrated. It seems highly probable that effective new treatments may arise from utilising modern technologies, greatly improving the lives of many people. However, it is vitally important not to become too wedded to whichever aspect of psychiatric research seems the most fruitful at any one time. The complexity of psychiatric disorders, and the vast array of effective treatments, must not be forgotten. Description based classification is the best way to ensure that a full range of effective treatments are available to improve people's lives.

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References

1. *Alloy L, Abramson LY, Whitehouse WG, Hogan ME, Panzarella C & Rose DT: Prospective incidence of first onsets and recurrences of depression in individuals at high and low cognitive risk for depression. Journal of Abnormal Psychology 2006; 115:145-156.*
2. *American Psychiatric Association: Diagnostic and Statistical Manual of Mental Disorders. 2nd ed. Washington, DC: American Psychiatric Association, 1968.*
3. *American Psychiatric Association: Diagnostic and Statistical Manual of Mental Disorders. 3rd ed. Washington, DC: American Psychiatric Association, 1980.*
4. *American Psychiatric Association: Diagnostic and Statistical Manual of Mental Disorders. 5th ed. Washington, DC: American Psychiatric Association, 2013.*
5. *Andreason NC: The Validation of Psychiatric Diagnosis: New Models and Approaches (editorial). American Journal of Psychiatry 1995: 152:161-2.*
6. *Andrews GA, Hobbs MJ, Borkovec TD, Beesdo K, Craske MG, Heimberg RG, Rapee RM, Ruscio AM & Stanley MA: Generalized worry disorder: a review of DSM-IV generalized anxiety disorder and options for DSM-5. Depression and Anxiety 2010: 27:134-147.*
7. *Bolton D: Classification and causal mechanisms: a deflationary approach to the classification problem. In: K. Kendler & J. Parnas, eds. Philosophical issues in psychiatry ii: nosology. Oxford: Oxford University Press, 2012; pp 6-11.*
8. *Carter KC: The Development of Pasteur's Concept of Disease Causation and the Emergence of Specific Causes in Nineteenth-Century Medicine. Bulletin of the History of Medicine 1991; 65:528-548.*
9. *Cooney GM, Dwan K, Greig CA, Lawlor DA, Rimer J, Waugh FR, McMurdo M & Mead GE: Exercise for depression. Cochrane Database of Systematic Reviews, 2013; Issue 9. Art. No.: CD004366. DOI: 10.1002/14651858.CD004366.pub6*
10. *Cooper R: Psychiatry and the Philosophy of Science. Stocksfield: Acumen Publishing Limited, 2007.*
11. *Craddock N, O'Donovan MC & Owen MJ: Phenotypic and genetic complexity of psychosis. The British Journal of Psychiatry 2007; 190:200-203.*
12. *Crowe S: Assessing the Neurocognitive Disorders of the Diagnostic and Statistical Manual of Mental Disorders (Fifth Edition). Australian Psychologist 2015; 50:1-5.*
13. *Endicott J, Nee J, Fleiss J, Cohen J, Williams JBW & Simon R: Diagnostic Criteria for Schizophrenia: Reliabilities and Agreements Between Systems. Archives of General Psychiatry 1982; 39:884-889.*
14. *Erhart M, Marder S & Carpenter W: Treatment of Schizophrenia Negative Symptoms: Future Prospects. Schizophrenia Bulletin 2006;32:234-237.*
15. *Feighner JP, Robins E, Guze SB, Woodruff Jr. RA, Winokur G & Munoz R: Diagnostic criteria for use in psychiatric research. Archives of General Psychiatry 1972; 26:57-63.*
16. *Ferriman A: Threat' of institutional psychiatry described at mental health meeting. The Times, 1977; 9 December, p. 4.*
17. *First MB: The Development of DSM-III From a Historical/Conceptual Perspective. In: K. S. Kendler & J. Parnas, eds. Philosophical Issues in Psychiatry II: Nosology. Oxford: Oxford University Press, 2012; pp 127-140.*
18. *Flint J & Kendler K: The Genetics of Major Depression. Neuron 2014; 81:484-503.*
19. *Foucault M: The Birth of the Clinic. 2003 ed. London: Routledge, 1963.*
20. *Foucault M: Madness and Civilization. London: Tavistock Publications, 1967.*
21. *Galison P: Image and Logic. Chicago: The University of Chicago Press, 1997.*
22. *Ghaemi DN: Taking disease seriously: beyond "pragmatic" nosology. In: K. S. Kendler & J. Parnas, eds. Philosophical Issues in Psychiatry II: Nosology. Oxford: Oxford University Press, 2012; pp 42-53.*
23. *Goldenberg MM: Overview of Drugs Used For Epilepsy and Seizures: Etiology, Diagnosis, and Treatment. Pharmacy and Therapeutics 2010; 35:392-415.*
24. *Graham GG, Davies MJ, Day RO, Mohamudally A & Scott KF: The modern pharmacology of paracetamol: therapeutic actions, mechanism of action, metabolism, toxicity and recent pharmacological findings'. Inflammopharmacology 2013; 21:201-232.*
25. *Gutting G: Michael Foucault's Archaeology of Scientific Reason. Cambridge: Cambridge University Press, 1989.*
26. *Hempel C: Aspects of Scientific Explanation. New York: MacMillan, 1970.*
27. *Jablensky A: Diagnosis and revision of the classification systems. In: J. Wiley, ed. Schizophrenia: current science and clincial practice. Chichester: Wiley-Blackwell, 2011; pp 1-30.*
28. *Kendell R, Cooper JE, Gourlay AJ, Copeland RRM, Sharpe L & Gurland BJ: Diagnostic criteria of American and British psychiatrists. Archives of General Psychiatry 1971; 25:123-130.*
29. *Kendler K: Towards a Philosophical Structure for Psychiatry. American Journal of Psychiatry 2005; 162:433-440.*
30. *Kendler K: Epistemic iteration as a historical model for psychiatric nosology: promises and limitations. In: K. K & J. Parnas, eds. Philosophical Issues in Psychiatry II: Nosology. Oxford: Oxford University Press, 2012; pp 305-322.*
31. *Kupfer DJ, Regier DA & Kuhl EA: On the road to DSM-5 and ICD-11. European Archives of Psychiatry and Clinical Neuroscience 2008; 258(Suppl 5):2-6.*

32. LaFerla F, Green K & Oddo SO: Intracellular amyloid-beta in Alzheimer's disease. Nature Reviews Neuroscience 2007; 8:499-509.
33. Lichtenstein P, Yip BH, Björk C, Pawitan Y, Cannon TD, Sullivan PF & Hultman CM: Common genetic determinants of schizophrenia and bipolar disorder in Swedish families: a population-based study. The Lancet 2009; 373:234-239.
34. Lisanby S: Electroconvulsive therapy for depression. The New England Journal of Medicine 2007; 357:1939-1945.
35. Meehl P: Philosophy of science: Help or hindrance? Psychological Reports 1993; 72:707-733.
36. Mortensen P, Pedersen CB, Melbye MM, Mors OO & Ewald HH: Individual and familial risk factors for bipolar affective disorders in Denmark. Archives of General Psychiatry 2003; 60:1209-1215.
37. Murphy D: Psychiatry in the Scientific Image. Cambridge, MA: MIT Press, 2006.
38. National Institute of Mental Health: NIMH Research Domain Criteria (RDoC), 2014.. [Online] Available at: http://www.nimh.nih.gov/research-priorities/rdoc/nimh-research-domain-criteria-rdoc.shtml#toc_product [Accessed 4 April 2015].
39. O'Donnell ML, Alkemade N, Nickerson A, Creamer M, McFarlane AC, Silove D, Bryant RA & Forbes D: Impact of the diagnostic changes to post-traumatic stress disorder for DSM-5 and the proposed changes to ICD-11. The British Journal of Psychiatry 2014; 205:230-235.
40. Phiel CJ & Klein PS: Molecular targets of lithium action. Annual Review of Pharmacology and Toxicology 2001; 41:789-813.
41. Pulman J, Jette N, Dykeman J, Hemming K, Hutton JL & Marson AG: Topiramate add-on for drug-resistant partial epilepsy. Cochrane Database of Systematic Reviews, 2014; Issue 2. Art. No.: CD001417. DOI: 10.1002/14651858.CD001417.pub3.
42. Regier DA, Narrow WE & Kuhl EAKDJ: The Conceptual Development of DSM-5. American Journal of Psychiatry 2009; 166:645-650.
43. Reiser SJ: Medicine and the Reign of Technology. Cambridge: Cambridge University Press, 1978.
44. Rosenhan D: On Being Sane in Insane Places. Science, 1973; 179;250-258.
45. Schmidt H, Shelton R & Duman R: Functional Biomarkers of Depression: Diagnosis, Treatment, and Pathophysiology. Neuropsychopharmacology 2011; 36:2375-2394.
46. Seeman P: All Roads to Schizophrenia Lead to Dopamine Supersensitivity and Elevated Dopamine D2 Receptors. CNS Neuroscience and Therapeutics 2011; 17:118-132.
47. Smith K, Fairburn C & Cowen P: Relapse of depression after rapid depletion of tryptophan. The Lancet 1997; 349:915-919.
48. Stober T, Wussow W & Schimrigk K: Bicaudate diameter: the most specific and simple CT parameter in the diagnosis of Huntington's disease. Neuroradiology 1986; 26:25-28.
49. Tandon R, Gaebel W, Barch DM, Bustillo J, Gur RE, Heckers S, Malaspina D, Owen MJ, Schultz S, Tsuang M, Os JV & Carpenter W: Definition and description of schizofrenia in the DSM-5. Schizofrenia Research 2013; 150:3-10.
50. Walker F: Huntington's disease. Lancet 2007; 369:218-228.
51. Worboys M: Was There a Bacteriological Revolution in Late Nineteenth-Century Medicine? Studies in History and Philosophy of Biological and Biomedical Sciences 2007; 38:20-42.
52. Wright IC, Rabe-Hesketh S, Woodruff PWR, David AS, Murray RM & Bullmore ET: Meta-analysis of regional brain volumes in schizophrenia. The American Journal of Psychiatry 2000; 157:16-25.

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