Science, Psychiatry, and the DSM

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SUMMARY

The upcoming publication of the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5), provides an opportunity to revisit the seldom-addressed methodological issues in contemporary psychiatry. We think that DSM widely determines the scientific and clinical orientation of the discipline, and therefore provides a good vantage point to critique the current psychiatric methodology. The main scientific problem is a perseverative attempt at validating descriptively defined disorders that are standardized and simplified to achieve diagnostic reliability. Lack of a single psychiatric phenomenon that is valid, i.e. natural, for initiating any reduction limits research to inductive-probabilistic methods, basically correlational analyses. Furthermore, reduction in psychiatry is typically directed at basic sciences, neglecting general medical diagnoses as possible intermediary correlates. The subcategory "Due to a General Medical Condition" is elusive, and the biopsychosocial approach does no more than strengthen the brain-disease illusion surrounding DSM definitions by justifying psychiatry as a branch of medicine while failing to stipulate detailed medical assessment and discouraging psychopathology-based clinical reasoning. It is therefore no surprise that, although our understanding of the neural basis and mechanisms of behavior has improved along with advances in the neurosciences, not a single DSM disorder has been validated by the discovery of a specific cause, pathophysiology, or structural abnormality since the adoption of the descriptive approach in 1980. New knowledge involves single traits or dimensions of mood, thought, or behavior, none of which are specific to any disorder. The optimum approach today would be to redefine the discipline as neuropsychiatry.

Keywords: Classification system, DSM, DSM-5, epistemology, methodology, psychiatric diagnosis

INTRODUCTION

The upcoming publication in May 2013 of the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (DSM-5) by the American Psychiatric Association (APA) follows a transparent process of preparation. The draft was made available on the APA website last year (DSM-5 2012) and relevant professionals were able to provide feedback for a period of 2 months. The drastic increase in the speed and means of communication via the Internet dates back only as far as the late 1990s, after the release of the Revised Text for the previous edition of the DSM in 1994 (DSM-IV TR). As such, DSM-5 will be the first edition to have been monitored and criticized as it was authored. Drafts for diagnostic criteria have been tested for reliability, validity, and user-friendliness in field trials or at centers that were assigned or selected from among volunteers. Independent studies have also been carried out. Work Groups have published to elaborate on issues relevant to their areas of specialization and on their progress. It is probably safe to assume that no other DSM edition has been addressed to such an extent in publication prior to its official launch.

The methodology of research and/or clinical practice has not been a popular topic in journals of general psychiatry, and the few articles on epistemology have been limited for the most part to specialty journals. We take advantage of the recently revived interest in methodology to present an epistemological critique of contemporary psychiatry in a journal of general

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psychiatry. Our assumption in addressing contemporary psychiatry via DSM-5 is that this manual of classification represents the current framework of psychiatry in terms of theoretical background, assumptions about the nature of psychiatric disorder, and the inherent value choices.

For the following concepts that are central to many of the arguments presented herein we adhered to the definitions supplied by Hançerlioğlu (1977): Being refers to the universe whose existence is independent from consciousness, e.g. atom, DNA, stone, animal, etc.; Fact refers to what has happened (e.g. the stone fell to the ground), what is certain to happen under certain circumstances (e.g. dropped objects will fall to the ground), or concepts referring to the laws that govern them (e.g. gravity); Anything detectable with the senses is a phenomenon, beings (e.g. stone), or facts (e.g. gravity, or the falling of a stone as witnessed).

1. How is DSM Regarded as the Representation of Contemporary Psychiatry?

DSM-III (APA 1980) had diagnostic reliability and standard diagnostic criteria as its primary goals. Those goals reflected radical changes and necessitated adoption of a different approach to mental and behavioral disturbances in general: (1) Psychiatric assessment was modified to understand and explain all symptoms in a medical context; (2) Diagnostic categories were referred to as disorders, reflecting the atheoretical approach of basing diagnoses on objective descriptions of symptom constellations alone. The word disease was avoided and reaction was dropped, as they implied either a specific biological correlate or definitive information regarding etiology; (3) A 5-axis diagnostic system was built in order to include psychosocial assessment and to specify developmental disorders, personality disorders, and other medical diagnoses that might either coexist with the primary psychiatric diagnosis or need to be regarded as the main focus of attention; (4) In order to achieve a satisfactory level of diagnostic agreement, special care was taken to formulate the diagnostic criteria with simple and clear symptom definitions. Psychopathological reasoning or clinical intuition was not part of the diagnostic process, and definitions were dissociated from etiology.

Starting with DSM-III, the manual has come with a *Text* which elaborated on the disorders and included information on epidemiology, subtypes, course, prognosis, and differential diagnosis. This has practically transformed the DSM from a manual—a quick reference guide—to an introductory textbook covering the basic principles of psychiatry. In addition, the use of DSM has extended beyond the USA over the years. With the widespread adherence to DSM and its *Text* in research and clinical practice, the manual, authored for members of the APA, is today, arguably, "The Book of Psychiatry". This transformation can be attributed to the high impact of North American science and medicine. In addition, DSM is regarded as the primary reference in many areas that are indirectly related to medical practice, with a central impact in diverse contexts, including research and development in the pharmaceutical industry, governmental healthcare policy in many countries, and competency and responsibility assessment relevant to law are based on information collected and understood according to the standard criteria and language of an official classification system. A detailed history and analysis of DSM and its implications have been covered in earlier comprehensive reviews (Andreasen 2007; Grob 1991, Jablensky 1999; Wilson 1993).

2. Modern Science

The definition and principles of modern science are based on the assumptions of logical empiricism and logical positivism (Rosenberg 2005). Science is based on objective observation and inquiry with the aim of either proving facts or providing findings that can be reasonably generalized via probability calculations. By correctly identifying phenomena and discovering their causes and consequences, science provides answers to the questions of what, why, and how. Truth consists of, and only of, explanations and predictions. Phenomena are explained and predicted by laws.

2. 1. The primary methods of explanation and prediction

Absolute scientific statements that explain and predict phenomena are of the deductive-nomological type. This type of reasoning provides a definitive explanation for a phenomenon and accurately predicts its occurrence, i.e. its premises and conclusion necessitate one another (Hempel and Oppenheim 1948), as in the following example:

Premises: Objects dropped to free fall will hit the ground; the acceleration is 9.81 m s^{-2}; the time to hit the ground depends on the height at which the object has been dropped; a stone is dropped to free fall from a height of 5 m. Conclusion: The duration of the fall is 1 s.

The conclusion and the fact referring to height among the premises are symmetrical; the duration of the stone's fall is 1 s, if and only if the height from which it is dropped is 5 m. Deductions may have boundary conditions, e.g. many laws of physics are true under (bound by) the normal conditions of pressure and temperature; however, most natural phenomena are too complex to fit the explanatory equations beyond experimental conditions.

Scientific explanations based on generalizing observations and findings via probability calculations are inductive arguments. Research in the life sciences and social sciences is pri-

marily carried out in an inductive-statistical model (Weber 2011), as in the following example:

Premises: 75% of individuals that carry the intermediate allele for Huntington's disease (HD) (with a trinucleotide repeat number of 36-39 in the relevant locus) were observed to have developed HD at age 75. (Quarrell et al. 2007). Ali has a CAG repeat number of 39. Conclusion: Ali has or will have the symptoms of HD with a likelihood of 75%.

Premises and conclusions are not symmetrical in inductions, i.e. explanations and predictions do not necessitate one another. Following the above example, if Ali has a symptom of HD (chorea, for instance) and his CAG repeat number is the only information we have the HD carrier state safely counts as a scientific explanation of chorea; however, every piece of new information about the case will make available (and present the challenge of accepting or ruling out) other possible explanations. If we know, for instance, that Ali is 30 years old and possess the knowledge of a disease X with a childhood onset and a 99% likelihood of presenting with chorea, the HD carrier state cannot be accepted as a scientific explanation until disease X has been ruled out.

The validity of an argument refers to its lack of logical error, and it is a prerequisite of soundness. Conclusions in deductive arguments are sound when their premises are true. Soundness of an inductive argument, on the other hand, depends on correct reasoning with the premises. This corresponds in research to the selection of logical operations or mathematical calculations that are appropriate for the explored phenomena, conducted experiments, or characteristics of samples, such as distribution or magnitude of quantitative data. Inconsistent conclusions from different studies testing the same hypothesis are commonly attributed to the complexity of the studied phenomenon; however, it is not uncommon that they are due to differences in methods of data collection or statistical analysis. The soundness of an inductive argument is a degree, as by definition, generalizations involve a probability of error greater than zero. This is why inductive-statistical arguments are accompanied by the probability of error in their conclusion. Other conditions necessary for the soundness of an argument are the reliability and validity of the concepts they are concerned with, i.e. definitions that are accepted to correspond to the phenomena under examination (Hayran and Hayran 2011).

The conditions mentioned above translate in statistics to definitions and calculation methods, such as variance, correlation, and regression analyses, the percentage of explained variance, odds ratio, main effects, interaction effects, etc. Scientific knowledge in many areas—including medicine—is rarely deductive and most knowledge consists of the conclusions of inductive arguments, i.e. reasonably generalized observations and findings, not covering laws (Toulmin 1976).

2. 2. Objectivity, disinterested curiosity, and freedom from value choice

Objectivity is regarded as essential for scientific research. As such, a scientist's experience with any topic of interest is assumed to be limited to curiosity, which is, by definition, neutral. Most sciences include in their culture the assumption that observation is objective and unbiased. It is not easy, however, to justify the necessity or possibility of absolute objectivity and freedom from value choice in scientific inquiry. To explicate, the following relevant propositions must be considered separately.

(1) Every possible inquiry, i.e. anything that might be the subject matter of science, is bound to correspond to a value and therefore in no instance can scientific research be completely free from value choice. This refers to the impossibility of objectivity in science as a whole, and is not particularly relevant to psychiatric research.

(2) Scientific inquiry may involve value-laden concepts or phenomena, in which case value choice is inherent in the question. This is of particular importance for scientific research that involves distinctions that cannot be necessary in every context and at all times, e.g. normal vs. abnormal, health vs. disease. In fact, a common reason for mistaking the inductive arguments of behavioral or social science for covering laws, as defined by the positivistic viewpoint (Hempel and Oppenheim 1948), is a failure to identify the values inherent in the questions or conclusions of research in these fields (Fulford 1994). To summarize, we think that the notion of scientific objectivity is based on wishful thinking and a failure to recognize the role of value choices in scientific inquiry; it does not simply refer to a rule to be followed.

2. 3. The hypothetico-deductive method: Reduction

The hypothetico-deductive method aims to create deductive arguments via hypothesis testing. A series of hypotheses directed at explaining the phenomenon of interest is tested, and those that cannot be reasonably rejected (i.e. those with an acceptably low probability of error, usually referred to by studies as significant findings) constitute evidence in synthesizing a deductive-nomological explanation. The basic principle is reduction, a process whereby the researcher seeks to discover correlates with higher specificity and at more basic levels for complex phenomena, until the simplest and most specific explanation is found or proven. The final argument is a deductive-nomological explanation. For instance, hypotheses about a biological phenomenon aim to replace the phenomenon with the valid constructs covered by the established laws of chemistry. When reduction has been achieved, the biological phenomenon can be treated as a case in chemistry, covered (completely explained) by its laws. Chemical phenomena are in turn assumed to corresopond to what are treated as cases in physics, i.e. absolutely coverable by the laws of physics.

In disciplines for which the focus of interest is constituted solely by constructs, attempts at reduction to natural correlates and laws reflect the presumption that the physical explanations (causes, structures, etc.) of phenomena are simply waiting to be discovered. This is a logical fallacy, because it is circular: validating any one of these constructs is, in the strict sense of scientific validity, no less than demonstrating its specific natural correlates, i.e. proving its specific physical existence, which in turn implies that the initial aim of proper scientific reduction has been achieved. The validity of a categorical construct in these disciplines is therefore a degree, and it never equals 0 or 1, i.e. it can be reasonable, but not natural.

3. Medicine and Science

One can hardly argue against the necessity of a scientific basis for clinical practice, which can be justified because it is ethical or reasonable, or both. Human life is precious beyond dispute, health and well-being deserve the maximum care and respect of the responsible and authorized professionals, and physicians possess the authority and responsibility regarding health and well-being; therefore, they must be equipped with sophisticated skills and expertise, as well as extensive knowledge, and science is the most appropriate means to acquire, revise, update, and expand such knowledge.

Characterization of medical practice as scientific, on the other hand, can correspond to agreement with either the first or both of the propositions below, and this decision deserves consideration:

(1) The medical profession must be based on scientific knowledge and it is possible for the medical profession to be based on scientific knowledge;

(2) The medical profession must be based on scientific knowledge and only on scientific knowledge, and it is possible for the medical profession to be based on scientific knowledge and only on scientific knowledge.

We agree with the first proposition and argue against the second. It is neither necessary nor possible for medical practice to be based only on science. To explicate:

(1) The medical profession is inseparable from value choices, which might challenge the disinterested curiosity (the principle of detached and objective observation motivated solely by curiosity) expected from a scientist. The ultimate concern of the physician is the patient's well being, and this may be dependent on other conditions in addition to scientific facts, or may even be incompatible with them.

(2) Medicine is practiced in the context of human relationships that involve emotions in every case, if not of the same intensity. It requires concerted effort to remain fully neutral towards a person whom one strives to heal. In fact, the person that aims to maintain the proper attitude of a scientist and a physician is in a tragic situation, in that they are constantly bound to forgo one of the two to some extent.

(3) Clinical research is almost completely limited to inductive-statistical methods and many clinical phenomena are too complex to lend themselves to generalizations, i.e. the multitude of relevant variables presents a major challenge to a study's power. Although medicine is only a profession, and not necessarily an academic one, it is commonly mistaken as a science per se. The confusion is reflected by such null expressions as, the science of medicine, and is probably accentuated by the emphasis placed on the unique indispensability of a scientific basis for good clinical practice.

We approve of the expression medical sciences, which implies a distinction—sciences that guide the practice of medicine (a profession). Medical sciences are diverse and are becoming increasingly specific, from health sociology and epidemiology to high-resolution genomics and functional brain imaging. It must be emphasized here that despite increasing sophistication in modeling and cutting-edge technology, conclusions are based more on generalizations than on demonstration or proof; however, precision in methods—experimental or statistical—tends to be attributed to conclusions and the illusion of advanced sciences guiding medicine tends to overshadow the robustness of fundamental and indispensible knowledge, such as definite causality or structural information, established over the course of years with robust, albeit less sophisticated methods. For instance, the affinity of haloperidol to dopamine DA2 receptors is absolute knowledge, an established fact, whereas the degree of symptom reduction for a specific patient on a specific dose of haloperidol can never be precisely predicted and only inferred from the probability figures (statistics) reported by clinical studies. Similarly, an increase in the survival rate demonstrated for a new antineoplastic agent, an achievement of high technology, is not a scientific law like the cell theory or the solid information on mitotic division.

Publicity about mental illness and psychiatry has increased following advances in the neurosciences. Mistaking the accuracy and success of the guiding sciences for the accuracy of information concerning phenomena encountered in clinical practice has repercussions not only in the popular culture, but also in the medical community—a widely and firmly held belief in the medical validity of mental illness and an exclusively biological basis for all mental disorders, reminiscent of the psychoanalysis era. The brain-disease discourse concerning variations of behavioral traits is no less naïve than that which adhered to narratives of repressed unconscious drives as the scientific explanation of neurosis: both involve knowledge that is partly factual or consistent, both admit a need for further studies for the theory to be completed and validated, both include false beliefs associated with incomplete understanding and oversimplification, and both have a tendency to induce in professionals either strong advocacy, idealization and identification, or

harsh criticism. As helpful as the brain-disease formulation of severe mental illnesses may have been in—arguably—diminishing the stigma experienced by patients' families, it has disseminated the illusion that the symptom constellations defining each disorder refer to a natural phenomenon, a real disease for which cure can be expected in the near future. Moreover, credit for the big discoveries in neuroscience has been shared by the clinical disciplines applying them, where most of the "translation" is far from being specific, precisely because the clinical definition is simply a construct with questionable reliability, shaped and modified over years by many factors, only one of which is brain dysfunction.

Credibility of the disease model in psychiatry may stem partly from a tendency for defensiveness related to the burden of enduring uncertainty in a field characterized by the scarcity of definite knowledge, a predominance of vague clinical phenomena, blurred distinctions between categories, and difficulty establishing or maintaining objectivity in clinical practice due to the very nature of psychiatric conditions. Lack of an introductory course on epistemology in medical schools might be another factor.

One negative consequence of conceptualizing medical practice as a pure application of science would be attributing all mistakes and negative outcomes to scientific error or bad technique, inviting undue criticism of medical sciences and decreasing their credibility, while in fact precision in diagnosis and success of treatment depend on many other factors. Resolution of controversies concerning professional choices by referring to scientific evidence alone would be similarly misleading. Professional determination of method or technique in clinical practice is shaped by many other factors, including individual differences in value choices and reasoning style, as well as the influence of training institutions on professional identity. Furthermore, in sciences that rely on statistical generalization, inconsistent evidence is the rule rather than the exception, and most inconsistencies simply reflect mathematical error or methodological flaw in one or more relevant studies. Obviously, professional training is for knowledge and skill development—determining the right method in clinical practice rarely requires philosophical justification; however, critical thinking is indispensible in order to avoid mistaking subjective, political, ethical, and at times defensive discussions for scientific debate grounded on absolute findings.

4. Weak Aspects of the Scientific Foundations of Psychiatry

4.1. Reliability

Reliability of categories parallels (i) the clarity of their definition and (ii) the conspicuousness of the cases they define, such as intensity, size, rarity, or degree of abnormality. A definition based on a single specific property, such as the atomic number, is absolutely clear, although both clarity and conspicuousness are essentially degrees and are not always absolute. The two are also independent. Definitions of Mars and the Moon are no different in terms of clarity, but the Moon is more likely to be recognized accurately by everyone at all times, whereas the probability of correctly detecting Mars varies with the observer, the time of observation, and many other conditions. For some categories with absolutely clear definitions, the high degree of homogeneity afforded by the definition may not be visible to the naked eye or an uninformed observer. For instance, the ultimate defining property of plant is microscopic, and the reliability of plant may lag behind that of Mars in instances in which the non-defining characteristics are complex. Phenomena defined by multiple properties (criteria), e.g. fruit, or quantitative properties, e.g. wind, also exemplify the dependence of reliability on the identifying person and the observational circumstances. Analogies in medicine, respectively, would be thyroiditis, for which clinical recognition requires more expertise in some cases, acne vulgaris, for which clinical diagnosis of lesions that are only microscopically visible can be less reliable compared to thyroiditis. Schizophrenia, with a multitude of possible presentations, and diabetes mellitus, with modifications in the thresholds for its diagnosis, are other diagnoses with degrees of reliability that therefore cannot be expressed in terms of an absolute and constant figure. Thus, numerical measures of reliability in medical research refer to reliability that can be achieved for the average/prototypical case diagnosed under average/normal or typical conditions of healthcare by a diagnostician with an average level of knowledge and expertise, i.e. it is an approximation

In medicine, achievement of reliability becomes more difficult and requires additional training when diagnostic criteria include symptoms that can be detected by examining and exploring the findings or the patient's reports with empathy, expertise, and theoretical knowledge. Training always involves theoretical knowledge; thus, although targeting reliability in the context of an atheoretical approach with DSM-III had understandable motives, it left an important question unanswered—why would medical training be necessary for diagnosis if diagnoses are made by checking for the presence or absence of clearly defined symptoms based on patient reports? Although this approach to descriptive diagnosis may not appear reasonable to all, it is not indefinable. In fact, many researchers have favored descriptive diagnoses for science-based psychiatry; examples include Compton and Guze (1995), Feighner et al. (1972), Robins and Guze (1970) and Spitzer et al. (1978). Such an emphasis on standard diagnostic criteria is commonly justified by the argument that clinical knowledge, skills, and expertise could well serve the purpose of determining the presence or absence of every criterion. This cannot be theoretically falsified; however, we think that psychiatric

diagnosis is limited in many settings to a review of all symptoms with no elaboration guided by clinical reasoning, which fails to consider areas that deserve deeper exploration. This reflects the atheoretical approach stipulated by DSM, which had a huge impact on training as well as psychiatric practice, so that theories of psychopathology, psychiatric interviewing skills, and the techniques of psychotherapy are underemphasized in many residency training programs, although they are indispensible for conducting sophisticated diagnostic interviews. Furthermore, objectivity is quite difficult in medicine, especially in psychiatry. Training, experience, and peer supervision, as well as professional discipline and concerted effort can help attain a level of reliability that is satisfactory for good clinical practice, but this is far from meeting the standards of science.

4.2. Factors that decrease diagnostic reliability

4.2.1. The DSM category "Due to a General Medical Condition"

DSM stipulates that mental disturbances secondary to identifiable conditions should be diagnosed as separate categories when there is evidence from patient history, physical examination, or laboratory findings that the disturbance is the direct physiological consequence of a general medical condition, and the disturbance is not better accounted for by another mental disorder. This corresponds to what is traditionally referred to as organic in the professional jargon; in fact, organic mental disorder has been in the official nomenclature until DSM-IV. The distinction, stated as organic vs. functional or primary vs. secondary is problematic because:

(1) The attributes organic and functional are not reliable. Functional in medicine refers to (i) disorders for which an exclusively associated structural abnormality—macroscopic or microscopic—has not been demonstrated to provide either absolute diagnostic differentiation or a specific pathophysiologic explanation and (ii) disorders for which explanations are based on environmental (here, psychosocial) rather than constitutional (organic, biologic) factors. Distinction between environmental and constitutional is influenced by the mind-brain dichotomy and the belief that biological correlates are insignificant (nonexistent even) if no structural correlate has been observed; thus, the dichotomy of organic vs. functional indicates our current level of information about a phenomenon rather than the phenomenon itself, and it should be considered an indication of demonstrability with available technical equipment and sophistication of any perceivable correlate. A clear-cut expression would be simple vs. complex. It is generally accepted that medical education is the necessary and sufficient condition for differentiating what is organic; however, cases with low levels of diagnostic agreement are generally complex and require more than general medical competency for accurate diagnosis. Traditionally, it is the job of the neurologist to decide which cases should be referred to the psychiatrist as non-organic. This approach is problematic because (i) non-behavioral manifestations are not rare in psychiatric disorders, (ii) disorders in other medical disciplines can manifest with symptoms of mood, thought, or behavior, and (iii) in some cases that present with a variety of somatic and mental symptoms the long list of diagnoses, each formulated by one specialist, can be reduced to a simpler explanation based on detailed general medical assessment and a wider perspective. The organic-functional distinction further complicates assessment in such cases. For instance, research (Gould et al. 1986; Nicholson et al., 2011) as well as our own experience indicate that no criterion classically accepted for differentiating conversion disorder from a neurological disorder is reliable. The strongest among the group of weak clues is failure to explain a symptom with any neurological disorder after thorough neurologic examination, however, neurologists are not exempt from overlooking neurological disorders (Stone et al. 2006), especially when the first manifestations of the disorder are relatively mild symptoms of mood, thought, or behavior.

(2) DSM disorders due to a general medical condition (DGMC) are by definition clinically similar to their primary psychiatric counterparts. Like all DSM categories, therefore, disorders DGMC would be heterogenous in terms of clinical presentation. Indeed, no study has indicated that patients diagnosed with disorders DGMC are less diverse compared to patients diagnosed with primary psychiatric disorders, and the only feature common to all patients with these disorders is that their condition has been judged to be DGMC. We seriously doubt, and no study has ever challenged the assumption, that diagnosticians are uniformly competent in recognizing possible associated medical conditions in the psychiatric setting.

The brain-disease emphasis for other diagnoses—the "real" psychiatric disorders—further complicates the issue by discouraging the questioning of their internal consistency, as well as a thorough medical assessment before reaching any psychiatric diagnosis. The argument that psychiatrists are the only mental health professionals that can assess individuals with symptoms of mood, thought, or behavior is weakened by the very nature of psychiatric assessment and the management that DSM stipulates. This common practice includes diagnosis based on a review of symptom check lists, basing decisions primarily on patients' claims, with an approach that is free from theory-driven elaboration, while at the same time reserving the right to prescribe and perform psychosocial interventions, including, as deemed necessary according to the biopsychosocial model, psychodynamic and social interventions, although this obviously contradicts the principle of the evidence-based approach. Psychiatry is becoming a profession with a limited theoretical background, as theories

of psychopathology are being deemphasized and more and more physicians are taught to maintain the approach of using standard criteria, which has in practice been neither completely atheoretical nor appropriately medical. Physicians' understanding of psychiatric diagnoses as valid disease entities and the brain-disorder emphasis probably influence patients' views about the causes of their illness. A large-scale study on patients' level of knowledge about their diagnoses has shown that the addition of the category DGMC has not changed the distribution of diagnoses that patients report they have (Sunderland et al. 2008).

(3) Sometimes the principle of indicating the medical cause of a psychiatric disturbance is arbitrarily neglected. Psychosis in the course of velocardiofacial syndrome (VCFS, 22q11.2 deletion) is an example. Patients with a psychotic disorder due to VCFS are diagnosed with schizophrenia, and not psychotic disorder due to VCFS, probably because the association happened to be reported for the first time by geneticists (Lindsay et al. 1995) that were, naturally not interested in the diagnostic principles of DSM. The terminology remained in subsequent publications on this topic, so that today it is accepted that that 6%-30% of cases with VCFS have schizophrenia (Kobrynski and Sullivan 2007). To our knowledge no study has reported the similarities and differences between psychosis in VCFS and schizophrenia with conclusive findings and this is a potential source of confusion in research on schizophrenia, VCFS, and the DSM category psychotic disorder DGMC. On the other hand interestingly, a case with psychosis and third stage syphilis would most likely receive a DSM diagnosis of psychosis (or dementia) due to syphilis, simply because third stage syphilis is rare and the term general paresis has consequently been much less familiar to many physicians compared to the nomenclature of DSM.

4.2.2. The presumption of uniformity inherent in stigmatization

Stigmatization in the social sciences refers to societal discrimination or its experience. The word originally derives from the Christian concept of stigma, a visible mark on a person that indicates their suffering or a negative attribute. Although all DSM diagnoses are polythetic with no pathognomonic symptoms, greater weight is given to some symptoms in clinical practice for the diagnosis of certain disorders. These symptoms are like the "stigmata" of the associated disorder, i.e. their obvious presence increases the likelihood of a hasty diagnosis. For example, psychomotor retardation, severe disability, and poverty of thought suggest a diagnosis of schizophrenia more strongly than many other symptoms do, especially when they coexist, although neither is sufficient or necessary for the diagnosis. Interestingly, they are among the most common and non-specific psychiatric symptoms. This is indicative of the tendency to conceptualize schizophrenia as a uniformly disabling disorder. This aspect of stigmatization is not frequently emphasized; however, it is important in terms of its negative effect on diagnostic reliability.

5. The DSM-5 Draft

As work on DSM-5 was initiated the general agreement was that diagnostic categories, without their specific symptoms, had several shortcomings and disadvantages for research and practice, and a dimensional approach was projected for the new classification system. The final draft, however, is predominantly categorical—with few dimensional assessments.

Personality disorders are among the few diagnoses for which dimensional assessment has been given central diagnostic importance. Priority is given to dimensionality in other disorders for which inclusion in a spectrum has been supported with strong evidence. Obsessive-compulsive disorder and posttraumatic stress disorder are no longer classified as anxiety disorders and have been reclassified along the spectra they evidently belong to. Simplifying subtypes via defining 2 main types of mood disorders (specifically, depressive disorders and bipolar disorders, widened to include all associated diagnoses) is also based on a preference for the dimensional approach. The continuum approach and dimensionality are not emphasized equally for disorders that are closely associated in terms of clinical presentation and pathophysiology. For example, the assessment stipulated for the symptom dimensions of psychotic disorders is far more detailed than the severity assessment for bipolar disorder, which includes less specification.

One common criticism of DSM-5 is the possible influence of the pharmaceutical industry that is perhaps stronger than it had been in previous editions. The possibility of conflict of interest is reported to be around 70% among the officially assigned groups of authors (Cosgrove et al. 2009). The emphasis on dimensionality that is less than was projected might be associated with concerns about the potential expense of dropping categorical diagnoses, most of which are approved indications for very expensive medical treatments with very high costs of development, i.e. drugs that have been heavily invested in.

Two other modifications that need to be mentioned are the generally lower threshold of diagnosis and new diagnostic definitions. Among the diagnoses to be introduced with DSM-5 the most controversial are attenuated psychosis syndrome, internet dependence, and disruptive mood dysregulation. The former 2 were removed following the suggestions of research reports and expert opinions highlighting the lack of sufficient evidence (Carpenter and van Os 2011; Jairam et al. 2012; Pies 2009), and have been categorized as diagnoses that merit further attention. The decrease in diagnostic thresholds and new diagnostic categories will probably result in an increase in the number of cases that receive treatment, and the

cost-effectiveness of this in terms of both money and side effects needs to be assessed in the nearest future.

5.1. Research Domain Criteria: A promising development

Research Domain Criteria—a new group of criteria being developed under the leadership of NIMH (Insel et al. 2010)—is the most promising novelty. Many scientists that have had to adjust their scientific views and hypotheses to the restrictions of categorical diagnoses will now have an official opportunity to develop hypotheses and grant applications with greater freedom.

5.2. The most problematic aspect of DSM's perspective: The belief that reduction is achievable

Validation of medical conditions as diseases is achieved via the discovery of a specific etiologic explanation or the demonstration of a specific structural substrate. Today's formal categories of diagnosis in psychiatry are too complex to expect a reduction to biology with clear-cut and simple explanations. Kendler's (2005) succinct expression is worth quoting: "Psychiatric disorders are etiologically complex, and no more 'spirochete-like' discoveries will be made that explain their origins in simple terms." To insist on a categorical classification in DSM-5, one must ignore the truth of the aphorism and maintain the expectation of a big discovery via coincidence or systematic study.

5.3. Change in psychiatric methodology represented by the DSM is not Kuhn's paradigm shift: It is the reflection of a change in the perspective of prominent figures and institutions

Kuhn (1970a), in his famous monograph published in 1962, asserted that transformation in science is not about change in theories by means of reduction or correction. He argued that a new system of descriptions and theory (a new paradigm) formed not when current theory is disproven, but when questions unanswerable within the framework of current theory accumulated (puzzles, as he called them) to an extent that further progress was possible only by assuming a novel framework with its own set of constructs. Paradigm changes (shifts) were therefore not progress—they were leaps. Normal science, in Kuhn's terms, referred to work during periods of regular hypothesis testing, the search for evidence, correction, and reduction, i.e. smooth progress until the inevitable block (a crisis) necessitated a new paradigm.

Paradigms change not by progress towards completing error correction and reduction, but by replacement when further correction or reduction has become impossible; therefore, their level of sophistication cannot be expressed in terms common to all, and comparing paradigms in terms of their proximity to truth or level of sophistication cannot be based on rational grounds. To express the irrationality of this comparison, Kuhn borrowed the term incommensurability from mathematics, which refers to the circumstance when 2 quantities cannot be rationally compared, i.e. expressed in terms of one another with a rational number. It is irrational like the $\sqrt{2}$-unit length of the hypotenuse in a Pythagorean triangle with two 1-unit sides, or as in the comparison of a rational with an irrational number, which is necessarily (where the ratio is bound to be) irrational, e.g. $\sqrt{2}$ for $\sqrt{2}$ vs. 1 or $7/\sqrt{2}$ for 7 vs. $\sqrt{2}$.

In the hypothesis-testing studies of the inductive-statistical model absolute validation is indefinable, i.e. validity ranges between 0 and 1, but is never equal to either. Our conclusions can still be judged as reasonable or not, however; and this is by way of calculation, for although validity in this model is not natural it is perfectly reasonable. This is possible during periods of what Kuhn calls normal science, when further reduction or search for significant evidence is still possible. Declining to avail oneself of reasoning at this stage is firm empiricism, the perspective that denies logical necessity.

Comparisons between the theories of Copernicus and Ptolemy, Newton and Aristotle, or Newton and Einstein for correctness or level of sophistication are driven by an illusion that forms when one views the past with today's knowledge and understanding. This, Kuhn argues, is best exemplified by the lessons and books of introduction to science (hence his metaphor, textbook science), in which current theories and knowledge are presented as covering laws, supported with ideal examples that perfectly fit relevant equations to confirm the current paradigm and point out the mistakes in older theories. The fallacy is in the presumption that the answer sought by all theories was in response to a question formulated with the same set of definitions. We thus tend to equate novel with correct, and old with primitive and flawed, wrongly inferring that older theories have failed and must be corrected using today's brand new and sophisticated theory.

The paradigm concept has been misunderstood and misused in many contexts with multiple meanings. The confusion was partly created by Kuhn's use of the word in many senses, some of which were vague, as he admitted in his 1969 conference, published as, *The Postscript* (1970b) to *The Structure of Scientific Revolutions* (1970a). The concept has been popular in psychiatry, too, mostly in reference to the radical changes brought about by DSM-III (Atbaşoğlu 1997, Sorias 2012, Wilson 1993). Referring to Kuhn in understanding the history and methodology of psychiatry is a constrained (if not a completely unwarranted) adaptation, since the author's focus was absolute sciences. Scholars of the humanities similarly appealed to Kuhn for resolving methodological controversies, to be criticized later for the undue parallels they drew.

What is regarded as a paradigm shift in psychiatry is in fact a change in epistemological perspective via reasoning and making choices, which manifests as new diagnostic principles and

naturally translates to changes in research methodology and clinical practice. The difference between the pre- and post-DSM-III eras cannot be characterized by the introduction of a brand new perspective to the discipline. The "old vs. the novel" in this context is the expression of such familiar dichotomies as "nature vs. nurture", "constitution vs. environment", "objective vs. subjective", and even the ancient "physics vs. metaphysics". Furthermore, not a single definition adopted in DSM-III and maintained through the present day has facilitated the discovery of an absolute or specific entity or fact, or otherwise has proven itself to correspond precisely to a natural entity or fact, i.e. to be real.

DSM-III definitions did not make possible any discovery of a treatment or prevention method that had been lacking because the previous perspective or DSM-II had been misleading. The range of treatment modalities and options currently available that weren't available during the previous century is the achievement of the sciences that contribute to psychiatry, and this progress can hardly be considered as driven by modification of the epistemological perspective, including the classification principles or new atheoretical definitions. New agents or methods of treatment tested and approved after publication of DSM-III are far from conclusive or absolutely justifiable in a strictly positivistic view. Indeed, almost all important discoveries relevant to either the etiology or treatment of psychiatric illnesses date back to the period before DSM-III. As such, it is safe to state that no important discovery has been made in clinical psychiatry following the publication of DSM-III, nor do we have reason to think that the important discoveries relevant to psychiatry achieved in the related sciences would not have been possible without the perspective that DSM-III provided.

There have always been a group of psychiatrists that were unconvinced that a hypothetico-deductive method would achieve the ultimate reduction of psychiatric phenomena to natural sciences and were therefore unwilling to work with this model. Some, on the other hand, were simply not interested because their clinical practices based on the non-physicalist method appeared to be successful and safe; nor did those that attempted to incorporate physical reduction do so after other methods failed them—they simply favored an approach that was more comfortable and worked better for them. Kuhn's definition of a crisis in the paradigm does not apply here; Kuhn's paradigm shift is not about choosing one paradigm from among the alternatives that existed simultaneously. Strong adherence to a particular theory in psychiatry has typically been about lack of recognition for others—either in the literal sense, failing to utilize them in practice due to lack of awareness, or with dismissal of their utility. In fact, neither a physicalist nor an analytical method has materialized as a new paradigm to facilitate the progress that older methods have ceased to provide.

This is not the case in science; for instance, unlike physics and metaphysics or evidence and interpretation, mechanics and relativity have never existed simultaneously as equally strong alternatives to one another—science leaped to the novel when the former contributed all it could and could no longer provide answers to the remaining questions. DSM-III was not a paradigm shift or a scientific revolution, primarily because the pre-DSM-III understanding of mental illness based on psychodynamics was no less deterministic than the physicalism imposed by DSM-III. Both were reflective of a naively optimistic expectation that their method and theory would fully explain mental illness. The only difference is in the level of reduction they targeted: psychology for one and biology for the other. Psychoanalysis was not acceptable as the primary theory in a medical discipline, so it was replaced with biology, later to become more specific as neuroscience. Present attempts at reducing mental illness to basic science ignore the potential of explanation at levels between behavior and biology. This was initiated with the assumption (or at least expectation) that the DSM-III categories were (or would be) reliable enough to be accepted as reasonable candidates for reduction; however, the coverage of general medical conditions in DSM-III and its successors has never been satisfactory, resulting in an understatement of general medicine in psychiatric practice, and a failure in research to seek for medical explanations as more appropriate targets of reduction, compared to biology.

Looking back, one can hardly see any achievement facilitated by the context provided by DSM. In fact, no groundbreaking discovery has been achieved in the field of clinical psychiatry, certainly not comparable to that of Newton following Aristotle or of Einstein following Newton. Exciting discoveries have been achieved in the neurosciences, and forcing them to be applied to clinical categories is definitely no revolution.

CONCLUSIONS

Methods of psychiatric research and practice adopted along with the publication of DSM-III and maintained through DSM-5 include more expert views and political/economic determinants than scientific evidence or absolute logical necessity. In our view the DSM approach to mental illness has flaws and limitations that outweigh its advantages. Taking into account the major influence of DSM on practice and research worldwide that has occurred during the past 30 years, it appears that the limitations and methodological weakness of contemporary psychiatry will remain unchanged in the decades to come.

We suggest the following.

1) Theoretical knowledge that is uniformly applicable, i.e. solid enough to be accepted as universal fact is only one factor

that plays a major role in the quality of clinical practice, which has many other determinants such as the individual physician, treatment setting, and value choices. Universally valid and applicable knowledge is not easy to establish in medicine, especially in the specialties that are more sensitive to cultural influence at many levels, including symptom manifestation and norms of the doctor-patient relationship. The contribution of science to medical practice must be considered with these reservations in mind. We think that the potential, as well as previous, contribution of science to good clinical practice tends to be overemphasized. Clinicians must maintain an optimum balance between skepticism and adherence regarding what is presented as scientific evidence.

2) Sub-specialization and expertise in specific psychiatric topics might serve a purpose in academia; however, translation of scientific specialization to clinical psychiatric practice is limited by the low reliability of clinical categories, scarcity of conclusive findings, and the prerequisites that are independent of specialization, such as the establishment and maintenance of a sufficient doctor-patient relationship, skills for interviewing and history taking, mastery in general medical assessment, and balancing objectivity with empathy and theory-driven probing and observation. Thus, a high level of specialization in psychiatry almost never corresponds to excellence in clinical practice. In research, on the other hand, the accuracy and progress gained via sub-specialization is limited by the distance separating psychiatry and the hard sciences. Clinical psychiatric research is particularly challenging due to issues of reliability and inevitable subjectivity.

Unless practice is limited to highly specialized settings, claiming expertise in clinical psychiatry defined by scientific orientation or method, as in biological psychiatry or psychoanalytic psychotherapy, is technically wrong at the very basic level, aside from the ethical and epistemological issues.

3) Scientific research directed at reduction is hindered by the rigidity of the DSM categories, which results in a tendency to skip general medicine on the way from behavioral symptoms to biological mechanisms. Research directed at the biology of a psychiatric disorder with no consideration of the disciplines in between is like striving in vain to reduce biology to subatomic physics, without taking chemistry into account.

Equations and prediction are tempting in contemporary psychiatry; however, they depend on proper quantification, which in turn requires replacement of vague diagnostic categories with behavioral traits for which effortless clarity and simple definitions can be expected. Attempts to simplify the complex and heterogenous clinical diagnoses must be supported by well-designed qualitative studies, which have been neglected due to an optimistic reliance on the validity of standard diagnoses.

4) Given the circumstances, it is apparently for the best to draw the demarcation line of the discipline as neuropsychiatry, and drop psychiatry and neurology as separate specialties. In fact, given that specialization is tempting and valuable in science, but is rarely so in medical practice, the ideal is to define neuropsychiatry as a subspecialty of internal medicine. Although the cost-effectiveness of such an approach could be debated, we think the ensuing accuracy and higher quality it would bestow upon research and clinical practice would render it justifiable.

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