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Original Paper

How Scientism Infiltrated Medicine and Distorted Clinical Practice: Scientism May Be Hazardous to Your Health

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Abstract

Scientism can be defined as a passionate belief in the universal applicability of the scientific method and approach, and the view that empirical science constitutes the most authoritative worldview or most valuable part of human learning, to the exclusion of other viewpoints. At this level of generality, it is not difficult to show that scientism poses some distinct dangers, putting a damper as it does on the validity and usefulness of other kinds of knowledge and/or ways of learning. But this has not dissuaded some from thinking that scientism might still be of value in medicine. The popularity of evidence based medicine (EMB) attests to the fact that many so believe. We argue, to the contrary, that clinical practice relies on other kinds of knowledge, and that this is attainable only if we admit consideration of other kinds of learning. We conclude that scientism may be dangerous to your health.

Keywords

"-ism", tolerance, tacit knowledge, EBM, art of medicine

1. Introduction

In December, 2015, the Merriam-Webster dictionary declared "-ism" to be its Word of the Year, noting that just seven words using this suffix were the targets of millions of individual dictionary lookups (the seven: socialism, fascism, racism, feminism, communism, capitalism, and terrorism). They seemed oblivious to the fact that "-ism" is not actually a word (Note 1), but since we will want to use it as one, we feel compelled to provide a definition: *a passionate belief in some universal truth*. Thus, for example, adding to the above list, *neoliberalism* (c.f., Kowalski & Mrdjenovich, 2017) denotes a

passionate belief in the market as the final arbiter in all things economic. Building on these ideas, *scientism* has come to mean a passionate (and often aggressive) belief in the universal applicability of the scientific method and approach, and the view that empirical science constitutes the most authoritative worldview or most valuable part of human learning, to the exclusion of other viewpoints.

But, there is a problem with calling science "the only game in town." Once you accept that science is the *only* source of human knowledge, you have adopted a philosophical position (scientism) that cannot be verified (or falsified) by science itself. It is, well, unscientific. Put otherwise, the statement "all of epistemology reduces to the scientific method" cannot be proved using scientific methods. The statement contradicts itself. One might say that this exposes the would-be emperor as having no "-ology."

This, understandably, has caused some hesitancy to adopt this strong view, and there are many alternative views of scientism that have been proposed (almost as many as the number who have considered the question). Some of these are considered next.

2. What Is Scientism?

Mikael Stenmark (2018) notes that there are a number of current usages of "scientism." He discusses eight of these in detail, and we cite these in order to indicate their general tenor and diversity:

1) The view that all of the non-scientific academic disciplines can be reduced to science;
2) The attempt to extend the use of the methods of natural science to other academic disciplines;
3) The view that all, or at least some, of the essential non-academic areas of human life can be reduced to science;
4) The view that the only reality we can know anything about is the one science has access to;
5) The view that we are rationally entitled to believe only what can be scientifically justified or what is scientifically knowable;
6) The view that the only reality that exists is the one science has access to;
7) The view that science is the only truly valuable realm of human life, all other realms are of negligible value; and
8) The view that science alone can explain morality and replace traditional ethics.

Boudry and Pigliucci (2017), when considering the various definitions of scientism used in the fifteen Chapters by the contributors to their book, distinguished between two main themes: One starts off by treating *scientism* as a term of abuse (Note 2)—science intruding into areas in which it has no purview, and then asks if anything fits the bill; the other looks at *scientism* as an ordinary philosophical position concerning the limits of science, after which one examines whether purported limits are defensible. They then summarize by suggesting that scientism is the view that one way or another, science is the best or only game in town.

Six more definitions of scientism were provided by Thalos (2017). These overlap with those given by Stenmark and Boudrry and Pigliucci, and can be characterized by the *belief in the universal applicability of the scientific method and approach, and the view that empirical science constitutes the most authoritative worldview or most valuable part of human learning to the exclusion of other viewpoints* (cf. Sorell, 1994).

In reviewing these definitions (Note 3) it becomes apparent that while subtle differences exist, the above characterizations do capture the spirit of the exercise: *science is the only game in town*. We take issue with the idea that it is the *only* game in town.

3. Science and Pseudo-Science

The definitions considered above can be seen to be of two main types: Pejorative and dealing with exclusivity. The pejorative are invoked when some scientist has been caught overstepping—crossing a boundary where science is not applicable. This raises the question of "are there limits?" The second sense asks directly as to whether there are other ways of knowing. We will argue that there are limits to the kinds of questions science is able to answer. We are not prepared to say (precisely) where these limits lie, but argue the less ambitious case that scientific findings, at least in some cases, can be usefully supplemented by other forms of knowledge/learning. In particular, we argue that there exist other ways of knowing—ways that can play at least useful supplementary/complementary roles.

Before we proceed, we should note that all the definitions considered above assume we know what *science* and/or the *scientific method* are. Neither of these questions, however, has a clear-cut answer.

For one thing, what counts as scientific and the scientific method have varied considerably over time and across cultures (Williams & Robinson, 2015, p. 42). We limit our inquiry to modern times and Western civilization, but still questions arise.

What is science? involves the so-called demarcation problem (what distinguishes science from non-science or pseudo-science?), and this has a long history with few universally agreed upon answers (see, e.g., Pigliucci & Boudrey, 2013), although some useful guides are available (Note 4).

In discussing the demarcation problem, Boudry and Pigliucci (2017, 44ff), consider the idea that science can provide an objective basis for morality (Stenmark's #8 and as claimed., e.g., by Harris (2011)) as an example of "scientific overreach, an instance of pretending to offer a form of knowledge that is in principle inaccessible, no matter how broadly you construe science." They raise the idea that this issue was settled almost three centuries ago by David Hume when he noted that it is logically impossible to derive *ought* from *is* (Hume's insight was that an ought-conclusion must have at least one ought-premise; *is implies ought* has since been known as the naturalistic fallacy). They point out that if Hume is right, "ought" cannot be derived from "is" *simpliciter*, whether the "is" comprises scientific knowledge or any other sort of knowledge: "Even if you bring the social sciences and the humanities to the table, you will not make any headway in establishing objective moral facts. No method continuous

with the sciences, in its broadest possible sense, can offer any more hope in fettering out moral facts" (p. 45) (Note 5).

Midgley (1991) also draws on some well-known arguments (by Quine and Russell, no less) limiting the scope of science: According to Quine (p. 111),

> "There remains a vast field, traditionally included in philosophy, where scientific methods are inadequate. This field includes ultimate questions of value; science alone, for example, cannot prove that it is bad to enjoy the infliction of cruelty. Whatever can be known can be known by means of science; but things which are legitimately matters of feeling lie outside its province."

And Russell (p. 115),

> "Almost all the questions of most interest to the speculative minds are such that science cannot answer … Science tells us what we can know, but what we can know is little, and if we forget how much we cannot know we become insensitive to many things of great importance.

Ladyman (2013) has contributed three useful steps on developing demarcation criteria. First, he shows that pseudoscience differs from nonscience, bad science, and science fraud; second that the concept of pseudoscience is an important and useful one in need of theoretical elaboration; and third, that progress can be made along these lines by learning from Harry Frankfort's celebrated account of *bullshit* (Frankfort, 2005). Building on Frankfort's distinction between bullshitting and lying (lies are designed to mislead us about the truth, whereas bullshit is not concerned with the truth at all), he suggests that pseudoscience is to science fraud as bullshit is to lies.

We need not, however, attend to this level of minutia. Rather, we refer to Thurs and Numbers (2013, p. 134) who quote Edward Condon as characterizing pseudoscience as "scientific pornography." This allows us to say "we know pseudoscience when we see it," which suffices for our purposes.

What constitutes the scientific method? is no easier to pin down. As with science, what counts as scientific and the scientific method have varied considerably over time and across cultures.

Feyerbend (1975) advanced the idea that there is no such thing as unified, universal scientific method. If believers in scientific method wish to express a single universally valid rule, Feyerabend jokingly suggested, it should be "anything goes". Haack (2007, p. 10) toyed with the idea of beginning her book "There is no thing such as the scientific method, and this is a book about it." She also quoted Percy Bridgman as saying, "the scientific method, as far as it is a method, is nothing more than doing one's damnedest with one's mind, no holds barred" (p. 24). Pigliucci (2010, p. 20) pointed out, "there is more than one way to do science, depending on the nature of the questions and the methods typical of the field." As a proof that there is no *one way* to do science, different sources describe the steps of the scientific method in different ways. Some list three steps, some four and some five. Some will even list the field (e.g., biology) to which they are pertinent. It is small wonder then that there are so many views on the concept of *scientism*, depending as they do on the components, science and the scientific method. Fundamentally, however, the various definitions incorporate the same concepts and principles. "There may be no single straightforward methodology that is unique to science, but there are approaches to

inquiry that are *distinctively* scientific" (Blackford, 2017, p. 17). See, for example, Haack (2009). A useful way of thinking about these approaches to inquiry was given by Pigliucci (2010, p. 260): "Science is perhaps best conceived as a family of activities that share a common base provided by reliance on empirically testable hypotheses and on rationally constructed theoretical frameworks."

Scientism then enters the picture by declaring that these approaches constitute the *only* means available to us to learn about our world. Our focus is on this "strong view" of scientism, viz., the passionate (and often aggressive) belief in the universal applicability of the scientific method and approach, and the view that empirical science constitutes the most authoritative worldview or most valuable part of human learning, to the exclusion of other viewpoints.

4. Tossing Scientism into the Circular "-ISM" File

As noted, most of definitions of scientism considered above are unabashed statements to the effect that science is the *only* rational way to uncover the secrets of nature. Thus, according to Williams and Robinson (2015, p. 3), "Scientism entails a zealous metaphysical commitment and a requisite orthodoxy in method and in thought regarding the nature of the world and how understanding of the world is to be approached." There is, here, a passionate belief in an absolute truth that melds ontology with epistemology—the only reality that exists is the one "the scientific method" has access to. Even glossing over the questionable uniqueness of method claim, the very idea of a "scientific explanation" of anything exposes the part of the dual nature of science, i.e., that science is a product of human activity, meant for human consumption. Humans explaining to humans. Williams and Robinson (2015, p. 17) conclude, "Explanation always requires a starting point that scientism cannot provide and offers a type of understanding that scientism cannot accommodate."

We add to our case against scientism by developing two themes: The dual nature of science and that there are other ways to learn about (at least some aspects of) the world. We ground much of our argument on some work of Jacob Bronowski (Note 6). The roots of his influence date back to 1964 when he (Bronowski, 1964) studied the value system of science—the capacity to tolerate dissent, to foster freedom and independence of thought (pp. 63-64). Having developed this system over the next decade, he then noted: "One aim of the physical sciences has been to give an exact picture of the material world. One achievement of physics in the twentieth century has been to prove that that aim is unattainable." … "All information is imperfect. We have to treat it with humility. That is the human condition; and that is what quantum physics says" (p. 353).

This recognition is often packaged in terms of Heisenberg's Uncertainty Principle (Note 7), and the postmodernists (Note 8) have argued that since we can't have perfect knowledge all of the time, we can't ever have any "real" knowledge. This conclusion, however, is made possible only by the admittedly poor choice of the word *uncertain* to describe the situation: "[W]e are not uncertain; our knowledge is merely confined within a certain tolerance. We should call it the *Principle of Tolerance*" (Bronowski, 1973, p. 365).

This stands in sharp contrast to those who would adopt a position of certainty: a passionate belief in some universal truth. Bronowski (1973, p. 374) counters with Oliver Cromwell's famous quote: "I beseech you, in the bowels of Christ, to think it possible you may be mistaken." (Note 9).

The dual nature of science was pointed to by Bronowski (1973, p. 364):

> "The world is not a fixed, solid array of objects, out there, for it cannot be separated from our perception of it. It shifts under our gaze, it interacts with us, and the knowledge that it yields has to be interpreted by us. There is no way of exchanging information that does not demand an act of judgement."

The dual nature of science

We add to Bronowski's insights one from Levins (Note 10) (1996) who offered ten propositions on the demarcation problem. His 5th proposition is that *science has a dual nature*. On the one hand, it really does inform us about our interactions with the rest of the world, producing understanding and guiding our actions. On the other hand, science, as a product of human activity, reflects the conditions of its production, and the viewpoints of its producers or owners.

Giere (2006) concurs, emphasizing the objective/subjective meld, claiming that it is *both* true that science objectively expands our knowledge of the world *and* that science is a subjective activity because scientists cannot escape their limited access to the world as human beings—that is, they do not have access to a detached, all-encompassing, God's-eye view of things. Pigliucci (2010, p. 272) discusses Giere's view and ties to understanding qualia.

Another tack was taken by Nickles (2017) who compares research tools with crowbars or pry bars. To be useful, a crowbar must sufficiently engage the world at one end and the human hand on the other. How much engagement of each type is sufficient will of course depend on the task at hand.

A final testimony to science's dual nature was provided by Haack (2009). She answers the question *Does science have a special epistemic status?* with a "yes and no".

> "'Yes', because science has had spectacular successes, has come up with deep, broad and detailed explanatory hypotheses which are anchored by observation and which interlock surprisingly well with each other; 'no', because although, by virtue of these successes, science as a whole has acquired a certain epistemic authority in the eyes of the lay public, there is no reason to think that it is in possession of a special method of inquiry unavailable to historians or detectives or the rest of us, nor that it is immune from the susceptibility to fad and fashion, politics and propaganda, partiality and power-seeking to which all human cognitive activity is prone" (p. 187).

There are other ways of learning/other types of knowledge.

We begin at the beginning with Midgley (1992). She notes, "Science cannot stand alone. We cannot believe its propositions without first believing in a great many other … things, such as the existence of the external world, the reliability of our senses, memory and informants, and the validity of logic. If we do believe in these things, we already have a world far wider than that of science" (p. 108).

A paradigm developed by Carper (1978) and expanded by Chinn and Kramer (2015) describes four fundamental ways of knowing, especially as they relate to clinical practice. These four ways are: personal, empirical, ethical, and aesthetic. Personal knowledge is based on what we have seen and experienced; this knowledge is developed throughout observations, experiences, self-understanding, and reflection. Empirical knowledge is gained through research and examination of objective facts, i.e., factual knowledge that can be verified. Over time, empirical knowledge is organized into theories and laws. Ethical knowing is developed from ethical frameworks or principles and interpreted through our moral code, our sense of right and wrong. Aesthetic knowledge is based on perception, feeling, and sensing. It integrates the other types of knowing and creates a new understanding about a phenomenon or situation.

These ways of knowing are related to the model of evidence developed by Upshur et al. (2001) (consisting of qualitative/particular, qualitative/general, quantitative/general and quantitative/particular evidence) and the model of knowledge due to McHugh and Walker (2015) (consisting of tacit/particular, tacit/general, explicit/general and explicit/particular knowledge). These are considered in more detail later. The point to be made here is that scientism limits attention to empirical ways of knowing (quantitative/general evidence and explicit/general knowledge) and that this impairs clinical practice (Kowalski et al., 2019).

Haack (2007) points to the root of the problem that is sometimes seen to exist when one insists on putting strict limits on science. She notes that the confusion that exists about *what science is and what science can do* is often one of two types. The first type is *scientistic*, "an exaggerated kind of deference toward science, an excessive readiness to accept as authoritative any claim made by the sciences, and to dismiss every kind of criticism of science or its practitioners as anti-scientific prejudice," and the second, *anti-scientific*, "an exaggerated suspicion of science, an excessive readiness to see the work of the powerful in every scientific claim, and to accept every kind of criticism of science or its practitioners as undermining its pretentions to tell us how the world is" (pp. 17-18). She takes a middle road. She notes, "Science is not sacred: like all human enterprises, it is totally fallible, imperfect, uneven in its achievements, often fumbling, sometimes corrupt, and of course incomplete. Neither, however, is it a confidence trick: the natural sciences, at any rate, have surely been among the most successful of human enterprises" (p. 19).

In order to illustrate the need for more than one way of knowing (or form of evidence or kind of knowledge) we use Midgley's aquarium window metaphor, her many maps of the same territory metaphor (Note 11) and Susan Haack's use of the crossword puzzle (Note 12). Midgley (2004) employs the "many maps" metaphor, which was discussed in detail in *Science and Poetry*, 2001, to make the point that we need *scientific pluralism*—"the recognition that there are many independent forms and sources of knowledge—rather than reductivism, the conviction that one fundamental form underlies them all and settles everything" (p. 39). She considers the many maps of the world that are found in the first pages of atlases: "We do not make the mistake of thinking that these maps conflict.

We know that the political world is not a different world than the climatological one, that it is the same world seen from a different angle. Different questions are asked, so naturally there are different answers" (p. 39). The "one aquarium, many windows" metaphor is also useful in this regard. Consider a large aquarium with a number of windows allowing the simultaneous viewing of parts of that aquarium by multiple viewers. The view from any one window does not allow complete understanding of the contents of the entire aquarium: "We cannot have a single comprehensive view of the whole aquarium—a single, all-purpose, philosophic Theory of Everything … The world is simply too rich for such reductive strait-jacketing" (Midgley, 2001a, p. 19). But this does not say we are unable to improve upon our restricted view—all we need do is recognize our limitations and admit the possibility that others may be able to help us learn. Midgley continues, "This does not mean no understanding is possible. We can relate these various aspects rationally because they all occur within the framework of our lives. We can walk round and look at other windows and can discuss them with each other. But we cannot eliminate any of them. We have to combine a number of different ways of thinking—the views through several windows, historical, biological, mathematical, everyday and the rest—and somehow to fit them together". These metaphors are useful to Midgley since she takes a holistic, one-world's approach to looking at things: There is but one world; what we have are many ways of looking at that world. Each of these ways may be useful for answering a specific sort of question. No way is "the correct way". And, while she recognizes but one world, she emphasizes that it is a big one (Midgley, 1996), and that its complexity requires that we take in the information about it that are provided by alternative views and integrate their contributions into a unified whole. We take it that the fact that the world is complex needs no documentation.

Her latest (2018) book adds to her argument. She devotes three chapters to topics of interest here: Chapter 11 "Making sense of toleration," Chapter 14 "Scientism: The new sedative," and Chapter 23 "The mystique of scientism." In addition, her final chapter, "Conclusion; One world but many windows," reprises her aquarium with many windows metaphor which she has used with great effect for many years. She discusses this further, along with her several maps of the same territory metaphor (p. 195).

The above discussion captures much of Mary Midgley's thinking about scientific imperialism, but it should be recognized that it represents but a representative sample. Much of Midgley's work over the span of more than 30 years has focused on the proper role of the sciences in intellectual and cultural life. She wanted to ensure that the sciences inform, but do not imperialize, our efforts to make sense of ourselves, our world, and our place in it. *The Guardian* recognized her as "the foremost scourge of 'scientific pretension'" writing today and the ardent foe of the many salesmen of scientism." She tried to show how science and philosophy can, and should, cooperate and facilitate the work of the other (Kidd, 2015).

Another, earlier, philosopher who was a "scourge of scientific pretension" was Ludwig Wittgenstein. His attitude towards scientism was recently summarized, analyzed and illustrated by the various

contributors to Beale and Kidd (2017). Three main themes emerge, each capturing an important aspect of Wittgenstein's views of scientism: (1) Scientism is an attitude not *of* science, but *about* science, (2) Scientism has to do with an overconfidence in the power of science and the conviction that all there is, is knowable and explicable in scientific terms, and (3) Scientism goes beyond overconfidence in science; it is part of a whole world-view that emphasizes growth, progress, and construction (Boncompagni, 2018).

Wittgenstein was against the "scientism" that viewed every intelligible question has having either a scientific solution or no solution at all. He thought of philosophy not as a theory but as an activity, striving not after scientific truth, but conceptual clarity. Scientific understanding is achieved through the construction and testing of hypotheses; what we are after in philosophy is seeing connections.

There are many questions to which we do not have scientific answers, not because they are deep, impenetrable mysteries, but simply because they are not scientific questions. Philosophy addresses a distinct set of questions that must be answered for natural science to be properly conducted.

5. EBM as Medical Scientism

Scientism can be tied to the rise of such movements as eugenics, Sociobiology, Dawkins' reduction of all human behavior to selfish genes just trying to survive, evolutionary psychology, and Social Darwinism (an ideology that justified laissez-fare capitalism with reference to the "struggle for existence," Hughes (2012).

The scientistic attitude also gave rise to EBM; and the widespread adoption of EBM has, in turn, reinforced the tenants of scientism. This perfect reflexive storm was captured by McHugh and Walker (2015, p. 583) who noted: "Medicine has been informed by scientific principles throughout its history. However, perhaps partly because of the success of modern medical science, scientific knowledge is often elevated above other forms of knowledge, such that it might be expected that *all* medical knowledge should be scientifically justified. This expectation is reinforced by the widespread adoption of evidence-based medicine,"

Miles (2009, p. 944) added:

> "The advent and rise of EBM codifies the modern scientism in medicine, … and demonstrates all of the characteristics of scientism: radical reductionism, the privileging of the scientific method and inquiry above all others and a marked tendency to totalitarianism, even microfascism."

Note that here EBM is identified with a number of isms, viz., scientism, reductionism, totalitarianism and microfascism. In particular, according to Miles, "EBM formally codifies and embodies modern scientism in medicine."

McHugh and Walker (2015) provide the details of this embodiment in terms of a model of knowledge recognizing that there are four forms of knowledge operant in medicine, viz., tacit, explicit, particular and general (as opposed to simply objective or subjective) and that these point to the different roles and

grounding that medical knowledge can have (without presuming any one to be superior or inferior to others), viz., the tacit-particular, tacit-general, explicit-particular and explicit-general forms (Note 13). EBM focuses on only explicit-general evidence. They argue that since scientism excludes tacit and particular knowledge it thereby distorts "clinical reality" and impairs medical practice and medical ethics. This is the sense in which scientism may be hazardous to your health, as has been noted by a number of others. To point to just a few, Leggett (1997, p. 97) noted, "There are influences other than the disease process which constitute the context in which the disease occurs; to ignore these may lead to excellent management of the disease but bad management of the patient" (Note 14).

Loughlin et al. (2013, p. 133) thought that if we adopt a scientistic worldview, i.e., adopt EBM, "[w]e may be encouraged to think we cannot value the patient report of a clinical effect of treatment unless it can be measured 'scientifically,' giving rise to the vast literature purporting to give accounts of what feelings of love , pain, shame, anger and other emotional reactions 'really are' in purely neurological terms … and the academic industry dedicated to reducing 'quality of life' to something expressible as a numerical value …". They go on complete the connection to Midgley's metaphors: "But there is a difference between saying that looking at the world in a certain way can help you understand certain aspects of the truth about your predicament, and saying that looking at the world in a particular way, understood through the lenses of scientism, provides the only truth, such that no other ways of investigating the world can give us a believable and relevant insight into what it 'is really like'" (p. 143).

In a similar vein, Miles and Loughlin (2011) summarized the works of Paul Tournier as the need for attention to be given to the patient *in his entirety*, that is to say, to the biological, psychological, emotional and spiritual dimensions of what it is to be human and to the social context of the individual within his family and society more generally. This explicitly recognizes each of the tacit, explicit, general *and* particular sources of knowledge and points the way to replacing evidence-*based* by evidence-*informed* approaches to clinical practice. It recognizes that science is a *tool* of medicine, not its defining characteristic.

Miles (2009) thought that it was never too early to begin down this road: Medical students should be taught that *science is a tool of medicine, and not its soul*. Thus, Doran (1983) makes the point that teaching and practice are inextricably intertwined: "[N]ot only does the nature of clinical practice influence the training of health care personnel, but the training of those personnel will invariably alter the nature of clinical practice" (1831). Thus the emphasis on basic sciences in the medical curriculum can be linked to the rise of scientism in practice. If all you learn about is basic science, you will naturally rely on those tools to guide your practice.

Some medical schools have taken innovative steps to restore balance to the curriculum. While all medical schools (properly) teach basic science, many schools also aspire to expose students to a range of experiences beyond the basic sciences. For example, several medical schools, including the University of Michigan, Northwestern University, Indiana University, and Stony Brook University

have used *improv training* with medical students to aid communication skills and empathy. Improv training has been called "generous thinking" by Fitzpatrick (2019, p. 4) (Note 15) and is based on improvisational comedy's "rule of agreement," "a mode of engagement that emphasizes listening over speaking, community over individualism, collaboration over competition, and lingering with the ideas that are in front of us rather than continually pressing forward to where we want to go." Classroom activity typically includes both verbal and non-verbal activities, role-plays, and classic improv/theater exercises (Kaplan-Liss et al., 2018). When engaged with these exercises students must be fully present and listen deeply, not knowing what will happen next. "Yes, and…" is a fundamental mantra of improv; it implores the improviser to find something in another's words or actions to say "Yes" to, and add to it so that the scene continues to move forward and further connection can be built. Improv training is thus a deeply collaborative and co-creative process, fostering skills of teamwork and creative risk taking. Improv can thus help students develop comfort with interpersonal complexity, uncertainty, and surprise—common aspects of medicine today (Hoffmann-Longtin et al., 2019; Watson, 2011; Watson & Fu, 2016). Such training can, in its subtle and often fun way, build the essential skills of trust and empathy. Ultimately such experiences, and learning, may result in more holistic clinical decision making. Building skills of empathy and clarity of communication can certainly be of use in bridging the "science/non-science schism" as well.

6. Embracing the Art Of Clinical Practice

We begin by locating the position of "the art of medicine" in the context of the present discussion. This is necessary, for although "the art of medicine" has been the object of much discussion, it is seldom precisely defined or circumscribed (Malterud, 1995). All too often, "the art" is contrasted with "scientific medicine," leaving the impression that somehow "the art" is completely devoid of science. Thus, when the discussion is framed in terms of art vs science or by asking the question "Medicine: Art or science?" we are faced with a dichotomous *choice*, one or the other, when, as so often happens (Kowalski & Mrdjenovich, 2016) the more fertile middle ground is where greater insight is available. It is all too easy to identify the art with subjective knowledge/evidence ("opinion") that is in all respects inferior to objective (note 16) knowledge/evidence (the science), and to simply choose *science*, when clinical medicine is best served by the *appropriate* application of an evidence-based intervention. Finding the appropriate application is a matter of professional judgement, where we take "Professional judgement … is the means for adjudicating between alternative sources of [evidence] and weighing their relevance to the problem at hand" (Loughlin, 2008, p. 665). Isaac and Franscheshi (2008) thought that this involves the "contextual interaction" and a "circular integration" of "best research evidence, clinical expertise and patient values." Thus Malterud (1995, p. 189) argues that "the art of medicine" should be defined as *the successful interrelationship between the biomedical and the humanistic perspectives in clinical practice* (p. 189).

The role of evidence-based practice in clinical care has been debated on several levels (Cohen, Stavri, & Hersh, 2004). In reality, clinicians cannot rely solely on scientific evidence to support clinical interventions in many situations. Evidence may not exist, it may be inadequately evaluated, or it may become replaced or overturned through additional scientific study. It may exist but patients may not choose to follow the evidence-based recommendations of their clinicians because of personal decisions. And, in some situations, clinicians may not be basing their practice on best evidence available because of lack of awareness of research which revises evidence previously used to support interventions. Each of these possibilities will be examined briefly to illustrate how basing practice on scientific evidence alone may be insufficient.

The randomized, controlled clinical trial (RCT) is generally held as the gold standard for evaluating the most effective evidence-based interventions to support clinical practice. RCT results are used to support standards of practice, develop clinical guidelines, and define quality when clinician performance is evaluated. Yet, limitations of the RCT design have been discussed in both the clinical and lay literature (e.g., Speid, 2010; Prasad & Cifu, 2015; Epstein, 2018). Many vulnerable populations, such as the elderly, disabled, ethnic and racial minorities are underrepresented or not included in RCTs due to rigid eligibility and enrollment criteria. And yet, the types of patients to whom trial results can be generalized depends primarily on the type of patients enrolled in the RCT. Thus, a practicing clinician may face the dilemma of treating a patient using evidence-based interventions that may not be applicable in a given situation. Additionally, rare or orphan diseases are generally not investigated in RCT's and no evidence is available to support the care of patients with those conditions (Speid, 2010).

The book *Elderhood* (Aronson, 2019) contains an excellent discussion of, and examples showing how, science can negatively impact the health care given to elderly patients. The examples include the ordering of unnecessary, sometimes painful and always uncomfortable, tests and interventions that promise to do more harm than good in this cohort. She presents convincing evidence for the adoption of a more holistic approach to health care, especially among older patients, but applicable quite generally.

Science is dependent on replication of findings by independent teams for development, testing, and refinement of evidence over time. Munafo and Smith (2018) point out that replication is not undertaken to the degree that it should be in all scientific fields. And replication alone may not be sufficient. They discuss the merits of triangulation, the deliberate use of different methodologies by different disciplines, to examine the same research question from multiple viewpoints for the purpose of comparing results across different approaches. They argue that such an approach over time may provide the type of evidence that will make the greatest improvements in attaining optimal health outcomes.

Another issue having an effect on evidence-based practice is the fact that evidence changes over time in recognition of new research. Prasad, Vandross, Toomey, et al. (2013) discuss this growing trend of reversing existing evidence. This is due to many factors ranging from adopting evidence before it has

been evaluated sufficiently to a new research finding that existing practice is no better than a lesser therapy. This reversal pattern can result in new standards of care and changes in practice patterns.

Models to guide patient-provider interactions are also changing. Patient-centered care increasingly is valued as the preferred approach to providing clinical care, replacing more provider-centric models with a collaborative approach. In patient-centered care, treatment options are discussed with patients and families and a treatment plan is developed collaboratively that reflects their preferences. Patients may choose a treatment plan that is not evidence-based but more reflective of their values, cultural or ethnic preferences, or concerns over quality of life issues. This approach to improving health care outcomes and patient satisfaction has been endorsed by the Institute of Medicine, health care delivery organizations, and third-party payers (Epstein & Street, 2011).

To cite just one of the many instances in which patient preferences and values play an important role is when patients' religious/spiritual (R/S) beliefs and practices are taken into account (Koenig, 2007). Specifically, many patients have R/S needs and concerns related to their illness, which often go unmet (Clark, Drain, & Malone, 2003). The failure to address these concerns can adversely affect medical outcomes and contribute to higher health care costs (Balboni et al., 2007; MacLean et al., 2003). Moreover, R/S beliefs and practices can influence patients' medical decisions, as well as their treatment adherence and treatment response, and their ability to cope with illness (Koenig, 1998; Pargament et al., 2004; Silvestri et al., 2003). For these and other reasons, Koenig (2012) recommends that health care professionals should discuss R/S issues with their patients.

Importantly, there is an evidence-base in the way of data-driven, quantitative research published in peer-reviewed journals that demonstrates the influence of R/S factors on various aspects of physical and mental health (Koenig, King, & Carson, 2012). There is also an entire literature on the integration of religion/spirituality in health care, including reviews of treatment outcome studies that involve interventions with R/S components (Galen, 2018; Koenig, 2008). Such phenomena can be studied using natural methods of science and, in an ideal world, health professionals would utilize the relevant research findings as a tool to guide their practice. At the same time, however, it is important for clinicians to recognize that scientific evidence of a relationship between R/S constructs and health outcomes conveys nothing about the existence of supernatural or transcendent forces, or other matters of *faith* (Koenig, 2005). Clearly, religious faith reflects a worldview among certain patients—and perhaps a way of knowing or learning among some clinicians—that differs from empirical science, but which has significant implications for clinical practice. Consequently, an evidence-*informed* approach is needed whereby spirituality is integrated into patient care based on a substantial amount of research, while bearing in mind the fact that religious faith does not necessarily lend itself to scientific explanation.

The most common barriers to the integration of religion/spirituality in patient care are discomfort and lack of awareness on the part of providers (Sloan et al., 2000). Ideally, clinicians would receive information and training as part of standard curricula on how to address R/S issues with their patients

(e.g., how to assess the role of R/S beliefs or practices in the patient's illness and determine whether and how those beliefs and practices influence the patient's decisions about medical care, or how to identify spiritual needs that might warrant a referral to a chaplain) (Koenig, 2012; Koenig et al., 2010). If trainees were solely exposed to basic science though, it seems less likely that they could overcome barriers and include tools such as these in their clinical practice.

Finding the appropriate application of R/S content as a clinician is, of course, a matter of professional judgement. The "art" of clinical practice involves a healthy respect for patients' autonomy when it comes to religion/spirituality, and a keen awareness of boundaries that should not be crossed. In other words, caring for patients in their entirety does *not* mean that R/S interventions should be implemented with *all* patients (Koenig, 2007; Plante & Sherman, 2001). Accordingly, Koenig (2007) describes a secular framework whereby R/S content is not actively elicited or explicitly addressed among nonreligious/nonspiritual patients beyond an appropriate assessment—in terms of meaning and purpose, meditation, and social support rather than R/S beliefs, prayer, or congregational membership—and a referral to community resources as needed.

7. Concluding Thought

Evidence is always important in clinical care. But, increasingly, it is recognized that the complexities of care involve multiple factors that need to be considered and evidence is just one of those factors to be evaluated. Clinical judgement is a complex interrelationship based on art, science, and clinical experience which is also shaped by patient preference and values.

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Notes

1) Hofstadter (1999, pp. 704-6) noted that "ism," "[b]eing a suffix without a prefix, it suggests an ideology without ideas…"

2) When considering the definition of scientism, Pigliucci (2010) notes that while the term sounds descriptive, it is in fact only used as an insult: "The fact that scientism is an insult, not a philosophical position that anybody cares officially to defend, is perhaps best shown by the fact that there is no noun associated with it: if one engages in scientism, one is 'being scientistic,' not being a scientist" (p. 235). Hofstadter (1992/1944, p. 63) gives a good example: He quotes William Sumner who defined *Protectionism* as "*the ism that teaches that waste makes wealth*."

3) Haack (2012) took a different tack. Rather than providing yet another *definition*, she gave six *signs* (symptoms?) of scientism. The six signs are: (i) Using the words "science," "scientific," "scientifically," "scientist," etc., honorifically, as generic terms of epistemic praise; (ii) Adopting the manners, the trappings, the technical terminology, etc., of the sciences, irrespective of their real usefulness; (iii) A preoccupation with demarcation, i.e., the drawing of a sharp line between genuine science, the real thing, and "pseudo-scientific" imposters; (iv) A corresponding preoccupation with identifying the "scientific method," presumed to explain how the sciences have been so successful; (v) Looking at the sciences for answers to questions beyond their scope; and (vi) Denying or denigrating the legitimacy or the worth of other kinds of inquiry beside the scientific, or the value of human activities other than inquiry, such as poetry.

4) Casti (1990) provides a list of telltale signs of pseudoscience, viz., anachronistic thinking, the glorification of mysteries, the appeal to myths, a cavalier approach to evidence, an appeal to irrefutable hypotheses, the emphasis on probably spurious similarities, explanation by scenario ("story-telling"). "Literary" rather than empirically based interpretations of facts, extreme resistance to revising one's positions, a tendency to shift the burden of proof, and sympathy for a theory just because it's new or daring.

5) It should be noted that some, e.g., Mackie (1977), don't believe there are any such things as "moral facts," in which case the question is moot. Indeed, if moral facts do not exist, no method will be

successful in unearthing them. We find this nihilistic view untenable, however; we cannot accept the notion that "the holocaust as just the Nazi's way of doing things" … (c.f. Loughlin, 2008).

6) Bronowski was well-positioned to observe both what can happen when a monstrous certainty that will tolerate no dissent (Nazism, Fascism, Communism, etc.) rises to power, and the power of science to eradicate these—isms. He did not, however, ascribe to scientism—he emphasized that science was a human activity that could be put to both good (Salk's vaccine) and bad (Hiroshima) purposes.

7) "Heisenberg's principle says that no events, not even atomic events, can be described with certainty, that is, with zero tolerance. What makes the principle profound is that Heisenberg specifies the tolerance that can be reached. The measuring rod is Max plank's quantum. In the world of the atom the area of uncertainty is always mapped out by the quantum" (Bronowski, 1973, p. 365).

8) Scientism can be seen as the polar opposite of the postmodern view that science is impotent, that science can't really tell us anything, by insisting that science can (or will, eventually, be able to) tell us everything. Both are passionate beliefs in some universal truth. Nothing vs. Everything! Neither position can stand close scrutiny. Beware dichotomies! (Kowalski & Mrdjenovich, 2016).

9) The statistician Dennis Lindley has called this Cromwell's rule, using it in the context of not assigning prior probabilities of zero (or one) to propositions unless they were logically impossible (or certain). We would also advance the idea that there are certain (important) topics that promise to remain in a state of ambivalence no matter our efforts to exercise rational control over them. One such topic is *death*. Burt (2002) has shown that our attempts to "control" death in varied contexts like euthanasia, abortion, capital punishment, war, advance directives, etc. often result in more harm done than good. He documents the long-standing resistance of death to rational understanding and control by the use of such quotes as La Rochefoucauld's maxim "that death, like the sun, should not be stared at" (4). He also refers to what John Keats referred to as "negative capability … that is, when a man is capable of being in uncertainties, mysteries, doubts, without any irritable reaching after fact and reason" (p. 184) and to Learned Hand's definition of "liberty [as] the spirit that is not too sure that it is right" (p. 42). Thus, in addressing the status of death, this spirit demanded the rejection of any moral certainty, that "the outcome must needs be tentative" (p. 184). This is not easy to do in that it requires that we learn to live with a paradox regarding death: We must teach ourselves, through our rational intellectual capacities, that our rational intellect cannot adequately comprehend, much less control, death. Burt suggests that we'd be better to admit, as noted by W.H. Auden, "Death is not understood by Death, nor You, nor I" (p. 185).

10) Levins (1996, p. 188) also includes the familiar "things are the way they are because they got that way, not because they have to be that way, or always were that way, or because it's the only way to be." If we extend this to "things are the way they are because they got that way, not because they *ought* to be that way," we uncover a trove of examples for Hume's dictum: *ough*t does not follow from *is*. Science (viz., evolution) can speak to how things are, and even to *how* they got that way, but steers clear of suggesting that there is some moral justification for that particular realization. The evolutionary

medicine literature may be consulted for examples of where "evolution got it wrong," in the sense that the way we are now is not the best that we could be (see, e.g., Nesse & Williams, 1994).

11) This got us thinking about other metaphors that might be used to capture the same sorts of partial views as windows and maps. (a) Instant replay. Any sport will do. The same play (a wide receiver catching the ball (or not) in the corner of the end zone, or a runner sliding into second base, trying to elude a tag is viewed from a number of different camera angles in order to assess the true outcome. (b) Nature scene seen from different angles, under varying conditions. As seen during the day, at night, at twilight, dusk, sunrise, sunset. It might be calm or windy; clear, cloudy, or rainy skies. (c) Microscopic images at different resolutions. (d) The same person depicted at different developmental stages. (e) Kaleidoscope Depending on which angle it is held, a kaleidoscope will reveal different colors and configurations of objects to the viewer. Denzin (1970) suggested triangulation as an approach to "negotiating a reality" in this context.

12) She has found the crossword puzzle analogy useful (for a long time), but recognizes that scientific evidence isn't like a crossword puzzle in every respect: the solution will not appear in tomorrow's paper, and the puzzle has a human designer (p. 58). Nevertheless, following her discussion on pp. 93-9 there are a number of correspondences, both with respect to scientific evidence and the methods used by scientists used to produce such evidence.

13) These dimensions may be related to the qualitative-personal, qualitative-general, quantitative-personal, and quantitative-general formulation of types of evidence given earlier by Upshur et al (2001). Kowalski et al. (2019) pointed out that the McHugh and Walker and Upshur et al formulations were essentially equivalent and documented other uses (beyond the demonstration that EBM impairs medical practice and ethics) including the purported research/practice distinction and the estrangement of the medical and nursing professions.

14) We want to emphasize that it should not be necessary to choose between management of the disease and patient, one or the other. Good medical practice requires *both* or, at least, striking a balance between the two. Beware dichotomies! (Kowalski & Mrdjenovich, 2016).

15) The subtitle to Fitzpatrick's book indicates that "generous thinking" is an approach to saving the university. We make the more modest attempt to use it as a supplement to the medical school curriculum.

16) Malterud (2001) suggests that rather than thinking of qualitative and quantitative strategies as incompatible, they should be seen as complementary, and she details a number of ways in which it is possible to "look at subjective data objectively."