Objectivity, Scientificity, and the Dualist Epistemology of Medicine

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Abstract This paper considers the view that medicine is both "science" and "art." It is argued that on this view certain clinical knowledge – of patients' histories, values, and preferences, and how to integrate them in decision-making – cannot be scientific knowledge. However, by drawing on recent work in philosophy of science it is argued that progress in gaining such knowledge has been achieved by the accumulation of what should be understood as "scientific" knowledge. I claim there are varying degrees of objectivity pertaining to various aspects of clinical medicine. Hence, what is often understood as constituting the "art" of medicine is amenable to objective methods of inquiry, and so, may be understood as "science". As a result, I conclude that rather than endorse the popular philosophical distinction between the art and science of medicine, in the future a unified, multifaceted epistemology of medicine should be developed to replace it.

Introduction

In philosophy, clinical medicine is commonly said to have a dualistic nature, to be both science and art.[1] How this assumption is interpreted is important because the extent to which we view medicine as science rather than art affects our epistemological expectations of medicine. For example, if we hold that medicine is a science, it has been argued we should thus only expect it to meet scientific standards of inquiry, namely, the acquisition of objective knowledge. On such reasoning, medicine need not meet additional moral standards of inquiry, such as being sensitive to

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patients' health care needs and how they are met (Munson 1981). But of course, medicine without moral sensitivity would be deeply flawed, as it would forsake a basic aim of benefitting the patient through restoration and healing. Hence, so this reasoning goes, we should be persuaded to adopt a *dualist epistemology of medicine*; we should recognize two equally fundamental ways of medical knowing: in terms of objective scientific knowledge of biology and physiology, and subjective personal knowledge of the craft of patient care.

While I accept that ethical medicine must be sensitive to patients' health care needs and how they are met, the claim that this belief provides a reason to adopt a dualist epistemology of medicine is not persuasive. Indeed, I contend this doctrine has pernicious affects on our understanding of integral aspects of clinical medicine, because accepting it implies that certain clinical knowledge – of patients' histories, values, and preferences, and how to integrate them in decision-making – cannot be scientific knowledge. Yet, decades of work in clinical decision science suggests this knowledge is already being attained and used, altering how clinicians provide care (e.g., Weinstein and Fineberg 1980; Ende et al. 1989; Deber et al. 1996; Stiggelbout and Kiebert 1997; Levinson et al. 2005). If we aim to accurately capture the epistemic structure of medicine, including types of knowledge commonly relegated to the undifferentiated heap of the "art" of medicine, then this aim motivates a reassessment and challenge of the dualist epistemology of medicine.

Moreover, recent work in history and philosophy of science suggests that the art/science distinction rests on deeply flawed and hackneyed assumptions about science, as value free inquiry (*e.g.*, Longino 1990; Proctor 1991; Dupré 1993; Nelson and Nelson 1996; Lacey 1999; Douglas 2009). Thus, the arguments given here against a dualist epistemology of medicine also find a second motivation, of questioning a common thesis in philosophy of medicine in light of recent progress in philosophy of science.

The plan of the paper is as follows. It first reconsiders a classic debate over the scientificity of medicine, which shows that the vision of science assumed for juxtaposition with clinical medicine underpins conclusions about the scientificity of medicine. That is, whether we see medicine as a science rather than an art will depend chiefly on the extent to which we believe medicine is inherently "subjective" and "value-laden" versus "objective" and "value-free," and the extent to which science is not. Drawing on recent work in history and philosophy of science on the conceptual complexity of objectivity and subjectivity (Douglas 2004, 2009), the paper next argues that a dualist epistemology of medicine assumes an antiquated dichotomy between pure objectivity and pure subjectivity, where science aims at (and achieves) the former and anything that does not is not science. If we reject this dichotomy, as it is argued we should, then what is important is no longer whether medicine is a science, but the extent to which aspects of clinical medicine may be said to be objective, and therefore, amenable to scientific methods of inquiry. As two brief case studies show, while there remains (and will always remain) a degree of subjectivity in clinical medicine, this does not entail that it cannot be a

science, once science is understood as admitting of multiple types of objectivity and as incorporating values.

Distinctions in the Art/Science Debate

Being a Science Versus Being Scientific

Over 30 years ago, Lee Forstrom argued clinical medicine is not only scientific, but also is an autonomous science. Following Braithwhite, Forstrom defined a science in terms of two criteria, whether it has its own natural domain of inquiry and whether it aims at establishing general laws explaining the phenomena of that domain (1977, 8–9). Rendered in light of contemporary concepts in philosophy of science, we may interpret Forstrom as arguing that medicine has both a unique domain of inquiry and that it aims at robust generalizations.

According to Forstrom, the domain of clinical medicine is the living human being, which is both its object of inquiry and "its usual experimental context" (15). Yet, as human illness manifests across levels of analysis, from molecules and organs to organ systems and social systems, the clinician "must interpret and evaluate the effects on the organism of social and economic as well as physical and biologic factors" (9). Thus, medicine's unique domain is the sum total of levels of analysis required to understand health and disease in a living, embodied person. It is not simply an aggregate of the other sciences that explain phenomena in these domains, such as molecular biology, genetics, physiology, psychology, and economics, because medical science synthesizes the results of these domains for the purpose of developing knowledge designed for individual patient care.[2] Medicine is thus directed at knowledge about patient care rather than about biopsychosocial phenomena isolated from the context of human well being and suffering.

In response to Forstrom, Ronald Munson argues medicine is not, and will never be, a science, even though it is *scientific*. Using Forstrom's criteria, Munson argues that despite the fact that the notion of a unique domain of inquiry is vague, medicine nevertheless fails to have one. Because, he says, simply identifying a concern with the health and disease of living humans, and a requirement that this concern be expressed in considerations of many levels of analysis, fails to demarcate medicine from other fields, such as "medical sociology, epidemiology, bacteriology, biochemistry, and social work" (1981, 186). Moreover, distinguishing medicine from these fields by appealing to medical intervention as the defining aspect of clinical medicine will not do, because that would be patently circular.

[2] This depiction accords well with Engel's "biopsychosocial model of medicine" (Engel 1977) and the more recent model of "patient-centered medicine" (Bardes 2012).

What is at issue here is the type of generalizations clinical medicine aims at and how robust they are. To see this, notice that Munson's main objection is that not only is medicine not a science, but also, it can *never* be a science. While Munson recognizes that medicine is scientific, he rejects the claim that it is a science because of how he defines science. Munson holds something is a science if and only if it aims to generate robust generalizations; thus, the basic aim of science "is the acquisition of knowledge and understanding of the world and things that are in it," (190), no more and no less. For a scientist to justify her work, she "need only demonstrate that it is likely to increase our knowledge" (191). For a physician, however, solely appealing to increasing knowledge is insufficient and actually negligent. Since the aim of medicine is "to promote the health of people through prevention or treatment of disease," to justify her work, "the medical researcher must, in effect, present a dual justification: (1) the work will increase our knowledge; (2) the knowledge will be relevant to the aim of medicine" (*ibid.*).

Munson's response is perhaps the clearest of many attempts in the past three decades to justify a common view, that medicine is both science and art. That is, on the one hand, it aims at robust generalizations, while on the other hand it aims at idiosyncratic inferences concerning the treatment of particular persons. Because of these dual aims, medicine is bound to be concerned with patients' assessments of health, which entails a consideration of patients' values. Consequently, Munson concludes medicine has an inherently subjective, moral component, whereas science lacks such a component because of its function, to generate pure, objective knowledge.

Values, Scientificity, and Objectivity

Beneath Munson and Forstrom's debate lie assumptions about what characteristics must be present in order for science to aim at robust generalizations. Specifically, this debate shows that what justifies construing medicine in terms of a dualism between science and art is another assumed dualism, between inquiries that are "value-free" and those that are "value-laden," where the former pertain to the science of medicine and the latter to its art. For Munson, understanding what it means to aim at robust generalizations requires conceiving of them in terms of objective, value-free knowledge of the world. These are the targets of science, whereas medicine aims *also* at a subjective understanding of the patient. However, by questioning this second-order dualism, we can show that there are better ways to understand "science," and thus, better ways to describe the sense in which science and medicine aim at robust generalizations.

Consider the approach adopted by Gorovitz and MacIntyre in a classic paper from the same era. Science, they say, does not only aim at universal knowledge of properties, kinds, and generalizations linking one to the other; it also aims at generalizations about particulars. And, medicine is a science, so understood. For the clinician, understanding what makes a particular individual distinctive is paramount, even if this understanding comports poorly with medical theory. Whereas a

scientist aims to yield abstract generalizations from his or her experiments, rather than fuller knowledge of the specific features of samples being studied, for the clinician working with particular patients, "how such particulars differ from one another in their diversity thus becomes as important as the characteristics they commonly share" (1976, 59).

Gorovitz and MacIntyre's claim that medicine is a science hinges on their rejection of the fact-value dichotomy, which they say gives a false impression of the epistemology of science. It is the familiar thesis that sciences generate statements of fact, which cannot entail statements of value, that they contend leads to the erroneous view that natural sciences are not concerned with particulars, and as medicine is clearly so concerned, that medicine is not a science.[3] For Gorovitz and MacIntyre, then, medicine is a science, and that it is so is entailed by an account of scientificity that differs from Forstrum's and Munson's. Sciences *are* concerned with understanding particular phenomena, such as particular hurricanes, tsunamis, election results, and stroke victims. Hence, the fact that medical theory and practice are focused on understanding particular patients does not imply medicine is not a science.

Taken together, the claims made in these classic papers indicate that there are at least three different concerns at issue in debates about the dualist epistemology of medicine, each of which can be simply rendered in terms of a second-order dualism or distinction. One concern is with subjectivity and objectivity, specifically as manifested in a dualism between subjective and objective knowledge. Another is with value-free versus value-laden types of inquiry, and their relation to the production of knowledge. A third concern is captured in the distinction between general explanations and explanations of particulars.

Given that each of these three distinctions admits of its own literature, it would be foolish to attempt to give a full characterization of any of them here.[4] My aim is more modest, namely to show how attending to the assumptions one holds regarding each of them supports ones epistemology of medicine, and moreover, that certain (more tenable) assumptions suggest that a multifaceted epistemology of medicine is warranted, rather than a dualist one distinguishing simply between science and art.

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[3] As an aside, this claim warrants comment. It is not clear that ethical non-naturalists need be troubled by Gorovitz and MacIntyre's assertion here. They need only deny that factual information is sufficient for informing claims about what is good, not that it can play a (non-sufficient) warranted role in justifying inferences about what is good for a patient or other agent in the health care system.

[4] Indeed, for example, the issue of generality in explanation has been with us since the Ancients. Ancient Greek thinkers also distinguished between *episteme* and *techne*, a distinction based in part on the claim that the best explanations are those that are timeless and apply with broad generality. However, though early Greek thinkers also distinguish between these forms of knowing, as discussed below (n. 8), these distinctions do not match the contemporary distinction between art and science well as it is described here. See Parry (2009) for a detailed review of the diversity of Ancient Greek views on this topic and the many ways they relate to current epistemology.

When understood in terms of objectivity and subjectivity, the debate over whether medicine is a science comes down to whether medicine is "purely objective" and aims at the accumulation of objective knowledge, or whether it includes an inherently "subjective" component. This "subjective" component has been rendered in terms of personal values in the debate over the scientificity of medicine. In this way, we see the interplay between the value-free/value-laden distinction and the distinction between objectivity and subjectivity, in that medicine is an art if it aims at understanding patients' subjective knowledge of illness in terms that are patently laden with the patient's values. Likewise, medicine is understood as a science in as much as it aims to understand patients' diseases in objective terms, meaning those that are disconnected from the values of particular patients and clinicians.[5]

Distinguishing between general explanations and explanations of particulars also relates to the other two distinctions. If understood as a science, medicine is taken to aim at knowledge that holds of patients in general, indeed *because* it aims at objective knowledge, free from the values of particular patients and clinicians. And, medicine is art insofar as clinicians aim to skillfully bring these generalizations to bear on subjectively understood, value-laden illness in particular instantiations; that is, in particular patients.

Eric Cassell, a longstanding proponent of the dualist epistemology of medicine (*e.g.*, 1995, 2004), provides a paradigmatic example of how these distinctions interrelate in philosophical explorations of medicine. Cassell argues that in practice physicians adopt a narrow understanding of the concept of objectivity and a multifaceted understanding of subjectivity. Imagine you feel feverish, he says. You are achy and have cold sweats. You feel ill. If you go to a physician and she takes your temperature, then, "the reading on the clinical thermometer is an objective measurement of an elevation of body temperature. The feeling of feverishness is subjective because a feeling can only be experienced by the subject" (Cassell 2004, 171). This is one sense of what it means to be subjective; it is to feel a certain way, which can only be felt by you, the subject. There is also another sense, which is associated with your ideas *about* the way you feel. You may think that your feelings of achiness warrant the belief that you have a fever. According to Cassell, that idea is subjective in a second sense. Thus, on this view, how you feel and what you reason about your state of affairs in light of your feelings are both subjective. But, there is also a third sense of 'subjective' in medicine: "your *statement* that you feel feverish is also considered subjective…What the words *mean* is not something outside observers can hold in common," hence, they are subjective too (*ibid.*; italics in original).

Notice here that for Cassell, being subjective connotes being specific, local, and particular. Individual persons have particular feelings, ideas, or understandings of meaning. However, being objective is associated with generality: a thermometer reading is taken to be objective by contrast to being felt solely by the subject – it is

[5] In his *The Wounded Storyteller*, Arthur Frank (1995) develops an account of illness as subjective experience and disease as the objective description of that subjective experience in biomedical terms. It is in this sense that I use terms such as "illness" and "disease."

valid everywhere, no matter who wields the apparatus, as long as it is used correctly.[6] Also, being objective is associated with being general in the sense that there is general agreement about objective features of the world, in contrast to the particular meaning of statements as understood by specific persons.

Thus, underlying debates about the scientificity of medicine are assumptions about the meaning of objectivity, which is intimately related to the role of values in, and generality of, the target knowledge of interest. It is assumed that the clinician is tasked with acquiring two types of knowledge about the patient, objective (scientific) knowledge, for which there are general, measurable facts of the matter, and subjective knowledge, for which there are particular, incorrigible idiosyncrasies and thus, no facts of the matter.[7]

Objectivity and the Scientificity of Medicine

Now, one may reasonably wonder whether it matters that some philosophers defend a dualist epistemology of medicine. There are at least two reasons to think that it does. First, if we accept a dualist epistemology of medicine – as inherently both "art" and "science", both "objective" and "subjective," both "value-free" and "value-laden" – then such common activities as a clinician inquiring about a patient's symptoms, beliefs about the genesis of his complaint, or way of speaking about his illness, become activities that cannot be objectively characterized. That is, if medicine is both science and art, then we must agree with Cassell that "establishing a scientific basis for dealing with values and human qualities" is "doomed…Instead, each physician must solve the problem internally" (2004, 19–20).[8] Second, another

[6] In contrast to Cassell's assertion, Hasok Chang's (2004) work on the science of thermometry shows that the standardization of the activity of measuring "temperature" over hundreds of years is what makes this example appear as an innocuous instance of the elucidation of a objective fact about a patient. However, Chang's account of the evolution of the concept of temperature shows that such facts require literally centuries of research and debate in order for the idiosyncrasies of experimentation to be codified into a broadly accepted physical theory of temperature measurement.

[7] Another context in philosophy of medicine where the relationship between objective and subjective knowledge figures largely is debates over the meaning of the concepts, health, disease, and illness. Beginning with Boorse's account (1977, 1997), some argue that health has meaning by contrast with disease, which is best described in objective, "biostatistical" terms, or in terms of species typical functioning. Yet, others argue that these foundational medical concepts are thoroughly subjective due to the normative, evaluational aspects of medical reasoning and nosology (*e.g.*, Nordenfelt 1987). And, yet others contend that concepts like health and disease are normative *and* objective, proposing a hybrid account of sorts (Lennox 1995; Schaffner 1999). Finally, others argue that understanding these concepts philosophically is a quixotic pursuit, with no bearing on medical practice (Hesslow 1993). Taking a stance on this literature lies beyond the scope of this inquiry.

[8] This too is a problem that extends historically to the Ancients. As noted (n. 4), Ancient Greek philosophers distinguished between different ways of knowing, including *episteme* and *techne*. However, different thinkers interpreted these terms quite differently. For example, in the

reason that the dualist epistemology matters is that it is common in philosophy of medicine (*e.g.*, Waymack 2009; Saunders 2000; Cassell 1995; Malterud 1995; Battista et al. 1994), which threatens to distance work in this field from important progress elsewhere in philosophy, especially in philosophy of science.[9] That is, given the progress made in recent years on the question of whether science is value-laden or 'purely objective' in philosophy of science, if philosophy of medicine ignores this work it adopts an antiquated theory of science, which threatens to render it obsolete.

The Irreducible Complexity of Objectivity

One way to challenge the dualist epistemology of medicine is to challenge its conceptualization of scientific objectivity. In light of recent work in history and philosophy of science, objectivity may be seen as far more complex than discussants in the art/science debate suppose.[10] Consequently, the notion of "value-free" aspects of clinical medicine is a nonstarter. Therefore, clinical medicine should be understood as an integrative science that draws on various methods, which are objective by varying degrees.

In its contemporary usage, the concept of objectivity is, as historians of the notion have put it, "hopelessly but interestingly confused" (Daston and Galison 1992, 82). Following Heather Douglas (2004, 2009), we may distinguish between different senses of objectivity implicit in the broader concept by attending to the different ways objective claims are *produced*. Douglas distinguishes three categories of processes that result in objective claims: interactions with the world (such as experimentation or observation), individual thought processes (particularly reasoning leading to certain claims), and social processes for generating claims (such as polling, voting, or collaboration).

As illustrated by Cassell above, from the clinician's perspective, interacting with patients may be seen as an instance of an interaction with worldly phenomena.

Nicomachean Ethics (especially *Book VI*), Aristotle describes these two types of knowledge as more general, in contrast to a third type of knowledge of how to act rightly in particular contexts, known as practical wisdom or *phronesis* (Aristotle 2000). It is fascinating that Ancient Greek thinkers took medicine, along with navigation, as an exemplar of practices where all types of knowledge were required (Jaeger 1957). Although these discussions are clearly relevant to modern debates about the epistemology of medicine, contemporary scholars are in agreement that the Ancient Greek conceptions of knowledge do not mirror our own understanding of art as a craft and science as objective facts (Hofmann 2003; Evans 2006).

[9] The same might be said for empirical work in applied ethics, however, for the sake of brevity that point will not be made here.

[10] This argument could be expanded to draw on the considerable philosophical and historical literatures on objectivity and science (e.g. Nagel 1979; Longino 1990; Proctor 1991), but doing so is outside the scope of the present discussion.

Though a patient is a person, he is also a phenomenon to be studied, to be poked and prodded, in order to generate evidence for knowledge claims. To make such claims, physicians procure evidence through multiple avenues, such as different types of diagnostic tests (e.g., genetic, blood, and imaging), and inquire whether the evidence supports inferences about the patient's illness. On Douglas' typology, this is *convergent* objectivity, where convergence of sufficiently independent lines of inquiry yields "increasing confidence in the reliability of the result" (2009, 119–120).

Interacting with patients may also be understood as a social process, for instance, of eliciting information about the patient's illness, of healing, or of deliberating about treatment options. These processes may also be understood as generating objective claims. *Concordant* objectivity occurs when "some set of competent observers all concur on [a] particular observation" (126). *Interactive* objectivity denotes moments where persons deliberate "to ferret out the sources of their disagreements" before certifying a claim (127). In the clinical context, concordant objectivity may be exemplified by physician consultations or second opinions. In each case, the question is whether multiple observers will agree on a patient's diagnosis, prognosis, and treatment options; if so, then in this sense the agreement conveys that these are objective claims about the patient. Interactive objectivity is exemplified by treatment decision-making and team-based approaches to clinical care, where in both instances persons deliberate over whether a choice is correct in light of what is known about a patient.[11] According to Douglas, the more diverse the deliberators and the more robust the disagreement and deliberation, the more objective this type of objectivity will be.

Individual thought processes could also be described as objective. In one sense, to be objective is to think about phenomena while keeping personal 'distance' from it. That is, *detached* objectivity follows from a "prohibition against using values in place of evidence" (120); the investigator is prohibited from appealing to her values in making inferences about the happenings of the world. This seems to be the kind of objectivity intended by Munson in his characterization of science, where scientists aim at producing general knowledge, and nothing more. Yet, Munson's characterization of science is ambiguous in that it also implies *value-free* objectivity, which is more restrictive than detached objectivity, because it denotes a process where all values are prohibited from entering into reasoning. If science is characterized as lacking an inherent moral principle, as Munson holds, then this suggests values are banned from scientific reasoning, which is a stronger prohibition than that they cannot serve as components of inferences (detached objectivity) or that one must adopt a neutral position with regard to the values at play in inquiry (*value-neutral* objectivity).

[11] For a lively, careful discussion of the philosophical implications of team-based care, see the contributions to King et al. 1988.

Scientificity and the Epistemology of Medicine

Whether clinical medicine is both art and science depends on how one defines "science". In the art/science debate, to be a science is to be "value-free," "objective," and to aim at (robust} generalizations. But as Douglas (2004) argues, the meaning of "objectivity" is irreducibly complex; consequently, the extent to which being value-free is a hallmark of science is an open question that depends for its answer on the extent to which science exhibits various types of objectivity. Thus, if science is not value-free in the requisite sense – of value-free objectivity defined above – then the claim that medicine is not a science becomes unsupportable. Just as other sciences exhibit types, and hence degrees of objectivity, so too does medicine. Accordingly, just like other sciences, medicine may be seen as a science despite the fact that it is not "value-free."

There are good reasons to think that value-free objectivity is not and should not be a hallmark of scientific inquiry. As Douglas argues, scientists routinely make decisions about research based on various methodological and ethical values. Scientists also dispute the relative importance of different epistemic values and their implications for hypothesis acceptance. Furthermore, the distinction between epistemic and non-epistemic values is dubious. Finally, scientists have a responsibility to consider the consequences of errors in their reasoning. What follows from this is that the role values play in science indicates that the value-free ideal of objectivity is also a nonstarter. Values are ever-present in science; understanding the roles they play in inquiry and the extent to which they are justified is what is important.

Values play many roles in medical reasoning. Hence, a satisfactory epistemology of medicine should not be dualistic, but should be both unified and multifaceted. It should be possible to describe the moments where, for example, detached objectivity is warranted or inapt, or where convergent objectivity justifies a claim that is nonetheless challenged through processes described by concordant objectivity. To put it another way, if we shift from a dualistic epistemology of medicine to a unified and multifaceted one, we may draw upon rich philosophical accounts of the multi-level nature of explanation in medicine (Schaffner 1993) in order to justify the types and degrees of objectivity operative at each level and the extent to which they interact in the making of justified medical claims. On such an account, clinical medicine is a science through and through, only to be a science is no longer to be "objective" in a simple sense of being value-free; rather, to be objective is to be produced by a process one can rely on, a process that is likely to be trustworthy.

However, though we may be better positioned to evaluate the implications of the art/science distinction in medicine by considering recent work in history and philosophy of science, we may nevertheless still believe the dualist epistemology has its virtues. Principle among these might be its emphasis on the distinction between general and particular knowledge claims, an area of inquiry where history and philosophy of science has made far less recent progress than in the understanding of values and objectivity. That is, though we may follow Douglas and others in shifting an emphasis to how knowledge claims are produced to understand the roles values

play in them and the senses in which they are objective, it is not clear that this is helpful for characterizing the extent to which these claims are more or less general or particular, and what this means for their validity, reliability, or meaningfulness.

Consider that we may speak of a "myocardial infarction" as a type of event or as a token event. It is not clear whether clinicians who use this language – or language of "swollen," "sharp pain," or "anxiety" – generally mean to invoke just the type or just the token event. Which, or whether they are being ambiguous, will be a matter of the pragmatics of medical practice, and is not something that can be decided in the current inquiry. Moreover, it is also unclear how clarifying the multiplicity of ways science is value-laden and the complexity with which it aims at objectivity will aid in characterizing those pragmatics, though I assume in time they will.

Consequently, if these remarks about the complexity of objectivity and the role played by an antiquated concept of objectivity in the dualist epistemology of medicine are cogent, then they suggest at most that the art/science distinction rests on shaky ground. If, as has been argued, science is value-laden, then the mere fact that what is often called the "art" of medicine requires eliciting patients' values does not entail medicine cannot, therefore, be a science. With objectivity so understood, the traditional art/science distinction may thus reduce to an ancient, and perhaps intractable puzzle about the relationship between general and particular knowledge claims.

A Role for a Unified Epistemology of Medicine: Two Case Studies

Absent sound philosophical reasons for adopting a dualist epistemology of medicine, I contend it should be rejected because of its pernicious effects, which I describe in this section by considering examples from recent work on decision-making in hereditary breast and ovarian cancer syndrome (HBOC) and end-of-life care. In both cases, one finds many aspects of clinical medicine that are routinely understood under the rubric of the "art" of medicine, but which are better understood when depicted as part of the "science" of medicine, because doing so allows for the assimilation of this research into the domain of unified medical knowledge.

Pathophysiology, Psychology, and Social Science in Hereditary Breast and Ovarian Cancer

HBOC is defined in terms of a known genetic predisposition to breast and ovarian cancer. Many factors must be considered in its diagnosis, but the determining one is returning a positive result for mutations in the *BRCA1* or *BRCA2* genes (Rubenstein 2001). In order to qualify for a genetic test, a patient must meet certain criteria,

including having a first degree relative with a known mutation, being of Ashkenazi Jewish descent, or receiving a diagnosis of breast cancer before age 45 (National Cancer Institute 2011). If a patient is diagnosed with HBOC, this licenses a number of inferences about processes that are occurring in her cells, depending upon the mutation she harbors (Turner et al. 2004). While much is known about the genetics and physiology of this syndrome, the study of HBOC is still in its infancy, so it is known with varying degrees of uncertainty. Despite this uncertainty, these aspects of the clinical science of HBOC surely fall under the rubric of the "science" of medicine on any account.

However, we know much more about HBOC than simply its pathophysiology. We also know how the ways in which clinicians interact with patients may affect their decision-making. And, we know what patients' typical emotional reactions will be when faced with the prospects of having HBOC. Appreciating this research, described below, on various phenomena arising from typical clinical encounters in HBOC suggests that what is often understood as the "art" of medicine is also a science, though in the psychological and social sciences. It aims to measure qualities of particular social beings and social relations. And it studies agents who seek care, their loved ones, the professionals who provide care, and the relationships among them. Through increasing success at such measurement, increasing development and application of statistical techniques, increasing conceptual progress, and increasing innovation in experimental design, we are learning about these relationships in ways that support interventions upon them. Thus, the art and craft of medicine is constituted by diverse studies of social relations in medical practice and their application to particular moments of patient care.

Empirical studies of the psychosocial aspects of HBOC have resulted in a rich portrait of what it means to face an HBOC diagnosis, how patients and family members make treatment decisions, and what the consequences of their choices commonly are. For example, we know that genetic counselors are far more disposed to choose genetic testing and prophylactic surgery than their patients (Matloff et al. 2000). And we know that what is most important to patients who face decisions about testing and surgery is information about their test results and their family history. Yet, also of importance are concerns about the risks of surgery, the timing of interventions in their lives, and the impact treatment will have on sexuality (Ray et al. 2005). Finally, for those who choose testing, we know that irrespective of their test results, patients will feel a mixture of sadness, anger, guilt, and relief; and many will worry about insurance discrimination (Lynch et al. 1997).

Though this description of HBOC is abstract and simplified, it suffices to illustrate both how a complex understanding of objectivity is useful for characterizing the scientificity of medicine and why it is better to understand medical knowledge as scientific, rather than as both science and art.

The principle justification for a dualist epistemology of medicine resides in the belief that there are certain aspects of the craft of medicine that are inherently subjective and particular, meaning they are value-laden, and hence, inaccessible to scientific methods of inquiry. The examples of such aspects given above by Cassell are the values of the patient, the idiosyncrasies of clinical judgment, and the

emotional influence on patient and physician cognition during all aspects of clinical interactions. The position argued for here is that these features may also be understood as being objective, once a simplistic account of objectivity is identified, challenged, and replaced with a more nuanced account. On this view, empirical studies of phenomena like clinicians' biases and patients' emotional responses to various moments in treatment provide knowledge that is objective, and in an important way, in the same sense as knowledge of the molecular processes that cause cancer. Both types of knowledge are the result of many processes of data collection and inference. These processes will be objective to varying degrees, if modeled in terms of the types of objectivity above. Whereas our knowledge of the molecular pathophysiology of HBOC may be a product of processes where concordant, convergent, and detached objectivity are more salient than other types, it is also true that our knowledge of the psychosocial aspects of HBOC are produced by processes where concordant, interactive, and value-neutral objectivity play prominent roles. Hence, it is not the case that what has been characterized as the art of medicine is incorrigible by appeal to scientific inquiry; rather, it is, and this entails that there may be a science of the art of medicine. Furthermore, just as objective knowledge of pathophysiology is necessary for the optimal delivery of patient care, so too is objective knowledge of the psychosocial aspects of medicine instrumental for optimal care.

End-of-Life Care in the Intensive Care Unit and the Scientificity of Medicine

Research on decision-making in end-of-life care is another, and perhaps better, case where important recent progress has been made in scientifically studying aspects of care that would traditionally be confined to the "art" of medicine. For many people, life will end in an institutional setting; indeed, recent studies showed that for over 65 % of subjects life ended in an institutional setting, including a hospital or nursing home; and, for those who died at home, over 60 % received some type of nursing or hospice care at home before death (Teno et al. 2004). In recent years, clinicians, social scientists, and applied ethicists have endeavored to describe how people die in institutional settings and to suggest ways for optimizing these most common ways of ending life (*e.g.*, Kaufman 2005). What considering a tiny but representative portion of this literature indicates is that, like in the case of HBOC, studies have developed significant, empirically justified knowledge describing end-of-life care from the perspectives of providers, patients, caregivers, and other stakeholders and decision makers. In the context of the current argument, this research provides further evidence for the view that a dualist epistemology of medicine has pernicious effects: specifically, if one accepts it, then the knowledge gained by such studies must be dislocated from other medical knowledge that is equally important to providing quality end-of-life care, namely, that which justifies scientific inferences about a patient's prognosis. With such dislocation there is no coherent way to describe how to take into account both how patients understand dying in institutional settings or what it means to

provide quality end-of-life care, and how to provide quality medical interventions at the end of life. And this is deeply problematic because integrating these different types of knowledge is required in end-of-life care, as it is in all medical practice. Yet, if one adopts the science/art distinction, one should expect that such an integration is not only hopeless, but also impossible, because on that view to try to assimilate art into science or *vice versa* is to make a category error.

In a recent review, physician J. R. Curtis argues that "[Intensive Care Unit] clinicians should approach the family conference with the same care and planning that they approach other ICU procedures" (Curtis et al. 2001). That is, he believes it is just as important to understand how to communicate well about end-of-life decisions, as it is to understand how to perform a procedure such as a tracheostomy. Moreover, knowledge of how to do both well is not just equally important, it also may require the same types of reasoning.

As Curtis has shown in many subsequent studies, to be a better communicator requires developing an expertise in understanding how physicians communicate poorly and how they communicate well. For instance, in a recent paper, he and his colleagues show that there are four distinct roles that physicians take on when discussing surrogate decision-making regarding life support decisions. Most physicians adopt a collaborative role, defined as providing medical information, eliciting patient's values, and making treatment recommendations. However, others adopt what they describe as "directive," "facilitative," or "informative" roles in the decision-making process (White et al. 2010). If philosophers are to adequately characterize clinical research such as this, then the dualist epistemology of medicine must be rejected and superseded by a more cogent account.

Consider other recent work on end-of-life care. A recent study of the psychology of clinical decision-making in the ICU shows that physicians' beliefs about the appropriateness of withdrawing life support strongly correlate with whether patients in the ICU receive the option to withdraw treatment (Schenker et al. 2012). This research suggests that by better understanding the mental mechanisms by which physicians form beliefs it may be possible in the future to create interventions to increase the quality of end-of-life care, in terms of increasing the goodness of fit between presented treatment options and patients' intuitions about quality of life. Consequently, the logic of this research presupposes that by empirically studying the "art" of medical practice using common scientific methodologies, it will be possible to both better understand clinical practice and create empirically derived interventions for bettering patient care.

As in the case of HBOC, careful attention to research studying various aspects of clinical practice and decision-making in end-of-life care indicates that there are many instances where scientific methods are fruitfully applied to patient care. What results are measures of various aspects of patient care that have the promise of revolutionizing practice once better understood. Such measures are out of place if one joins scholars like Cassell in assuming that there is an art to medicine that cannot be studied scientifically, and for which no progress can be made other than by the apprenticeship model. Given the value of these measures, it is only reasonable to conclude that the time has come to move past the dualist epistemology of

medicine and to begin the process of crafting a new, coherent epistemology that is multifaceted while also remaining unified in recognizing the persistent scientificity of medical theory and practice.

Conclusion

This paper argues a dualist epistemology of medicine has significant and pernicious implications. It implies that certain clinical knowledge – such as, of patients' histories, values, and preferences, and how to integrate them in decision-making – cannot be scientific knowledge. Moreover, the distinction between an "art" and "science" of medicine rests on flawed and antiquated conceptions of science, as characterized above. By considering recent progress on the question of whether science is value-free, and relatedly, the conceptual complexity of objectivity and subjectivity, it has been argued there may be varying degrees of objectivity pertaining to various aspects of clinical medicine. Hence, what is often understood as constituting the "art" of medicine is also amenable to objective methods of inquiry, and so, may be understood as "science". Therefore, the popular philosophical distinction between the art and science of medicine ought to be rejected and in its place a unified, multifaceted epistemology of medicine should be developed.

The upshot of rejecting a dualist epistemology of medicine is that it allows one to make explicit and to critically evaluate the role of values in medical science. It stands to reason that different aspects of medicine, such as the pathophysiological and psychosocial, will have very different degrees of objectivity, correlative with the different roles values play in them. But, these should be understood as differences of degree, not in kind. Thus, it is better to see medicine as an integrative science aiming at multi-level explanation in the service of patient health, rather than as a science on the one hand and an art on the other. What remains an open question, however, is whether issues arising from the generality and particularity of knowledge claims in medicine continue to be salient in light of new understandings of the complexity of objectivity and roles of values in science. This is but one of the important issues facing those who aim toward a unified epistemology of medicine.

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