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PRIORS AND PREJUDICE

ABSTRACT. This paper explores the relationship between concepts of probability and hermeneutics. It seeks to examine the relationship between subjective (Bayesian) views of probability and hermeneutic descriptions of understanding. It is argued that Gadamer's account of the prejudicial nature of understanding, derived from Heidegger's analysis of foreunderstanding, offers a provocative model of clinical reasoning. The implications of this model for "evidence-based" medicine are discussed in conclusion.

KEY WORDS: hermeneutics, probability, clinical reasoning, evidence-based medicine, philosophy of medicine, Bayes Theorem

INTRODUCTION

Clinical reasoning is an extremely complex process. It is frequently described as probabilistic reflecting its status as a stochastic art with a lineage dating back to classical antiquity.[1] On this view, the use of probability models to study medical decision making under conditions of uncertainty seems straightforward and uncontroversial. The application of probability models to clinical problems, though, leaves undisturbed a set of theoretical and philosophical questions that may provide fertile grounds for exploration. A central question involves the source of clinician's knowledge of probabilities.

One explanation of the origin of clinicians knowledge of probabilities is that they arise from the published scientific literature. Clinical reasoning and knowing is then essentially a species of scientific inference. This view is largely echoed by clinical epidemiologists and proponents of evidence-based medicine.[2] Those unsympathetic to this view have argued for the tacit dimensions of physician knowledge.[3] Hence a dynamic tension exists between the "art" and "science" of medicine.

An alternative account of the status of probability estimations may come from an analysis of the hermeneutic dimension of medical experience. It is the intention of this essay to explore the nature of clinical probability in hermeneutic terms as the working out of a foreunderstanding. This will situate the generation of clinician's prior probabilities clearly in an existential context and permit a possible fusion of Bayesian thinking

with hermeneutics. The implications of hermeneutics for evidence-based medicine will be discussed.

UNCERTAINTY AND PROBABILITY

Uncertainty and probability are often used interchangeably. This is unfortunate because both terms embrace contrasting concepts and so are not entirely synonymous.[4] Uncertainty has two dimensions relating to the incompleteness of understanding: underdetermination and ignorance. In the case of underdetermination, uncertainty relates to the degree to which the totality of scientific evidence fails to give a complete account of a subject. In this case competing interpretations of the same data or clinical scenario may be offered by reasonable persons.[5] Answers to important questions may be at present unknown, or there exists a community of interpreters with varied and conflicting interpretations of the best answer given current evidence. In the case of ignorance, the correct answer exists, but the interpreter is unaware of how to access the evidence or fails to grasp or utilize the existing correct information. In this analysis we shall be concerned solely with the first type of uncertainty.

Statistics is the science concerned with the quantification of uncertainty.[6] Probability calculus is central to the discipline of statistics. There is a long, and sometimes divisive debate among theoretical statisticians concerning the ultimate meaning or status of the nature of probability itself. The point here is not to rehash the debate, but merely to highlight the essences. There are two competing and conflicting views of the nature of probability: Bayesian and frequentist. For a frequentist a probability is "the relative frequency of some kind of event in a certain type of sequence of events or . . . in a set of events."[7] It is a property or propensity of the way things behave in the world. The idea of a relative frequency can best be appreciated by the kind of sampling examples used in elementary statistics courses. If one has an urn filled with two different colours of beads, by repeated sampling one can more precisely determine the true distribution of coloured beads. Frequentist conceptions of probability rely on replications, repeated sampling and the invocation of the long run. With modern computer technology, one can conduct simulations of almost infinite replications, thus providing robust distributions. Yet they remain simulations.

The second primary interpretation of probability comes from those statisticians influenced by Bayes Theorem. To them, probability is a characteristic of a person's opinion about an event. It is an index related to one's willingness to believe, take action or change one's mind on the basis

of evidence at hand or on new evidence presented to be interpreted.[8] On this "subjectivist" or personalistic view, then, there are as many probabilities as there are persons. Probability is not an objective property of events in the world. Bayes theorem, though, allows one to readjust, or update, one's degree of belief in a hypothesis on the basis of new information.[9] The finer points of the debate between the two rival interpretations will not be discussed here. They are exhaustively discussed elsewhere.[10]

Textbooks in clinical epidemiology and in medical decision making often recommend the use of Bayes theorem as a useful, if not indispensable, tool for rational decision making.[11] Such discussions seldom venture into detailed discussions on the nature of probability. Evidence exists that physicians are largely indifferent to the meaning of probability. It is sufficient to note that in clinical medicine, both concepts of probability outlined above are operative, and often used interchangeably.[12] Even less discussion or examination goes into how and where clinicians derive their prior probabilities. It has been argued that the inputs found in clinical medicine fail to specify prior probabilities.[13] Textbooks usually employ well established prior probabilities, derived from empirical studies to show the utility of Bayesian reasoning. These examples, though, scarcely exhaust the problems encountering practising clinicians.

However, as statistical reasoning becomes more broadly integrated with clinical reasoning it is essential that core conceptual issues are not obscured. There is an increasing number of admonitions from clinical epidemiologists urging clinicians to be more algorithmic or decision analytic in their approach to diagnosis and therapy. The discipline of clinical epidemiology rests firmly on the use of formal probability models in clinical medicine. Hence the claim that clinical epidemiology is a basic medical science. The debate concerning evidence based medicine has been taken by some to represent the triumph of "statistics" over clinical common sense based on deterministic reasoning.[14] Opinion is being polarized in the medical community concerning the ultimate nature and status of rationality in medicine.

HERMENEUTIC UNDERSTANDING

Outside the disciplines of epidemiology and statistics, commentators from the humanities have discovered the relevance of the hermeneutic tradition for medicine. In a recent set of papers published in Theoretical Medicine, the relationship between medical practice and hermeneutics was analysed.[15] The emphasis on hermeneutics was largely restricted to the domain of ethical issues. Epistemic issues received comparatively little

attention. This is surprising since one of the seminal works of this century, *Truth and Method* by H.G. Gadamer was an exploration of the ontological character of hermeneutic understanding. By claiming a universality for hermeneutic understanding it is evident that the application of hermeneutics extends beyond the domain of the ethical and into the epistemic. This is precisely true in the practice of medicine.

In *Truth and Method*, HG Gadamer sets out to describe the type of understanding that characterizes the *Geisteswissenschaften*, or human sciences. Explicitly abjuring any quarrel with the methods of the natural sciences he seeks to reclaim the priority of hermeneutic understanding in the human sciences. Following Heidegger, Gadamer demonstrates how the exercise of understanding and interpretation are constitutional or ontological aspects of human being in the world. Central to the nature of understanding and interpretation is the rehabilitation of the concept of prejudice.

Prejudice has a distinctively pejorative connotation in modern discourse. Gadamer, in seeking to rehabilitate the concept of prejudice could be seen to rest on problematic grounds if consideration is restricted to contemporary usage. In Gadamer's analysis, the concept of prejudice acquired negative connotations during the Enlightenment. Since the Enlightenment, the goal of epistemological reflection has been to make knowledge as presuppositionless as possible. The idea is to refine Descarte's quest for apodictic certainty. Truth, then, is self evident and self transparent. In the Enlightenment project, presuppositionless knowledge is the ultimate goal, representing the completion of the Cartesian project of methodologically secure knowledge.

Gadamer points out that the original sense of the term prejudice "means a judgement that is given before all elements that determine a situation have been fully examined."[16] In terms of medical diagnosis, one commonly renders judgements before all elements have been examined. In terms of human health, it is unclear to what extent one can ever precisely state all elements of a clinical situation. Given the dynamic and time saturated nature of existence, there is a very real sense in which all medical opinion partakes of this kind of prejudicial understanding.

Gadamer is careful to argue that there must be a means of distinguishing legitimate from illegitimate prejudices. The traditional view of prejudices as a narrowing of view is contrasted with their generative capacity. Understanding emerges from rather than escapes prejudgement. Prejudices are the beginning of understanding.[17]

On this view, all human knowledge is conditioned and conditional. The conditioned nature of knowledge relates to our thrownness. We are

born into cultures, practices, and beliefs that are not of our own creation. The conditional nature of our knowledge relates to its historicity: we are contingent, finite creatures born to inherit a relationship to cultures and traditions of ancient lineage and complexity not of our own creation. As Gadamer writes:

> Long before we understand ourselves through the process of self-examination, we understand ourselves in a self evident way in the family, society and state in which we live . . . The self-awareness of the individual is only a flickering in the closed circuits of historical life. That is why the prejudices of the individual, far more than his judgements, constitute the historical reality of his being.[18]

Hermeneutic understanding emerges from historical context and facticity. Each individual must work through their fore understanding and prejudices. Gadamer illustrates this by citing the example of the interpretation of ancient texts and works of art. They have a quality of alienness and otherness. We approach such objects as the other, but work through towards an understanding of it by encountering it. As in a dialogue, the otherness must be acknowledged as legitimate and having a claim to authenticity equal to our own. Through what Gadamer terms a fusion of horizons, a novel understanding is created. This is how the hermeneutic circle unfolds. The radical dimension of Gadamer relates to his claim that experience of the hermeneutic circle is universal, that is constitutive of understanding.

Claims of an inherent and constitutive hermeneutic dimension to the decision analytic aspects of medical practice are likely to grate upon the sensibilities of those who believe medicine is an entirely empirical science. The claims of the relativity of interpretation will in their minds, undermine the "objectivity" of medicine. However, if one seeks to explore the "subjective" element of probability in the context of clinical practice, then fears of multiplicity and subjectivity are transformed into an examination of context and judgement. If probabilities are subjective, but not arbitrary, then they can be explicated in hermeneutic terms.

The means through which this can be achieved is by linking a Bayesian concept of probability with a hermeneutic understanding of prejudice. What I am suggesting is that clinicians priors are products of their prejudice. Consequently the notion of a prior probability distribution is not rooted in willingness to bet, but rather emerges from the experience of being in the world. Issues of perfect consistency will be leavened with phronesis.

PRIORS AND PREJUDICE?

How, then does the Gadamerian description of the hermeneutic circle relate to Bayesian reasoning and clinical practice? Consider the following example:

A family physician receives a new patient. Before she enters the room to conduct the history and physical investigation, she stops to look at the demographic information, age, sex and occupation of the patient. From the information she constructs an image of the patient and makes an estimation of the likely complaints, concerns and risk factors as she enters the room.

Most accounts of this simple process have focused on the scientific nature of the enterprise. The clinician ultimately uses the information from the history and physical to formulate a precise hypothesis to test. Conditions will be ruled in or ruled out according to a hierarchically ordered set of probability judgements analogous to exercises in corroboration or refutation of hypothesis (depending on your school of thought).

Alternatively, they can be viewed as the working out of the fore-understanding of the physician. The constitutive aspects of risk profiling are historically contingent. Our knowledge of most diseases and disease processes is incomplete. There is a quality of alieness to the patient and their complaint which must be overcome. Risk factors are not causes: they are incompletely understood potentials. They are also mosaic in the sense that they are not solely derived from the physicians knowledge of the patient or population he or she serves, but are filtered through epidemiologic studies of disparate populations. The search for risk factors in each new patient is a required ritual, but the profile of such factors does not determine anything concretely. They are patterns accrued through research and experience and may be interpreted or granted significance to varying degrees by different clinicians. Some are well established and others grounded merely in theory. Reasoning on the basis of them is to work out a prejudgement. The prior and the prejudice are the same.

What makes this process hermeneutic is the interpretive nature of the exercise. Despite the existence of clinical "algorithms", they are infrequently used in office practice. Context and tacit aspects of practice permeate medical decision making. It is in this sense that seasoned clinicians talk about hunches or personal knowledge of patients.[19] Thus when formulating a diagnostic strategy or treatment plan, many clinicians do not go through a formal process of determining prior probabilities on the basis of willingness to pay (or willingness to believe) and then apply Bayes theorem to determine their next step. Such explicit processes are the domain of academia, and clinical epidemiology in particular. More

frequently, the decision is implemented on the basis of the working out of the prior in experience. The diagnosis is either evident at a certain likelihood or becomes manifest with time, and diagnostic strategies are a means of exploring this aspect of the foreunderstanding. That a fore-understanding can be modified by data is where the Bayesian perspective is more fully integrated with hermeneutics. The use of Bayes theorem is meant to update probabilities in light of new evidence. The newly created posterior probability is, in some ways, akin to the fusion of horizons that Gadamer talks about. The posterior probability is both something new, but constituted to some degree, by its past.

In clinical practice, what constitutes evidence is very contextual: to a sensitive and perceptive clinician, affect, tone of voice and a wide assort-ment of visual and verbal cues are evidence of a patient's emotional state and well being. How reliable one's reasoning is about such processes is revealed in time. One's foreunderstanding expands through contact with the other.

EVIDENCE-BASED HERMENEUTICS?

Adding a hermeneutic dimension to the understanding of Bayes theorem deepens its significance for clinicians. Unlike strictly positivistic concepts of evidence, hermeneutics can incorporate a wide range of inputs: textual data such as lab slips and consultants reports, visual data such as radio-graphs, existential/phenomenal data such as the history and physical all fit within this model. The sheer range and diversity of such inputs, their dynamism and unfolding with time argue against any quick reductionist strategy to replace interpretation with algorithm. The role of a physician as an interpreter is not a licence for free relativism or escape from evaluation. In essence it brings together the goals of evidence-based medicine with hermeneutics.

The link between evidence-based medicine and hermeneutics can now be explicated in terms of phronesis. Sackett et al. define evidence-based medicine as "the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients."[20] These adjectives describe virtues rather than scientific categories and are characteristically prudential virtues. The exemplification of these virtues in the life-world is the exercise of practical wisdom which is the concrete manifestation of phronesis.

The hermeneutic dimension of medicine draws attention away from unproductive discussions of simplisitic dichotomies such as whether medi-cine is an art or a science, or whether clinical knowledege is subjective

or objective. It orients the analysis of clinical reasoning to the life-world where probability models may inform and enlighten clinicians, but weight must also be given to contextual and experiential variables in clinical reasoning. Clinicians are prudential interpreters of the health experience of their patients. Interpretation is constitutive of clinical reasoning. Therefore medical reasoning is rightly considered hemeneutic.

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17. Peirce, C.S. holds a strikingly similar view: We cannot begin with complete doubt. We must begin with all the prejudices which we actually have when we enter upon the study of philosophy. These prejudices are not to be dispelled by a maxim, for they are things which it does not occur to us can be questioned. Hence this initial scepticism will be a mere self-deception, and not real doubt; and no-one who follows the Cartesian method will ever be satisfied until he has formally recovered all those

beliefs which in form he has given up. . . . A person may, it is true, in the course of his studies find reason to doubt what he began by believing; but in that case he doubts because he has a positive reason for it and not because of the Cartesian maxim." Some Consequences of Four Incapacities, in Buchler, J. ed. *Philosophical Writings of Peirce*. New York: Dover Publications, 1955 pp. 228–229.

18. Gadamer *op cit.,* p. 245.
19. See note 3.
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