



Thinking about Thinking: Implications for Patient Safety

Kathryn Montgomery

Abstract

Clinical medicine, a learned, rational, science-using practice, is labelled a science even though physicians have the good sense not to practise it that way. Rather than thinking like scientists – or how we *think* scientists think – physicians are engaged in analogical, interpretive reasoning that resembles Aristotle's *phronesis*, or practical reasoning, more closely than *episteme*, or scientific reasoning. In medicine, *phronesis* is clinical judgment; and while it depends on both a fund of information and extensive experience, somehow it is not quite teachable.

This practical, clinical rationality relies on case narrative for teaching and learning about illness and disease, for recording and communicating about patient care and, inevitably, for thinking about and remembering the details, as well as the overarching rules of practice. At the same time, "anecdotal" remains the most pejorative word in medicine, and the tension between the justifiable caution this disdain expresses and the

pervasive narrative structure of medical knowledge is characteristic of clinical knowing generally: a tug-of-war between apparent irreconcilables that can be settled only by an appeal to the circumstances of the clinical situation.

Practical rationality in the clinical encounter is characterized by a productive circulation between the particular details of the patient's presentation and general information about disease stored as a taxonomy of cases. Evidence-based medicine can improve this negotiation between general knowledge and the patient's particulars, but it cannot replace it. In a scientific era, clinical judgment remains the quintessential intellectual strength of the clinician.

Why, then, do we not teach the epistemology of medicine? Understanding the mis-description of physicians' thinking – and the accompanying claim that medicine is, in itself, a science – could mitigate the misplaced perfectionism that makes mistakes in medicine personal and unthinkable.

The prevailing ideas about thinking in medicine affect that thinking in ways we seldom ponder. They shape attitudes about medical error for both patients and physicians and, thus, influence our ability to understand and remedy them.

Efforts to improve patient safety are surely right to address systemic flaws first, ahead of the potential for cognitive error (Kassirer and Kopelman 1991); but real change in the safety of medical practice may depend on setting right the culture-wide mis-description of medicine as a science. Improvement

must counter the faith that physicians possess a body of knowledge that is objective, generalizable and, if not complete, then nearing completion.

How do physicians know what they know? Certainly, they draw on biomedical science and detailed information about individual patients available through technology; contemporary medicine is highly scientific and technologically sophisticated. But clinical practice is not itself a science, nor is physicians' rationality scientific. That is, physicians think quite rationally. They may even think like scientists actually think, given that a number of persuasive studies of science have argued that scientists' thinking is contextual, narrative and interpretive. But physicians do not think the way they think scientists think.

Physicians, like almost all of us, have a simplistic, Newtonian idea of science and its methods. Science is understood as the investigation of the real: what scientists see is what is there. There is the knowledge of objective facts that are "out there" separate from us, the observers. This understanding is assumed throughout medical culture, even though most physicians have taken a physics course that almost certainly included quantum electrodynamics, Heisenberg's uncertainty principle and Schrödinger's cat. What's more, most physicians know that variation in medical diagnoses and treatment exists not only between industrialized and developing countries but also, surprisingly, among countries in the West (Payer 1988). Nevertheless, physicians are believed to be scientists. And if they don't universally claim that title for themselves, they allow others to assert it on their behalf.

Contrary to that claim, physicians in practice do not think like Galileo and Newton are said to have thought but, instead, think like Sherlock Holmes: "backward" from effect to cause. They reason with cases, narratively, analogically, casuistically, and they do so for the very good reason that they must. Patients come to physicians as puzzles in search of an interpretation that will make sense of their signs and symptoms. Patients present to clinical scrutiny the clues and traces of illness, and physicians must figure out the probable cause. This is detective work; and like detectives, physicians speak of cases, reason analogically with them, report and store them as case histories and teach and analyze and remember their experience narratively (Montgomery Hunter 1991).

In this era of biomedical achievement, then, the unacknowledged reality is that *medicine is not a science*. Claims to the contrary misdirect medical education and the public's understanding of medicine's clinical work. To say that medicine is also an art helps very little: how, except metaphorically, can something be both? Instead, it is time for medicine to be regarded as a distinctive activity in and of itself and not a step-down or imperfect science, not even (as Lewis Thomas famously labelled it) the youngest science (Thomas 1983).

Medicine, just as it always has been, is a practice: informed action taken on behalf of sick people. It is not only narrative

and interpretive but scientific too. But this does not make it a science in and of itself. The fund of knowledge physicians draw upon in making their interpretations also includes accumulated experience that, ideally, is well substantiated but may sometimes (all other things being equal) include intuition or a hunch (Gawande 2002; Greenhalgh 1999; Groopman 2000).

As a practice, medicine has a characteristic rationality and a characteristic pedagogy. Understanding these characteristics is essential, I believe, to altering the prevailing mindset about medicine and to fostering the safety of patients. The assumption that physicians in their clinical practice are engaged in science encourages expectations of perfection that are unattainable; thus, cognitive error becomes a moral failing rather than the ineradicable but corrigible rational possibility it actually is.

Understanding the difference between the practical reasoning actually used by physicians (as well as by other problem solvers) and the old-fashioned, positivist method implicit in the claim for medicine as a science is a useful step toward addressing the widespread contemporary difficulties and dissatisfactions with medicine. Burnout too often characterizes physicians' careers, and something like fear of imperfection undoubtedly motivates the well-documented retreat (in the United States) from primary care. Medical students, even after the curricular reforms that followed the Association of American Medical Colleges' report, the general professional education of the physician or *The GPEP Report* (Association of Medical Colleges 1984), are subjected to – take your pick of metaphors – a lockstep, cookie-cutter, drinking-from-a-firehose education that ignores individual interests and talents and is still too often dehumanizing. Patients themselves, still remarkably tolerant of the individual physicians on whom they depend, for decades have consistently reported diminished trust in medicine and in physicians in general.

Medicine's characteristic thinking is far older than biomedical science. Aristotle described that rationality in the *Nicomachean Ethics*, a treatise concerned with, among other things, the rational activity essential to solving questions about action in the world (Aristotle circa 340 BC/1985). There, ethics is likened to medicine and to navigation as activities that require *phronesis*, or practical reasoning. This intellectual virtue is distinguished from episteme, or scientific reasoning, about "fixed things," such as rocks and stars, and *techne*, or art, which concerns craft knowledge such as cooking and (he might today include) suturing and intubation. Aristotle drew these distinctions because, he said, "the type of accounts we demand should reflect the subject matter," and, as he pointed out, "questions about actions and expediency (i.e., about ethics) like questions about health have no fixed and invariable answers" (Aristotle circa 340 BC/1985).

In medicine, the intellectual virtue of practical reasoning or *phronesis* is called clinical judgment. And here is why Aristotle is still relevant: scientific advances do not change this process of clinical reasoning – and neither does evidence-based medicine

(Montgomery 2006). Only the content is changed. The clinical task is still an interpretative, hermeneutic one. Physicians must answer the quintessential hermeneutic question, what is going on here?

As a consequence, medical education has the task of turning students who have devoted their lives thus far to science into “backward,” practical reasoners. They must learn to think like historians or anthropologists – or detectives. This is not science, at least not what our early teachers or the media have led us to believe science is: the hypothetico-deductive determination of physical reality. There *are* hypothetico-deductive scientific bits in the clinical encounter: particularly, the tests to rule in or out possible diagnoses in the physician’s differential list of possibilities. But this is only part of doctoring, a part that the woman in the street could do if given the mere facts. The real work of doctoring – something that cannot be replicated by the layman or even by an anxious mother – lies in constructing that comprehensive list of possibilities and in knowing what to do *in this case, for this patient*. This interpretive process does not lead to cultural relativism: there are certainly wrong answers, but, almost always, there is a range of acceptable ones. What is needed is clinical judgment – phronesis. The clinician who possesses clinical judgment knows how to respond to this particular situation, a larger, more cultural matter that takes account of but is far larger than biomedical science.

Such clinical judgment, the interpretive thinking necessary to clinical practice, requires the retrospective reconstruction of the proximate cause(s) of a patient’s present malady. This is a narrative process that tests the “plots” of various diseases against the chronological manifestation of signs and symptoms in this case. It will never be perfect, which is to say that we will never be able to turn diagnosis and treatment choice over to computer programs or algorithms, however helpful they may be. Because people vary biologically and socially and diseases manifest themselves in varying ways, the individual patient will almost always require clinical scrutiny and interpretation by a clinician, and the possible exceptions that would be amenable to computerized consultation will not arrive marked as such.

Not surprisingly, medical education takes account of this radical uncertainty: not in the first two years of basic science study in the classroom but afterward, during the long years of clinical education. Good clinical judgment, phronesis, is its goal; and it is fostered in surprising ways. Even as the idea of science serves as a “gold standard,” pedagogical methods are narrative and proverb using, and, as Charles Bosk demonstrated three decades ago, they are focused on *behavioural* norms, moral or performative rules that guide behaviour in uncertain circumstances (Bosk 1979).

These methods are distinctly “unscientific.” Fundamentally, there is the narrative structure of clinical discourse: its thinking and communication, its teaching and learning, its methods of

recall and even the stimuli for research are case based. More surprisingly, clinical students learn – and experienced clinicians support their judgment – with proverbs and maxims such as, “Listen to your patient: he is telling you the diagnosis,” or, “Always do a review of systems.” These utterances are lower-level rules, and their folk-like character signals that they cannot be generalized to every case. Indeed, like proverbs generally, medical maxims exist in tension with equally valid locutions that tug in the opposite direction. The patient may be telling you the diagnosis, but the standard clinical locution is a skeptical, “The patient denies ...” And when students notice that experienced clinicians do not always review their patients’ every organ system, they will be reassured, “A good clinician has an index of suspicion” (Montgomery 2006). Occam’s razor, the frequently cited rule against multiplying possibilities unnecessarily, is countered with Hickam’s dictum: “The patient can have as many diseases/As the patient damn well pleases” (Miller 1998).

Beyond these maxims, there are no rules for deciding which rule rules. Instead, the working theory of clinical thinking, its phronesiology, is also expressed in proverbs and maxims. This is not to say that there are no principles of clinical rationality, just that those that do exist are not absolute, and they also come in contradictory pairs. “Medicine is an art,” we are assured; but, of course, “medicine is a science.” *Primum non nocere* – “First, do no harm” – is every physician’s Hippocratic watchword, but it is countered by the therapeutic imperative, “Patients deserve the full-court press.” Which trumps? It depends. That is exactly what is being taught.

This lesson is little different from what Arthur Elstein taught years ago, that clinical reasoning cannot be taught to medical students as a freestanding course. Their ability to think practically about clinical problems depends on what they know, including what they have experienced and the cases they’ve absorbed vicariously. Yet physicians who think of their reasoning as scientific or “deductive” – Sherlock Holmes makes the same mistaken claim about his own interpretive method – have no objection to using aphorisms. Nor have they investigated their other strange pedagogical practices, including their clinical reliance on narrative. Instead, medical students and residents, clinical apprentices all, are enjoined to be thorough, logical and objective, traits worthy of thinking in a science.

Clinicians’ lack of curiosity about clinical thinking (with its concomitant appeal to science) turns out to be characteristic of all practice, an apparently unavoidable consequence of the requirement that practitioners act despite uncertainty. Hans-Georg Gadamer acknowledged this constraint when he observed, “Practice requires knowledge, which means that it is obliged to treat the knowledge available at the time as complete and certain” (Gadamer 1996). Pierre Bourdieu, perhaps the most eloquent theoretician of practice, noted that it invariably “exclude[s] from the experience any inquiry as to its own condi-

tions of possibility” (Bourdieu 1990). This obliviousness goes far to explain experts’ inability, described by Hubert Dreyfus and Richard Dreyfus (Dreyfus and Dreyfus 1987) and Patricia Benner (1984), to account for how they do what they do.

As these scholars suggest, Aristotle is not the only one who describes more than one way of reasoning or who identifies a kind of thinking distinct from the rationality of science. Although since the 18th century, the West has so privileged scientific reasoning that we are still working free of the assumption that science is the only valid way of knowing, a number of thinkers – well before dual-process theory (Evans 2008) – described another way of knowing, one that resembles phronesis. In the 19th century, William James spoke of rationality as something larger than scientific hypotheses and verification: “To say that all human thinking is essentially of two kinds – reasoning on the one hand and narrative, descriptive, contemplative thinking on the other – is to say only what every reader’s experience will corroborate” (James 1878).

Charles Taylor has addressed the second-class status of practical rationality, which he argues is so pervasive that it warps attitudes to rationality itself. If our “model of practical reasoning,” he says, is “based on an illegitimate extrapolation from reasoning in natural science [rather than being described for itself], little can meet its criteria and skepticism about reason itself is the consequence” (Taylor 1989).

Certainly this has led to the popular belief that emotion and intuition must be excluded from respectable, admissible thinking. Yet, it’s not that thinking in medicine is not rational: it is as rational as it can possibly be! Or, if I’ve only half convinced you, you could say that it’s as “scientific” as the material clinicians work with will allow. It possesses hypotheses and logic and variables to control or pursue, tests and rule-outs and statistical studies. These are all characteristics of science. But they are also characteristic of thinking in other fields: anthropology, history, political science – and (except perhaps for the statistics) art theory and literary criticism.

Thus, not only can clinical research be described as a social science – or, if you prefer the Continental taxonomy, a human science – but clinical practice can be too. Every patient is to some extent an experiment, a data point, in the ongoing phronesiology of medicine. And while almost every physician acknowledges this, the science claim persists. In the early to mid-20th century, social and cultural anthropologies, history, literary study all aspired to be or become a science. But because their various subject matter demands interpretation (and intellectual honesty requires their theory to take that interpretation into account), they recovered and turned their attention to better, more useful accounts of how they think.

Medicine remains the exception, insulated for a little while by its claim to be not a fallible and (re-)interpretable social science but a science in and of itself. But the cost of ignoring

medicine as a fallible, uncertain, corrigible (but never perfectible) practice is high: for patients, for physicians themselves and for society as a whole. **HQ**

References

- Aristotle. 1985. *Nicomachean Ethics* (T. Irwin, Trans.). Indianapolis, IN: Hackett. (Original work written circa 340 BC).
- Association of American Medical Colleges. 1984. *Physicians for the Twenty-First Century: The GPEP Report*. Washington, DC: Author.
- Benner, P. 1984. *From Novice to Expert: Excellence and Power in Clinical Nursing Practice*. Reading, MA: Addison-Wesley.
- Bosk, C. 1979. *Forgive and Remember: Managing Medical Failure*. Chicago: University of Chicago Press.
- Bourdieu, P. 1990. *The Logic of Practice* (R. Nice, Trans.) Stanford, CA: Stanford University Press.
- Dreyfus, H.L. and S.E. Dreyfus. 1987. “From Socrates to Expert systems: The Limits of Calculative Rationality.” In Rabinow, P. and Sullivan, W.M., eds. *Interpretive Social Sciences: A Second Look*. Berkeley: University of California Press, pp. 327–50.
- Evans, J.St B.T. 2008. “Dual-Processing Accounts of Reasoning, Judgment, and Social Cognition,” *Annual Review of Psychology* 59: 255–78.
- Gadamer, H.G. 1996. *The Enigma of Health: The Art of Healing in a Scientific Age* (J. Gaiger and N. Walker, Trans.) Stanford, CA: Stanford University Press.
- Gawande, A. 2002. *Complications: A Surgeon’s Notes on an Imperfect Science*. New York: Metropolitan.
- Greenhalgh, T. 1999. “Narrative Based Medicine in an Evidence Based World.” In T. Greenhalgh and B. Hurwitz, eds., *Narrative Based Medicine*. London: BMJ Books.
- Groopman, J. 2000. “Annals of Medicine: Second Opinion.” *New Yorker* January: 40–49.
- James, W. 1878. “Brute and Human Intellect,” in *Writings 1878-1899*. New York: Viking, 1992, p. 11.
- Kassirer, J.P. and R.I. Kopelman. 1991. *Learning Clinical Reasoning*. Baltimore, MD: William and Wilkins.
- Miller, W.T. 1998. “Occam versus Hickam.” *Seminars in Roentgenology* 33: 213.
- Montgomery, K. 2006. *How Doctors Think: Clinical Judgment and the Practice of Medicine*. New York: Oxford University Press.
- Montgomery Hunter, K. 1991. *Doctors’ Stories: The Narrative Structure of Knowledge in Medicine*. Princeton, NJ: Princeton University Press.
- Payer, L. 1988. *Medicine and Culture: Varieties of Treatment in the United States, England, West Germany, and France*. New York: Penguin Books.
- Taylor, C. 1989. *Sources of the Self: The Making of the Modern Identity*. Cambridge, MA: Harvard University Press.
- Thomas, L. 1983. *The Youngest Science: Notes of a Medicine-Watcher*. New York: Viking.

About the Author

Kathryn Montgomery, PhD, is professor of medical humanities and bioethics and of medicine at Northwestern University’s Feinberg School of Medicine, Chicago, Illinois, USA.