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Two Kinds of Knowledge: Maps and Stories

HENRY H. BAUER

Chemistry & Science Studies
Virginia Polytechnic Institute & State University
Blacksburg, VA 24061-0212

Abstract — The most reliable knowledge is map-like: "If you do this, then that will always follow." But such knowledge carries little if any inherent human meaning. Most meaningful is story-like knowledge, which teaches about morals and values; but about that, agreement cannot be forced by demonstration. Failure to distinguish between the meaningfulness and the reliability of knowledge helps to make arguments intractable. It would be very useful always to ask about a bit of claimed knowledge, "Is this more like a story or more like a map?"

The Problem

Bitter and long-standing disputes are everywhere, over what is right and what is wrong. Concerning anomalous claims, arguments of that sort are familiar enough to readers of this journal. But where does the authority lie to settle such an argument?

The belief is common that where knowledge is concerned science (and only science) is authoritative. This underlies the fuss about C. P. Snow's (1959) contrasting of "The Two Cultures", the scientific and the literary. The viewpoint is perhaps most clearly exemplified by such groups as the Committee for the Scientific Investigation of Claims of the Paranormal (see its magazine, *Skeptical Inquirer*); but it is general throughout society, illustrated for instance by the frequently expressed belief that a lack of scientific literacy augurs doom for our society (Bauer 1992a, chapter 1).

Science and religion are typically portrayed either as entirely separate and incommensurable or else as antagonists, with science standing for knowledge and religion standing for "values". Thus Appleyard (1992) argues explicitly that science has separated values from knowledge. Earlier societies saw the world as human-centered, he says; they interpreted Nature from a human standpoint and ascribed moral and transcendent characteristics to some aspects of Nature; whereas nowadays we see the world as impersonal and interpret (or seek to interpret) human beings from Nature's standpoint as revealed by the natural sciences. In such an impersonal world, moral values are only happenstance in human culture, not anything inherent in the universe.

The real issue is the meaning or value of knowledge for human beings and where the authority to certify knowledge resides. Typically, discussion has

been couched in terms of such dichotomies as Snow's Two Cultures[1]; and dichotomies are intractable. So long as we conceive knowledge and meaning (or value) as distinct things, science as the embodiment of knowledge and religion as the embodiment of meaning remain but doubtfully and problematically coexistent.

I shall suggest that these disputes dissolve, or can usefully be seen in a very different light, if we take "meaning" to be not something separate from knowledge but rather an inherent characteristic of knowledge; and recognize that different bits of knowledge vary in the amount of meaning (for humans!) that attaches to them. Thus some knowledge is pregnant with meaning whereas other knowledge can be — to human beings — essentially empty of meaning[2]. As Steven Weinberg puts it, "The more the universe seems comprehensible, the more it also seems pointless" (Rigden, 1994). By acknowledging that human knowledge spans a continuum from virtually meaningless to highly meaningful, matters that otherwise seem unresolvable polarities or dichotomies can become more manageable.

Varieties of Knowledge

Consider a couple of things that I claim to know:

$$E = mc^2$$

I love my children

I have the same feeling of certainty when I make those two statements; but I'm relying on two *significantly* different sorts of knowledge.

About mass and energy, the knowledge I have is (or can be) precisely the same as the knowledge other people have: we can persuade one another that it is correct, that E does not equal mc, or m^2c, or mc^3.

About who I love, you just have to take my word for it. You cannot deduce it unerringly from the way I behave; you cannot unerringly predict my behavior through knowing it. And yet it is much more important to me than that $E = mc^2$ or any other such fact. We easily assume that the most reliable knowledge is at the same time the most important, useful, and significant; yet that is not the

[1]Mitchell (1991), like Snow, contrasts the literary with the practical or phenomenal: "Where communication is, and had better be, phenomenal, tied in logical correspondence to what is out there, literature is metaphysical, whispering to what is in here. Where communication is practical and to be judged only by the correctness of its correspondences, literature is moral, hinting at meaning in lives and deeds, and to be judged by its truth, if only we knew the truth." Medawar (1972), too, sees science and literature as competitors employing different sorts of imagination. Bruner (1986) contrasts two modes of thought, the paradigmatic and the narrative. Polanyi (1964) distinguishes between *personal* and ***subjective*** knowledge. Oakeshott (1989) emphasizes the distinction between information and judgment and notes (p. 65) that "a human being is the inhabitant of a world composed, not of 'things', but of meanings."

[2]That all humans can ever be concerned with is *human* meaning may be the point of the aphorism ascribed to Protagoras, that "Man is the measure of all things". I'm grateful to Jo Maxon-Dodd for pointing that out.

case: the most significant knowledge for us may be (or at least seem to everyone else) quite unreliable.

The first kind of knowledge is often called "objective", the second "subjective". What is not commonly added, however, is that objective knowledge, the knowledge that we can agree with others over, about which clear, right-or-wrong answers are possible, is at the same time knowledge that has little (if any) human meaning. The most *meaningful* human knowledge is subjective, personal knowledge — about which people don't necessarily agree, about which in fact they usually disagree, about which they *cannot be made to agree* by evidence and logical argument[3].

It is important to distinguish between these two sorts of knowledge precisely because we can reasonably expect to get agreement over the one but certainly not about the other. Yet in practice we do not make this necessary distinction; and all manner of confusion stems from that (see for example Figure 1).

Knowledge may be about *what* exists; or about *how* things behave; or about *why* they exist or behave as they do. It has become common-sensically obvious that we cannot discover *what* exists; or, what amounts to the same thing, we cannot know whether our beliefs about *what* exists are true[4]. Thus we have discovered enough to know that electrons (and other "elementary particles")

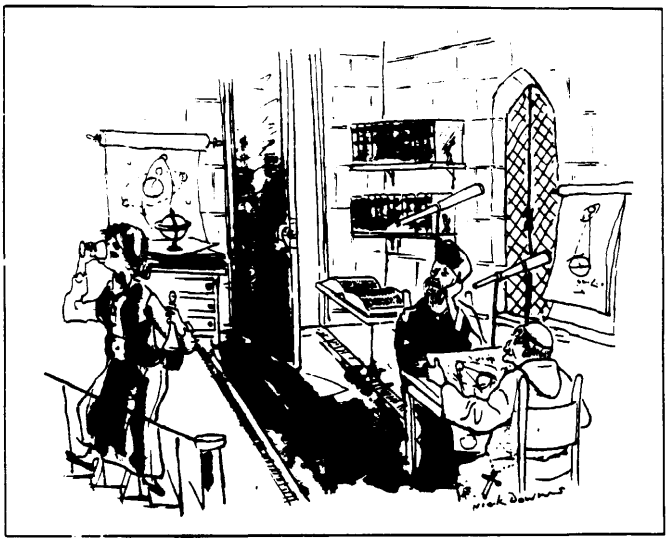

Fig. 1. Confusing objective and subjective knowledge: "There was a time when I knew that the Earth revolved around HER."

[3]A very similar point is made by Stent (1977) in his discussion of scientism.

[4]Of course, there is no problem about *what* exists at the level of normal human sensation: about what a chair is, say. But if we want to know about *fundamentals*, what the chair is "actually" made of, then the problem becomes evident.

are not "particles"; nor are they "waves", though we can nicely calculate much about them by sometimes using wave-equations and other times using particle-equations. Again, we know that $E = mc^2$, in other words that mass and energy are interconvertible; but we can hardly claim to know what mass actually is, or energy. What we do know is how to observe or measure what we call mass, and what we call energy, and the behavior of what we call electrons. Scientific laws and theories are short-hand ways of describing how things happen: "if this, then that". When in freshman chemistry we say, "sodium and chlorine react with one another because the first has one valence electron and the second has seven and a stable atom or ion has eight," we are actually saying "when two atoms come together, one with seven valence electrons and the other with one, they react": the common parlance of "why" does not address fundamental reasons, it is a way of talking about how the world works. Thus scientific knowledge is of an operational sort[5] or map-like (Bauer 1992a, 67-71; Ziman 1978, chapter 4 and references given therein); it is knowledge "how" or "how-to-".

The equation, $E = mc^2$, is not, however, purely objective knowledge. Though agreed to by an overwhelming consensus of relevant experts, still there is no absolute guarantee that the consensus is permanent for all eternity or for all intelligent species in the universe: at some time or place it may well be superseded. And, too, that I love my children is not purely subjective: even if my actions cannot be predicted on that ground, nevertheless I am more likely to act in certain ways rather than others because of it, and some observers (if not all) are able to infer that. Neither extreme of the continuum of knowledge is accessible to us. Nevertheless, it can be useful to look upon all knowledge as some amalgam of these two extreme, abstract, ideal sorts.

To describe them, philosophers or mathematicians might be happy to talk about Knowledge I and Knowledge II, or about Knowledge A and B respectively, but to be widely useful one needs metaphors that carry an appropriate intuitive weight. "Objective" and "subjective" lack the corollary connotations of humanly meaningless and humanly meaningful that I wish to emphasize, as well as the contrast between "how-to" and "why". Maps and stories seem to work well as contrasting metaphors, as I show in the following Table. In earlier presentations of these ideas[6], I've found that the metaphor of "stories" resonates in a satisfactory way for most people, and it is less stilted than the more pointed "parables". The metaphor of "maps", on the other hand, has some disadvantages, because we sometimes use the concept of maps in humanly mean-

[5]Philosophers call this opinion about the nature of scientific knowledge "instrumentalism" or "operationalism". They are not, of course, all agreed that it is the best or most appropriate.

[6]The idea of contrasting map-like and story-like knowledge came under the stimulus of discussions with Jim Collier and Vince Hamner about the scientific status of the social sciences during a course on "Scientific Method from the Scientist's Viewpoint" (VPI&SU, Spring 1992). The present version owes much to comments made by them and by others: at the Center for the Study of Science in Society (VPI&SU, October 1992); at Monash University (Melbourne, Australia, May 1993); at the Annual Meeting of the Society for Scientific Exploration (Austin, Texas, June 1994).

ingful ways[7]; and some discussions explicitly equate theories — which I would call essentially stories — with maps (for example, Ziman (1978)). But I have so far found nothing that captures the notion better than "map". "Equation" or "formula" gives the sense of objectivity, but not so well that of "how-to" by contrast to "why". The sense of "how" or "how-to" is nicely captured by "recipe", which also contrasts nicely with "stories": but (as pointed out by Stanley Krippner) for chefs the concept of recipe can carry a sense of subjectivity rather than of impersonal objectivity; and "recipe-like" is more cumbersome than "map-like". So I remain with maps and stories.

Knowledge How:	Knowledge Why:
Map-like Knowledge (equations, formulas, recipes)	Story-like Knowledge (tales, parables, epics)
about inanimate things	about living things
literal knowledge	humanly meaningful knowledge
"plain facts"	significant facts
impersonal; objective; external	socially constructed; ideological
representation of reality only, not reality itself	representation of reality only, not reality itself
yet maps can be an entirely reliable operational guide — a schematic map of the stations (Figure 2) is an entirely reliable guide for taking a journey by train, even though the map is nothing like the actual terrain *(but maps offer no reasons for taking or not taking a journey);*	stories address the desirability of taking a journey and how to behave during it *(but they do not reliably predict where one will finish up);* parables agree that it is good to be honest, hard-working, and productive, but following those precepts does not guarantee any specific outcome — one might get judged not on the merits but by what one's race or gender happens to be
how things can be done	why things should be done
public, communal, shared, universal: people from different cultures can contribute equally to map-making; maps have the same meaning for all people — different units of measure are readily translated; we can agree on what maps show — just so long as they are geographic maps and not political ones, plainly factual rather than humanly significant	particular, sectarian, individual; difficult to communicate across cultures — a story may have disparate meanings for various people and in different cultures; translation into other idioms, dialects, or languages is problematic

[7]Thus Jacques Vallee brought to my attention "maps of tenderness", or maps of the Land of Tenderness, in quite common usage in 17th-century French novels.

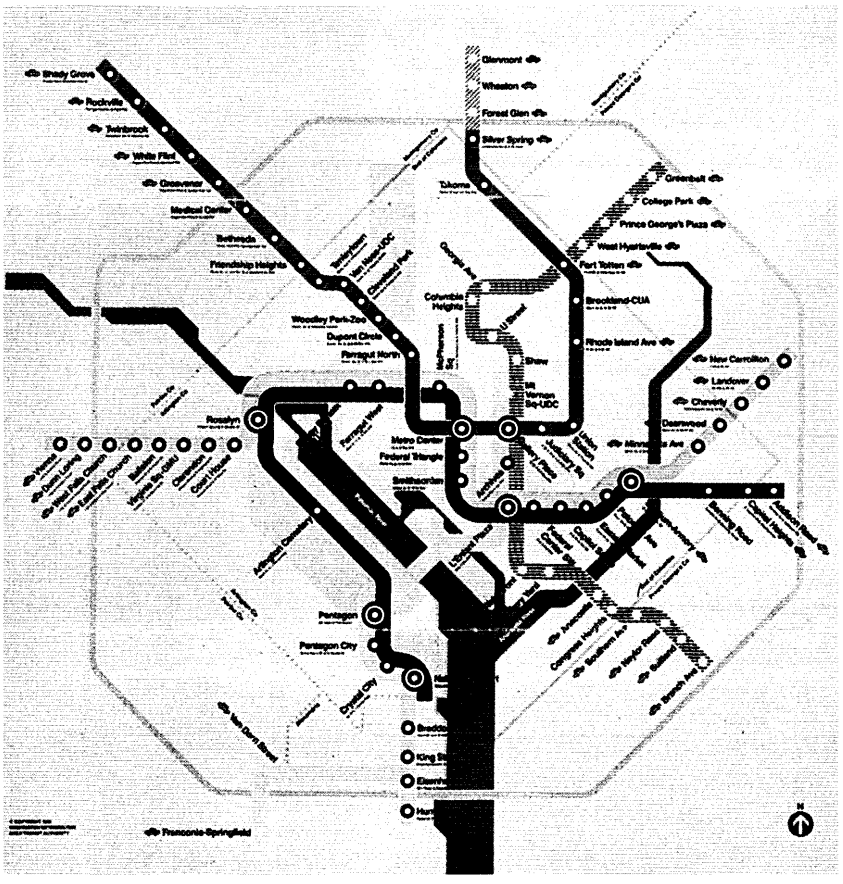

Fig. 2. Station map of the Washington Metro system: it looks nothing like the actual terrain but is utterly reliable for getting around.

demonstrable: maps can be tested by going over the same terrain again and again	revelatory, prophetic: stories — events involving people — can never be exactly repeated or tested; doing something the second time is never the same as doing it the first time
false theories can be proved false because they claim universality: a single counter-instance can destroy a law, theory, or paradigm (just as a single finding can show a map to be wrong)	explanations often cannot be proven false, because they deal with unique persons, relationships, or events that are past: the revelance of any given "counter-instance" can therefore be disputed (take psychoanalysis, for instance; or spouses discussing what an extra-marital encounter means)

coldly precise:	warmly fuzzy:
quantification is always a good thing in map-making	quantification is beside the point, it rarely adds anything essential to a story; a height of 7 feet means quite different things in a chess-player and in a basketball layer; getting $100,000 means becoming rich to some but nothing at all to others
determinate knowledge: all experts see the same things in a given map; map-reading is a matter of competence	conditional, indeterminate: people being capricious, events are contingencies; under the "same" circumstances, a given individual may do one thing on one occasion but a different thing on another occasion; interpretation — what a story means — is a matter of judgment, not of competence
precise prediction is often possible, all experts make the same predictions —	precise prediction is not a reasonable aim, different experts make different predictions (see Figure 3)

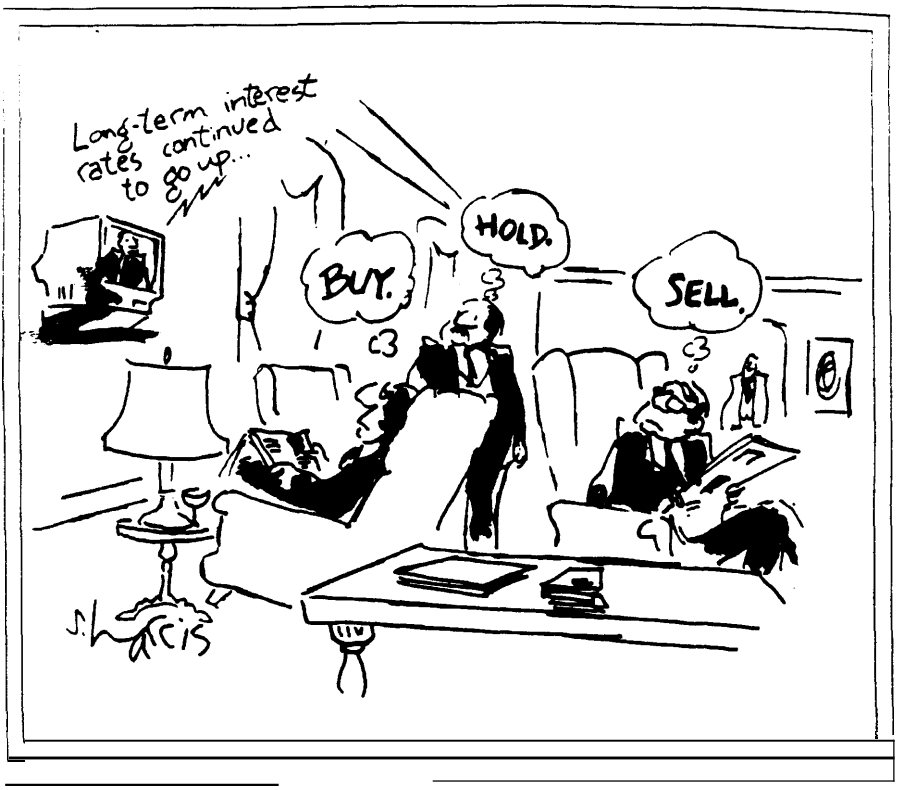

Fig. 3. Expert predictions disagree with one another.

prediction is a matter of competence; the outcomes of map-guided journeys are precisely predictable	predicting is a matter of judgement, not of technical competence — it is more prophesy than (accurate) prediction; the endings of stories cannot be foreseen — as some authors have reported, even as they create characters and invent situations they cannot be sure what the actual, eventual outcome will be
as time goes by, there is progress: reliability increases with repetition, use, modification (ancient and medieval maps have been superseded)	there may be change but there is no progress: stories do not get better or more reliable over time (Greek drama has not been superseded, nor has Shakespeare's)
correctness is what counts, and aesthetics follows: a map cannot be beautiful though wrong (the criteria are impersonal, objective, independent of human tastes)	beauty is in the eyes of the beholders: what is beautiful or fragrant for some may be ugly or malodorous for others; some identify with the heroines of the stories and others with the villains there are no impersonal, objective criteria for what is "right" — Thomas Mann or Kurt Vonnegut? Republican or Democrat? Beethoven or rock-and-roll?
it is appropriate to believe and it is appropriate to try to persuade everyone else to believe the same things	it is appropriate to have faith but it is not appropriate to think that everyone else should share the same faith
maps are of little if any use in resolving human disputes: literal truth does not much influence most people's opinions or actions	stories are powerfully persuasive: we are quick to believe stories even when they conflict with literal truth, and we are slow to abandon myths

Thus in disputes over technical matters, scientists and engineers in particular are quick to deplore that public policy is rarely based on the facts. Academics and intellectuals in general tend to agree that public policy is typically made in ignorance of self-evident facts. And there is ample evidence to support that cynical-seeming view: that spending more than one's income brings disaster, is a literal truth; but it did not make Mr. Micawber change his ways.

Innumerable mistaken myths persist because they justify beliefs that we want to preserve: that Richard III murdered his nephews, say, or that Welsh miners were massacred by government troops at Tonypandy (Tey, 1951). It is not cynicism but a simple acknowledgment of reality, that human individuals and groups make decisions based much more on ideology and wishfulness than on evidence and logic. Stories carry far more weight with us than do maps.

This distinction between map-like and story-like forms of knowledge can be helpful in considering quite a wide range of intellectual issues. To illustrate that utility, in the following I discuss:

The distinction between indoctrination and education.

- The history of ideas.
- The relationship among the various academic disciplines.
- How to resolve intellectual disputes.
- Controversies over anomalies;

Miscellaneous applications.

Education and Indoctrination

In a democratic society, surely education should be at a maximum and indoctrination at a minimum. Yet *some* indoctrination is essential in any civilized society: for example, into the belief that it is wrong to kill a human being. So indoctrinated, mature adults can later concoct their own, personal, individual, exceptions: perhaps in warfare, perhaps in euthanasia, perhaps in abortion; yet the fundamental indoctrination is necessary — as demonstrated, for example, in the novel, *The* Lord *of the Flies* (Golding 1954).

But what criteria do we have by which to judge, in what matters indoctrination is necessary and in what others it is impermissible? One good guide, I suggest, is the degree to which the knowledge concerned is map-like or story-like.

As to map-like knowledge, it is both necessary and appropriate for teachers to tell students *what* they should think: learning well-established facts about Nature, studying science in other words, means becoming indoctrinated with the conventional wisdom: studying texts, learning to work standard problems, memorizing a great deal of material. That's surely one reason why many students dislike "science" and mathematics in comparison to "softer" subjects: in the latter they are free to express opinions "of their own" from the beginning without benefit of any background knowledge.

When it comes to story-like knowledge, indoctrination is a much more complicated issue. In matters of human values, in the humanities and in religion, society must always strive to distinguish matters on which indoctrination shall be carried out — for example, that killing people is wrong — from issues on which indoctrination *shall not* be done — for instance, as to religious faith. In those latter cases, "education" should not mean trying to instill particular beliefs, particular stories. Yet young humans do have to be taught *something* about human life and meaning: "The reason teaching has to go on is that children are not born human; they are made so" (Barzun, 1945). As Postman (1989) has cogently argued, pre-eminently what children must be taught is *stories:* "How can we help our students to organize information? . . . to sort the relevant from the irrelevant? . . . [to] keep . . . from being driven insane by information? [by the so-called explosion of knowledge, which is actually the accumulation of map-like trivia] . . . . How do you know what you need to know? And. . . when and where and how you need to know it? . . . [We] need stories, narratives, tales, theories . . . that can serve as moral and intellectual frameworks . . . to give meaning to the facts of . . . existence."

Even as we need stories, in a democratic society we aim to educate children in such a manner that, as they attain maturity, they can choose for themselves the stories they will believe in and try to live by. So as to story-like knowledge

by contrast to map-like knowledge, education should help students learn not what to think but how to form their own opinions, how to make wise choices[8].

The History of Human Ideas

The intellectual history of the human race can be summarized rather well by means of these metaphors of maps and stories:

Human beings must have started to "know" things as soon as there were human beings, though obviously we have little evidence of it from times before writing was invented. It seems likely that the earliest knowledge was orally transmitted in the form of stories: epics, histories, legends, myths, parables. We know from Celtic traditions that are just now disappearing, and from the Polynesian and Australian-aboriginal cultures, that stories can be passed down orally and quite accurately over many generations. Some of the earliest writings (that are not just lists, accounts, or epigraphs) were also stories: the epic of Gilgamesh, the *Odyssey,* the Bible.

The surrounding inanimate world formed part of these stories, of course, but describing Nature was not their main purpose[9]. Over the course of recorded history, we can discern an increasing interest in accurate description of the inanimate world as well as a progressive distinction between human beings on the one hand — animate, conscious, purposive — and on the other hand their inanimate, morally passive or neutral surroundings. Within both what we call "science" and what we call "religion", people began to rely less on authority, on the official stories, and more on empirical evidence, the actualities that can be reproducibly observed and objectively represented on maps. That tendency culminated in Western Europe in the Reformation, the Scientific Revolution, and the Industrial Revolution: the overthrow of traditional authority in every field coupled with the adoption of a pervasive belief in the benefits of change, of the possibility of *progress* [10].

By the late 19th century, our knowledge of the natural world had become comprehensive and impressive. Map-making about Nature having been so successful, why not extend that successful approach to understanding human affairs? Karl Marx and Herbert Spencer and others set out to do that in politics, Sigmund Freud and B. F. Skinner and others in psychology, and archaeologists and anthropologists and sociologists even now consider how they might

[8] This, at least, is the view held by traditional liberals and conservatives. Marxists, radical feminists, Afrocentrists, other activists, and some relativist sociologists, by contrast, hold that it is neither possible *nor desirable* for teachers to attempt neutrality in education.

[9] On this point the map-and-story metaphor becomes awkward: Australians and Polynesians use certain epic tales as accurate guides to navigation, on land and sea respectively; they have evolved some stories that serve as guide-maps.

[10] Historians are generally agreed that the idea of progress, of change in human affairs as a desirable *advance,* arose in the West-European intellectual and political ferment of the centuries that culminated in the Scientific and Industrial Revolutions. Societies uninterested in change remain satisfied with traditional or religious guidance, place little value on science, and are ambivalent about technology; thus Imperial China remained stable over a couple of millennia, even though it had developed a number of major technologies much earlier than did Western Europe.

make their disciplines more like the natural sciences (for example, Renfrew et al. 1982).

Yet it is plainly impossible to get map-like knowledge about human beings or human societies. And increasingly — maybe over the last century, certainly in the last few decades — there has come the realization that the marvelously reliable, repeatable knowledge that the natural sciences have achieved has not merely failed so far to answer our most serious questions: science is actually *incapable* of answering them. We want to know about the purpose of human life, and the significance of human death, and whether or not God exists; and it is no real answer, to be told about the Big Bang and natural selection. The social sciences, on the other hand, cannot deliver the sort of *certainty* of answer about human affairs that the natural sciences do about inanimate things.

So humankind has gone from unquestioning reliance on meaningful stories, to an infatuation with map-making, to the realization that no matter how accurate our maps may be, it takes good stories to make sense of them. The infatuation with map-making reached a high point in the 18th-century European Enlightenment; and another in the latter part of the 19th century when it became widely believed that science and only science is the way to get proper understanding of anything, including human and social behavior. That extreme belief is nowadays described as "scientism". In reaction to it stands Romanticism, which took hold in Western society in the early 19th century as a reaction against excesses of the Enlightenment. One might say that the disease of scientism is an intellectual pathology according to which abstract maps of an objective inanimate world are supposed somehow to provide meaningful guidance for human life; whereas the intellectual disability of Romanticism holds that human beings can live well enough without the benefit of any maps at all". Continuing up to the present time, one can discern alternating phases of dominance of Romanticism and scientism (Brush, 1978).

Humanities, Sciences, Social Sciences

Especially over the last century or so, the pursuit of human understanding has become increasingly ordered into separate disciplines. There is little agreement over how these various disciplines relate to one another: they differ over how to go about acquiring knowledge and over the reliability of whatever knowledge may be attained. There are disagreements over particular bits of knowledge, different answers being claimed by different disciplines — most notably, perhaps, among philosophy, science, and theology. I suggest that the relationship among the disciplines is clarified by recognizing that they do not all deal in the same thing, namely "knowledge", but that they deal in a variety

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"In a course on "Science and the Making of the Modern World" (VPI&SU, Spring 1994), one of my students, Mark Ruskin, suggested that Romanticism is the precise opposite of scientism; which may be as true as any sweeping generalization about such things can be.

of different forms of knowledge that vary in the degrees to which they are map-like or story-like[12].

Sciences and Non-Sciences

One perennial issue is the relationship between the sciences and the non-sciences. For a century or more, the scientistic belief has been prominent, that the natural sciences and *only* the natural sciences have a reliable handle on truth-gathering, through applying the scientific method; and that therefore all human endeavors ought to be carried out "scientifically". But if one recognizes that science aims for *purely map-like* knowledge, it immediately becomes evident how invalid or beside the point the scientistic claim is: for the closer knowledge actually comes to being map-like, the closer it also comes to being, for human purposes, meaningless.

Science

In point of actual fact, though bits of the natural sciences have indeed become very map-like (the Periodic Table of the chemical elements, say), most existing science is not very map-like at all (even as it *aims* to be or to become so). Scientific research begins as story-telling: the reporting of instances, unique claims by a single source. *Frontier* research, the most exciting and attention-catching, is very story-like; much of it quite wild and short-lived stories, what is more. Only after much time, and work by many individuals, does some *textbook* science emerge that offers largely reliable guides to doing things. (For the distinction of textbook from frontier science, see Bauer 1992a, chapters 3 & 6).

Scientific *theories* always remain to some extent story-like: *why* the Periodic Table has the shape that it does, say.

So map-like and story-like are *metaphors* for *abstract ideals,* and all *actual* kinds of human knowledge, *including scientific knowledge,* are mixtures of map-like and story-like — though the composition of that mixture varies in different fields.

The Various Sciences

The miscellaneous sciences that together make up what we call "science" occupy somewhat different spaces on the map-story continuum; geology and biology stretch less far toward the map-like end than do physics or chemistry (Figure 4).

[12]Of course, that is not the only difference among disciplines. Much anecdotal data about a multitude of differences has been cited and discussed by Bauer (1990a,b). In one of the few formal empirical studies of what differentiates disciplines, Biglan (1973a,b) found three dimensions to be significant: whether or not there was an over-arching paradigm; the degree of practical applicability of the knowledge; and concern with living systems.

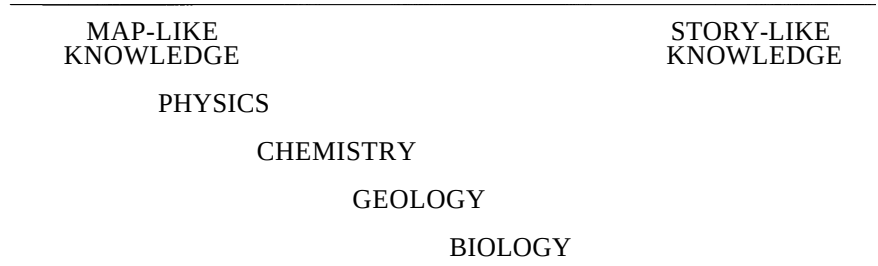

Fig. 4. The various sciences incorporate different mixes of map-like and story-like knowledge.

Within each science, the various specialties may cover quite different parts of this continuum. Thus physics includes such very map-like bits as mechanics and sound, and such fairly map-like bits as electromagnetism and planetary astronomy and gravitation, as well as such almost entirely story-like elements as cosmology, say (Figure 5).

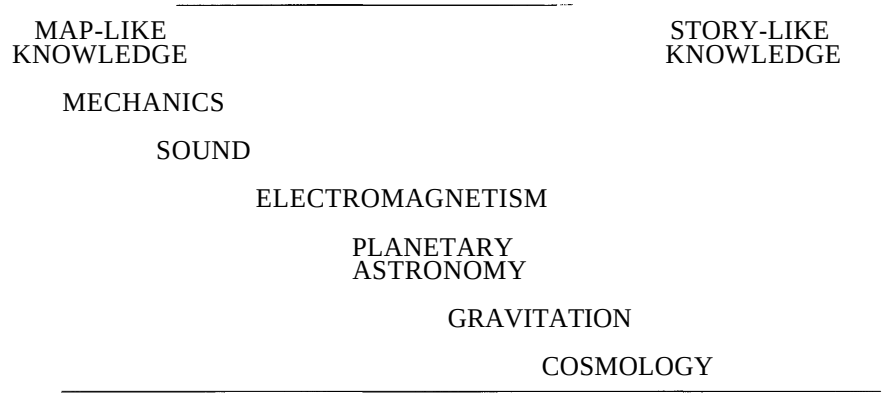

Fig. 5. Within any science, different bits incorporate different mixes of map-like and story-like.

Arts, Humanities, Sciences: What They Aim For

As to the relation between the sciences and other intellectual disciplines, it is interesting to consider the ambitions of the different fields (Figure 6):

Religion, art, music seek almost exclusively *revelation* of significance or meaning, with little concern for plain facts of the inanimate world[13]. They run into trouble if they try to deal in strictly map-like knowledge, as for instance the Catholic Church in confronting Galileo and the Copernican view, or nowadays the "scientific creationists". And these disciplines are not much concerned to *progress*, even as they adapt to changing circumstances.

History occupies an interesting intermediary position. Its highest aim is to

[13]Which is not to deny that they make use of available technical possibilities. As Jo Maxon-Dodd reminded me, modem Western composers take a very intellectual approach to their craft and make use of computers and electronic sound-generators.

MAP-LIKE KNOWLEDGE		STORY-LIKE KNOWLEDGE
SCIENCE	HISTORY	ART
		MUSIC
		RELIGION

Fig. 6. Ambitions to knowledge of various disciplines.

tell a good story; but unlike creative artists, historians work under the constraint that the settings of their stories should be as map-like as possible. History does make progress, as historians of later generations embed their tales in ever more authentic maps: Barzun (1974) points out that history can be objective even as it uses the narrative or literary mode. Nevertheless, it is not so much the authenticity of the maps that makes good history as the meaningfulness of the stories about what happened on that terrain: for the historian, "accuracy is a duty, not a virtue" (Carr, 1961).

Because of their equal dependence on map-making and story-telling, historians are perhaps in the best disciplinary position to recognize the emptiness of the opposing claims, made on the one hand by some scientists — that only map-like knowledge is worth having — and on the other hand by some sociologists, that *all* knowledge is nothing but ideologically motivated story-telling. How historians may go about being true to the facts while telling a good story has been nicely described by Richard Pipes (1994) as he argues that it is quite appropriate for historians and scholars to be *passionate* rather than "objective" on such a matter as the fall of the Soviet Union:

> The assembling of the relevant facts must certainly be carried out dispassionately . . . ; this aspect of the historian's craft is no different from the scientist's. But. . . the sorting of these facts — the decision as to which are "relevant" — requires judgment . . . . Facts as such are meaningless . . . : to "make sense" of the past, the historian must follow some principle.
>
> We properly expect physicians to diagnose diseases and suggest remedies in a cool and dispassionate manner. An accountant analyzing the finances of a company, an engineer investigating the safety of equipment, an intelligence officer estimating enemy capabilities obviously must remain emotionally uninvolved. This is so because their investigations have as their objective the making of sound decisions. *But for the historian the decisions have already been made by others, and detachment adds nothing to understanding.* [emphasis added]

Scientists, of course, are trying pre-eminently to draw maps. This is underscored by the fact that when scientists are not too sure of something, when they have not yet gained the understanding they would like to have, they are prone to admit in crestfallen tone that the best they can do is to tell a story; thus, about the coelacanth and the evolution of fishes: *"Unfortunately* each of these

possible explanations is really only a plausible 'story' . . . very difficult to test" (Thomson, 1991; emphasis added).

Scientific maps have, beyond question, become very much better over the last few centuries. The progress of science has been spectacular, and has properly brought it unparalleled status and prestige in modern society. But when we look at things in the way suggested here, it turns out that in terms of ambitions, science has actually done worse than other fields. Though science has drawn some excellent maps, much of it remains "only" stories, and so it has not come consistently close to its own goal; whereas religion, art, music, have long brought much appreciated revelation and thus have come much closer to their goals.

Analyzing Controversies

Controversies over knowledge claims often seem intractable. By considering to what degree the disputed bits of knowledge are story-like, however, otherwise intractable disputes can be clarified and partly resolved — if not for the protagonists then at least for those on the sidelines.

Consider the continuing dispute between evolutionists and creationists. Among the former are dogmatists who maintain that "evolution is not a theory but a scientific fact" (Bauer, 1992a, p.163); among the latter are religious believers who think (mistakenly, I suggest) that if there was evolution then there cannot be God (see, for example, Bauer, 1992b,c; Johnson, 1991, 1992). Typically, the two sides do no meaningful arguing but rather talk past one another and engage in propaganda aimed at bystanders. But if we begin by trying to situate evolutionary science on the continuum between map-like and story-like knowledge, it becomes immediately obvious that the dispute has to be unpacked into much smaller bits — see Figure 7:

The "scientific fact" of evolution actually comprises a number of elements on different parts of the continuum between map-like and story-like, with much of evolutionary theory being markedly story-like. Knowledge of the chemical affinities among all living things is quite map-like: the similarities of function and structure of DNA, proteins, ADP, and so forth. Knowledge of the so-far-discovered fossil record is reasonably map-like too, in its relative and absolute ages; in showing an increase over time in the complexity of forms, many similarities among different forms, and apparent extinctions and apparent beginnings.

Taken together, there are ample map-like bits around which to contrive stories about what has actually happened, about what the evident relationship among all living things means; but one can contrive more than one plausible story.

Those stories judged most plausible within the framework of science tell of

MAP-LIKE KNOWLEDGE	STORY-LIKE KNOWLEDGE
CHEMICAL AFFINITIES	
FOSSIL RECORD	
DESCENT WITH MODIFICATION	
FROM A SINGLE ULTIMATE ANCESTOR	
BY PURELY RANDOM VARIATION AND NATURAL ENVIRONMENTAL SELECTION	
BEGINNING ON EARTH WITH INORGANIC MATERIALS	

Fig. 7. The so-called scientific fact of evolution is a melange of bits, some of which are reasonably map-like whereas others are chiefly story

hereditary descent with modification. In turn, most of those imagine a *single* joint ancestral form; yet that is far from the only conceivable or possible story.

As to *why* the modification came about, there are again a number of tales, and even most of the story-tellers themselves do not claim theirs to be the only *possible* one. Probably it is only a minority of bards who recite epics of entirely random mutation and natural environmental selection. And when it comes to ultimate origins (Shapiro, 1986), it is only a very few minstrels, even within the scientific community, who profess to be quite sure that it all started on Earth in an inorganic but somehow fertile broth on templates of clay.

Segregating the various knowledge claims in this manner, asking always what is map and what is story, surely offers more insight, more hope for useful discussion, than do the arguments we see going on nowadays between extremists who believe so utterly in their own stories that they bend and cut and even falsify maps in their attempts to win the argument. Like the rest of us, they have the human habit of looking at or seeing maps only as illustrations of their own favorite stories.

Anomalous Claims

So long as a phenomenon is not publicly repeatable, it remains largely story-like. It is then futile to seek universal agreement about it; yet the seeking of such agreement seems to be a major preoccupation for many proponents of anomalous claims. Instead of making excessive claims of map-like proof, to attract attention and interest it makes more sense to stress potential *meaning. If* this is the case, one can argue, look at what might follow. That is common enough, after all, where there is no single, universally-agreed-to paradigm, say

in philosophy or social science. Each exposition posits certain things and then strives to attain *interesting* conclusions, or to employ *interesting* modes: interesting to people who may not see the postulates themselves as particularly well founded. It is only in science that new pieces of work are expected to base themselves on universally agreed foundations.

The appeal to interest rather than proof is indeed sometimes made by anomalists, albeit more often in such areas as psychic claims than in ufology or cryptozoology. It has shown its effectiveness perhaps most with respect to alternative medicine: in those cases where plain knowledge offers no cure, unorthodox and unproven treatments may well be more humane than orthodox experimentation that uses the dying as guinea pigs.

The maps-and-stories approach can also accommodate the useful classification by Truzzi (1977) of anomalous claims into *crypto* (simple albeit unorthodox existence claims) and *para* (heretical claims that new types of cause-effect relationships exist). Crypto claims aver that maps should properly show a certain feature. No matter how unexpected or earlier resisted, once the terrain has been sufficiently explored, argument ceases, and theories or stories are adjusted in whatever way might be required: human ingenuity has shown itself perfectly capable of adapting stories and theories to accommodate almost any new fact. That very ingenuity, of course, also makes it very difficult to effect a dramatic *change* of story, as opposed to modification or adaptation of an existing one: when adherents of some belief do not wish to adapt, then maps are not very effective in persuading them, as already said. Thus para claims face virtually insurmountable barriers of disbelief; those barriers need to be eroded from several directions over a period of time, only rarely if ever could they be surmounted by a single "extraordinary proof'.

Miscellaneous Illustrations

1. McHugh (1994) criticizes the "raw romanticism" of some psychiatrists, using the specific instance of Paul Lozano who committed suicide after idiosyncratic "treatment" by his psychiatrist. "At its best," he says, "psychotherapy helps patients by getting them to reflect on themselves."

In terms of the map-story metaphors:

To the extent that our understanding of psychology lacks universally-agreed-to maps, there exist no map-like cures. Then psychotherapy should be like education about story-like matters: therapists should not aim to indoctrinate patients with their own favorite stories, be they Freudian or Skinnerian or whatever. They should aim to bring their patients to a point where they can choose an appropriate story for themselves.

2. "Michael J. Novacek, . . . dean of science [at the American Museum of Natural History] . . . wasn't sure how to interpret another puzzler: 62% [of respondents in a Harris poll] agreed that 'scientists believe' humans are 'most closely related to' apes . . . . Yet only 44% agreed that humans evolved from 'earlier species of animals'" (Holden 1994a).

Novacek needs to realize that the relationship part is map-like whereas the "evolved" part is story (see Figure 7).

3. "Miracle of Bolsena . . . [:] In 1263, a German priest on a pilgrimage to Rome was experiencing a crisis of faith, wondering if the sacramental wafer was really the body of Christ. But when he stopped in the Italian city of Bolsena to celebrate mass, his doubts were erased when 'blood' oozed from the host onto the alter. . . . Scientists . . . have proffered a more mundane explanation: the common bacterium *Serratia marcenses*, which produces a red pigment. . . . But 'I don't think it totally throws the miracle out of the window' — since the priest found solace exactly when his faith was tested" (Holden 1994b).

That seems a nice way of making map and story compatible: it is no insult to either, and does not insist that everyone swallow the same story.

References

Appleyard, Bryan (1992). *Understanding the Present: Science and the Soul of Modern Man.* London: Pan Books; New York: Doubleday, 1993. See review essay by Hester, Carl (1995). *Journal of Scientific Exploration,* 9, 144.

Barzun, Jacques (1945). *Teacher in America.* Little, Brown (also Garden City (NY): Doubleday, Anchor, 1954.

Barzun, Jacques (1974). *Clio and the Doctors.* Chicago: University of Chicago Press, 57.

Bauer, Henry H. (1990a). A dialectical discussion on the nature of disciplines and disciplinarity. *Social Epistemology,* 4, 215.

Bauer, Henry H. (1990b). Barriers against interdisciplinarity: implications for studies of Science, Technology, and Society (STS). *Science, Technology & Human Values,* 15, *105.*

Bauer, Henry H. (1992a). *Scientific Literacy and the Myth of the Scientific Method.* Urbana & Chicago: University of Illinois Press.

Bauer, Henry H. (1992b). Review of Johnson (1991). *Journal of Scientific Exploration,* 6, 181; reprinted in *Reviews of Creationist Books,* ed. Liz Rank Hughes, Berkeley (CA): National Center for Science Education (2nd ed., 1992), 73.

Bauer, Henry H. (1992c). Reply to Johnson. *Journal of Scientific Exploration,* 6, 392.

Biglan, Anthony (1973a). The characteristics of subject matter in different academic areas. *Journal of Applied Psychology,* 57, 195.

Biglan, Anthony (1973b). Relationships between subject matter characteristics and the structure and output of university departments. *Journal of Applied Psychology,* 57,204.

Bruner, Jerome (1986). Two modes of thought. In *Actual Minds, Possible Worlds,* Cambridge (MA): Harvard University Press.

Brush, Stephen (1978). *The Temperature of History.* New York: Burt Franklin.

Carr, E. H. (1961). *What is History?* New York: Vintage Books, 8 (reported as a comment by A. E. Housman on M. Manilius).

Golding, William (1954). *The Lord of the Flies.* London: Faber & Faber (1962, New York: Coward-McCann).

Holden, Constance (1994a). Random Samples — Science: What the Public Thinks. *Science,* 264 (13 May, 902.

Holden, Constance (1994b). Random Samples — Miracle or Microbe? *Science,* 264 (13 May), 903.

Johnson, Phillip E. (1991). *Darwin on Trial.* Washington (DC): Regnery Gateway.

Johnson, Phillip E. (1992). Darwin on Trial Review. *Journal of Scientific Exploration,* 6, 391.

McHugh, Paul R. (1994). Psychotherapy awry. *American Scholar,* 63 (#1, Winter), 17. See also subsequent correspondence, including from Jacques Barzun on Romanticism, in *American Scholar,* 63 (#3, Summer), 476).

Medawar, Peter (1972). Science and literature. In *The Hope of Progress,* London: Methuen.

Mitchell, Richard (1991). Running on empty. *The Underground Grammarian,* 15 #4.

Oakeshott, Michael (1989). *The Voice of Liberal Learning: Michael Oakeshott on Education.* Ed. Timothy Fuller, New Haven & London: Yale University Press.

Pipes, Richard (1994). Did the Russian Revolution have to happen? *American Scholar,* 63,215.
Polanyi, Michael (1964). *Personal Knowledge.* New York: Harper Torchbook; see also Marjorie Grene, The Personal and the Subjective, in *Polanyiana,* vol. II (1993).
Postman, Neil (1989). Learning by story. *Atlantic,* December, 119.
Renfrew, Colin, Michael J. Rowlands & Barbara Abbott Seagraves (eds.) (1982). *Theory and Explanation in Archaeology.* New York: Academic Press.
Rigden, John S. (1994). A reductionist in search of beauty. (Review of Steven Weinberg, *Dreams of a Final Theory),American Scientist,* 82 (January-February), 69.
Shapiro, Robert (1986). *Origins: A Skeptic's Guide to the Creation of Life on Earth.* New York: Summit Books.
Snow, C. P. (1959). *The Two Cultures and the Scientific Revolution.* Cambridge: Cambridge University Press; expanded version, 1963: *The Two Cultures: and a Second Look.*
Stent, Gunther S. (1977). The poverty of scientism. In *Foundation of Ethics and Its Relationship to Science* (ed. *H.* Tristram Engelhardt & D. Callan), Hastings-on-Hudson (NY): Institute of Society, Ethics & the Life Sciences; reprinted as "The decade of scientism" in *Paradoxes of Progress* by Gunther S. Stent, San Francisco: W. H. Freeman (1978).
Tey, Josephine (1951). *The Daughter of Time.* London: Peter Davies (and many subsequent editions).
Thomson, Keith Stewart (1991). *Living Fossil: the Story of the Coelacanth.* New York: W. W. Norton, 179.
Truzzi, Marcello (1977). Editorial. *The Zetetic* (subsequently *Skeptical Inquirer).* 1 (#2, Spring/Summer), 3.
Ziman, John (1978). *Reliable Knowledge: An Exploration of the Grounds for Belief in Science.* Cambridge: Cambridge University Press.