

Two Cultures — or Three Filters?

On being ecolate as well as literate and numerate

by Garrett Hardin

In 1959 C.P. Snow (1905-1980), novelist and scientist, in his famous lecture "The Two Cultures"(1) sought to persuade contemplative people to reexamine the abstraction called "the intellectual." As one who had worked with both words and scientific apparatus Snow questioned whether competence with only the first of these tools was enough to justify the honorific title.

Snow's forceful attack evoked a counter attack. The well-established literary critic F.R. Leavis fiercely defended the established view of intellectuality. Contemptuous of Snow's ability as a novelist, Leavis was unwilling to admit that the physical scientist was a true intellectual.

We now realize that Snow was examining the world as an anthropologist or a historian might, seeking to distinguish the principal varieties of actors in the human drama. Every animal faces a world that is rich in diversity; its survival depends on quickly distinguishing friends and foes. Discrimination must be made where there is never total certainty. In the deepest sense, speedy discrimination is an economic, sometimes even a vital, necessity. Among all active animals categorizing is the order of the day. Man is an animal.

But man is, as Aristotle said, a thinking animal. In recent times he has come to distrust his categorizations. All too frequently the motives of the categorizers are perceived to be contaminated by prejudice, bias or bigotry. An external observer -- the hypothetical Man from Mars, say -- might be thoroughly objective; but

Garrett Hardin is professor emeritus of human ecology in the department of biological sciences at the University of California, Santa Barbara. His newest book is The Ostrich Factor: Our Population Myopia published by Oxford University Press.

where is the Man from Mars?

Like most people trained in the sciences I am uneasy about what I see as the excessive weight given to words by the Leavis and his like. This emphasis has of course ancient roots. I can best state my position by repeating a passage I presented to a symposium of religionists several years ago:

A scientist cannot accept the orientation of the first sentence of the book of John: "In the beginning was the Word, and the Word was with God, and the Word was God." No doubt this statement can be interpreted in terms of symbols, parables or myths, but all such substitutes for real propositions are ambiguous. Scientists are more attracted to the motto of the Royal Society of London: Nullius in verba. If I were charged with altering Scripture to conform with science I would say: "In the beginning was the World, which everywhere and forever envelops us; against this external reality all human words must be measured.(2)

Adopting the Biblical position automatically generates a dispute with the Leavises of this world. The unreliability of words is well illustrated by a stow from the life of Arthur O. Lovejoy, the great 20th century historian of ideas. Appearing as an expert witness in a court case he was asked to take the routine oath, "Do you... so help you God?" Lovejoy politely pointed out that before he could respond to the question he would have to know what kind of a God the questioner had in mind? Opposing counsel casually asked what kind of God he thought was possible. Lovejoy said he was so glad he had been asked, because this was a subject to which he had given considerable attention. There are many kinds of Gods, he said, even within the Christian religion. There is God the First Cause, God the Prime Mover, the God Who Answers Prayers, the God who..., and so on.

Legal tradition dictates that an attorney, having raised a particular point, cannot keep the witness from flooding the record with his reply. Lovejoy went on until he had made (as I recall) 37 distinctions and then sweetly asked: "Which one of these Gods does the court have in mind?" The attorney threw up his hands in despair and urged that the trial move on to substantive issues.

The moral should be clear: there is no unambiguous relation of words to reality. Conventions rule; and we cannot expect that working with words-only will answer our questions about the world outside the words. Often non-verbal language is more intelligible than words. In a popular lecture given in 1883, the English physicist Lord Kelvin (1824-1907), discoursed on a language much used by scientists, namely the language of mathematics:

I often say that when you can measure what you are speaking about and express it in numbers you know something about it; but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind: it may be the beginning of knowledge, but you have scarcely, in your thoughts, advanced to the stage of science...(3)

At this point we pause to name the intellectual stages discussed so far. The first stage, as illustrated in the quotation from the Bible, can be called the literate stage, using the word "literacy" and its derivatives to cover words transmitted by whatever medium (not just inked letters on paper). An intellectual of the Leavis stripe is said to be literate. The intellectuality of Kelvin (and other scientists) is now referred to under the rubric of "numeracy," the ability to think and communicate with numbers. According to the Oxford English Dictionary the second word was coined by a royal commission in the very year of Snow's lecture. After 1959 the words numerate and numeracy appeared with ever greater frequency in general discussions.

The thrust of Snow's analysis makes us question the legitimacy of an important human activity: categorizing people into cultural groups. Doing so invites dissent because categories are only statistically valid. Moreover, the name of almost any category carries an emotional baggage: think of the uproar created by the chameleon-like terms "liberal" and "conservative." Being pigeonholed is usually resented by the subject; but the passion for pigeonholing other people is a human failing. (Think of

the joys of hurling at one's opponents the epithets "Bigot! Xenophobe! Racist! and Nativist!")

Quite an amusing brouhaha resulted from the Snow-Leavis controversy; we can now see that the differences uncovered had more important functions than that of name-calling. But before going further we need to introduce one more thread into the argument.

In the last half of the 19th century the science of ecology was christened. Its definition was initially confined to the biological sciences; about a century later people interested in characteristically human problems broadened its meaning. The both economic and environmental ones. That position made academic economics no more than a specialized corner of ecology. Needless to say, card-bearing economists did not agree.

That something was missing from official economics had been noticed at least as far back as Gulliver's Travels. In the fantasy land of Laputa, Jonathan Swift told how mathematical analyses produced ill-fitting clothes for the Laputans, while "their houses were very ill built.., without one right angle in any apartment... I have not seen a more clumsy, awkward and unhandy people..."(4) Thus did Swift ridicule scholars who thought that purely numerical analyses could solve all human problems. That was in 1726.

Then in 1962 a biologist employed by the American government, Rachel Carson, gave an elegant presentation of human ecology in her book *Silent Spring*, which was both highly praised and passionately damned. In the generation that followed, well-established economists mounted one defense after another, the contents of which suggested that the thrust of Swift's satire was not mere fiction. A bouquet of their astonishing statements follows. (Unless otherwise noted, each quotation is by an established economist or a recognized spokesman for the group.)

"The world can, in effect, get along without natural resources." -- Robert Solow(5)

"There is no danger from the exhaustion of physical resources." -- Peter T. Bauer (6)

"In the received paradigm, economic growth can, in principle, continue indefinitely without resource constraints." --Allen V. Kneese.(7)

"The so-called Law of Diminishing Returns only operates in the absence, on the one hand, of significant technological changes, and on the other of significant social changes." --Colin Clark.(8)

"On average, human beings create more than they use in their lifetimes. It has to be so or we would be an extinct species. This process is, as the physicists say, an invariancy. It applies to all metals, all fuels, all food, all measures of human welfare. It applies in all countries. It applies in all times." --Julian Simon, a merchandising and sales specialist.(9)

"The United States must overcome the materialistic fallacy: the illusion that resources and capital are essentially things which can run out, rather than products of the human will and imagination which in freedom are inexhaustible." --George Gilder, popularizer of economics.(10)

To these individual confessions should be added the testimony of Constance Holden, for many years a trusted reporter of the weekly Science magazine. In a planned encounter of economists and environmentalists at the World Bank, "... the economists at the meeting rejected the idea that resources could be finite. Said one: 'The notion that there are limits that can't be taken care of by capital has to be rejected.' Said another: 'I think the burden of proof is on your side to show that there are limits and where the limits are.' They were suspicious of weU-worn ecological terms such as 'carrying capacity' and 'sustainability.' Said one: 'We need definitions in economic, not biological terms.'"

These objections by the economists take us to the heart of the economics-ecology controversy, the "burden of proof" issue. It is clear that economists assume that unlimited growth is normal and does not call for evidence. For an applied science that claims to be erected on a mathematical framework, it is astonishing to think that, since Adam Smith (1776), the evolution of this applied science has brought it into a domain where "infinity" is a legitimate operator in its equations. Early on, professional mathematicians forbade dividing by zero because it produces "infinity," the operational meaning of which has long been regarded as illegitimate. But not, apparently in economics.

The frequent assertions of the economists quoted

above cannot be reconciled with the traditions of the natural sciences. If Newton had denied the constancy of gravity he could never have successfully described our world. (The slight modification later called for by Einstein created a new constant entity with the dimensions of both mass and energy.) In biology, the variability of living things derives from a sort of constancy of hereditary elements.

When they wrestle with fundamentals scientists have to stop at some point, and say: "Thus far and no farther with our doubting." It is quite true that we have made mistakes in the past when we settled for "self-evident truths,^M ~common sense" and the like, but unlimited doubt creates an infinite regress that leaves no firm foundation for further advances. Einstein expressed what may be the best way to terminate an infinite regress. According to his biographer, Einstein said: "When judging a scientific theory, his own or another's, he asked himself whether he would have made the universe in that way had he been God."(11)

A modern term is needed for whatever mental entity we use to limit an infinite regress. Semantic coloring should not invest the chosen name with too much power. Of the suggestions made to date I like best the term, the "default position."(12) This term implicitly lays the burden of proof on any contradictory position. Constancy (with no creation & no destruction) is generally taken as a default position in the sciences. The laws of thermodynamics are default positions. (Ecological applications of this new term are discussed at length in *The Ostrich Factor*. [13])

Conflicts between economists and ecologists could have been aborted forty years before *Silent Spring* had the economists paid attention to the criticisms of Frederick Soddy.(14) The English chemist pointed out that the theory embedded in neoclassical economics in effect presupposes a perpetual-motion machine, a material form of infinity forbidden to science. Yet when, half a century after Soddy's critique, the multiply-authored work, *The Limits to Growth*, came out, Wilfred Beckerman expressed the opinion of his comrades in economics by calling it an "impudent piece of nonsense.(15) Why "impudent"? Because it refused to make the economically fashionable assumptions of worldly infinities.

The standard conclusion of traditional economists pleases John Q. Citizen. Default positions, which tell us

there are limits to what we can do, are seldom welcomed. ("How pessimistic!" says JQC.) After some ten thousand years of civilization, magic is still welcomed into millions of minds. Most daily newspapers in the United States still carry a regular column of astrological counsel; the flavor of the advice is certainly optimistic. So also are most of the orations given on ceremonial occasions: the speakers accept without question perpetual-motion machines proposed by the neoclassical economists. As evidence, consider a commencement address given by a philosopher at St. John's College:

It is now common knowledge in the farthest corners of the world that hunger, sickness, nakedness, and homelessness -- all those symptoms of the economy of scarcity under which we have all lived -- can by the proper multiplication and distribution of science and technology be abolished from the earth. --Scott Buchanan.(16)

I have augmented C. P. Snow's two paths to a culture (the literate path and the numerate path) with a third one, the "ecolate" path. Should someone write a new essay entitled "The Three Cultures"? I think this would be counterproductive: we already have enough stereotypes to keep our repulsive passions well supplied. Our greater need is to become more aware of the different languages we use in our attempt to surround and express the truth. It is now clear that as the human mind processes the inputs from experience it uses three different filters, each connected with its characteristic question.(17)

Literacy: What are the appropriate words?

Numeracy: What are the operational numbers?

Ecolacy: And then what?

More consistently than the first two filters, the ecolate filter is focused on time and the probable consequences of a proposed action. Ecolacy presumes a consequentialist ethics (which is often at odds with the motivational ethics produced by earlier, and predominantly literate, intellectuals).(18) As human beings become ever more crowded together the need for a mastery of these three "languages" grows. Can we

bring this about?

As one who was heavily involved in undergraduate education for more than three decades I have some suggestions to make. In the struggle to preserve the best of our civilization we have to take as our target those citizens who are most in need of a "general" education, namely the future teachers in primary and secondary schools, and the future journalists who will fashion the news reported in the press and in the electronic media. The informal fraction of the education of these two groups takes place outside the university and college curricula. Only the formal part is subject to academic influences. The principal emphasis of "general" courses should be on the needs of future citizens rather than those of students headed for academic specialties. In the past, successes in this area have been rather disappointing. Why? For the answer we need to plunge deeply into human behavior.

REWARD DETERMINES BEHAVIOR. In a world of living elements this is a universal default position. In any particular class of interactions, the determination need not be 100% effective: anything over 50% will make it determinative of the results. In the field of biology, natural selection is the overwhelming example of the operation of this default mode. Among domesticated animals and plants, rewards set up by animal and plant breeders determine what a strain will be like. In the economist's world of the free market, consumer preference determines the prosperity of human "producers."

What about the academic world? Many tax-payers are under the impression that teaching performance is the primary behavior that is rewarded in universities. Those who are close to the academic world know that this is not so -- particularly not so in universities, which set the style more than do colleges. As far as abilities are concerned it is fortunate that great teaching ability and great research ability are NOT mutually exclusive. (This is shown by the numerous individuals who are very good at both.) But in universities generally, the criteria for filling academic slots, result in research ability being rewarded more generously than teaching ability.

An academician's chance of advancement is largely determined by how his research accomplishment is perceived at OTHER institutions. (Teaching reputations are less well-known at a distance.) Since there are only 24 hours in the day, the perceptive and ambitious

academician gives research more attention than teaching. Rewards determine behavior -- Q. E. D.

Actually, rewards in academia are a mixed bag, and many professors exert themselves mightily in educating the next generation. "General" courses are devised to tell all the non-X students what they need to know about X, if they are going to be well balanced citizens later. But it is easier for a teacher to speak one language rather than several, and so the professor's specialty is apt to play the pirate in a course dedicated to more extensive goals.

The result of this unplanned selectivity is tragic: the neglect of the needs of the vast majority of students who stand most in need of a general education. This group includes those students who will one day be most responsible for training yet another generation of citizens. Tragedy compounded!

The two most important sub-groups are the primary and secondary teachers, and the journalists. The life stories of the two professions differ. For a long time teaching (in our part of the world) has been professionalized and esoteric. Administrators in the schools of education have a dictatorial clamp on the criteria for certification procedures. At a lower level the everyday workers, joined into teachers' unions, furnish the political power that keeps uncertified teachers out of the classroom.

University faculty who may take their advising duties seriously soon learn a sad fact: the education department or school at most universities has a reputation for general incompetence. Time after time, faculty advisors observe that the student who is no more than marginally competent at intellectual tasks ends up by becoming an "ed major." (Student scuttlebutt tells him that he will have an easy job there.) The final result was cruelly satirized by George Bernard Shaw almost a century ago: "He who can, does. He who cannot, teaches." (19) Of course, this is only a statistical truth: a few schools of education give a quality education, but the profession suffers from the majority. Extensive reform would be frighteningly difficult, but the welfare of future generations is at stake.

The other sub-group, with perhaps even more influence on the future, is the fraternity of journalists. Our schools of journalism may be as bad as education departments, but journalists have not succeeded in producing a closed shop. Most practicing journalists did not come out of journalism schools: they just wandered

into the occupation. Some are self-educated to a high level. But numeracy is still often mocked by the highly literate; the results show in the press.

As for ecolacy, this modern development is seen as threatening to many of the vested interests of society; and these, through the power of advertizing budgets, exert a powerful suppressive effect on ecolate analysis. The end result is that our civilization seems determined to get along with a single language, literacy, with numeracy and ecolacy being marginalized.

Can we survive? Well, who is we? If that great romantic dream of One World becomes -- temporarily -- a reality, the inevitable dysfunctions of scale probably preclude the possibility of universal reform. If, on the other hand, our world continues to be subdivided into many separate sovereignties (as it is now), there is at least a possibility that one or another of the semi-independent units may some day become truly tripartite in both thinking and communication. One such local success might then inspire others to follow the example.

NOTES

(1) C. P. Snow. *The Two Cultures*. Cambridge: Cambridge University Press. 1993. pp.1-51.

(2) Garrett Hardin. "An ecological view of ethics," in James B. Miller and Kenneth E. McCall, eds. *The Church and Contemporary Cosmology*. Pittsburgh: Carnegie Mellon University Press. 1990. p.345.

(3) Sir William Thomson (Lord Kelvin). *Popular Lectures and Addresses*. London: Macmillan. 1891. v. 1, p.80.

(4) Jonathan Swift. *Gulliver's Travels*. 1726. Travel III, Chap. II

(5) Robert Solow. "The economics of resources or the resources of economics." *Journal of Economic Literature* 6:11. 1974.

(6) Peter T. Bauer. *Equality and the Third World and Economic Delusion*. Cambridge, MA, Harvard University Press. 1981. p.206.

(7) Allen V. Kneese. "The economics of natural resources." *Population and Development Review*,

14(suppl):289. 1988.

(8) Colin Clark. [Book review] *Population and Development Review*, 11:120. 1985.

(9) Norman Myers and Julian L. Simon. *Scarcity or Abundance?* New York: Norton. 1994. pp.133-134.

(10) Quoted by Herman E. Daly and John Cobb in *For the Common Good*. Boston: Beacon. 1989. p.109.

(11) Banesh Hoffman. *Albert Einstein, Creator and Rebel*. New York: Columbia University Press. 1972. p.12.

(12) Garrett Hardin. "Paramount positions in ecological economics," in Robert Costanza, ed. *Ecological Economics*. New York: Columbia University Press. pp.47-57. (After introducing "default" in the Abstract I then -- unwisely, as I now think -- used a different term in the body of the text.)

(13) Garrett Hardin. *The Ostrich Factor: Our Population Myopia*. New York: Oxford University Press. 1999 (in press). Chap. 4.

(14) Allen V. Kneese. "The economics of natural resources." *Population and Development Review*, 14(suppl.):302. 1988.

(15) Charles Perrings. *Economy and Environment*. Cambridge: Cambridge University Press. 1987. p.48.

(16) Reported later in Scott Buchanan. *So Reason Can Rule*. New York: Farrar, Strauss, Giroux. 1982. p.12.

(17) Garrett Hardin. *Filters Against Folly*. New York: Viking Press. 1985. Chap. 3

(18) For views of consequential ethics in the pre-ecolocate stage see Samuel Scheffier, ed.: *Consequentialism and Its Critics*. 1988. New York: Oxford University Press.

(19) George Bernard Shaw. *Man and Superman*. 1903. Act IV.