

141

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Economics and the Limits of Scientific Knowledge¹

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For all their quarrels, economists know a lot. Some of it is obvious, the common sense of adults, such as that many things are scarce and that therefore we cannot have everything. The postulate of scarcity is what makes economics hard to teach to young adults, who believe they live among the blessed.

But a lot of economics is not so obvious, even to the middle-aged. The sociologist Randall Collins wrote an illuminating book subtitled *An Introduction to Non-Obvious Sociology*.² His job would have been easier in economics, not because economists are superior to lesser breeds without the law, but because economists have loved since the beginning the nonobvious, the counterintuitive, the paradoxical.³ Even more than other social scientists, economists love to dumbfound the bourgeoisie. Did the Oregon Plan, selling gasoline by license plate number, cut lines at service stations? No. It had no effect on the lines, because the lines needed to be long enough to ration out the existing supplies (which were low at the controlled price). Is it a good idea to restrict American imports of Japanese cars, thereby saving jobs in Detroit? No. The last time we did so, the price of all cars rose by \$1,000 each, costing American car buyers \$160,000 a year in higher costs for each job saved (at \$30,000 a year). Were unions the main reason that wages rose in the United States? No. Only 10 percentage points out of the 900 percentage points that wages have risen since 1865 can be explained by unions. Is America rich because of abundant natural resources? No. Less than 2 or 3 percent of the income of a modern economy is attributable to the original and indestructible properties of the soil.

As sociologists and political scientists and geographers can also claim, doubtless, we economists know a lot. We know for a fact that slavery was profitable. We know for a theory that first-place sealed-

bid common-value auctions have a winner's curse. Economics is, to use the magic word, a Science.

That word capitalized, as it will be here when used in its magical sense—*Science*—is dangerously potent. English speakers over the past century and a half have used the word in a peculiar way, as in British academic usage—arts and sciences, the “arts” of literature and philosophy as against the “Sciences” of chemistry and geology. A historical geologist, in modern English, is a Scientist; a political historian is not. The usage in English is recent, a point which is difficult for a current English speaker to grasp or to believe. The evidence is overwhelming that *Science* in English has come to be specialized to “lab-coated, quantitative, dealing with physical nature”; whereas in all other languages the word is meant to mark off serious thinking from journalism. The English usage would puzzle an Italian mother boasting of her studious son, *mio scienziato* (my learned one). She does not mean that he is a physicist. Italians use the word to mean simply “systematic inquiry”—as do French, German, Dutch, Spanish, Swedish, Polish, Hungarian, Finnish, Turkish, Korean, Hindi, Tamil, and every other language where testimony has been collected. Only English, and only the English of the past century, has made physical and biological Science (definition 5b in the old *Oxford English Dictionary*) into, as the *Supplement* and the new *OED* describe it, “the dominant sense in ordinary use.”

Economics has acquired, since the Second World War, the trappings of the dominant sense in ordinary use: numbers, models, and, above all, a tough mathematization that evokes envious squeals from other social scientists. Modernists in English long ago appropriated the word *Science* for their purposes. The word has ever since been a club with which to batter the arguments that the modernists do not wish to hear. Economists get into the National Academy of Science because they are armed to the teeth, in the English-speaking manner, with the weapons of Science.⁴ Political scientists, if mathematicians can prevent it, do not get in, because the mere name of Science is not enough.

The weapons of Science are in daily use around the culture. The standard sneer is to attack the appropriation of “Science” in social Science, judging economics or anthropology as failing to make the cut. Science must enumerate: That lets out political philosophy as true Science (that it also lets out most of biology does not worry the attacker). Science must be mathematical: That lets out anthropology (and again much of biology). Science must predict: That lets out history (and paleontology and historical geology and cosmology). Science must experiment: That lets out every social science except parts of psychology and tiny bits of economics, archeology, and sociology (along with astron-

omy). Science must be about the physical world: That lets out the rest, with no remainder except certain branches of physics as understood by nonphysicists in 1900.

The Science-weapon, backed by the English use of the Science-word, has consequences. A good deal of money has been spent by the National Science Foundation since the 1950s to examine periodic stars and subatomic particles. A good deal of money has been spent by the National Institute of Health to examine genes and cell walls. The big expenditures on Big Science has been justified on the grounds that these are core Scientific activities and that such activities account for modern economic growth and modern improvements in health.

Such grounds for supporting Big Science are false, scientifically speaking. A sociologist of science could attest that the triumph of the physicists in chemistry and biology is a postwar accident. An economic historian could attest that Science had effectively nothing to do with economic growth until well into the twentieth century, and even at century's end its contribution is modest beside the big factors of peace, literacy, shop-floor ingenuity, and sound economic policies. A historian of public health could attest that most of the decline in the death rate since the eighteenth century occurred before medical Science could save more people than it killed (a date that Lewis Thomas once put in the 1920s, or perhaps as late as penicillin). And she might note that despite the enormous expenditure by the National Institute of Health on cancer research, cancer rates have gently but steadily increased in the past twenty years.

Not much is spent to test such hypotheses in history or in economics. The National Science Foundation does not support history, which is not a Science, and the Foundation's budget for economics (about \$11 million) would not pay the light bill for high-energy physics.

So our English usage puts physical and biological Scientists in charge. The grounds are verbal, as must be the case in a human world or in a science run by humans. We cannot avoid using words, though we can use them poorly or well. The people who sneer about social “science” being un-Scientific are using childish verbal categories. The world, they think, comes in paired and correlated flavors of hard/soft, thing/word, fact/opinion, is/ought, male/female, Science/art. But people who scrutinize the hard facts about things in science usually come to the conclusion that the facts are constructed by words of art.⁵ I can attest that in economic science the statistics central to its being are grounded in values, though no less scientific on that account.

Nonscientists and nonhumanists are in love with the project of demarcating Science from the rest of the culture, declaring the demar-

cation problem to be the central problem of epistemology.⁶ In their view, the set of correlated dichotomies popular among English speakers over the past century occur naturally, like the ocean. The view is provincial. Except for government funding and a few other matters of persuading the electorate to go on paying for it, the demarcation of Science from non-Science, when you think of it, is lacking in point.

The pointless provinciality, an English-speaking one, is to think of Science and literature as two cultures. The two cultures are not natural territories, though department chairs and college deans in defense of the territories sometimes behave like border guards in the Eastern Europe of old, erecting barbed wire and shooting escapees. A dean of research at a large state university gave a speech a couple of years ago in which she described the humanities as what is left over after the (physical and biological) Sciences, and then after them the social sciences, have expended their eloquence. The humanities, in her mind, are a residuum for the mystical and the ineffable. (I have a friend, a remarkable economic scientist, who, when he learned that I was reading books about literature, asked me amiably whether I had become, as he put it, a "mystic.") The dean and my friend were being good-natured. The bad-natured remarks muttered from each side are worse: that if we mention "metaphors" we are committed to an arty irrationalism; that if we mention "logic" we are committed to a Scientific autism.

One wants to shake both sides and say, "Get serious." The better definition of *science* is the broader and more serious and less English one, as for instance in de Felice and Duro, *Dizionario della Lingua Italiana*: "the speculative, agreed-upon inquiry which recognizes and distinguishes, defines and interprets reality and its various aspects and parts, on the basis of theoretical principles, models, and methods rigorously cohering." The contrast is not with the humanities but with, say, bad journalism or the untutored opinion of the street. Nothing is said about using calculus or test tubes. The "rigor" can come from any argument that coheres. And so the speakers of German have their *Altertums wissenschaft*, the "science" of olden times, Greek and Roman classics; *klassische Wissenschaft*, similarly, is what English speakers call the humanities.

In non-English worlds of language, it is perhaps more evident that the sciences, such as chemistry, history, or economics, require "humanistic" methods, right in the middle of their sciences. They are sciences, not Sciences. The Sciences with a capital S are figments of the philosophical imagination. The real argumentative work gets done by lower case sciences. Newton used logic and metaphors. Darwin used facts and stories. And likewise, the arts and humanities require fact

and logic, right in the middle. Leonardo, the scientist-artist, used stories and logic.⁷ Shakespeare and John Donne made pointed use of alchemy and astrology (prestigious sciences in their day, to which that same Newton devoted most of his life). Goethe wrote a scientific (*wissenschaftlich*) treatise on colors. Science is literary, requiring metaphors and stories in its daily work, and literature is scientific.

Like other arts and sciences, to put it another way, economics as one of the social sciences uses the whole "rhetorical tetrad"—the facts, logics, metaphors, and stories necessary for completed human reasoning. Pieces of the four are not enough. The allegedly Scientific half of the tetrad, the fact and logic, falls short of an adequate economic science, or even a science of rocks and stars. The allegedly humanistic half falls short of an adequate art of economics or even a criticism of form and color. Scientists and scholars and artists had better be factual and logical. They had also better be literary—able to frame good models and tell true histories about the first three minutes of the universe or the last three months of the economy.⁸ A scientist with only half of the culture is going to mess up her science.

The idea that fact and logic are enough for Science puts one in mind of the rural Midwestern expression "a few bricks short of a load." The program over the past fifty years of narrowing down our arguments in the name of rationality was a few bricks short of a load. The experiment in getting along with fewer than all the resources of human reasoning was worth trying and had plenty of good results; but it has done its work. To admit now that metaphor and story matter also in human reasoning does not entail becoming less rational and less reasonable, dressing in saffron robes or tuning in to "New Directions." On the contrary, it entails becoming more rational and more reasonable, because it puts more of what persuades serious people under the scrutiny of reason. Modernism, the ugly if fruitful experiment of the past fifty years, was rigorous about a tiny part of reasoning and angrily unreasonable about the rest. It's time to move on, without losing the permanent gains.

Bertrand Russell, the master of modernism in philosophy, is a case in point.⁹ Santayana describes Russell during the First World War exploiting his retentive memory without the check of comprehensive reason:

This information, though accurate, was necessarily partial, and brought forward in a partisan argument; he couldn't know, he refused to consider everything; so that his judgments, nominally based on that partial information, were really inspired by pas-

sionate prejudice and were always unfair and sometimes mad. He would say, for instance, that the bishops supported the war because they had money invested in munition works.¹⁰

Modernists in philosophy or architecture or economics cannot reason with most of their opponents; on most matters they can only shout and sneer. They would say you are an unscientific fool if you do not believe that in building downtown Dallas in the 1970s the form should follow the function; you are an ignorant knave if you do not believe that political science in the 1990s should be reduced to secondhand econometrics.

Resistance to reason is faith. It is entirely unoriginal and uncontroversial to point out that Science is the modern faith; it arose after the sea of religious faith retreated down the vast edges drear and naked shingles of the world. Scientists, especially in the English sense, are ordained priests; winners of the Nobel Prize are granted a cardinal's hat, and in exceptional cases are canonized, to intervene for us in God's game of dice. The Science-faith is practiced on many college campuses. When forced into contact with Scientists, the economists, historians, and, most embarrassingly of all, the political scientists live in dread of Scientific sneers. The California Institute of Technology is a case in point. There and everywhere in our Science-faithful culture, the Scientific ayatollahs, mainly from physics and mathematics, have gotten into the ugly habit of mounting holy wars against other disciplines or at least initiating a diverting heresy trial now and then.

You know the rankings in Science itself: physics, math, chemistry, biology, geology, engineering. The chemist who made the trigger for the atom bomb was sneered at by the physicists and mathematicians; one of them—John von Neumann, I think—congratulated him with this rib-rocking jest: "You're a wonderful chemist—that is, a good third-rate physicist." The notion that Science is whatever most closely approximates the higher-status parts of physics showed in the fury of the physicists in New Haven and Los Angeles against the chemists in Utah ("Utah!" one could hear the Coasties sneer) who had the temerity to claim to have made fusion in a test tube. I wonder if physicists realize that we bystanders pray nightly in another faith that the chemists turn out to be right.

I do not mean all this to be funny. Soberly, really, religion and Science serve similar functions. An eminent anthropologist was asked by the anticreationist side in the Arkansas case if he would testify for the good guys. The lawyer argued something like this: "As a cultural

anthropologist, you are an expert in both religion and Science, since you study one and practice the other. Therefore, you would be an excellent witness testifying that creation 'science' is not Science and that our blessed martyred Science is not a religion." The anthropologist thought about it for a while and then declined. He knew that on the witness stand he would have to admit that he could see no great difference between religion and Science, and especially not between Bible Belt Christianity and the Science myth we have created in the newspapers and public assemblies over the past century.

It is revealing how the scientist-customer is treated by workers in the service industries of Science—deans, journalists, book editors, foundation executives, and grant administrators. You would expect them to have the most cynically realistic view of Science. After all, they know what goes into the sausage. They know the unguarded remarks of scientists, the petty jealousies and the rejected proposals, and they know from the outside, unindoctrinated in the special topics of a particular science. Yet, despite this knowledge, they adhere to the Science religion of our culture.¹¹ They seem to get their prestige from pretending that Scientists are holy. They will claim that they support Science out of a devotion to truth (or, as they would put it, Truth); but, in fact, they define truth to be Science, squeezing out what does not fit the 3 × 5 card. Again, these service people of science are quick to adopt the Scientistic apologies for fallibility, such as that, after all, we are only approximating the truth. They forget that the only certitude is that yesterday's certitude in science will become tomorrow's laughingstock: a Newtonian universe, for example, or a Lamarckian theory of inheritance. Always in the theology of Science is today's credo that is timelessly True.

The service sector is forced into this position in part by its other customers, the attending and reading and, in any case, paying public, who have a magical view of Science. Either it's a heap good medicine, this Science, or its just a charlatan's trick. The attitude accounts for the genre of Fads and Fallacies in the Name of Science and the careers of some professional magicians devoted to unmasking nonconventional science (oddly, the magicians do not examine the magic in conventional laboratories; you would think they would want some controls on their experiments). The average person, educated or not, views Science as on/off, true/false, real/phony. He understands it with certain crude theories—the theory which has come to be called "Baconian," for example (I have never found it in Bacon), that speaks of "generalizing from data," and which Darwin, from the first sentence of *The Origin of Species*, had to pretend he followed.

When on board H.M.S. *Beagle* [1831-1836], as naturalist, I was much struck with certain facts. . . . On my return home, it occurred to me, in 1837, that something might perhaps be made out . . . by patiently accumulating and reflecting on all sorts of facts. . . . After five years' work I allowed myself to speculate on the subject.¹²

In private, Darwin himself scorned this 3 × 5-card version of scientific method. As he remarked in a letter to a colleague in 1861, "How odd it is that anyone should not see that all observation must be for or against some view if it is to be of any service!"¹³ Nowadays, a 3 × 5-card version of Karl Popper's thinking has taken the place of Baconianism as the credo of the Scientific, with a line or two from Thomas Kuhn in the Eastern rite. The ceremonies are closer to what happens in science, but not very close withal.

Modernist Scientism, in brief, is simple-minded and does not work. It does not deliver the miracles it promises, and erects pointless hierarchies to conceal the fact. The dilemma of practice in the post-modern world is that the experts have failed us, repeatedly, in Vietnam and in outer space and in the classroom. The experts' arrogant, muddled, intolerant, undemocratic, and unreasonable way of making social decisions comes from the elevation of Science and its correlate expertise into a religion. We need again an eighteenth-century scepticism about crude religions. Voltaire, where are you when we need you?

Fortunately, I am in possession of an answer to this problem and numerous others, a word to the wise that I am willing to share with you, at no extra charge. In an early scene of *The Graduate*, an uncle but-tonholes Dustin Hoffman and gives him a bit of career advice: "Plastic," he says, "plastic." Plastic was a good bet, to tell the truth, in 1967. The uncle was right. For 1990, the avuncular advice is, in a word, "Rhetoric."

By the ancient definition, rhetoric is the whole art of argument—not ornament and bombast alone. If science is to cohere, it must use the art of argument; and if it is to be agreed upon by free people, it must be argued persuasively. Rhetoric is not a new foundation. It is merely a way of talking about the business we scholars are already in. The most fundamental epistemological implication of the rhetorical turn is simply that fundamental implications are useless for work in science. We do our work with words; and, to be responsible about words, the scientist must recognize her rhetoric, not ruminate on epistemology.

Even the Nobel science of the economy cannot bypass rhetoric. This is no bad thing. Speaking of a science such as economics in literary

terms, of course, inverts a recent and guilt-producing hierarchy. But contrary to the century-long and English-speaking program to demarcate Science from the rest of the culture—a strange program, when you think about it—science is, after all, a matter of arguing. The ancient categories of argument are going to apply.¹⁴

As the economists Argo Klamer and Don Lavoie have pointed out, applying rhetorical thinking to economics leads one to an "interpretive economics." Interpretive economics would not be antiquantitative or antimathematical. To swing back against formal methods is to adopt another dichotomy of modernism, if only from the other side. The symbiotic relationship between rationalism and its alleged opposite, irrationalism, is captured nicely in this fact: The Rand Corporation, that bastion of rationalism, is located in Santa Monica, that bastion of irrationalism.

Economics can do better than choose up sides between feeling and thought, between the Humanities (note the capitalization again) and the Sciences. Since Adam Smith, economists have been both analyzing action and analyzing behavior, understanding the reasonableness of what people do down in the ruck of the market and seeing them also "from the eighth floor," as a sociologist once put it. To do economics otherwise is to be a few bricks short of a load.

It is easy to see the academic field of economics in rhetorical terms. No wonder: Academics are arguers. A scientific text can be analyzed like a poem, to see how it achieves its purposes through metaphors and ethos, implied readers and ruling stories.¹⁵

Maybe one can see the economy itself in rhetorical terms, too. If it proved possible—that is, if it resulted in empirical programs of research that explained more of what we see—an interpretive economics would reunite the sentence and the equation. For instance, business people spend a great deal of time persuading each other, and the fact might well figure in a wider economics. David Lodge describes a businessman, in his novel *Nice Work*, through the eyes of Robyn Penrose:

It did strike [her] that Vic Wilcox stood to his subordinates in the relation of teacher to pupils. . . . [S]he could see that he was trying to *teach* the other men, to coax and persuade them to look at the factory's operations in a new way. He would have been surprised to be told it, but he used the Socratic method: he prompted the other directors and middle managers and even the foremen to identify the problems themselves and to reach by their own reasoning the solutions he had himself already determined upon. It

was so deftly done that she had sometimes to temper her admiration by reminding herself that it was all directed by the profit-motive. (p. 219)

The interpretive economists have been trying recently to formulate a theory of the entrepreneur as a rhetorician, a persuader of bankers and workers.

It is early days yet for interpretive economics. But an economics brought back into the conversation of humankind has already a few things to whisper across the disciplinary walls. Allow me to sell you a couple.

First, if economics is a good imitation of physics, as it is supposed to be if it is a Science, then it should predict.¹⁶ But if you're so smart, oh predictor of human events, why ain't you rich? The question is the American Question, natural to economics.

The question cuts deeper than most intellectuals and experts care to admit. The test of riches is a perfectly fair one if the expertise claims to deliver actual riches, in gold or in glory. The American Question embarrasses anyone claiming profitable expertise who cannot show a profit, the historian second-guessing generals or the critic propounding a formula for art. He who is so smart claims a Faustian knowledge, "Whose deepness doth entice such forward wits / To practice more than heavenly power permits."

Start with economics. Take it as an axiom of human behavior that people pick up \$500 bills left on the sidewalk. The Axiom of Modest Greed involves no close calculation of advantage or large willingness to take a risk. The average person sees a quarter and sidles over to it (it has been found experimentally that Manhattanites will stoop for a quarter); he sees a \$500 bill and jumps for it. The axiom is not controversial. All economists subscribe to it, whether or not they "believe in the market" (as the shorthand test for ideology goes), and so should you.

Yet the Axiom of Modest Greed has a distressing outcome, a dismal commonplace of adult life, a sad little \$500 Bill Theorem:

If the Axiom of Modest Greed applies, then today there exists no sidewalk in the neighborhood of your house on which a \$500 bill remains.

PROOF. By contradiction, if there had been a \$500 bill lying there at time $T - N$, then, according to the axiom, someone would have picked it up before T , before today.

From this advanced scientific reasoning, it is a short step to common sense. If a man offers advice on how to find a \$500 bill on the sidewalk, for which he asks merely a nominal fee, the prudent adult declines the offer. If there really were a \$500 bill lying there, the confidence man would pick it up himself. "A tout," said Damon Runyon, who knew the score on the economics of prediction, "is a guy who goes around a race track giving out tips on the races, if he can find anybody who will listen to his tips, especially suckers, and a tout is nearly always broke. If he is not broke, he is by no means a tout, but a handicapper, and is respected by one and all."

The payment need not be monetary if money is not what the seer desires. Prestige in the local saloon would be cheaply acquired if the American Question did not also cast doubt on predictions of sporting events. But it does. The lineaments of the sporting future apparent to the average guy will be reflected in the sporting odds. Only fresh details give profits above average, measured in money or prestige. Fresh details are hard to come by. Information, like steel and haircuts, is costly to produce.

The upshot is that American Question and the \$500 Bill Theorem radically limit what economists and calculators can know about the future. No economist watches the TV program "Wall Street Week," which claims to predict the future, without a vague sense that he is betraying his science. He should be pleased. His science proves its robustness by asserting confidently that the science cannot profitably predict; indeed, that no science of humankind can profitably predict, even the science of stockbrokers. The economic theorem is so powerful that it applies to economists.

An economist looking at the business world is like a critic looking at the art world. Economists and other human scientists can reflect intelligently on present conditions and can tell useful stories about the past. These produce wisdom, which permits broad, conditional "predictions." Some are obvious; some require an economist. But none is a machine for achieving fame or riches. The study of the human sciences can produce wisdom; but it cannot produce prediction and control.

To become an effective manager or college dean, the consistent modernist must unlearn his modernism—the notion that Procedure will tell all. If it were easy to organize "correctly," then people would do it, which is what is wrong with the journalistic notion that it is easy for business to choose the Swedish Way or the Japanese Way or whatever Way is currently on their minds (note that the Swedish Way is now in disrepute, as the Japanese Way will be by the year 2000). The hubris of social engineering is the same as the hubris of facile social criticism.

No one is justly subject to the American Question who retains a proper modesty about what observation and recording and storytelling can do. We can observe the history of economies or the history of painting and, in retrospect, tell a story about how security of commercial property or the analysis of vanishing points made for good things. An expert, such as an economist, is an expert on the past and about the future that can be known without divine and profitable possession. Human scientists and critics of human arts, in other words, write history, not prophecy.

As Harry Truman once said, the expert as expert, a bookish sort consulting what is already known, cannot by his nature learn anything new, "because then he wouldn't be an expert." He would be an entrepreneur, a statesman, or an Artist with a capital A. The expert critic can make these nonexpert entrepreneurs more wise, perhaps, by telling them about the past. But he must settle for low wages. Smartness of the expert's sort cannot proceed to riches.

Economics teaches this, the limit on social engineering. It teaches that we can be wise and good but not foresighted in detail.

So that's one thing economics can tell other disciplines when it gets back into the conversation, that the disciplines are not magic. The other one is that the disciplines must trade. American and other academic life is thoroughly departmental. We know that in a century the disciplines will be organized differently, yet most institutions of higher learning are arranged to keep the inevitable from happening. Not all the change in the next century, but a lot of it (he says wisely, on the basis of looking backward), will come from between the disciplines—thus biochemistry and biophysics, thus comparative literature, thus history renewed by drawing on the social sciences, thus economics remaking itself between philosophy and engineering.

You will hear from deans—I hear it from some of my own—the tired argument that what we need is more specialization, building on strength; that what is wrong with letting the interdisciplines flourish is that they have no Standards, these nondepartmental things. And what are the Standards? Ah, well: the departmental. Something, you see, is fishy.

What is fishy is the economics involved. Specialization is an economic idea. But it is grossly misused by academic planners (and even by some economists when they become academic planners) to justify what could be described in economic terms as autarchic protectionism. The key economic point is this: *Specialization itself is not good*. In fact, Adam Smith himself (not to speak of Marx, you see) was eloquent on the damage that specialization does to the human spirit. What is good is spe-

cialization *and then trade*. As Adam Smith remarked famously, "Consumption is the sole end and purpose of all production; and the interest of the producer ought to be attended to, only so far as it may be necessary for promoting that of the consumer." There is no point in a shoemaker piling up shoes in the backyard unless he is going to sell them some day in order to consume the fruits of other people's specialization.

The trade in intellectual life is precisely the use of other people's work for one's own: It is what goes on in interdisciplinary activity, if the activity is something more than polite acknowledgment of the other's expertise, insulated carefully from disturbing one's own. If we actually read each other's work and let it affect our own, we are well and truly following the economic model of free trade. If we do what most academics do—never crack a book outside of their subdiscipline—then we are following the economic model of old Albania, specializing in ox carts and moldy wheat. Modern academic life has whole departments of ox carts.

Understand, the argument is not against specialization but against the failure at last to trade. It will be sweet work for psychologists, say, to talk long and hard about observable behavior, temporarily setting aside arguments from introspection. There is nothing hostile to systematic work in my argument. No one would wish to stop systematic specialization.

The problem comes when the narrow, temporary agreement hardens into a methodological doctrine for all time. Then the shoes start piling up, unsold, in the backyard. If the psychologists make the methodological rule permanent, throwing introspection into a nonspecific outer darkness forever and ever on merely epistemological grounds, they fall into absurdities. Speaking of psychology in the late 1930s, Jerome Bruner remarks, "For reasons that now seem bizarre, you *had* to convert contested issues into rat terms in order to enter the 'in' debates."¹⁷ Two strictly behaviorist psychologists make love. One says to the other, "You enjoyed that. Did I?"

The failure of specializing modernism in psychology, economics, and elsewhere to achieve their inflated promises does not say they were bad ideas to try. And it certainly does not say that we should now abandon fact and logic, surface and cube, and surrender to the Celtic curve and the irrational. We are all very glad to keep whatever we have learned from the Bauhaus or the Vienna Circle or the running of rats. It says merely that we should now turn back to the work at hand, equipped with the full tetrad of fact, logic, metaphor, and story.

The anthropologist Roy D'Andrade put it well recently: "One cannot expect to improve upon Freud by observing less about human beings than he did."¹⁸ It is economics again: We will do better with fewer arguments ruled out. That entails less sneering in academic life, less ignoring of chemists by physicists or of sociologists by economists or of statisticians by mathematicians. Considering that other scholars read different books and lead different lives, it would be economically remarkable, a violation of economic principles, if nothing could be learned from trading with them. The notion that something can be learned from trading with others merely applies consistently the economics of intellectual life. Just as differences in taste or endowment are grounds for trade, disagreements about the causes of crime or the nature of capitalism are grounds for serious conversation.

One can arrive at the same result against arrogant specialization through a philosophical/linguistic argument, too. A Maxim of Presumed Seriousness would assert that we, as serious scholars, must presume, until sound evidence contradicts it, that others are serious, too. The official rhetoric of scholarship presupposes the maxim. In linguistic terms, the maxim is a "conversational implicature," which is to say, a rule for making sense of what another scholar says. We are contradicting our own pragmatics of scholarship if we decide on poor evidence that sociologists are flat-earthers beside the Scientific majesty of economics.

The rhetoric in this is that languages are used to exclude people. When you walk into a pub in the Outer Hebrides, the men will switch from English to Gaelic. We do that a lot in academic life. The language in economics nowadays (wait a few years) is game theory. People have told me that their papers have been sent back by journals to be translated into game theoretic terms, although everyone knows that there is not always a point in doing so.

The two propositions in metaeconomics, then, are the Theorem of Intellectual Modesty and the Theorem of Intellectual Exchange. It would be nice if economists themselves would learn them.

Notice that nothing here is particularly French. I mention this because anything that smacks of reflexive criticism these days is liable to be attacked as "deconstruction" or some other foul-smelling French concoction, and then related to fascism, communism, and the decline of the West. What I am relying on here is plain old English-speaking, Scottish-invented economics, with a dash of American pragmatism and a half cup of ancient rhetoric. The American Question and the Principle of Toleration are not French.

If you want my opinion, I regard deconstruction and postmodernism as a jokey end game to modernism. But I regard them, too, as

necessary: End games are not optional. I am not going to indulge in the violent sneering against them that many other English-speaking intellectuals of conservative leanings favor. I do not believe that deconstruction foretells a new dark age; or that people I cannot understand are crypto-fascists or crypto-communists. My only problem with deconstruction is that it seems to be ancient rhetoric made into a founding theory. Rhetoric is ill-suited to founding theories. Notably, the French fathers of deconstruction were all trained in rhetoric, as no Briton and few Americans are. Ancient rhetoric is about how language achieves its ends, about what the linguists call pragmatics, and, as the linguist Stephen Levinson remarks:

There is a fundamental way in which a full account of the communicative power of language can never be reduced to a set of conventions for the use of language. The reason is that wherever some convention or expectation about the use of language arises, there will also therewith arise the possibility of the non-conventional exploitation of that convention or expectation. It follows that a purely . . . rule-based account of natural language usage can never be complete.¹⁹

But that is merely the wisdom of if-you're-so-smart, and is derivable from economics and ancient rhetoric as much as from po-mo playfulness.

The way to inaugurate the intellectual trade and intellectual modesty that will, I hope, characterize the world after modernism is to focus on rhetoric. It is an antiepistemological epistemology that breaks down the walls dividing disciplines. How do I know? Because we have done it at Iowa over the past ten years, in 250 meetings involving hundreds of faculty in departments ranging from mechanical engineering to English, discussing the speaker's work in the line-by-line style of the Writers' Workshop. Our Project on Rhetoric of Inquiry has resulted in now dozens of books and scores of articles. Some day the Coasties will recognize that they do not have to betake themselves to Paris or Frankfurt for their criticism, merely to Iowa.

The common ground is argument. We have discovered at Iowa that what professors have in common is not some subject or social problem but the art of argument. It is not epistemology or chaos theory or international relations that can create real conversations across disciplines. It is a focus on the very words. A professor of Spanish cannot give her colleague in mathematics any advice on the substance of his paper; but she can point out to him that the form is part of the sub-

stance, and can remind him that the appeals to authority (so important in mathematics) can be found in seventeenth-century Spanish plays. From this would come a revitalized science, rehumanized—without giving up even one of the gains from our long experiment in suppressing a part of our humanity.

The problem has always been trying to vault into a higher realm, asking whether such-and-such a methodology will lead ultimately to the end of the conversation, to the final Truth about economics or philosophy. This is the question asked by Plato and reiterated by Descartes and Bacon and confidently answered by the men of the nineteenth century, the Kelvins sneering at the possibility of radioactivity and predicting that physics was nearly complete, who gave us Scientism. The modesty of the sophist Protagoras, who said that *man* is the measure of all things, was not pleasing to Plato, Descartes, and Bacon.

For it is a false assertion that the sense of man is the measure of all things. On the contrary, all perceptions as well as of the sense as of the mind are according to the measure of the individual and not according to the measure of the universe. And the human understanding is like a false mirror, which, receiving rays irregularly, distorts and discolors the nature of things by mangling its own nature with it.²⁰ [Bacon, *The Great Instauration*, 1620, XVI]

The "measure of the universe," however, cannot be taken direct; it can only be taken from the sublunary mirrors we have. Questions such as What will economics look like once it is finished? are not answerable on this side of the Last Judgment. Wolfgang Pauli used an economic metaphor to scold his fellow physicists for anticipating the physics that would arise once judgment was ended, claiming "credits for the future." Economists, with their dismal jokes that lunches are not free and \$500 bills do not lie about unclaimed, should have no trouble seeing that little can be hoped for from pre-science in such matters. The problem is that pre-science is precisely pre-science, knowing before knowing. We can be wise, if we trade intellectually. But we cannot be social engineers independent of society, for if we were, in fact, so smart, we would be rich.

Notes

1. Parts of the argument are pursued at greater length in D. N. McCloskey, *If You're So Smart: The Narrative Of Economic Expertise* (Chicago: University of Chicago Press, 1990).

2. Randall Collins, *Sociological Insight: An Introduction to Non-Obvious Sociology* (New York: Oxford University Press, 1982).

3. There is a genre in economics of "Everything You Thought You Knew About the Economy That Is In Fact Wrong." See, for example, Douglass C. North and Roger L. Miller, *The Economics of Public Issues*, 6th ed. (New York: Harper Collins, 1983); and A. Smith, *The Nature and Causes of the Wealth of Nations* (1776).

4. An article in *Science* (Robert Pool, "Strange Bedfellows," *Science* 245 (18 August 1989): 700-3) describes the amazement of the physicists collaborating with economists at the new Sante Fe Institute (formed to do economic science properly) at how much mathematics the economists used—far more than the physicists themselves thought useful.

5. The conclusion has become a cliché among scientists. To name three eminent scientists who make the point: Michael Polanyi (crystallography) in *Personal Knowledge* (Chicago: University of Chicago Press, 1958); Ludwik Fleck (bacteriology) in *Genesis and Development of a Scientific Fact* (Chicago: University of Chicago Press, 1979; originally published in German in 1935); and Steven Weinberg (theoretical physics) in "Beautiful Theories," Revision of the Second Annual Gordon Mills Lecture on Science and the Humanities (University of Texas, 5 April 1983).

6. The two books that a decade ago did most to reorient epistemology were, of course, Paul Feyerabend, *Against Method: Outline of an Anarchistic Theory of Knowledge* (London: Verso, 1978); and Richard Rorty, *Philosophy of the Mirror of Nature* (Princeton: Princeton University Press, 1979). An extension of this line, making full use of the British sociologists of science such as Bloor, Collins, Pinch, Barnes, and Mulkay, is Steve Fuller, *Social Epistemology* (Bloomington: Indiana University Press, 1988); Steve Fuller, *Philosophy of Science and Its Discontents* (Boulder: Westview Press, 1989); and Fuller's new journal, *Social Epistemology*. See also Gary B. Madison, *Understanding: A Phenomenological-Pragmatic Analysis* (Westport, CT: Greenwood, 1982); and Maurice A. Finocchiaro, *Galileo and the Art of Reasoning: Rhetorical Foundations of Logic and Scientific Method* (Dordrecht, Holland: Reidel, 1980).

7. A colleague at Iowa in hydraulic engineering, Enzo Macagno, is writing a book on Leonardo's drawings of water, chaos theory before the name.

8. See, for example, Mary Hesse, *Models and Analogies in Science* (South Bend: University of Notre Dame Press, 1963); and D. N. McCloskey, *If You're So Smart*.

9. Cf. Wayne Booth, *Modern Dogma and the Rhetoric of Assent* (Chicago: University of Chicago Press, 1974), who makes this point about Russell in persuasive detail.

10. George Santayana, *Persons and Places: Fragments of Autobiography*, ed. W. G. Holzberger and H. J. Saatkamp Jr. (Cambridge: MIT Press, 1987), 441.

11. When a conference was organized a few years ago to discuss the "rhetoric of economics," the organizers expected the journalists invited from *Newsweek*, the *New York Times*, and the *Boston Globe* to be the most canny of the guests. But, in fact, the science journalists could not grasp why the 3 x 5 card definition of scientific method was inadequate. The working economic scientists had no problem understanding it; the working journalists were uncomprehending and scandalized. See David Warsh's piece in Arjo Klamer, D. N. McCloskey, and R. M. Solow, eds., *The Consequences of Economic Rhetoric* (Cambridge: Cambridge University Press, 1988). Science journalists are puzzled at how to cover non-normal science or the criticism of science. They know how to cover astounding new findings that will make us wise and rich but not the finding that the findings are not astounding and will not make us wise or rich. They impose a naive metastory on science.

12. *The Origin of Species* (London: Penguin, 1968 [1859]), 65. In his *Autobiography*, Darwin asserts that he "worked on true Baconian principles, and without any theory collected facts on a wholesale scale" (quoted in John Angus Campbell, "Charles Darwin: Rhetorician of Science," in *The Rhetoric of the Human Sciences*, ed. John S. Nelson, D. N. McCloskey, and Allan Megill (Madison: University of Wisconsin Press, 1987), 73.

13. Quoted in Campbell, "Charles Darwin," 74.

14. For which see, among others in the revival of rhetoric, Chaim Perelman and Lucy Olbrechts-Tyteca, *The New Rhetoric: A Treatise on Argumentation*, trans. J. Wilkinson and P. Weaver (Notre Dame: University of Notre Dame Press, 1969); Wayne C. Booth, *Modern Dogma*; Brian Vickers, *In Defense of Rhetoric* (Oxford: Clarendon Press, 1988); Richard McKeon, *Rhetoric: Essays in Invention and Discovery* (Woodbridge, CT: Ox Bow Press, 1987); and the best short introduction to the techniques in practice, George A. Kennedy, *New Testament Interpretation through Rhetorical Criticism* (Chapel Hill: University of North Carolina Press, 1984). In particular fields (mathematics, anthropology, history, political science), see Nelson, Megill, and McCloskey, eds., *Rhetoric of the Human Sciences*; and other books in the Wisconsin University Press series *The Rhetoric of the Human Sciences*.

15. D. N. McCloskey, *The Rhetoric of Economics* (Wisconsin: University of Wisconsin Press, 1985); Arjo Klamer, *Conversations with Economists* (Totowa, NJ: Rowman and Allanheld, 1984).

16. See Stephen G. Brush, "Prediction and Theory Evaluation: The Case of Light Bending," *Science* 240 (1 December 1989): 1124-29. The prestige of prediction (as against postdiction, history) probably arises from the "discredited empiricist conception of science" (p. 1127) still dominant in the minds of non-scientists.

17. Jerome Bruner, *In Search of Mind: Essays in Autobiography* (New York: Harper & Row, 1983), 29.

18. Roy D'Andrade, "Three Scientific World Views and the Covering Law Model," in *Metatheory in Social Science*, ed. D. W. Fiske and R. A. Shweder (Chicago: University of Chicago Press, 1986), 39.

19. Stephen C. Levison, *Pragmatics* (Cambridge: Cambridge University Press, 1983), 112.

20. Francis Bacon, *The New Organon and The Great Instauration [Instauratio Magna]*, in *Francis Bacon: A Selection of His Works*, ed. S. Warhaft (Indianapolis: Bobbs-Merrill, 1965).