

The Diversity of Cultures as against the Universality of Science and Technology

By Jerome Y. Lettvin

Prof. Lettvin presented this paper at a UNESCO symposium on Culture and Science: The Diversity of Cultures as against the Universality of Science and Technology in Paris on last September 6.

Copyright 1971, UNESCO

The comprehensive involvement of man in science is now fatal. There are two distinct meanings to the word science. The first meaning is what physicists and mathematicians do. The second meaning is a magical art, about which the general public has superstition. These views are related to each other as basic theology and priestled religion in the middle ages. Politically it is the latter that is most useful. But just as one cannot divorce the deeds and policies of the Inquisition from the doctrines and propositions of the saints, so now one cannot really separate the tyrannies of government from the theories of scholars. That connexion occurs now as then through the schools in which vulgar opinion entrains the disciplines and expediency reshapes the work.

This vulgar opinion, this second and now overriding view of science, deserves a brief description. To it science consists of facts and artifacts – actuarial tables on the one hand, lasers on the other. Theory is a kind of incantation that ensures the fact and makes the artifact work. Advertising agencies, when they want to show that some breakfast cereal, degraded from cardboard wastes, is scientifically designed, put $E = mc^2$ conspicuously in the picture. Equal nonsense occurs in other contexts in other countries. By itself such gimmickry is no more harm than a St. Christopher medal. What is of harm is the blind faith in an imposed system that is implied. "Science says" has replaced "scripture tells us" but

with no more critical reflection on the one than on the other. Scripture once told us through the voice of authority that we should not suffer witches to live, that slaves are legitimately taken, that to be poor is to be virtuous and, by this dreadful twisting, was the instrument of oppression through much of our history in Europe and America. Science now says that Vietnamese peasants do not have the proper infrastructure to maintain a progressive and democratic economy, that blacks cannot reason as well as whites and that to be selfish is to be sane.

Once formal religion held temporal authority on a promise of heaven, astonished the people with miracles long past, and sold them futures in remitted pain for today's bread. It is replaced by the new faith whose living figures ascend to the heavens, whose miracles are offered in the immediate, and which gives electric bread-knives as souvenirs. Most wonderful of all it is not prayer but reason that distributes this bounty. Man was God all the time. But reason is no more understandable this year than prayer a thousand years ago. Little Billy may become a scientist as earlier he might have turned priest, and know the sacred texts, making of his experiments prayers. The chromed apparatus is blessed by distant authority, the water thrice filtered for purity, and he wears the white antiseptic gown we all know from TV commercials. But the masses still move by faith. And the cynical educators translate, like St. Jerome, sacred words into the administrator's language, hold press conferences on the latest wonders, and display in picture magazines. Broadcast is important not because it explains but because daily life has been conditioned to depend on a faith that can move mountains.

Like the religion it supplants, this new one must have its messiah who cannot be the divine substance itself, the propositions of science, nor yet the mortal gadgets it creates. So now, conceived without error, got almost wholly at cost, delivered in a bedlam over new stars in the east, and amortized on Caesar's due, comes the son of man, taking our labors on his console. Neither human nor divine, neither suffering nor transcending – here he is, here at the telephone, a finger-tip away – not on a low hill elsewhere and long ago, but here to be touched, questioned, heard, here to reveal that disinterested justice no mortal man could even attain. And he is promised to stay – world without end.

I have fear of what science says, not the science that is hard-won knowledge but that other science, the faith imposed on people by a self-elected administering priesthood. The most vicious thing that this public science says, the supporting lie on which revolutionary and reactionary alike agree, is that truth is in number, numbers are in machines, machines are not human and therefore just. They are spared the original sin. In the hands of an unscrupulous and power-grasping priesthood, this efficient tool, just as earlier, the Final Man, has become an instrument of bondage.

In spite of great differences in economic and social structure, the Western World now resembles the Western World of the sixth century. A metaphysics that ushered in the first dark ages is again flourishing. I call it Antaeism after that unhappy giant that Hercules killed by keeping him from touching the earth. Antaeism is an overwhelming abandonment of the phenomenal world as the source of knowledge.

Without denying other kinds of analysis, let us look back to the middle of the first millennium with this syndrome in mind. The world then, as now, had become crowded, not for lack of land and resources, but for lack of ways to use them. Ethics and politics, the way men treat each other, had become a major preoccupation, and control of man insensibly became more important than control of nature. In the schools Greek was dropped as a dead language and mathematics decayed as a useless discipline. Natural sciences turned from description to a ruminative scholarship concerned with authority. An almost sensuous Hippocratic immersion in observation of the patient gave way to the rationalist system of Galen whose style has reappeared in medical textbooks. Causes, broad enough in concept as to admit of no exceptions, gave a world of only accidentally modified effects. It did not matter, from the public and uninitiated view, that this system of reason was not truly productive, that mechanism was not truly explained by indwelling properties, that, indeed, an institution had grown powerful enough to fulfil its own prophecies. For the overwhelming daily problem that shadowed the sun by day and obscured the stars at night was how to live in a world more constrained by one's fellows than by any of the forces offered by nature. Then as now, manipulators appeared and kept shop everywhere, then as priests, now as social scientists, arrogating control by an alleged divine order whose shibboleths are parodies of serious thought, but always such as hold men down. It mattered as little to organized and organizing religion then as to the social sciences now what the nature is of the single man, and the models of the "good man" offered by heretic and patriarch alike

are as astonishing and foolish as the "economic man" of several decades ago or the interactive operator of today.

Nevertheless today seems, at first glance, very different. Control of nature has not been abandoned, rather is more violently and successfully pursued than ever in history. Indeed we seem almost at another extreme – allowing ethics and politics to lapse or be subverted to a progress manifest in consumer goods. But this first glance is superficial. When we penetrate the arts and sciences themselves we find a strange picture. With the sole exception of the physical sciences, including chemistry, a new style is ascendant, appearing in the arts as non-subjectivism, in the sciences as a mixture of positivism and operationalism. The foreseen accident of the computer, like the prophesied accident of Christ, has engendered a new mode of thought. Where Stoic and Talmudic rationalism shaped, then fused with, and finally disappeared into the figure of Jesus, so now technologic rationalism has constructed and is being embodied by the computer. Two metaphysical changes are already spreading rapidly; first, the denial of or indifference to generative law as distinct from convenient algorithm; second, the frank substitution of data for phenomena, in engineering and biology and medicine and almost overwhelmingly in social science. These changes are also central to the new religion.

In modelling the world one used to assume that laws are simple but hard to find. Parsimony and symmetry played the greatest part in setting up science as we know it. Had Newton's equations of motion been as long as the Principia itself, and proven, somehow, in an appendix to be necessarily that long, they would not have been so interesting even if they were true.

Beauty lay in the economy, for the ideas were not only easy to grasp, but universally applicable – like quotations from Shakespeare. The laws found were necessary in the sense that the whole world, the very heavens, bore witness to them. But one can reasonably ask: Is this aesthetic required to make working models of the world? Suppose instead of having a small set of lucid equations, one had an enormous set of measurements independently taken and covering most practical cases. Then suppose one had an immense machine of great storage capacity and high operating speed, and could show that for shooting cannon, computing freight costs and calculating orbits it was almost always a matter of practical indifference whether he used Newton's system or the huge set of separate expressions. Would there be any practical reason for preferring Newton except by the superstition of taste?

What has just been given in travesty for physics can be taken as directly applicable in many other sciences. Computers have vastly increased our ability to work with data points. It is possible, for example, to patch together weather prediction, or the location of oil deposits, or putting a man on the moon, because the dogwork of patching data can be done easily and rapidly by machine. Where a clearly determined human goal can inform a human judge to reorganize computation, patching becomes a fine art, the blending of apparently irrelevant procedures to produce wanted results. However, the patchwork is not usually a theory in any classical sense. It is prescriptive like a good recipe. But, when the same algorithms and programs, so successful in directed engineering, are used in cases where there is neither a theory to be checked nor a goal to be approached, the system turns bizarre, a thing out of

Jonathan Swift. Then the output of the machine, whatever it is, can become the goal, the program become the theory, as you can actually see occurring in certain branches of biophysics. What first occasions the work disappears and the real objects of discourse are revealed as the workings of the machine.

It is more in technology than in science that the computing machines flourish. Not only in automatic bookkeeping and traffic control, of rolling stock but also in the design of special devices, useful circuits, optimal ways of constructing apparatus, these computers are without peer. One experiences almost a frisson of awe when watching an automated draftsman lay out a set of complex plans, or an automated milling machine shape to perfection a piece of metal, or an automated editor justify the lines on a page and even proofread. So much of what we formerly thought to be talents and crafts turn out to be tedious exercises; so much labor, in retrospect, is slavery rather than work. And since the fruits of science are the gadgets and comforts now better made as well as better designed by machine, it is not unreasonable to imagine that science itself is of the same nature. From the popular view, science becomes what computers handle – sets of numbers, preferably large, as in Isaac Asimov's explanations of cosmology. Thus the fusion of the science qua religion and science qua discipline is already occurring.

The universe received as a large set of clever tricks, leads to a disengagement from it, makes it about as worthy of notice as a new car. This attitude is reinforced by a technology that has almost exclusive dominion over what we see. The ambient world now presented to the eyes of a city child is more the piling up of clever tricks

than an orchestration of natural process. The stage is set for the flourishing of Antaeism. Taken without aesthetic, as a list of independent measures rather than chains of distinct forms, correlated rather than caused, governed macroscopically by probability rather than necessity, the phenomenal world fades. What one perceives becomes not different in substance from conditions that model it, and the models no different in principle one from the other

Possibly our metaphysics could have withstood the strain if only the pressure of man on man were somewhat lessened; along with the methodical devaluation of the world has come the pressure to learn how to deal with each other as men, the same expediency which destroyed the schools in the early middle ages, it drives us again. And attention turns away from the whole of nature (as somewhat explicable, given money enough and time) to man himself. The acedia that palls the schools in the United States comes only partly from their commitment to an industry, or tissue culture of administrators. Most of my colleagues are also old prostitutes and we don't like supporting ourselves that way. Indeed, we will continue to lie, cheat, embezzle and pimp as is the custom, in order to keep our laboratories going and our students financed. Much more disheartening is it to find now in the clear eyes of these students as in the bloodshot eyes of their administrators how the world had changed from a great chain of being into a jig-saw puzzle, the connexions between the parts arbitrary or conventional and with the nature of the parts accidental or contrived. Puzzles are, in the end, boring, so it is that many young physicists and chemists are turning to biology and biologists are turning to medicine or social

science in one general compulsion to work with man himself. But the spirit of man has also been compromised by the spirit of the age, the same Antaeism that governs whatever science has no central theory. From the nature of psychological tests, from the results of brain stimulation, from the discovery of centers of the brain (e.g. those for "pain" and "pleasure"), from the attempt to make the blind see by inserting a primitive television set in the brain, from experiments on social interaction in small groups, from the studies of learning in children, in a word, from the whole contemporary psychology and so-called brain sciences, the image of man is that of a determined mosaic of stimulus-response mechanisms, perhaps modified contingently, but still a clockwork that can be disassembled. Epistemology has become a dirty word. In this atmosphere most computerniks rightly call the brain merely a meat machine.

From this overriding materially determinist point of view, wherein mental computation is ultimately described in terms of a cartesian mechanics, the social scientist proceeds to handle groups of men. The partitioning of work even tries to resemble what once happened in physics. It is left to the psychologist to say what are the eigen-characteristics of that social particle, man, but the social scientist writes the thermodynamics of the masses, defines social heat, social equilibrium, etc. In his sphere man is a bundle of properties that can be abstracted only from the aggregate. As temperature has no meaning for the single particle, so do his group dynamics have no counterpart in the individual. Older theories like the tripartite soul of Plato, invested by Freud, took society and the individual as mirrors of each other, but such

an idealist bias corrupts the collection of data, and so is disappearing.

Here is our new priest-ling, despised by the theologian, the proper scientist, but heard in the parishes to which high learning never penetrates and it is from him that the new church emanates rather than from learned arguments. Already his asceticism is wondrous – a mortification of spirit in an air-conditioned desert where once the flesh wasted on the hot lands of Libya. For he has denied himself all those weaknesses that plague commoner and professor alike, mercy, empathy, understanding and, most important of all, that generative property of mind, taste itself; to test his powers he will even take compassion to discourse, as once the desert fathers took whores to bed, in order to show his faith unmoved. In his hands, through a ritual he need not understand, by instruments he need not know, a miracle occurs that transubstantiates flesh to number. So are the Viet Nam peasants pacified by the six-fold connected society, plants shorn of their verdure when the threshold of hunger is calculated. How many men can we lose, by current opinion in the middle west? How many can they lose before the structure of the country submits to our will that is given precisely by models that even generals can grasp? And internally, how is dissent distributed, what connects and disconnects political action, how is credit distributed among the poor? How is intelligence related to class, how is class related to education, how is education related to profession, how is the hierarchy structured? What are the frames of reference from which the expandable ones hang as if on crosses? I do not need to give you specifics. You have read the newspapers, the Pentagon papers, Noam Chomsky's dissection of the arrogance in our social scientists turned to

politics, the power behind the drone. But also you must read Professor Herrnstein's handling of the genetic inferiority of the lower classes, and Professor Jansen's discussion of the genetic inferiority of the black man, and the clever discovery of inherent inability to read in the American Indian to realize the true power of endless number in the paper output, the interminable paper output that serves our Caesars. But do you think it is different in the Soviet Union, or France; or any other developed country? Of course, there are possibly some honest men in the field, as once there were honest monks, and they may even be in the majority for all I know or can read of what they issue, but I am not talking of them, rather their church, not of their beliefs, rather the public policies issued under their collective imprimatur. Yet, in fairness to them, as to the natural scientist, one must show the problems they face.

There are so damned many men, and so many diverse aspects to them, that sooner or later the social observer must interpose between himself and his material data gathering and data-arranging device – a kind of shaped filter or Procrustean bed to isolate features of moment. Gathering his data by questionnaire rather than by discussions, so as to exclude bias, counting noses and words rather than taking meanings, so as to define a set, converting people to symbols and then draining the symbols of reference, the social scientist is now, like a mathematician almost completely abstract, and able to handle social relations with divine disinterest.

But the immense ease with which the data can be shuffled by machine has seduced him. Model after model springs to mind before the huge ink-blot of correlation matrices. He must test them, cautiously,

carefully. Since he is studying an interactive and sensitive system that is willing, almost eager to accommodate itself to any imposed constraints, that, in fact, has been evolved like some transcendental Geisha girl to be all things to all customers, he can only enter into a *folie a deux*, a mutual delusion, with the society he studies.

Whatever he does to it will have an effect, and the effect will always be significant, must be significant, for his model. It is a triumph, elsewhere in science, to find a technique that is useful in confirming or denying what one proposes. It would be a triumph to find a social experiment without consequences to the ideas of the experimenter. Not even economics, that almost decent discipline is exempt.

What the epiphany of the computer has done in the social sciences is to remove any tendency to an aesthetic, to a judgment by taste, as it had done for all other sciences not yet possessed of a firm central theory. It has substituted for understanding a patchwork of rules of thumb, often neither tested nor intelligible. On the superstition that reduction to the number is the same as abstraction, it permits any arbitrary assemblage of data to be mined for relations that can then be named and reified in the same way as Fritz Mauthner once imagined that myths arise. Nor can the differences between other science and his sort of science be exposed from the outside – since the programs, subroutines, software and hardware cannot be distinguished between a problem in cosmology and the calculation of probable incidence of sexual aberrations in radical students.

I have gone into these matters to a tedious extent in order to prepare you for a glimpse of the saviour himself, as noble in concept as any modern enterprise, possibly the noblest of them all, but also the most

vicious in effect. This king, this bright star in the diadem of our paper universe is a project called Artificial Intelligence. You have heard vague rumours of his coming, and there will be a point at which you will be told that he came but you were looking elsewhere.

The venture is to change machine from being sorcerer's apprentice to being itself the sorcerer. Again, as always, there are two aspects to the science. On the one hand there is the serious attempt first, to find what are the properties and limits of computer as they are now or can be shortly, and second, whether or not human perception and judgment have rules that can be formalized and so modelled on machines. These are complex and beautiful questions. On the other hand there is the public aspect that promises new hope for automatic babysitters, psychiatrists, and executives. Within any single project, whether at MIT or Stanford, Tokyo or Moscow, there are at the same time those who are concerned with theory and those who promise performance to the eagerly waiting government that waits on a new and powerful tool. From the government's point of view, I may add, it doesn't matter one bit whether or not the device can be used, for all that is required of it is proclaimed existence, the public belief in an inspired golem, for the government to let it be known it is in use. Wiener attributed too much integrity to our leaders in his warning on this subject – his book, *God and Golem*.

The aim of those who promise performance can be given by a recently occurring anecdote. You may have read that a Japanese consortium has convinced its government to invest many millions of dollars in an artificial intelligence. I suppose also that you know of recent Russian interest in the same topic. The leader of a

major American computer project is trying to persuade the U.S. government also to invest heavily. For, this leader points out, the first machine devised that can proceed by itself will be given the task of designing a yet cleverer machine, and so on, until the third or fourth generation should be able to take over the world, and which do we as Americans want to have, their machine taking us over, or our machine defending us? I assume, by now, that most of you understand our euphemisms.

This is the sort of language that Caesar understands, and if anything characterizes the administrative algebraist, it is an extended low cunning. But you will note the administrative aims and weigh them against the search for pure knowledge on the part of those few scientists left who are interested in the computer as an object of study. The same unscrupulousness that has taken social science into applied social engineering and poisoned enduringly the field, is now used to develop a complement to the social engineer that makes the new church invincible. For it is that church and not the rulers it will appear to support, that becomes our ruling class, but now with a cap of invisibility or impenetrability.

I, in common with many other teachers, have already conceded defeat. It is not apocalypse that we cry but a dull death-watch that we hold. The spirit has already become uniformly Antaeic, and the vision is of a moribund world plucking at the coverlet and babbling of clear waters and green fields. Distant trees, blue skies, lassitude and anger, my hand and your body are truly, truly no more than appropriately long sets in a set-theoretically definable cosmos. It is not, sadly, what a programmer would call a neat universe, and the only frames of reference in sight seem to be gallows.

Since I have come to fear the administrative use of any experiment, good or bad, in the social and behavioral sciences, I spend my time with those jolly friars that tend the computer. The world, to them, is a system of propositions about elements that have, through human muddleheadedness, been improperly defined. When the definitions can be made precise then the propositions can be handled. One remembers Confucius and the rectification of names. They have finally found the solution to the mind-body problem – there is no mind. The computernik leans over his drink in debate – 'Well then, define the mind. I will not permit you to use undefined words.' Indeed, indeed. Why then let us define a man. There he is, a featherless biped with wide toenails to distinguish him from a plucked chicken. What in hell does he mean by defining, this jolly cleric? As if definition were applicable to phenomena at all, to a stone, a mote, a photon? But such is the gist of our foolish debates on thinking machines. And he has the advantage for he and I both know that physiology and psychology are dead issues, that it is probably easier to build a brain than analyse it. By the time he is ready, man will be evolved to act like his models.

One week he calls me up. There is a program devised by Professor Weizenbaum and it is an automatic non-directive psychiatrist. I type in "I feel lousy" – it types back, "why do you feel lousy?" – I type in "Because you are talking to me" – and it types back, "Does it bother you that I am talking to you?" I type in "Yes" – and it types back "I understand." I?!!! Understand?!!! And does it also intone *mea culpa mea, maxima culpa* to a forgiving steam engine in some sacred round-house? I know Weizenbaum very well. I know he

designed this program not for therapy but to show how little content there was in that therapeutic discipline. So I say this, and the computernik cries out "But can you tell it from the real therapist? Operationally is there a difference?" There really is none. And this is the way it goes. Ingenious solutions of technical problems, and heaps and heaps of clever tricks, because to this new religion that is what evolution is, a concatenation of clever tricks.

Weizenbaum meant a parody. But to the computerniks whatever utters "I"β, fulfills the Cartesian "cogito." In such hands our lives become trash. "Love?" they say; "come back week after next. We have a contract this week to translate Sir John Suckling into Icelandic." But week after next a bug has showed up in the translating program. There is a regular museum of bugs by now – they are seeking a universal bug-killer, for all that stands between them and the final conquest of cognition are these few bugs.

Their attitude is infectious in spite of the barrenness of results. One wanders around like a patient after shock treatment. The stars, so what; the war, so what; my friends are dying, so what; I don't feel anything, so what. Precisely here comes my revelation. For the world, decomposed by the antipoetic act can now be reassembled in a non-biodegradable way. Confronted by my own failure of nerve, by the senseless and brutal war in Viet Nam, the starving of Pakistani people with American cooperation, the daily tally of planned, annotated and correlated disaster I feel as if almost any universe were preferable, that the metamorphosis of the vampire cannot come soon enough.

And that is, I imagine, how it will appear to others. Sooner or later the promised delivery of a guaranteed thinker to advise our elect representatives will be

replaced by the noise that he exists, the rumour that he had just passed a street away, the certainty that he now rules.

Here, then, is the new saviour. And do not imagine that his retinue is different from what it was for Another after His rumour was inscribed. Attending the chrome-plated tradition are some of the sickest enthusiasts since Saint Simeon Stylites, faceless, empty-eyed, cooperating in their anonymity on programs inscribed like palimpsests on a poetry that no one understands anymore anyway. To them is the truth revealed, and in their numbers as in the prayers of the African fathers, all our liberties and lives, our sex and our science will become as dust, independent sense-data points.

Science says, and the poor will be marked unto the nth generation. Science says, and not a sparrow falls but the machine slaps it down and takes the identification number. Culture will be preserved in this apostolic empire, and will be displayed weekends on the walls of an IBM museum. Cultural imperialism? Nonsense. Our devices will bear the stamp of the country ordering them. Men will not be much changed in general. They will have achieved identity through indiscernibility as was foretold. Yet, as in Chicago, they will dance Ukrainian dances at least once a week to remind them of their heritage. Our sales representatives, trained in your tribal taboos, will call on you shortly. You have no choice but to buy. For this is the new rationalism, the new messiah, the new church, and the new dark ages come upon us.

UNESCO Symposium on Culture and Science, Paris, France September 6-10, 1971

J. Y. Lettvin, Comprehensive Involvement of Man in Scientific Activity

http://dspace.mit.edu/bitstream/handle/1721.1/56245/RLE_QPR_104_PUBREP.pdf;sequence=1

*This lecture was manually transcribed from the only known extant copy on the Internet, an archival scan of **The Tech**, MIT's student newspaper, dated October 29, 1971, <http://tech.mit.edu/V91/PDF/V91-N43.pdf> Pages 8 and 9.*