

letters

Kinship with social sciences

Most of the middle-class thinking citizens of the more advanced civilized countries have the feeling that they are helplessly enduring storms of turmoil in which the old standards of conduct, old buildings and old institutions are being blown away and replaced by new laws, new fears and innovations that they don't understand. They ask, "What is wrong with the world?"

Before answering this question let us recount some of the things that keep the citizenry shaken up. They say that street crime is increasing, we have more scandal among our political leaders, a weakening of the influence of the churches, a breakup of the family, increasing threats from the underworld, the shocking increase in the power of syndicates that control sources of fuel, food and labor to say nothing about threats of war between large as well as small nations.

One answer to the question of what is wrong with the world, and which might at first glance appear to be evasive is, "The world is perfect, but people won't believe it." There are three kinds of laws: (a) those passed down by our religious leaders and anyone who breaks one of them is a sinner; (b) those formulated by our government leaders and anyone who breaks one of them is a criminal, and, finally, (c) the laws of nature. In regard to the natural laws, people have been superbly innocent. We haven't broken a law of nature yet. It is to be noticed that among the storms of turmoil enumerated above, most of them have to do with human relations and the complexity of our society. Perhaps our trouble is that we do not know enough about the *natural* laws that govern our human relations, and we inadvertently try to correct matters by making *governmental* laws that are contradictory to them.

It is the general consensus of opinion that *society* is too complex to be subjected to the kind of analyses that are applied to the physical world. But it must be remembered that Man's *physical* surroundings appeared to be so mysterious and overwhelming in the early days in Europe that all gigantic events were attributed to the gods. It was not until after repeated breakthroughs by such men as Galileo, Newton, Faraday, Maxwell, and others that the scientific community developed the spirit of confidence

and hope that has resulted in so many of our modern accomplishments and is still inspiring researchers to tackle the ever-increasing mysteries that keep coming to view.

It might be that people in the social sciences and the physical sciences could exchange ideas for the ultimate benefit of both. This suggestion is inspired by the many analogies connecting the two fields, a few of which are as follows:

At the boundary separating two nations such as the US and Mexico where the economic and social conditions are so different, there is a tension analogous to surface tension with an "osmotic" pressure difference. The establishment of barriers along the boundary to control the migration of people and materials is like the construction of a semi-permeable membrane that is very difficult to maintain at top efficiency. Also tariffs and embargos at international boundaries behave in the same manner.

Individuals, like atoms, can dimerize through marriage or the formation of other partnerships and can even form agglomerates that are as stable as some molecules are.

One of the most prevalent phenomena in both the physical and social domains is diffusion. We have diffusion of energy sources such as coal, oil and nuclear materials through modern transportation and the diffusion of ideas through our sophisticated communication systems. Whether we refer to heavy freight, money or information, the diffusion always follows the lines of decreasing free energy. In fact, in the field of economics, one might give net profit the symbol ΔF , the difference between the selling price and the buying price the symbol ΔH and the manipulative losses of a chaotic nature as $T\Delta S$ and get equations similar to those used in thermodynamics.

Thermodynamics also teaches us that the purification of any substance to 100% purity is impractical because of the nature of the entropy of unmixing. Likewise it is impractical to try to get the number of law-breakers in the US down to zero, to get the number of accidents in industry or on the highways down to zero, or to reduce to zero the chances of leakage of secret information from corporations or the military. There is a cut-off point at which the cost of perfection exceeds its virtues.

It is impossible in this short letter to



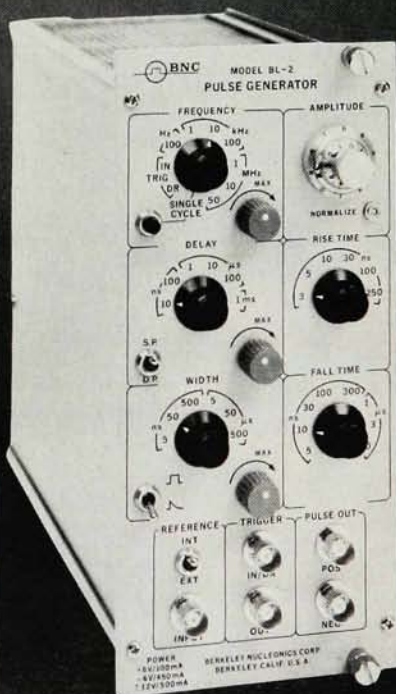
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letters

enumerate all the analogies in the physical and social sciences, but perhaps I have conveyed the idea that the two branches are not so different but what they can borrow from one another. It would be a wonderful thing if groups of researchers could be supported in universities and research institutes just to study and search for the fundamental laws governing social dynamics. It is hoped that such groups would not be restricted to the responsibility of enhancing the profits of any particular corporation or the immediate needs of any territory. Although these ideas are not new, this letter might add impetus to movements already underway.

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8/18/78

Scientists' public image

In George Abell's review of *Scientists Confront Velikovsky* (August, page 56), he mentions the frustration of scientists because Velikovsky was ever taken seriously, and, I think, correctly assesses the scientific community's reaction as one of bewilderment: "Where have we failed?"

That question has troubled me for some time. After 22 years in industry as physicist, program manager and chairman of an industry standards-writing section, I set up my own consulting business and fell to a serious examination of issues and trends in areas where science, technology, government and the public interact. Recent projects have included electronic mail, wideband communication and the evolution of home terminals.

I have observed that the issue of scientific credibility is often raised. Whether it is mandating flame retardants for infant clothes and having them found carcinogenic, or increasing filtering of grain dust and then facing five granary explosions, the public is ready to associate an element of amateurishness with the technology community that is really not deserved. Nevertheless, lives were lost, and the public, with a marvelous *ad hoc, ipso facto* intuition and a jaundiced eye for academic arrogance, racks up another point for taking any scientific pronouncement with a grain of salt.

Abell has put his finger on a sore point. While of course doubt and suspicion are healthy challenges to scientific inquiry, the public's healthy doubt about scientific infallibility has rather badly overshot. Why?

It seems to me the root problem involves the professionalism with which scientists speak to the public. It has been said that J. Willard Gibbs never wrote or said anything that isn't still so. While that may be an impossible goal, it ought

always to be in the scientist's mind when he or she speaks to the public.

When a scientist speaks to the public, the words are clothed with all the aura of the speaker's scientific credentials. In time, the public comes to judge the scientific credentials themselves by the enduring values it sees in the words. When a J. Willard Gibbs says something about equilibrium or thermodynamics, he knows whereof he speaks, and the scientific aura glows with credibility as time elapses and the words prove still to be true.

The problem, I think, arises when scientists speak as though with *ex cathedra* authority on subjects not within their realm of special expertise. It arises if a famous scientist with high integrity and credibility in his/her field of achievement speaks out on a social problem, on criminal justice (capital punishment), inelastic military collisions (Vietnam), a pet recipe for peace, or fetus morality, and does not make clear that in this exercise of the citizen's right of free speech, he or she is speaking out as an amateur and citizen, and not as an authoritative scientist.

The sophisticated distinctions between the *ex cathedra* scientific statement, and the layman's social pronunciamento, escape and confuse the public. So when a Velikovsky speaks out in a scientific matter which he knows not of, the public must evaluate the scientific community's protestations of absurdity by a yardstick of value judgement drawn against everything that any scientist has said lately that hits the press. If much of the association with famous scientific names has to do with social matters outside the scientist's personal area of recognized competence, and if the public has reservations about the infallibility of these social pronouncements, then these doubts will probably carry over to the *ex cathedra* comments as well, even when they fall cleanly in the area of the individual's expertise.

The erosion of trust in scientists on matters of controversy has probably occurred because there have been so many cases of scientists who have not clearly distinguished between *ex cathedra* and amateur statements. Perhaps a famous scientist should use a nom-de-plume when speaking out on social issues not directly related to his/her field of competence. At least there should be qualifiers and modest disclaimers that amputate the aura of scientific authority when the scientist wishes to remove the halo and speak out at an unprofessional level.

I am not a social scientist. I disclaim special expertise in assessing why the public is suspicious of revealed truth from scientists. It is not a matter of facsimile communications, or wideband, or displays, or electronic mail, so I have no special expertise in what I am saying. As

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