

# Introduction: Questions of Quest

STAFFORD BEER

Some people think that cybernetics is another word for automation; some that it concerns experiments with rats; some that it is a branch of mathematics; others that it wants to build a computer capable of running the country. My hope is that after reading this book people will understand both how these wonderfully different notions can be simultaneously current, and also why none of them is much to the point.

Gigantic new forces are being unleashed in the world today: the forces of nuclear energy, of new nations emerging to confidence in their potential strength, of rabid ideologies. One cannot detect a comparable development in the technique of control: neither economically nor politically, neither socially nor industrially. Science has sought the "ultimate" source of energy in the physics of the sun itself, in the release of energy from its basic transformation, the hydrogen-helium fusion. Science now seeks the "ultimate" source of control, in the cybernetics of natural processes, in the evolution of the nervous system and brain itself. The importance of research into control increases yearly, as the magnitude of uncontrolled forces continues to rise.

Support and encouragement is needed for those who must work from those who need the results. The inertia of old habits of thought has to be overcome by both. As usual in the advance of new thinking, the real barrier to success is not the intractability of the problem; it is the intractability of men. This may be sad; it also gives confidence that the new thinking is worthwhile. For nothing worthwhile is ever done easily, and only powerful concepts evoke powerful opposition.

You have just read three paragraphs that ought strictly to have been printed in quotation marks. I wrote them exactly 20 years ago. They are passages drawn from the preface to another book, my first, entitled Cybernetics and Management (Beer, 1959). The three paragraphs are not printed in quotation marks, however, because they make a perfectly adequate start to this book, 20 years later. Then you might well ask what is going on. You might well contend that my words were alarmist then, and could be equally alarmist now. I do not think so. There was plenty of evidence at the time that cybernetics had been misunderstood, that the balance between the use of force and the regulation of force was disturbed and had become dangerous, and that people in power were resisting necessary change. Twenty years later, there is yet more evidence to this effect. Then I need not plead guilty to having pointed in the wrong direction 20 years ago. It would be better to drink a toast to the fact that the world yet survives--and to go on pointing. How much advance notice does anyone want?

In defining cybernetics in the first instance, the great Norbert Wiener used the famous phrase, "the science of communication and control in the animal and the machine." In so doing, he was trying to emphasize two discoveries. The first was that communication and control were virtually synonymous. Regulation is an informational process. The second discovery was that the classic dichotomy, inherited from the ancient Greeks, between the animate and the inanimate was delusory. There are invariant natural laws of regulation that apply, like gravity, to everything. Neither of these discoveries has been fully apprehended even now; and yet they were real enough from the start.

The contents of this new book, in all their diversity, illustrate the point well--though maybe not well enough.

Scholars are compelled to present their work within the respected confines of academic disciplines. Practitioners are forced onto the Procrustean bed of organizational terminology. The academics might ask themselves whether God has determined a difference between physics and chemistry and biology. The managers and ministers might ask themselves whether the human being has determined a difference between his own health and education and sustenance. If it turns out that neither God nor man has insisted on this choreography of knowledge and of suffering, then why is cybernetics thus constrained? Whatever the (altogether obvious) reasons, these artificial constraints continue to inhibit the progress of cybernetics in the amelioration of world problems.

Many of the founders of our subject are now dead. Insofar as a junior colleague had the privilege to call them friends, I feel a duty to project the message that I received from them. I had intuited it myself, and thus obtained my introduction. But the support I gained from their clear vision, at a time when I saw through a glass darkly, is a support they still offer to yet another generation. Their books remain, and their messages must not be lost. Let me speak briefly of three of them, in the context of the introduction to this book--and the message that I in my turn essay to transmit. If I needed any excuse for the next three paragraphs, it lies in the fact that at a recent doctoral seminar that I gave on cybernetics, not a single student had read any of the works to which I refer.

Norbert Wiener was a world-ranking mathematician, best known perhaps for his work in Fourier series and harmonic analysis. His cybernetic views hit the world quite effectively in The Human Use of Human Beings (Wiener, 1955). Well done; and so much for the idea that cybernetics (or cyberneticists, as he called them--it was our only disagreement) are really technocrats at heart. But he wrote the original book (1948) called Cybernetics (Wiener, 1948). It is an amazing book, not least because it bears the marks of the tax-induced pressure under which he rapidly wrote it! If anyone can really cope with this book, he is truly enriched. Secondly, there is his tiny volume of mathematical lectures with the off-putting title Non-Linear Problems in Random Theory (Wiener, 1958). I have never met a soul who has read this book, but it is

full of perception. Both books demonstrate contempt for the distinctions, drawn by neither God nor man, that I castigated just now. My own overriding recollection of Wiener the man, of whom many very funny stories are told, is not all that funny. I was trying to get into his office at MIT, without an appointment, to meet him for the first time, through a Cerberus-type secretary who was looking after her master. Without much hope, I got her to submit my name, and to my amazement was let in. He almost vaulted his desk, and embraced me. "Ah," he said, "you finally came." It was the beginning of a friendship. He not only wrote, but understood, the human use of human beings.

Warren McCulloch was instrumental in convening the conference called Teleological Mechanisms (published 1948), under the auspices of the New York Academy of Sciences, as early as 1946. He often called himself a blacksmith--and correctly, since he enjoyed working with iron. But he was also a physician, and he held a chair in psychiatry in Illinois for a quarter of a century. Who but he, having taken early retirement from that career, could have appeared the following Monday as Professor in the Electrical Engineering Laboratories at MIT? His own book, which collects together his seminal papers in cybernetics over many years, is called Embodiments of Mind (McCulloch, 1965). It remains a gold-mine of ideas, the one of which has hardly been assailed do this day. And that book includes a section called "The Natural Fit." This first appeared as a booklet, issued by the Chicago Literary Club in 1959. It was McCulloch's response to an invitation by that society to give an address, at the height of his scientific fame, which members perhaps expected would explain the nature of cybernetics to them in words of one syllable. Instead, McCulloch read them his poems. The copy of the original booklet that he gave to me is inscribed in his handwriting thus:

Since of that loveliness I know is you  
which in quick having holds me quite  
content  
love could not gather what could not  
have grown  
or what from my poor gardening never  
grew  
I to the frenzied and immortal few  
turn hungry home.

Ross Ashby, above everything else, discovered the law of requisite variety. It has been denounced as trivial; worse, it has been widely ignored. I wish to

attest that this law, that only variety can absorb variety, is profound. I consider that it stands to cybernetics as the law of gravity stands to physics.

Ashby's books, Design for a Brain (Ashby, 1954) and Introduction to Cybernetics (Ashby, 1956), are meticulous accounts of his early teaching. But in addition there are at least 40 major papers published subsequently. These are available in microfiche, together with hundreds of other vital papers by other pioneers, at a very low price from the Electrical Engineering Laboratory of the University of Illinois, Urbana. Strangely, Ashby too was a psychiatrist by origin, and sometime head of the Burden Neurological Institute in England. I was with him in Urbana in 1960 when he decided to make the move to join Heinz von Foerster's laboratory, and I showed my amazement at his instant acceptance of the offer made to him at a party in von Foerster's house. He had simply said, "I accept. May I phone my wife in England?" As we walked alone across the campus under a full moon to our quarters, in the small hours of the morning, I asked why he had not asked for a few days to consider. He was amused at first, remarking that a few years would not be long enough to analyze the problem. There was no way of attaining the requisite variety. "But," I exclaimed, "this is irrational!" He stopped dead, and looked at me severely. "In the absence of requisite variety," said the man who discovered the law, "the most rational course is to obey hunch. In the absence of hunch," went on that great authority on the brain, "the most rational course would be to toss a coin." From that moment, I also truly understood Ashby's law.

These three vignettes are offered here for several reasons. I want to draw renewed attention to the publications quoted. I want to convey some feeling for what these men were like. They were all three polymaths. They scorned the protection of the specialisms within the strong walls of which each was vulnerable. Their minds ranged without limit and without fear in the search for invariance in regulatory systems. Above all, they were zealous and loving human beings--and each could handle, in his different way, the monumental Ego laid upon him by international respect. They were, despite all appearances, humble men.

Now: if cybernetics is the trans-disciplinary science that I take it to be, then humility in its approach to effective organization in nature, which I take to be its subject, is prerequisite. If someone

is a world authority on a particular kind of seaweed, he can afford to be proud of the fact: he knows what counts as a success, and can measure that success by the number of his honorary doctorates. But people who set out to break down the barriers between academic disciplines, and moreover set out to change the real world of entrenched beliefs and vested interests, cannot afford that kind of self-indulgence. They have to be guided by their own strength of purpose, by honesty, by love. As to the criteria of success, these are undoubtedly subjective. That may sound daunting indeed to a young scientist, who reasonably expects some sort of objective recognition. But, on reflection, he or she may recollect that "the system" with which the cybernetician operates is itself a subjective phenomenon--a mental construct artificially delineated from the unity of the universe--and enjoy a hearty laugh instead.

It is the opponents of cybernetic advance, those who wish to see current modes of organization enhanced despite all their manifest failure, who demand of us a kind of success that is, in the systemic nature of things, not available. If one of these were to say to any of the authors in this book, "very well, then show me where I can see all of this in action," I hope that the author would not be flustered, nor resort to excuses of the kind, "well, this is only a beginning." That is just what the opponent is waiting to hear. Such a reply enables him, within the value system from which he comes, to declare that the work is "pas sérieux," or ahead of its time, or "interesting," or "inconclusive."

Cybernetics, the science of effective organization, is in the business of changing the organizational paradigm of a managerial society that does not work.

It follows, first, that the Joshua model of success does not apply. When Joshua assailed the city of Jericho, he used a complicated algorithm. It involved a special procession around the city once a day for six days, seven such circumnavigations on the seventh day, the blowing of seven rams' horns by seven priests, and a great shout by the people. The walls of Jericho then fell flat. Perhaps this worked because Jericho was a closed system. It was totally shut up, and "none went out, and none came in" (Joshua, 6,1). We are not dealing with closed systems, nor do we have the algorithm. Then we cannot submit to the Joshua criterion of success. Be satisfied instead with a betterment. It may be an improvement in results,

however these are measured. It may be an amelioration of a situation that yet remains a mess. At any rate, those who ask for a complete exemplification of "the cybernetic solution" betray their own ignorance of the cybernetic world of integrated systems--as well as their political naivety.

Secondly, I hope that the cybernetician of whom this impossible demonstration is demanded, knowing that the criteria of success are subjective, will remain calm in the face of both praise and blame. His success comes from the knowledge that the paradigm has shifted, and that therefore he has initiated a process--after which nothing will ever be quite the same again. To make this evaluation, for or against oneself, in all "amour propre" and in all humility, is an immense strain. At least, after my first 30 years of putting cybernetics into practice, I have found it so. I have experienced failures, where the managerial paradigm was not at all shifted, that were hailed as successes because large profits were made. I have experienced successes, because I shifted the paradigm, marked by threats of death and by "odium academicum." "By their fruits you shall not know them," it seems; and that is because the judgement of ourselves cannot be made within the terms of the paradigm that we set out to overthrow.

Then what kind of a revolution is this, that seeks to change the organizational paradigm of a managerial society that does not work? Of course, it has everything to do with my first three paragraphs that were written 20 years ago.

In the first place, applications of cybernetics must be founded on the principles of that science of effective organization. The word "must" is a categorical imperative, not a moral admonition--for if they were not so founded, such applications would not be "cybernetic" at all. Then surely we ought all to make more effort to point to the invariant laws of regulation in nature that validate our work in the field. For it remains true that people in general still have (first introductory paragraph) "wonderfully different notions" as to the meaning of our science.

Second, we shall have to devote intense effort to the issue of human freedom. Ever since Plato's Republic and Aristotle's Politics it has been evident that there is a direct trade-off between individual freedom and societal stability. Two thousand years' thinking, innumerable wars, and the loss of millions of lives attest to the absence of a

satisfactory solution. Today, matters are worse than they ever were. Some kind of oppression afflicts everyone alive; and for the vast majority, the degree of oppression is obscenely great. How can a science, however zealously applied, do anything about it--as the number of absolute dictatorships grows, as governmental corruption increases in every country, as torture becomes our major growth industry on the planet?

The answer can lie only in attacking the existing paradigm of regulation and control. The intractability of men (third of the introductory paragraphs) relates to their perception of the problem. Telemachus told Socrates that "might is right." Socrates very properly refuted him. But they killed Socrates; and today guns point at the heads of the people, and electrodes at their genitals. The expectation is that strategies computed within this paradigm will lead to the extinction of humanity sooner rather than later. Then changing the paradigm is our highest priority, and not the computation of better or worse strategies within the existing one.

The task is enormous, and quite possibly hopeless to achieve. But if anyone is willing to try, the cybernetician has a better chance than the politician. Politics is locked into a theoretical framework whose only measure is power. The theoretical framework of cybernetics is discussed in terms of stability. And it was to the balance of energy and its regulation that I addressed myself in that book of 20 years ago (in the second introductory paragraph). Since then, my own applied work has revolved around the notion that crude power could be transformed into forces that conduced to equilibrium. I have amassed experience, in firms, in social services, in all kinds of institution, and in various departments of 15 different governments, that tells me--using the subjective criteria of success--that this can be done. It takes everything that cybernetics can put into the notion: Wiener's mathematics, McCulloch's redundancy of potential command, Ashby's requisite variety, the discoveries of many other cyberneticians --including my own laws of the viable system (Beer, 1972, 1979). It takes also a shift of paradigm, which can be achieved--given goodwill.

But there's the rub. There is much goodwill in the ordinary human being. I have tapped it, in the street and in the palaces of greatness, and I know that much. But the organizational paradigm that we have inherited is not geared to

the elevation of people of goodwill. It is geared to the elevation of near-psychotics, and especially paranoiacs. The process of promotion in our society satisfies those who feel most threatened, and therefore have most need to advance in a hierarchy that is itself a product of the paradigm. And they, of course, even if they have retained goodwill, are the very last people to observe that the paradigmatic structure of society that sustains their personal needs ought to be changed.

This has appeared to me to be the key problem for a long time; and, insofar as I was able to create shifts of paradigm, and noted others doing the same, I felt hopeful. But now I feel a very particular unease. The people who first began to realize that strategies should be computed in terms of stability, rather than naked power, were the power-men themselves.

The first time I noticed this was when Mr. Kruschew banged on the table at the United Nations with his shoe. To do so within that protocol was a destabilizing action; so much so in fact that it could well have been calculated, with cybernetic advice, to induce catatonia--as indeed it seemed to do in diplomatic terms. Next, let us consider the realities of terrorism: kidnapping, hijacking, and murder--especially when the targets are randomly selected. No civilized person will condone these stratagems. However, the terms in which they are customarily condemned reveal a total failure to understand the cybernetics involved. No sooner has some innocent and unconcerned person been hurt, than politicians, the church, and the media refer to the atrocity as "this senseless act." The word senseless seems to be obligatory, while the words "obscene" or "outrageous" would serve well. The one thing that these obscene and outrageous acts are not is senseless. They are very well contrived to be destabilizing. There will be no evidence that any one of us understands terrorism until the accusation that terrorist acts are senseless is abandoned.

Third, we may reflect that destabilization as a technique of policy in the United States, under Dr. Kissinger's advice, had all too great a success in the real world of nationalist aspiration. It was especially successful in Allende's Chile, described by the then director of the CIA, in congressional evidence in 1975 ("United States and Chile During the Allende Years, 1970-1973"), as "a prototype or laboratory experiment to test the techniques." Perhaps the Chilean people

who died as Mr. William Colby's laboratory guinea-pigs appreciated the honor, and perhaps not. Reports of these deaths have often been exaggerated, and it should be recorded therefore that the military junta later assured the United Nations that the number killed was "only 30,000." Allende, like Socrates, did not agree that "might is right"; and he is dead too.

Then for all manner of reasons we should be questioning what is our real quest.

From the standpoint of the cybernetician, I think that we search for the invariant laws of effective organization in nature. These are not easily recognized in the divergent disciplines of academia, or in the divergent applications of professional camps. We must strive in our work, and even in reading this book, to identify that invariance. I reintroduced the work of three pioneers to you, because I know the risks they ran in expanding their knowledge to encompass so large a perception, and in expanding their natural affection to encompass so much love. Let us be worthy of that large a vision and that great a spirit.

From the standpoint of the agent of change in society, I think that we need every ounce of cybernetic insight as just defined that we can muster. But we also have to understand that the change that counts is change in the paradigm--not change within the paradigm that is known to fail. That is just not enough. In Platform for Change (Beer, 1975), I have tried to explain this contention in full. From the standpoint of a man, aware as I am of the cybernetic quest and of the quest for societal stability, I think that the quest of Humankind for its innermost goals of peace and personal enlightenment demands a change in our own paradigm of success. The consumerist criteria of material advance have failed the individual who still lives in a frenzy, feeding on tranquility drugs, and encouraging his Third World brethren to follow his path to personal unhappiness and ecological destruction. The Joshua model of success is not our model --yet.

Do I say--"yet"? Maybe we could find the algorithm, and define the closed system to which it would apply. Then all that would be missing from the Joshua model is "the great shout of the people." In the Chile of 1970-73, we had a very loud shout indeed. It said, on walls, in pamphlets, and in songs: "Allende, Allende, the people defend you." But even that shout could not in the end be

heard above the rattle of guns. In the event there was no defense against "might is right." This surely tells us that the spread of our knowledge--of cybernetics itself and of our experience as agents of cybernetic change--is essential to the contribution that we think we can make. How to do that is itself a cybernetic problem in the science of effective organization. It is made doubly difficult because cyberneticians, as men and women, must continue in the spirit of their founding fathers as people of knowledge, humility and love, eschewing power. And yet we may be of good heart; it was only such people who ever changed a paradigm on this earth. The others simply changed the rules.

I welcome this book under all the headings that I have discussed, but especially the last. May it contribute to the spread of cybernetic insights,

when the reader stands back to consider its message as a whole. Let us all lend our cybernetic knowledge and skills towards the articulation of the great shout of the people against the forces of power that are immanently destructive.

Because of the dangers of instability that we are qualified to recognize, we can speak up to say that the shout must come soon. I do not think that it is up to us as cyberneticians, even though we know some of the laws of nature that are necessarily invoked, to predict what the shout will express. We may, however, influence its eventual message in our capacity as men and women and can hardly evade the responsibility to decide, each for himself and herself, what a more stable society should be like.

It is the last of the questions of our quest.