PART ONE

Science and Society

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Science and Human Experience: (Mephistopheles Is Alive and Well and Living in the Space Age)

One does not often find written today "The great object of science is to ameliorate the condition of man, by adding to the advantages which he naturally possesses." Has science failed us? If so, how?

This essay is based on a talk given for the Third Tykociner Memorial Lecture at the University of Illinois, Urbana, in 1976. The lecture series, named in honor of Joseph Tykociner, focuses on the relationship between science and art.

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Professor Tykociner was concerned with what is common to the arts and the sciences as well as the interplay between these very different areas, a subject that has always intrigued me. Whether what is common is more important than what is obviously different will probably be argued about for ever. However, the sharp distinction between the sciences and the arts that has been recently much talked about may not be that well posed. We might as well ask, considering the vastly different techniques employed, whether what the musician, painter, and playwright have in common is more important than where they differ.

I believe that there does exist a deep commonality of purpose among the arts and the sciences. But you will have to decide for

yourselves whether this is significant enough – considering their many differences – to be worth emphasizing.

I have always viewed science as rather closely related to other things we do, an elaboration – perhaps an outgrowth – of what all of us do normally in the course of our lives, rather than being separated from other activities by a special method or rationale known to and practiced only by certain chosen high priests. If I were to convey the attack and charm of science in a few words, I would remind you of the great detective: Sherlock Holmes.

Recall his attention to the facts: "What do you think, Holmes?" asks Watson. "The data are not yet sufficient," Holmes answers. For he must separate what actually is from all that might be. But then the most magical stroke. What seem disparate and disconnected events, through the power of his intellect become an ordered and rational whole. How delighted we are. It is the fulfillment of a primeval urge – that the world succumb to the mind.

Suddenly painter, storyteller, magician, detective, and scientist are one. Man has imposed his will on the chaos and disorder of experience.

But this ancient dream has become for some a nightmare. The early summer joy of discovery has given way to a winter of discontent. In spite of the evident and vast benefits showered upon us, we hear increasing complaints about the evils of science and technology. The two words have become so coupled it seems possible that some future dictionary, following modern tradition, might accept them as interchangeable.

Each age has its myths; for ours, the myth of workers alienated from the owners of productive machinery has been replaced by that of individuals alienated from reason and society, and from the structures that have made possible their successful entry into the world and their later survival. Yet, although such views have received immense publicity, I don't believe they are really shared by most people, who are simply too sensible to be swept

along with seasonal intellectual fashion. Still one would not likely find it written today that,

> The great object of science is to ameliorate the condition of man, by adding to the advantages which he naturally possesses.[1]

And there is no doubt that recently we have seen a particularly violent turn, not only against science but also more generally against what we might call rational argument and analysis. The problem is surely no longer one of social caste:

> Well, if you're like me, you loathe all science and mathematics …

says Scott Fitzgerald's Monsignor Darcy and young Amory Blaine, Princeton bound, nods in vehement agreement:

> Hate 'em all. Like English and history.[2]

Neither is it likely to be the hard work required to learn the complex language of science, nor the patience required to undergo the long period of initiation before one can begin to do things that are interesting and related to our ordinary concerns. In spite of a certain current preference for instant gratification, students still study foreign languages, music, and a variety of subjects equal in difficulty to the sciences.

This is a period of heightened awareness of the effects on nature of increasing population and industrialization. We have lived through a generation of unnecessary war, a decade in which sophistry and plain lies in high places have undermined our faith in what is said. Science, become institutionalized and bureaucratic, shares the faults of other institutions and has become equally vulnerable to criticism. The public and private behavior of scientists reveals them as ordinary human beings, which apparently

1 Webster, J. (1808). *Elements of Natural Philosophy*, Philadelphia: B. and T. Kite, Fry and Kammerer, p. v.
2 Fitzgerald, F. S. (1920). *This Side of Paradise*, New York: Penguin Books, p. 30.

surprises – even shocks – especially those who feel left out of the priesthood and view it with both fear and envy. Perhaps it should not startle us that this has led to suspicion that often goes as far as rejection of rational argument, especially among those who are young, pure, and most affected by the errors of their elders.

Yet accepting all of this, there is a certain irony (and I am sure I am not alone feeling this way) that people will complain about the evils of electricity in the uniform warmth of their homes while keeping all the lights on, the evils of medicine fully expecting that their children will survive early childhood and while taking penicillin to cure a strep throat. They will complain about the dangers of research in physics while listening to their transistor radios and enjoying in the privacy of their homes at a flick of the finger whatever music they desire. And I am sure that in the future when we no longer die of various dread diseases that terrify us today, and automobiles glide safely, odorlessly, and silently on cushions of air, we will continue to hear similar complaints.

That present middle-class comforts were not always available is obvious; that they were desired is perhaps not so well known. We won't mention the lack of plumbing in Versailles, nor the famous winter evening when the wine on the royal table froze. In 1887 Edward Bellamy wrote ("looking backward" from the Utopia he was visiting):

> … if we could have devised an arrangement for providing everybody with music in their homes, perfect in quality, unlimited in quantity, suited to every mood, and beginning and ceasing at will, we should have considered the limit of human felicity already attained, and ceased to strive for further improvements.[3]

Now we have indoor plumbing and central heating; we even have music in our homes but we are still not happy. Certainly not happier on the average than in times past. And if we are not happy

3 Bellamy, Edward (1888). *Looking Backward: 2000–1887*, New York: Random House, p. 90.

who or what is to blame? Didn't the World's Fair exhibit promise us a new world of the future, a world full of gadgets that did all the work at the flick of a finger? And weren't the human figures who populated that world always smiling?

You will not be misled, I am sure, into believing that I am trying to convince you that we live in a world where all is good and where "science and technology" lead us ever onward and upward. However, because the simplistic notion of continual progress is not an adequate description of history seems to me insufficient reason to replace it by an equally simplistic notion of continual decline. History has its ups and downs. All of us can look with nostalgia to some feature of the early or distant past that we wish could be retained. It is true of course that things look better in the past – if we can become sentimental about the Depression era, or consider the fifties exciting there must be something about memory that improves the quality of events.

Recently, Victor Weisskopf, a humane and learned man and certainly among the eminent scientists of our time, in a talk titled "The frontiers and limits of science" stated optimistically that "at least potentially, science can justifiably claim the ability to understand every observable phenomenon." This statement was of course qualified: "…there are many phenomena…that we do not yet understand. But…it is reasonable to predict that man will eventually understand all of nature scientifically."[4]

I was struck, however, with Professor Weisskopf's concern about the limits of science:

> A Beethoven sonata is a natural phenomenon which can be analyzed physically by studying the vibrations in the air, as well as chemically, physiologically and psychologically by studying the processes at work in the brain of the listener. However, even if these processes are completely understood in scientific terms, this kind of analysis does not touch what

4 Weisskopf, V. F. (1975). The Frontiers and Limits of Science, *Bulletin of the American Academy of Arts and Sciences*, **28**(6), 15–26.

we consider relevant and essential in a Beethoven sonata – the immediate and direct expression of the music. In the same way, one can understand a sunset or the stars in the night sky in a scientific way, but there is something about experiencing these phenomena that lies outside science.

Now I know no one who would claim that a Beethoven sonata or for that matter a Judy Collins song could somehow be replaced by science. Yet while I am not in disagreement when Professor Weisskopf says: "there is something about experiencing these phenomena that lies outside of science," I find striking the implication that what has failed us is science.

If there is a sense in Victor Weisskopf that science is "limited" and somehow has failed us, how much more violent and explicit this is in Theodore Roszak. Writing in *Daedalus*,[5] Roszak, whom one would not call an admirer or a lover of science, invokes Mary Shelley, the child author of *Frankenstein, or The Modern Prometheus*: "A girl of only nineteen … she joined the ranks of history's great mythmakers. What else but a myth could tell the truth so shrewdly, capture definitively the full moral tension of this strange intellectual passion we call science?"

"Asked to nominate a worthy successor to Victor Frankenstein's macabre brainchild what should we choose from our contemporary inventory of terrors?" Roszak ask rhetorically. No lack of candidates: "The bomb? … the behavioral brain washer? The despot computer? Modern science provides us with a surfeit of monsters, does it not?"

Not all scientists, Roszak admits, are mad doctors. He realizes that there are those who champion "a science for the people" and he writes "in full recognition of how the wrong-headed power elites of the world corrupt the promise of science." But all of this is preliminary because, he continues:

5 Roszak, T. (1974). The Monster and the Titan: Science, Knowledge, and Gnosis, *Daedalus*, Summer 1974, 17–32.

I have another monster in mind that troubles me as much as all the others – one who is nobody's child but the scientist's own and whose taming is no political task. I mean an invisible demon who works by subtle poison, not upon the flesh and bone, but upon the spirit. I refer to the monster of meaninglessness. The psychic malaise. The existential void where modern man searches in vain for his soul. 'Further' . . . it is science which has made our universe an unbounded theater of the absurd. . . .

And so on.

To most this will seem a trifle exaggerated. After all Frankenstein monsters have been created by bureaucrats as well as scientists, and the existential void may reflect personal as much as cosmic deficiencies. However, if so eminent a scientist as Weisskopf and so harsh a critic as Roszak intersect anywhere in their doubt, perhaps it is worth considering what might be troubling them.

I would like to discuss, then, why it is that science, which on its own terms has really been successful beyond the dreams of its founders, has come to be feared, distrusted, and so savagely attacked. What is the source of that unease expressed by scientists themselves? Has science really failed us? If so, how?

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We are not the first to have experienced this disenchantment. Let me remind you of Dr. Faust, eminent scholar and renowned professor. In Goethe's masterpiece we meet Faust first in his chamber, learned and old:

. . . Look at me.
Years wasted grinding through philosophy,
Slaving over medicine and law,
Learning everything – dear God even theology.
Now here I am with all this lore
Poor fool no wiser than before.[6]

6 All quotations from Goethe's *Faust* are taken from or based on the prose translation of Barker Fairley, University of Toronto Press, 1970. An occasional jingle may be mine.

He is one of us: tenured professor, rich in graduate students whom he leads "by the nose this way and that, upstairs and downstairs." He knows everything, but what does it amount to? Something is missing; he turns to magic, conjures up the devil: not Lucifer himself but Mephistopheles – sort of a deputy. Some portions of his story such as his compact with the devil and his seduction of Marguerite are well known. Less so his later adventures. In the end (and the end is a very long way off) in spite of the compact he is saved.

As is often the case, legend has its roots in fact.[7] The actual person we now know as Faust was born around 1480 in the small village of Knittlingen in the southwestern corner of Germany. His given name was George; he was rechristened John, and Goethe, for reasons we don't know, calls him Henry (Heinrich). His last name was Faustus, possibly nothing more than the fairly common name "Faust" with a Latin ending. His title Doctor.

During his life he wandered through many towns across German-speaking territory pursuing his career as a magician. He had already attracted considerable attention as a practitioner of magic when he was about 26 years old. An authority as reputable as Luther's associate, Philipp Melanchthon, tells us that Faust studied magic in Poland at Cracow University. (Magic, we discover, was a university subject at that time – the old, new curriculum.)

He was a braggart: boasting for example that he knew more alchemy that all other alchemists put together; claiming, in the years 1525 to 1527 when imperial troops were fighting in Italy, that he had produced their victories by remote control. And a performer. When he lectured on Homer at the University of Erfurt in 1513 he is said to have enlivened his classes by producing the

7 These "facts" are based on an account given in Charles E. Passage's introduction to his translation of *Faust*, Indianapolis: Bobbs-Merrill Co., 1965. I would like to express my appreciation to my colleague, Professor Karl Weimar, for directing me to these two translations of Faust.