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One-Armed Scientists?

A few months ago, Senator Muskie called for "one-armed" scientists. The occasion was a Senate hearing on the health effects of pollutants. Testimony from the National Academy of Sciences and other sources was not as definitive as the Senator desired. Witnesses insisted upon saying, "On one hand, the evidence is so, but on the other hand. . . ." Thus, the call for one-armed scientists.

This incident illustrates a fundamental dilemma of the scientist or engineer in communicating with his patron, the lay person. Laymen conceive of scientific fact as an absolute—shades of gray and uncertainty are not acceptable. Scientific investigations are to produce unequivocal answers, according to the popular notion. On the other hand, scientists know that there are very few absolutes that will stand up for long. Those few that do are enshrined as "laws of nature."

Should we phrase our communications to hide our doubts and the gaps in our knowledge? Should we be assertive in the interest of bringing science to greater influence on affairs? Should we take account of the human trait that impressions, however incorrect, are seldom changed by fact but only by other impressions? That would be a risky and unwise strategy in my view.

The modest influence of science in affairs today rests largely on its reputation for objectivity. To the degree that we abandon that virtue, we lose influence and are considered merely another self-serving, politically biased, ax-grinding constituency. We hear already the sinister thoughts from politicians that a reputable scientist can be found to support any side of any controversy, that scientists have used their disciplines to reinforce their political convictions, and that scientists are interested primarily in feathering their own nests.

However, there is some question as to how serious the politicians and the educated public really are about unequivocal views from scientists and engineers. Most of them know at least secondhand that absolute knowledge is rare. I suspect that much of their one-armed desire is animated by their reluctance to decide between evils or between virtues. A significant "scientific" tilt relieves them of responsibility for unpopular and difficult decisions. There are obvious reasons why we as scientists should not abet this tendency by lending our credibility to any side without stating all the caveats that go with a responsible scientific report to our own community.

It is indeed difficult to qualify properly theoretical results and their speculative implications, tentative conclusions from limited data, and social impacts without creating more uncertainty than previously existed and thereby weakening the basis for action. Yet that is the responsible path. We should be encouraging greater respect for the mystique of the scientific process and its role in uncovering reality. We should be emphasizing the complexity of important matters, their unknowability, and yet their promise for the future.

In the 1950's and early 1960's, we went through an age of simplification. That was a time of confidence and, as it turned out, overconfidence. Hopefully we are emerging into a new age of realism with the recognition of complexity. In this connection I was privileged to hear the farewell speech of Daniel Moynihan to the President's Cabinet in 1970. He said, "A century ago the Swiss historian Jacob Burckhardt foresaw that ours would be the age of 'the great simplifiers,' and that the essence of tyranny was the denial of complexity. He was right. This is the single great temptation of the time. It is the great corruptor, and must be resisted with purpose and with energy."

"What we need are great complexifiers, men who will not only seek to understand what it is they are about, but who will also dare to share that understanding with those for whom they act."—EDWARD E. DAVID, JR., *Gould, Inc.*, 8550 West Bryn Mawr Avenue, Chicago, Illinois 60631