

## ON MAKING A SCIENTIFIC REVOLUTION

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In class I presented the view that the book we are assembling should be thought of at least in part as a handbook for making a scientific revolution, where the field to be revolutionized would be the social (behavioral) sciences. This view assumes that cybernetics has much to contribute to social science and that this promise has not yet been realized. Because of this disparity, I first interpreted the phrase “cybernetics of cybernetics” as the application of cybernetics principles to achieve acceptance of cybernetics theory by the relevant disciplines. That is, use cybernetics as the theory to guide the revolution.

However, most people in class seem to have defined the “cybernetics of cybernetics” on the individual (related discipline psychology) level rather than the social system (related discipline political science) level. Thus first order cybernetics is taken to refer to the purpose of the model; second order cybernetics refers to the purpose of the modeler. The scientific revolution point of view defines first order cybernetics as the development of basic theoretical principles; second order cybernetics as the use of those principles to win acceptance and consequently widespread application of them.

Although the cyberneticians have succeeded remarkably in developing a theory, they have yet to win its widespread acceptance. Not to assign responsibility for winning acceptance of the theory to cyberneticians would leave one without a plan of action for achieving acceptance.

The statement “cybernetics has had little impact on social science,” states an observable fact. However, the statement, “social scientists have absorbed very little of cybernetics,” is predictable from what we know about selective perception, and thus should not be surprising. Consider again Thomas Kuhn’s thesis that scientific progress does not occur as a smooth, autonomous process with superior ideas replacing inferior ones, but rather as the result of intense struggle very similar to a political revolution. Scientists who depart from the prevailing paradigm and who do not also study the rules and tactics of the scientific rough and tumble may not be purged or turned out of public office, but they may find it difficult to find research funds or receive academic promotions.

Using this perspective of scientific change as a process similar to politics, one could hardly expect an establishment (behavioralists) to welcome a set of ideas (cybernetics) which would result in their removal from positions of prominence. Thus when a radically new set of ideas come along, it is in the interests of the scientific establishment (those with the greatest access to the leading journals and sources of funds, and who control academic promotions) to say that the new ideas are merely extensions of the ideas which they developed and consequently the most fundamental works are their works, not the new works. It is of course in the interests of the

new group to accentuate the differences. To claim that the new point of view is fundamentally different is to require that graduate students read one's own works rather than the older establishment's works, thus increasing one's own standing at the expense of the existing scientific elite.

The basic point is that in science, as in politics, one should not rely on the opposition to implement one's program. Going one step further, to teach students a new scientific paradigm (as in a book called the Cybernetics of Cybernetics) without also teaching them how to cope with the problems of academic politics (promotion and tenure for example), which adherence to the new point of view will inevitably involve them, would be like throwing a lamb to a pack of wolves. The shortage of well established academic enclaves for cybernetics suggests to me that this may have happened in the past and should not be permitted to happen in the future.

Making a revolution, scientific or otherwise, involves two basic strategies- - formulating the arguments to persuade and hold a growing group of followers and moving knowledgeable, sympathetic people into positions of power. Some details of these two strategies are outlined below:

- A. Develop a body of explanations, experiments, and successfully solved puzzles and then "publicize" these until they become well known.
  1. Whenever possible point out contradictions in the dominant paradigm and show how the new paradigm resolves the apparent contradictions.
  2. Ask questions (in letters to journals, at conferences) which the current paradigm cannot answer, but which the new paradigm deals with easily.
  3. Call attention to findings or common experiences which do not fit the current paradigm, but which do fit the new one.
  4. When explaining principles of the new paradigm, use examples familiar to the group one is addressing.
  5. Do not make the error of using the new paradigm to resolve current problems of the old paradigm; at least do not make this the core of one's argument. This strategy defines the new paradigm as merely a slight modification or improvement of the current paradigm. Make the core of the argument a challenge to the most fundamental assumptions of the current paradigm. A resolution of current issues of interest can then be used as a means to line up support among people interested in those issues and currently working on them.
  
- B. Whenever possible practitioners of the new approach should be moved into positions of power and responsibility.
  1. Funding agencies.
  2. Leading publications. Setting up a new journal is less preferable to taking over an established journal. It is the difference between setting up one's own lines of

- communication and taking over the opposition's lines of communication for one's own purposes.
3. Top ranked universities. Get the best graduate students possible, train them as thoroughly as possible and then get them appointments in the leading universities.
  4. Make sure the next generation is a close-knit group and stays in contact with each other. Develop a sense of a common professional destiny among those who know the new paradigm.
  5. When a new theoretical approach is very young, publish in one or a very few journals with a large number of subscribers. As word of the new theory spreads, people will try to find the original papers. If they are hard to find, the revolution may be swallowed up in the flood of scientific papers. If this situation does develop, edited complications of the scattered, early journal articles are essential.
  6. Establish new departments. One way to get control of existing university funds is to win department chairmanships for the developers of the new paradigm. An alternative (not mutually exclusive approach) is to set up a new department.

If the decision is made to include a section on winning academic acceptance for cybernetics it should present, as thoroughly as possible the basic arguments favoring cybernetics as opposed to behavioral science. It should also include a history of cybernetics (research groups, periodicals, major conferences, funding agencies, new departments, number of PhD's, etc.) up to the present time.

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