

Class meeting 5

Problématique du changement I:

What Is a "Scientific Revolution?" Paradigms Lost and Regained

The strengthening and weakening of prevailing Beliefs, Values and Practices in Science, Self and Society; Scientific Management; Automation, the degradation of work; a way forward?

PREPARATION:

READ: 5-1 Kuhn, T.S., (1962) *The Structure of Scientific Revolutions*, University of Chicago Press, Chicago. (excerpts)

Is the term "paradigm" clearly comprehensible to you?

The way we are using "paradigm" here builds upon its use by our former MIT colleague, the late Thomas S. Kuhn, who first used an Ancient Greek word meaning both pattern and exemplar to denote the fact that all scientific communities are organized around a shared set of core beliefs, values, and practices. As a matter of historical fact, the paradigms prevailing within scientific communities tend to undergo crises at particular points in their organization and development.

Kuhn saw the scientific enterprise, as most of us still can, as a quintessentially human inquiry process transgenerationally evolving through successive cycles of "normality" and "crisis." In a typical case (of which he explored several) experiments/observations/interpretations predicated on the particular set of core beliefs, begin to generate findings that simply do not fit within the prevailing conceptual and material framework (paradigm).

Insofar as the perception grows within the community in question that the prevailing paradigm is incapable of accounting for or explaining away the disparity, disagreements widen and a controversy grows that eventually leads to a "crisis". The need to resolve the disparities and to "normalize" the anomalies come to be taken increasingly seriously and more and more participants begin casting about for a conceptually and materially more satisfactory alternative to the prevailing framework.

The prototypical case of a "paradigm shift" – and the main one discussed by Kuhn – is the one provoked by the advent of Copernican astronomy.

What, precisely, was it that made heliocentric cosmology so profoundly "controversial"? How do you account for the fact that the ecclesiastical authorities of Galileo's time felt moved to bring the power of the church to bear upon the old man who had brought new meaning into astronomy? What, most particularly, did the church find so threatening about Galileo's Copernican convictions that he was brought to his knees and forced to publicly recant them? Is this touchy interplay of "meaning" and "power" applicable to any other specific instances that you know of?

A paradigm shift is not uncommonly a bitterly contested process. For our present purposes, however, an important point to consider is whether and in what respects scientific paradigms (which are themselves human social products) exhibit cognitive, affective and expressive modes of organization and development having their counterparts in the organization and development of other human systems at neurobiological, psychological and sociocultural levels.

By now it should no longer surprise you to learn that the answer to be arrived at generally is affirmative.

Do we know of any cases of significant conceptual and material change occurring in some other complex human system at biological, psychological and/or sociocultural levels of organization?

Decades ago, interviews with and writings by 29 astronauts and cosmonauts showed how the experience of circling the Earth every 90 minutes and viewing it from the moon profoundly affected the space travelers' perceptions of themselves, their world, and the future.

He also shows how the rest of us, who have been able to participate vicariously and imaginatively in these great adventures, have also been affected psychologically by what has been called "the overview effect". For us in the present context, the important point is that by conceptually distancing ourselves from – and especially by rising above – our accustomed surroundings, it becomes possible to bring a new perspective to bear on what Albert Einstein once called "the problems of our social life".

READ: 5-2 C.P. Snow (1956) *The Two Cultures*

Almost two decades before Pirsig's book appeared (1974) there lived a British scientist and academic administrator named C. P. Snow who famously introduced an obvious precursor and counterpart to Pirsig's "classical" and "romantic" perspectives.

His notion was that the paradigm prevailing in our own society, including our education systems and elsewhere in intellectual life, is seriously flawed. This is further demonstrated (according to Snow) by the associated splitting and fragmentation of experience, sensibilities, paradigms and cultures. Plainly Pirsig's exploration of "classical" and "romantic" perspectives owes a debt to Snow's view of the split between the "soft" fields of study -- arts or humanities on one hand, and the "hard" ones -- physics mathematics, engineering, finance, management, sciences on the other. The public debate is still raging in the media (and to some extent in the academy) today. For those of you who wish to pursue the matter further, please be advised that there is a recent reissue of Snow's "The Two Cultures" and a successor piece, "A Second Look" (in which Snow responded to the controversy four years later). The introduction by Stefan Collini does a good job of charting the history and context of the debate, its implications and its afterlife. The importance of science and technology in policy run largely by non-scientists, the future for education and research, and the problem of fragmentation threatening hopes for a common culture are just some of the subjects discussed.

VIEW: 5.3 Mindwalk

Please see the Wikipedia article on this video at <http://en.wikipedia.org/wiki/Mindwalk>

READ: 5-4 Chorover, S.L. (1995) "Comparing and Contrasting Scientific Paradigms." This is a table from the hardcopy portion of an early Macintosh Hypertext version of an interactive "electronic book" project intended to promote "sustainability" in a time of human/ecological crisis. (HomeWork: An Environmental Literacy Primer, WORKBOOK pp. 36-39.)

WRITE: Reaction Paper #4

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