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9.68 Affect: Biological, Psychological, and Social Aspects of "Feelings"
Spring 2009

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Class Meeting 7

March 17

Theme: *Problématique du changement I:*
 Sustainable Paradigms Lost and Regained
 What are "Crises?" What is a "Scientific Revolution?"
 Changing Beliefs, Values & Practices in Science and Society

PREPARATION:

READ: 7-1 Kuhn, T.S., (1962) *The Structure of Scientific Revolutions*,
 University of Chicago Press, Chicago. (excerpts)

READ: 7-2 C.P. Snow (1956) *The Two Cultures*

VIEW: 7-3 (Film #2) *Mindwalk Mindwalk* – (1991) (111)

WRITE: Reaction Paper #7 Summary and Evaluation of Main Points in Kuhn
 and Snow Readings

NOTES ABOUT ASSIGNMENTS:

7-1 Kuhn, *The Structure of Scientific Revolutions*

Is the term "paradigm" clearly comprehensible to you?

It was our former MIT colleague, the late Thomas S. Kuhn, who is generally credited with first using the word "paradigm" (from an Ancient Greek word meaning both pattern and exemplar) to denote a core set of beliefs, values and practices prevailing within scientific communities at particular points in their organization and development.

Kuhn saw the scientific enterprise, as most of us still do, as a quintessentially human inquiry process transgenerationally evolving through successive cycles. 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 more and more 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" – as discussed by Kuhn – is the case 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 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 which 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 in which a significant conceptual and material change occurred in some other complex human system at biological, psychological and/or sociocultural levels of organization? In a recent book based on interviews with and writings by 29 astronauts and cosmonauts, Frank White shows how experiences such as circling the Earth every 90 minutes and viewing it from the moon have 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." White argues forcefully and at length (if ultimately unconvincingly) for further space exploration, but 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."

7-2 C.P. Snow on "the two cultures"

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

The notion that the paradigm prevailing in our own society, in its education system and its intellectual life, is seriously flawed is demonstrated, according to Snow, by the associated splitting and fragmentation of experience, sensibilities, paradigms and cultures. Plainly Pirsig's opposed "classical" and "romantic" perspectives thus owe a debt to Snow's view of the split between the arts or humanities on one hand, and the sciences on the other. And 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. 'Probably the most important statement on the role of science in society yet available.' – Discovery; 'One cannot fail to take Snow seriously or to recognize his commitment to the cause of peace, intelligent action and human betterment.' Scientific American; 'Obvious authority and moral intelligence.' The New Yorker 'Effective because of its obvious generosity of mind and basic sanity.' The Sunday Times.

7.3 Mindwalk– (1991) (111) a film directed by Bernt Amadeus Capra, based on his own short story, based in-turn on the book *The Turning Point* by his brother Fritjof Capra, the author of the book *The Tao of Physics*. The majority of the movie is a conversation between three characters: scientist Sonia Hoffman (Liv Ullmann), politician Jack Edwards (Sam Waterston), and poet Thomas Harriman (John Heard) as they wander around Mont Saint Michel, France. The movie is, in effect, an introduction to systems theory and systems thinking, in which the implications of findings in post-Newtonian physics (e.g. quantum mechanics and particle physics) are also articulated. All of this is also extended and applied to the task of defining and dealing with personal, political and social problems. The notion that a systems approach offers potential alternative solutions for human and ecological problems, is another major focus of the film. But specific present-day problems and the need to seek sustainable solutions for them are not the main focus. Rather, the main point is that there is no one singularly and universally true and correct way to define and deal with human/ecological issues of broad scope and urgent moment. A multiplicity of uniquely different perspectives – each one altogether partial in its particular way -- is needed to view the human condition at all comprehensively. Sonia Hoffman is definitely the main protagonist here and her perspective is basically a holistic, or systems-theory, perspective – a post-modern scientific perspective – partial, complementaristic, relativistic and uncertain.. Thomas Harriman, the poet, -- endeavoring to mediate between scientific and political perspectives, recites the poem "Enigmas" by Pablo Neruda (based on the translation by Robert Bly) at the end of the movie, thus concluding the core of the discussion.