
INTERPRETING THEORIES: TOWARD A “SEMANTIC” HISTORY OF SCIENCE

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BY KENJI ITO

Kenji Ito

kenjiito@fas.harvard.edu

5-8759

Science Center 224 F

Office hours: By appointment or Monday 4-6.

COURSE DESCRIPTION

In a film “The Gods must be crazy (1980)” Bushmen in the Kalahari Desert encounter an unfamiliar technological object, a coke bottle. Bushmen perceived totally different meanings in the coke bottle from those we are familiar with. They used it as a tool, a musical instrument, or even as a weapon. In this instance, the coke bottle stops functioning as a “coke bottle” as we know it. Even if the material substance does not change, the function of an object can completely change.

Similar things can happen in science. In the early 18th century Japanese “mathematicians” developed a theory, “mathematically” equivalent to Newton’s theory on calculus. Yet, they perceived their work as a kind of art, similar to chess or flower arrangement. Even if these two theories were mathematically almost equivalent, they had totally different meaning.

This course is about “meaning” in science. The goal of this course is to develop a method of doing history of science, through examining the notion of “meaning” and in the context of doing methodological and historical works. It is not our goal to understand philosophical writings. The sole reason of reading philosophy in this course is to examine how they can be useful for us to write papers of the history of science.

This course moves between the height of abstract theories and lowly practice of empirical studies. In philosophical readings, we seek inspirations for the method of history rather than accurate understanding. Choice of historical readings is negotiable, so as to match participants’ interest, and the syllabus will be adjusted accordingly.

PART 1: TACIT KNOWLEDGE AND THE CRITIQUE OF THE EXPLICITNESS

- (1) Tacit knowledge, rules, and practices.
- (2) Tacit knowledge and replication.
- (3) Representation and inscription.

The course starts with a discussion of knowledge. Does “knowledge” exist? If so, where, and in what form? Can knowledge be stored in some sort of memory device, whether it is a book, a diagram, a floppy disk, or a human brain? This part of the course deals with “unconventional” forms of knowledge. For example, there must be something different between those who can ride a bicycle and those who cannot, yet no one can exactly tell someone else how to ride a bicycle. The purpose here is to put the notion of “knowledge” into action, to pave a way to see science as practice and culture, and to understand the complexity of the problem of meaning.

PART 2: PRACTICE

- (4) Theory of practice.
- (5) Practice and experiment.
- (6) Theoretical practice

Complementary to seeing science as knowledge is to see it as practice. But what legitimizes our understanding of science as practice? How can we overcome difficulties in such an approach? The course will explore both the theoretical possibility of studying practice of science and methods used in actual historical works. Particular attention will be paid to the possibility of “theoretical practice.”

PART 3: CULTURE

(7) Culture and Meaning. (8) Culture and Practice. (9) Culture as Meaning and Practice.

To examine cultures is one important way to talk about practice. Relying on an anthropological notion of culture, the course will develop a notion of “culture” useful for the history of science, and discuss relevant historical works.

PART 4: MEANING

(10) Moral economy (11) Kuhn and framework (12) “Holistic” semantics and science

The previous three parts will suggest that the notion of “meaning” might work as a “unifying principle” for all of these discussions. First we will discuss what I call an “hermeneutic approach” to science studies, which treats scientific works and practices as interpretive texts, then examine relevance of a “holistic” theory of meaning to the history of science. The final question is: What would be new possibilities of the history of science in the direction discussed in this seminar?

PREREQUISITE

No background in theory philosophy is required. Focus on any branch of the history of science is appropriate in this course.

COURSE REQUIREMENTS

1. Weekly reading assignment, consisting of :
 - a. Key readings: Usually one short paper or a part of a book related on methodological issues. Seminar discussions are based on them.
 - b. Main readings: Methodologically relevant books and articles of various subjects; negotiable according to participants’ interest.
 - c. Wider readings: optional.
2. In-class presentations on a main reading, or a wider reading. There will be about 10 presentations, and all participants will be required to present twice throughout the semester. We schedule presentations at Meeting 1.
3. Review paper: a 1-2 page essay review on a set of readings on the participant’s research topic. An annotated bibliography should be attached. Participants are encouraged to use this opportunity to prepare for the final paper.
4. Theoretical paper: a 3-4 page paper on the methodology of the history of science developed from the materials in this course. Participants are encouraged to make this the methodological basis of the final paper.
5. Final paper: a paper of 20 to 40 pages on a specific subject in the history of science, using the methodology developed through the course. Participants may incorporate relevant parts

of previous assignments into the final paper. Note a rough draft is required to submit at the 9th meeting.

COURSE MECHANISM

1. Brief introduction by the instructor on the background of the issues to be discussed. 10-20 minutes.
2. Discussion on the key reading(s). 30-40 minutes
3. Presentation on a main reading (or on a relevant topic). 30-40 minutes.
4. Discussion on the presentation (lead by the presenter). 20-30 minutes.

GRADES

Final paper 50%

Review paper 10%

Theoretical paper 10 %

Presentation 10 %

Participation 20%

READINGS REQUIRED

1. Mario Biagioli, ed., *Science Studies Reader*. New York: Routledge, 1999 (Hereafter *SSR*). Available from www.bn.com, www.amazon.com, and other major retailers.
2. Other readings (a reserve copy will be found in the History of Science Department main office).

FINAL PAPER

You can choose any field of study to focus. However, it is encouraged to make the following question at the center of your paper: "What were the meanings of XXXX in YYYY?" (XXXX can be anything related to science and technology; YYYY means a certain time and place). The paper should be in the style described in *The Chicago Manual of Style* or Turabian's *A Manual for Writers of Term Papers, Theses, and Dissertations*.

SCHEDULE

This schedule is subject to change. I am flexible about the selection of readings so that they fit the participants' interest. For complete bibliographical information of each item, see the attached bibliography.

PART 0: INTRODUCTION

February 3. Meeting 0: Introduction

PART 1: TACIT KNOWLEDGE AND THE CRITICQUE OF EXPLICITNESS

February 10. Meeting 1: Tacit Knowledge and Replication

Key Readings:

- Harry Collins. "The TEA Set: Tacit Knowledge and Scientific Networks."

Wider reading

- Michael Polanyi. *The Tacit Dimension*.

February 9. Meeting 2: Rules and Practices

Key Reading:

- Ludwig Wittgenstein. *Philosophical Investigations*, 56-88.
- David Bloor. *Wittgenstein, Rules and Institutions*. 1-26
- Michael Lynch. "Extending Wittgenstein."

February 24. Meeting 3: Representation and Inscription

Key Readings:

- Paul Tibbets, "Representation and the Realist-Constructivist Controversy."
- Timothy Lenoir, "Inscription Practices and Materialities of Communication."

Main Readings (Choose one):

- David Kaiser, "When Texts become Tools: Feynman Diagrams as Practices in Midcentury Particle Physics."
- Bruno Latour, "Drawing Things Together."
- Bruno Latour, "Visualization and Cognition."

PART 2: MEANING THROUGH PRACTICE

March 2. Meeting 4: Theory of Practice

Key Reading:

- Excerpts from Pierre Bourdieu, *Outline of the Theory of Practice*.
- Joseph Rouse, “The Significance of Scientific Practice.”

Main Readings (Choose one):

- Andrew Pickering, “Mangle of Practice: Agency and Emergence in the Sociology of Science.”
- Simon Schaffer, “Manufacture of Ohm.”
- An essays from the second part of Jed Buchwald, ed., *Scientific Practice*.
- Joan Fujimura, “Crafting Science.”

Wider Readings:

- Stephen Turner, *Social Theory of Practice*.
- Bruno Latour, *Science in Action*.

March 9. Meeting 5: Practice and experiment

Key Reading:

- Timothy Lenoir, “Practice, Reason, Context: The Dialogue Between Theory and Experiment.”

Main Readings (Choose one):

- Bruno Latour and Steve Woolgar, *Laboratory Life*.
- Peter Galison, *How Experiments End*.
- David Gooding, “Putting Agency Back into Experiment.”
- An essay from the second part of Jed Buchwald, ed., *Scientific Practice*.

March 16. Meeting 6: Theoretical practice

Key Reading:

- Peter Galison and Andrew Warwick, “Introduction: Cultures of Theory.”

Main Readings (Choose one):

- Galison, “Feynman’s War.”
- Andrew Warwick, “A mathematical world on paper.”
- David Kaiser, “A Ψ Is Just a Ψ ?”
- Brian Rotman, “Thinking Dia-Grams.”

PART 3: CULTURE

March 23. Meeting 7: Culture and Meaning

Key Reading:

- Clifford Geertz, “Thick Description”

Main Readings (Choose one):

- Sharon Traweek, “Pilgrim’s Progress.”
- Andrew Warwick, “Cambridge Mathematics” Part I & II

<Theoretical Paper due>

March 30. Spring Break. No Meeting.

April 6. Meeting 8: Culture and Practice

Key Reading:

- Joseph Rouse, “Understanding Scientific Practices: Cultural Studies of Science as a Philosophical Program”

Main Reading:

- Mario Biagioli, *Galileo Courtier*.

April 13. Meeting 9: Meaning and Practice

Key Readings:

- William H. Sewell, “The Concept(s) of Culture,”
- Joseph Rouse, “What Are Cultural Studies of Science?”

Main Reading:

- Crosbie Smith and Norton Wise, *Energy and Empire*. (Read selectively).

<Rough draft of the final paper due>

PART 4: MEANING

April 20. Meeting 10: “Moral Economy” and Meaning

Key Reading:

- Lorraine Daston. “The Moral Economy of Science.”

Main Reading (Choose one):

- Robert E. Kohler, “Moral Economy, Material Culture, and Community in *Drosophila*, Genetics.”
- Lorraine Daston, “Objectivity and the Escape from Perspective.”

April 27. Meeting 11: Kuhn and Framework

Key Readings:

- Thomas Kuhn, *Structure of Scientific Revolutions*. (or one of Kuhn’s later works)

Main Readings:

Rough drafts by participants

<No presentation this week>

May 4. Meeting 12: Holistic Semantics

Key Readings:

- Donald Davidson, *Inquiries into Truth and Meaning*. Essays 13
- Rouse, “Against Representation: Davidsonian Semantics and Cultural Studies of Science.”
- Ian Hacking (To be announced)

Main Readings:

Rough drafts by participants

<No presentation this week>

May 11. No meeting

Final paper due.