

The Irrationality of Western Science
Honors Seminar
Spring 2008

Professor Robert Hahn
Office Hours: Tuesday and Thursday 8-9:45am
and by appointment
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1) Course Introduction

Part I: The Traditional Idea of the Rationality of Science and its Challenges:

2) The Paradigm of *Western Rationality*: Euclid's *Elements* and the Idea of Deductive Proof (Reading: Euclid. *Elements*. Bk. I)

a) Introduction to Geometry as a system.

- i) Definitions
- ii) Postulates
- iii) Common-Notions

b) The Idea of **Proof** or Demonstration

- i) Theorems. Bk. I

3) Deductive Proof: Euclidean Geometry and Aristotelian Logic (Reading: Euclid. *Elements*. Bk.I, and from Aristotle's *Prior* and *Posterior Analytics*.)

a) Euclid's theorems, Bk.I

b) Aristotle's Theory: Deduction vs Demonstration

- (i) Syllogistic/Logic & Deduction, *Prior* and *Posterior Analytics*
- (ii) Aristotle's Theory of Demonstration, *Posterior Analytics*

d) Aristotle's Proof of the Irrational

4) Aristotle and the Problem of First Principles: The Irrational Foundation of Rational Demonstration?

Since every proof rests on assumptions/principles, HOW do we grasp (and moreover, "justify") these primary assumptions/principles?

a) Aristotle, *Posterior Analytics* II, 19.

5) Euclid, Aristotle, and Eratosthenes: The Application of the Deductive Method (Reading: from Hahn's *Formal Deductive Logic*, ch. 4)

- a) Arguments for the Sphericity of the Earth
- b) Physical Presuppositions: Problems in early Astronomy
- c) Applying Euclid's *Parallel theorems*
- d) The Measurement of the Circumference of the Earth

6) Field Trip to the Planetarium at The University of Missouri at St. Louis

a) Picturing the Cosmos and Ancient Sundials

- b) Plotting the Sun's path: the Solstice and Equinox
 - c) The Zodiac and the calculation of the Solar Year
- 7) Deductive Reasoning and the Challenge to "Common-Sense": The Triumph of the Mind over the Body and the Senses (Reading: from Kirk-Raven, *The PreSocratic Philosophers*, and from Plato's *Meno* and *Parmenides*).
- a) Zeno's Paradoxes: the Dichotomy and the Arrow
 - b) The Pythagorean Theorem and the Discovery of the Irrational
 - c) Gorgias' argument: *Nothing Exists*
 - d) Plato's Argument in the *Theaetetus* that "false opinion is impossible."
 - e) Meno's Argument: All Learning is Impossible
 - f) Plato's *Parmenides* argument: The Unreality of Plurality
 - g) Aristotle's Argument concerning the Unreality of Time
- 8) The Triumph of the Mind over the Body and Senses: Part I
Grasping Reality Behind the Appearance (Reading: from Plato's *Republic*, Bk. VII, Hahn's article in the *Journal of the History of Philosophy*, and an article by Harold Cherniss, "The Philosophical Economy of the Theory of Ideas").
- a) Plato's theory of Ideas/Forms (Ultimate Reality)
- 9) Triumph of the Mind over the Body and Senses: Part II
Grasping Reality Behind the Appearance (Reading: from Aristotle's *Metaphysics A* and *L*, and summary of Aristotle's physical theories from the *De Caelo*)
- a) Aristotle doctrine of Being (Ultimate Reality) and the Unmoved Mover.
- 10) Re-Thinking the Conventional Interpretation of Western Rationality and Science:
- Part I (Reading from Kuhn, *Structure of Scientific Revolutions*)
- a) Normal vs Paradigmatic Science
 - b) "Revolutions" in Science
 - i) the social and political context
 - ii) the importance of the community
 - iii) the importance of case studies
- 11) Mid-Term Examination.

Part II: The Irrationality of Western Science: Case Studies from the History of Science

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14: Re-Thinking Copernicus' 'Revolution' in Astronomy. The debate between Geocentrists and Heliocentrists

- a) Re-evaluating the idea of a rational reconstruction. Can we make sense of

a privileged point of view? The consequences of Kuhn's *SSR* for our understanding of science.

b) The Internal/External distinction in scientific reconstruction: Is it only a fanciful myth?

15) Final Exam.

Evaluations/Grades: (Please Read Carefully)

Your grade will be determined by several contributing factors:

- 1) regular attendance and participation in weekly seminar meetings
- 2) a weekly 2-page (typed!) essay* on an assigned topic, submitted just prior to the start of the seminar meeting** (60% of final grade)
- 3) a mid-term examination (20% of final grade)
- 4) a final examination written during our last seminar meeting (20% of final grade)

The regulations for the two-page weekly paper are very specific.

***I will not read papers longer than 2 pages in length.** The paper MUST BE:

- a) typed, double-spaced;
- b) type font cannot be smaller than 12 pitch,
- c) conforming to Margins: 1 -1/2" on the left, and 1" on top, bottom, and right.

This regular writing exercise is designed to limit your space and requires the development of written communication skills in the writing, and re-writing, of the essay.

The average grade for your weekly writing assignments will be determined by dropping your lowest grade and averaging the remaining grades.....IF you submit ALL the essay assignments. IF you do NOT submit all the essay assignments, then all the assignments will be averaged to constitute that portion of your final grade. **Please Note Carefully: Any *unexcused* paper not submitted on time will not be graded.**

**A few of the papers, submitted at the start of the seminar, will be presented orally at the start of the class. The purpose of this oral exercise will help us review the preceding class and will offer some training on presentation skills.

2-Page Essay Questions:

(These assignments are due in the seminar for the week immediately *following* the discussion of those materials in the seminar)

- 1) How is it that Euclid proves geometrical theorems beyond a reasonable doubt?
- 2) For Aristotle, what is the difference between a deduction and a demonstration?
- 3) For Aristotle, how are the primary assumptions of every scientific argument reached?
- 4) How is it that Eratosthenes was able to measure the circumference of the Earth, beyond a reasonable doubt?

- 5) What deductive reasoning is offered in rejecting common-sense in at least two of the “rational” arguments we considered?
- 6) How is it that the Platonic theory of Forms is supposed to overcome the challenge of “relativism”?
- 7) What argument does Aristotle advance in *Metaphysics L* on behalf of the Unmoved Mover as the highest or “most real” Being?
- 8) For Kuhn in the *Structure of Scientific Revolutions*, what is the difference between *normal science* and *paradigmatic science*?