Phil. 401: Discussion Questions

January 5th, 2017

Readings: T. S. Kuhn. *The Copernican revolution: Planetary astronomy in the development of Western thought.* Harvard University Press, 1957, Chapter 1.

1 Using the Two-Sphere Model

In groups of five students, complete the following questions. Whenever you've finished one section of questions, let me know. We will then discuss the group of questions as a class. If you finish before other groups, move onto the next set of questions.

1.1 Defining astronomical terms

1. Discuss your answers to the following question from last night's reading assignment. How can the behavior of a sundial be used to define the following terms: (1) noon, (2) solar day, (3) equinox, (4) solstice, and (5) year?

2. Use your definition of "solstice" in the previous question:

   - Does it follow that the summer solstice is the day during which the time between between sunrise and sunset is greatest?
   - Does it follow that the summer solstice occurs on the same day in eastern Egypt as it does in western Egypt? Explain.
   - Does it follow that the summer solstice is typically a warmer day than the winter solstice? Explain.

3. How can a sundial be used to define "north?"

4. How does the motion of Polaris differ from that of other stars in the night sky?

1.2 The Two-Sphere System: Apparent Motions of the Stars

The following questions are answered in chapter one of Kuhn's book.

1. Explain how to draw the ecliptic on a star map.
2. Outline one or two arguments for the claim that the Earth must be spherical.
3. Reconstruct the argument on pages 43-44 that purports to show that the Earth is not moving.
4. Draw the two-sphere system. Label the solstices, equinoxes, the ecliptic, and the north-star. Explain how you can use the definitions of "solstice," "equinox" and so on in the previous section of questions to identify the solstices, equinoxes, etc. on your diagram.
5. Use the two-sphere system to explain why
   - Some stars rise and set.
   - The north star is immobile.
   - Some stars never set,

1.3 The Two-Sphere System: Solstices and Seasons

The following question is *not* answered in Kuhn's book, and so it's meant to give you practice using the two-sphere system on your own. Use the two-sphere system to explain

1. Why the summer solstice occurs on the day in which the time between sunrise and sunset is greatest,
2. Why Polaris appears almost due north to observers near the equator.
3. Why temperatures vary throughout the year,
4. Why the timing of seasons differ in the northern and southern hemispheres, and
5. Why observers at identical latitudes will agree upon which day the solstices and equinoxes occurs.

2 Definitions in Scientific Theories

Compare and contrast the following, possible definitions of "equinox:"

- An equinox is a day in which, according to shadows cast by a sundial, the angles at which the sun rises and sets form a straight line.
- An equinox is a day in which day and night are both 12 hours.
- An equinox is a day in which the sun crosses the plane of the earth's equator.

3 Functions of Conceptual Schemes

1. What purposes does Copernicus attribute to "conceptual schemes?" To answer this question, please discuss your answers to the following questions from last night's readings:
   (a) What "function" of cosmologies does Kuhn claim is unique to "our own Western civilization?"
   (b) In no more than two sentences each, explain
      a. What Kuhn means by "conceptual economy" and how the two-sphere system provided conceptual economy.
      b. Why conceptual economy does not require *believing* the two-system accurately describes the universe.
   (c) Describe one function of a conceptual scheme that Kuhn thinks may require belief and why it requires belief.
   (d) According to Kuhn, how did Copernicus's theory contribute to the "intellectual ferment known as the scientific revolution?"
2. Open-Ended Discussion: Do you expect that one cosmological conceptual scheme will be best for all of the purposes Kuhn enumerates? Why or why not?