# Questions for Exam 3

## Scientific Thought II

Spring 2010

Exam 3 will consist of a selection of these questions.

1. Hume's investigation of the concept of causation involves looking for where we could get an impression of necessary connection. (a) Why is necessary connection relevant to causation? (b) Why does Hume think we must have an impression of it? (c) What does he hope to achieve by finding that impression?

2. What is the impression that gives rise to the idea of necessary connection, according to Hume?

3. Did Hume think it is true that if C causes E then there is a necessary connection between C and E? Explain.

4. According to Mill, what is the meaning of "law" and "law of nature"? Give an example that illustrates the difference.

5. According to Mill, what does it mean for A to be the cause of B? Does it follow from Mill's definition that night is the cause of day? Explain.

6. Does our everyday use of the terms "cause" and "effect" agree with Mill's definitions? Explain and give an example.

7. What is the nature of the necessary connection between causes and effects, according to Mill? How does Mill's account of this differ from Hume's?

8. Does the term "law of nature" mean a general fact? Justify your answer.

9. What is a counterfactual conditional?

10. Give an example of (a) a counterfactual that is correct because a fact is a law, and (b) a counterfactual that is incorrect because a fact isn't a law.

11. "Only true laws support counterfactuals, while accidental regularities do not." Is this correct? Justify your answer.

12. Explain what a subjunctive conditional is and give an example. How are counterfactual conditionals related to subjunctive conditionals?

13. What does Lange mean by the notation "$p > q$"?

14. (a) What does it mean to say that something is physically necessary? (b) Are all laws physically necessary? Justify your answer. (c) Are all physically necessary facts laws? Justify your answer.

15. For each of the following, say whether it is true and justify your answer.

   P1. p is a law iff $q > p$ is correct for all q consistent with the laws.

   P2. p is physically necessary iff $q > p$ is correct for all q consistent with the laws.

16. State Lange's proposal about the relation between laws and counterfactuals.

17. What does it mean for a theory of causation to be reductive? Give an example of a reductive theory of causation.

18. Is Woodward's manipulability theory of causation reductive? Explain.

19. Give an example of your own of (a) a token-causal claim, and (b) a type-causal claim.

20. Let S be the variable with values {smokes, does not smoke} and let D be the variable with values {develops lung cancer, does not develop lung cancer}. If S causes D, in Woodward's sense, does it follow that smoking raises the probability of developing lung cancer? Explain.

21. Draw the graph of the causal structure when $Y = X_1 X_2 + X_3$.

22. Write equations that give the following causal structure:

$$X_1 \searrow$$
$$Y \longrightarrow Z$$
$$X_2 \nearrow$$
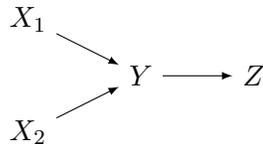
23. Explain what Woodward means by:

   (a) I is an intervention on X with respect to Y.

   (b) X is a total cause of Y.

   (c) X is a direct cause of Y with respect to variable set $\mathbf{V}$.

24. A flagpole of height H is standing on level ground, the sun is at an angle A above the horizon, and the flagpole's shadow has length L. For each of the following, say whether it is true and justify your answer using Woodward's definitions.

   (a) H is a total cause of L.

   (b) L is a total cause of H.

   (c) A is a total cause of L.

25. Suppose it is known that X, Y, and Z are related in one of the following two ways:

$$X \longrightarrow Y \longrightarrow Z$$

$$X \longrightarrow Z$$
$$\searrow \quad \nearrow$$
$$Y$$
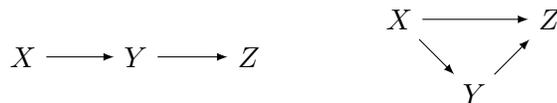
   Describe how to determine experimentally which is correct.

26. State Woodward's definition (AC) of actual causation.

27. A man eats a particular dish and dies in consequence, that is, would not have died if he had not eaten it. Did eating the dish cause the man's death, according to (AC)? Explain.

28. A sergeant and a major give orders to a corporal. The major's orders always trump the sergeant's, in the sense that the corporal always does what the major orders, regardless of the sergeant's orders. But when the major gives no orders, the corporal always follows the sergeant's orders. Suppose that the major and the sergeant order "Advance" and the corporal advances. According to (AC), does the major's order cause the corporal to advance? Does the sergeant's? Explain.

29. Each of two campers throws a lighted cigarette into the forest, where each cigarette on its own would have produced a forest fire, and a fire follows. Was the action of either camper a cause of the fire, according to (AC)? Justify your answer.

30. Woodward says that claims like "Being female causes one to be discriminated against in hiring" are unclear. What are his reasons for saying this? How can such claims be clarified?

31. A review of Woodward's book said that on Woodward's view "genotype is not ... even a remote cause of an individual's treatment by others" because "there are no interventions on [genotype] with suitable invariance" (Clark Glymour, *British Journal for the Philosophy of Science*, 2004). Is this correct? Justify your answer.

32. Woodward uses counterfactuals to analyze causal concepts, but some philosophers have said that counterfactuals are so vague and context-dependent that they are not suitable for elucidating any concept of scientific interest. What is Woodward's response to this criticism?

33. Woodward's definitions of total cause, direct cause, etc., all refer to *possible interventions*. What does "possible" mean here? What are some things it does not mean?

34. If an intervention is physically impossible, does it follow that we cannot know what the effect of such an intervention would be? Justify your answer.

35. According to Carnap, what does it mean to say a law is empirical, and how are empirical laws confirmed? Give an example of something he regards as an empirical law.

36. According to Carnap, what does it mean to say a law is theoretical, and how are theoretical laws confirmed? Give an example of something he regards as a theoretical law.

37. What does Carnap mean by "correspondence rules"? Why does he believe they are needed? Give an example of something he regards as a correspondence rule.

38. What does Carnap mean by "L-true" and "A-true"? Give an example that shows the difference between these concepts.

39. What is the connection between A-truth and A-postulates for an artificial language?

40. Explain what the Ramsey sentence for a theory is.

41. Let TC be the conjunction of the theoretical postulates and correspondence rules for a theory. According to Carnap, what is the part of TC that specifies meanings of the theoretical terms, and hence can be taken as an A-postulate? What reasons does Carnap have to justify this choice?

42. Carnap thought the language of science can be divided into two parts: (1) An observation language, which contains only logical and observation terms, and whose sentences can be tested directly by observation. (2) A theoretical language, whose sentences contain theoretical terms and can't be tested directly by observation. Is this correct? Justify your answer.

43. What does Lewis mean by a "T-term" and an "O-term"?

44. How does Lewis write a theory T so as to show its T-terms? What is a realization of T?

45. Use the concept of a realization to explain in English what the Ramsey and Carnap sentences of a theory T say.

46. Let T be the "theory" that all electrons have the same electric charge. Suppose "electron" is a T-term and "electric charge" is an O-term. Describe (a) two different realizations of T and (b) something that isn't a realization of T (according to currently accepted science).

47. Does Lewis agree that the Carnap sentence of a theory T gives the meaning of its T-terms? If not, why not?

48. State Lewis's definition of the T-terms of a theory. Does this definition specify the meaning of the T-terms, or does it merely say what they designate? Justify your answer to the latter question.

49. When Lewis considers what happens when a theory T is modified, he considers two possibilities:

    (a) The T-terms are defined using the revised version of T.
    (b) The T-terms are defined using the original version of T.

    Explain why neither solution is attractive.