

Philosophy 311
Philosophy of Science

Take-Home Examination 1

Due 17 September 2008 by 5:00 p.m.

I. Short Answer / Identifications. Define and/or discuss the meaning and significance of six (6) of the following terms. Give examples to illustrate your points. [10 points each]

1. Theory
2. Theoretical Virtue
3. Entrenchment
4. Covering Law
5. Ceteris-Paribus Law
6. Context of Justification
7. Crucial Experiment
8. Nicod's Criterion
9. Raven's Paradox
10. Auxiliary Condition / Auxiliary Theory

II. Essay. Respond to one (1) of the following prompts. [40 points]

- A. Critically discuss the Covering-Law Model of Explanation. Be sure to: (1) describe the model; (2) illustrate each of its conditions; (3) explain the rationale for each condition; (4) discuss at least one objection to the model.
- B. Discuss the Causal Model of Explanation. Be sure to: (1) describe the model; (2) illustrate each of its conditions; (3) explain how the model differs from a covering-law model; (4) discuss whether the model supports the claim that explanatory power is a theoretical virtue.
- C. Critically discuss the Hypothetico-Deductive Model of Confirmation. Be sure to: (1) describe the model; (2) illustrate the model as applied to a case of theory confirmation; (3) illustrate the model as applied to a case of theory disconfirmation; (4) discuss at least one objection to the model *other than the Quine-Duhem Problem*.
- D. Discuss the Quine-Duhem Problem and Confirmation Holism. Be sure to: (1) state the problem; (2) provide an illustration of the problem; (3) define and illustrate Confirmation Holism; (4) explain how the Quine-Duhem Problem supports Confirmation Holism.

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Take-Home Examination 2

Due 15 October 2008 by 5:00 p.m.

I. Short Answer / Identifications. Define and/or discuss the meaning and significance of six (6) of the following terms. Give examples to illustrate your points. [10 points each]

1. Empirical Equivalence
2. Instrumentalism
3. Approximate Truth
4. Theory-Laden Observation
5. Explanatory Power
6. Paradigm
7. Incommensurability Thesis
8. Pessimistic Metainduction for Antirealism *or* Cautiously Optimistic Induction for Realism
9. Bayesianism
10. Independent Evidence

II. Essay. Respond to one (1) of the following prompts. [40 points]

- A. Discuss the Underdetermination Problem as an argument in favor of Scientific Antirealism (of the Empiricist, rather than Instrumentalist, variety). Be sure to: (1) explain what underdetermination is and why it is a problem; (2) provide an illustration of the problem; (3) distinguish between scientific antirealism and scientific realism, and explain how the problem supports antirealism but undermines realism; (4) discuss at least one possible reply to the problem on behalf of the scientific realist.
- B. Discuss the "No Miracles" Argument for Scientific Realism. Be sure to: (1) explain what it means to say that currently accepted scientific theories are successful; (2) provide an illustration of how a theory is successful in this sense; (3) discuss (and illustrate) the antirealist explanation of success; (4) discuss and illustrate the realist explanation of success, and explain why it seems to be more adequate than the antirealist explanation.
- C. Discuss foundationalism as a criterion of truth. Be sure to: (1) discuss the difference between Criterion Foundationalism and Criterion Coherentism; (2) explain why the foundational basis must be infallible and incorrigible; (3) why observation reports fail to be infallible; (4) why observation reports fail to be incorrigible.
- D. Discuss coherence as a criterion of truth. Be sure to: (1) discuss the difference between Criterion Foundationalism and Criterion Coherentism; (2) explain the nature of coherence and give examples that illustrate what coherence is; (3) discuss either the Isolation Objection or the Alternative Systems Objection to Criterion Coherentism; (4) discuss a possible reply to this objection.

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Take-Home Final Examination

Due 3 December 2008 by 5:00 p.m.

- I. **Short Answer / Identifications.** Define and/or discuss the meaning and significance of six (6) of the following terms. Give examples to illustrate your points. [10 points each]
1. Metaphysics vs. Epistemology
 2. Relative Frequency vs. Propensity interpretations of probability
 3. Objective probability vs. Subjective probability
 4. Determinism vs. Indeterminism
 5. Wave vs. Particle
 6. Complementarity
 7. Heisenberg's Uncertainty Principle
 8. Nonlocal Causation (aka action-at-a-distance)
 9. Superposition
 10. The Measurement Problem (in Quantum Mechanics)
- II. **Essay.** Respond to one (1) of the following prompts. [40 points]
- A. The results of the double-slit experiment and the photoelectric effect seem to show that whether light is a wave or a particle depends upon factors external to the light. Explain and discuss. Be sure to: (1) say what the double-slit experiment shows about light, and why it shows that; (2) say what the photoelectric effect shows about light, and why it shows that; (3) explain how these results support rejecting the view that light's being a wave or a particle is an intrinsic, non-relational property of light; (4) explain what it is, external to light, upon which light's being a wave or a particle might depend; and (5) discuss the plausibility of taking these experiments to show that light's being a wave or a particle depends upon factors external to the light.
- B. Explain how standard quantum theory and a "hidden variables" theory differ in their explanation of results from the Stern-Gerlach experiments. Be sure to: (1) describe the setup and observed results of a basic Stern-Gerlach experiment; (2) explain how standard quantum theory explains these results (in terms of superpositions and their collapse); (3) explain how a hidden variables theory would explain the same results, without superpositions; (4) state Bell's theorem and explain what it shows about the prospects for a hidden variables theory.
- C. Compare the Copenhagen interpretation of quantum theory with either the Many-Worlds or the Consciousness interpretation. Be sure to: (1) explain what the Copenhagen interpretation says; (2) explain what the alternative interpretation says; (3) explain how the interpretations are similar and how they are different; (4) explain which interpretation is superior, and why.
- D. Discuss the plausibility of realism vs. antirealism with respect to standard quantum theory. Be sure to: (1) discuss the difference between realism about quantum theory and antirealism about quantum theory; (2) discuss the significance (if any) of Bell's theorem and the EPR experiments for the realism/antirealism debate; (3) discuss the significance (if any) the various interpretations of quantum theory for that debate, and (4) clearly state a thesis and provide arguments for it.