

Study Guide for *Induction in Physics and Philosophy*

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Lecture One

- Why is generalization the essence of all human cognition?
- What is the definition of a generalization?
- Why are the philosophic axioms not inductive generalizations?
- Why must philosophic principles be validated through induction?
- Why is enumeration insufficient to account for an induction?
- In what sense are generalizations hierarchical? Give a few examples.
- How does one reduce a generalization?
- What is a first-level generalization?

Lecture Two

- What is necessary to validate a first-level generalization?
- What is the importance of causality in this process?
- Where do our original inductive generalizations come from?
- What is the “impersonal metaphysics” and what role did it play?
- What is the path from a causal connection to a generalization?
- How does omitting the measurements of a causal connection allow the jump to a generalization?
- How does the application of measurement omission apply to induction?
- Using a unique example, describe the process of moving from a perceptual grasp of causality to a conceptual grasp of a generalization.
- Why does all valid reasoning involve a conclusion that necessarily follows from the premises?

Lecture Three

- How does a scientist determine the standard of relevance for factors involved in causation?

- What are the methods of difference and agreement? Give examples.
- How is the method of difference related to the process of conceptualization?
- Does the process of induction rely upon quantity?
- How does Galileo's process of induction rely upon his concepts?
- How do reduction and integration play a role in induction?
- What process is necessary to rise up into higher and higher levels of induction?
- What does it mean to have a "green light" to induction?
- What are the four ways that quantitative relationships are important?

Lecture Four

- How did Michael Faraday's discovery of the concept of "field" open new areas for induction?
- Why was motion so important in Faraday's study of magnetism?
- What was the key method used by Faraday in his experimentation?
- Why is mathematical derivation of physical law a leap in scientific induction?

Lecture Five

- What was the breakthrough achieved by James Clerk Maxwell?
- How did induction feature in this step in physics? Mathematics?
- Why is it so vital to validate inductive fundamentals?
- What is the role of a principle that functions as a primary?
- What is required to declare that an inductive fundamental is valid?
- What are the main sources of errors in induction?
- What are the five positive principles of induction?
- Describe the parallels between these and concept formation.

Lecture Six

- What are the primary differences between philosophy and physics?
- Are philosophic principles broader than scientific ones?
- What similarities are there between philosophy and physics?
- How do we get the first level generalizations of philosophy?
- Explain the steps of a first level generalization and work through the example.

- How do we connect these generalizations to axioms?
- What is the parallel in philosophy of experiments in physics?
- Why is it insufficient merely to be able to give examples of principles?
- Explain how philosophy is self-correcting in a way similar to science.

Lecture Seven

- What is the proper understanding of the claim that philosophy is not mathematical?
- How do quantitative relationships arise in philosophy?
- Why does the integrating faculty of human consciousness not allow for the selection of a unit to serve as its standard of measure?
- Why do the concepts of concept formation not reduce to units in the way that matter does?
- How does the numeration of degrees become inapplicable in ethical arguments about principles?
- Why do states of consciousness have intensity but not discrete numerical units?
- Why does grasping the quantity of physical things become essential to grasping the quality of things?
- How have two crucial errors in philosophy made mathematics in physics incomprehensible?
- What is the proper understanding of mathematics in understanding physics?
- Why is it not a black mark against philosophy that it is not mathematical in its inductions?
- What is the essential guidance of philosophy on all levels?
- How is it proper to say that philosophy is as scientific as physics?