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Karl Popper and Thomas Kuhn

Q1. What does Popper mean when he says that Einstein's theory of relativity is "risky"?

Popper believes Einstein's theory of relativity is "risky" because it makes bold predictions that can be refuted by observation or experiment. Unlike theories that are so broad they can explain any outcome, Einstein's theory puts itself at risk of being proven wrong. For example, it predicted the precise amount of light bending around the sun, a prediction that could have been proven incorrect with observations during an eclipse. This vulnerability to falsification, according to Popper, is what makes a theory scientific.

Q2. Why is psychoanalysis said to be "irrefutable"?

Psychoanalysis is considered "irrefutable" because it is structured in a way that it can explain any human behavior. No matter what a person does, psychoanalytic theory can interpret it in terms of unconscious desires or traumas, making it impossible to find an observation that contradicts it. This inability to be proven wrong, however, also makes it non-scientific according to Popper, as it does not allow for the possibility of falsification.

Q3. According to Popper, Marxism was initially a scientific theory, but later stopped being one. Explain why.

Marxism was initially considered scientific by Popper because it made concrete predictions about the future of societies, such as the inevitable fall of capitalism and the rise of the proletariat. However, as time went on and these predictions did not materialize, instead of being abandoned or revised, the theory was adjusted to explain away any contradictions. This shift from making bold, risky predictions to interpreting any outcome as consistent with the theory led Popper to view Marxism as ceasing to be scientific.

Q4. According to Popper, induction cannot be used to prove scientific theories. Explain why.

Popper argues that induction—the process of deriving general principles from specific observations—cannot be used to conclusively prove scientific theories because no amount of observational evidence can guarantee the truth of a general statement. There will always be a possibility of encountering a contradictory case in the future. Thus, science progresses not by proving theories true through induction but by falsifying them through deduction, where theories are tested by attempting to refute them with evidence.

Q5. If somebody built a machine that moves forever without consuming external energy, what would it prove?

Building a machine that moves forever without consuming external energy would prove the falsity of the current understanding of the laws of physics, particularly the law of conservation of energy. It would be a significant falsification event, showing that our current scientific theories are incomplete or incorrect in explaining the universe.

Q6. Explain "Kuhn Loss".

"Kuhn Loss" refers to the loss of some problems or solutions when a scientific paradigm shifts to a new one. According to Kuhn, scientific revolutions often involve changes in the fundamental concepts and methods of a field, leading to certain problems that were solvable under the old paradigm becoming irrelevant or unsolvable under the new one. This loss is a natural consequence of scientific progress, as the new paradigm opens up new avenues of inquiry while rendering some old questions obsolete.

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Q7. What does "progress towards truth" mean according to Kuhn?

According to Kuhn, "progress towards truth" is a problematic concept because he questions the idea that science moves linearly closer to an objective truth. Instead, Kuhn suggests that scientific progress involves shifts from one paradigm to another, with each paradigm offering its own framework for understanding the world. These shifts do not necessarily bring science closer to a singular truth but rather change the way scientists understand and interact with the world.

Q8. What, according to Kuhn, is a scientific revolution?

A scientific revolution, according to Kuhn, occurs when the scientific community adopts a new paradigm that fundamentally changes the concepts, methods, and standards of the field. This shift is not just an incremental improvement but a transformative change that redefines what is considered scientific knowledge, leading to a period of intense debate and reevaluation of existing theories and practices.

Q9. Explain the differences between Kuhn's and Popper's views of how science advances.

Kuhn and Popper have fundamentally different views on the advancement of science. Popper sees science as progressing through a rigorous process of conjecture and refutation, where theories are proposed and then attempted to be falsified through empirical testing. Scientific knowledge advances by discarding theories that are proven false, moving closer to the truth through elimination.

Kuhn, on the other hand, argues that science advances through paradigms, which are overarching theoretical frameworks that guide research. Scientific progress occurs not through the falsification of individual hypotheses but through paradigm shifts, where an existing framework becomes unable to solve emerging anomalies and is replaced by a new paradigm that offers a different perspective on scientific inquiry. These shifts are not necessarily closer to an objective truth but represent changes in the scientific community's approach to understanding the world.