

Analysis of Truth Theories: Inductive, Deductive, and Alternatives in Science

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ABSTRACT

This article discusses the concept of truth in the philosophy of science, emphasizing that truth is not a singular entity but can be understood through various theories and approaches. Classical theories, such as correspondence, coherence, and pragmatics, explain truth from the perspective of conformity to reality, logical consistency, and practical utility. Furthermore, this article outlines the role of inductive, deductive, and alternative approaches (performative and constructive) in the development of science. The inductive approach emphasizes drawing general conclusions from specific facts, while the deductive approach starts from general principles to specific conclusions. Performative and constructivist theories, as alternative approaches, broaden the horizons of understanding truth through language that creates realities and generative learning experiences. The results of this study indicate that the integration of these three approaches enriches scientific methodology and provides a more comprehensive philosophical foundation for building and developing science.

1. Introduction

Truth is a fundamental aspect of the world of science. Humans are instinctively driven to seek, understand, and practice the truth. When truth is not realized in action, it can lead to prolonged conflict, both psychologically and socially. Therefore, truth is one of the primary values in human life. This value serves as part of human spiritual needs, demonstrating that human dignity is always directed toward achieving and defending the truth. (Mustofa, 2017). In general, there are three main approaches to understanding truth: inductive, deductive, and alternative. Inductive thinking is a reasoning process that begins with specific facts or cases and then draws general conclusions. Meanwhile, deductive thinking is a method of drawing conclusions based on pre-established premises. Alternative theories of truth, on the other hand, are performative and constructive. These differences in approaches to truth have direct implications for how science is developed, validated, and critiqued. Therefore, an in-depth analysis of the theories of truth in science is important to study.

2. Literature Review

The etymological definition of truth, referring to the Great Dictionary of the Indonesian Language (Dictionary Compilation Team, Center for Language Development and Cultivation, 1994), the word truth can be interpreted as: 1) A condition or thing that matches the actual condition or thing; 2) Something that truly or truly exists; 3) Straightforwardness, honesty. Truth can be actualized or manifested in the form of scientific knowledge. Or in other words, knowledge is called scientific precisely because within that knowledge there is a truth that is scientific in nature. (Farida et al., 2024). In the history of science, many theories that were initially accepted as scientific truth were later refuted or revised when new evidence was discovered. Thus, scientific truth is a dynamic process that continues to develop along with new discoveries and more advanced scientific methods. The role of philosophy of science in understanding the concept of scientific truth is crucial, as it helps ensure that

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science not only accumulates knowledge but also considers its validity and reliability for the advancement of human understanding as a whole. Essentially, the theory of truth consists of correspondence, coherence, and pragmatism, commonly referred to as the classical theory of truth. Correspondence truth tends to emphasize objective facts found in the universe. In this view, nature is the source of truth because every statement must correspond to existing reality. However, because nature can change in form and situation, a statement can become untrue if it no longer reflects that changing reality. This discrepancy between a statement and reality can be caused by various influencing factors. Therefore, it appears that the main weakness of correspondence theory is its relative nature; its truth can change depending on the conditions or context in which it is based. (Patawari, 2019). Coherence truth states that a statement is considered true if it is consistent or in harmony with other statements that have previously been accepted as true. For example: "All humans must die, Sipolan is human, therefore Sipolan will certainly die." This statement is considered true because each part of the statement is logically related to each other. Pragmatic truth refers to a statement that is considered true if the statement or its consequences have practical use in everyday life. This theory is known as the pragmatic theory of truth, which focuses on the aspects of benefits and real results of a statement. (Nur et al., 2024)

3. Methodology

This research employed a library research method with a qualitative philosophical approach. Data were obtained from secondary literature in the form of books, scientific articles, and academic works discussing theories of truth in the philosophy of science. The analysis was conducted descriptively, analytically, and comparatively to explore and compare inductive, deductive, and alternative approaches to understanding truth in a scientific context.

4. Results and Discussion

4.1. Inductive

Thinking In the realm of science, thinking inductively starts from various events or special data to later formulated into a general conclusion or law. This process requires certain stages of reasoning as follows:

1. First stage: Custom data collection

The first step in inductive thinking is to gather specific facts or data. This process is carried out through observation and experimentation. Observations must be carried out carefully and thoroughly, while experiments are used to create or replace objects of study so that they can be analyzed more deeply.

2. Second stage: Hypothesis formulation

After the data is collected, the next step is to formulate a hypothesis, which is a conjecture or temporary answer based on existing information. This hypothesis serves as a guide in further research. In order to be called scientific, a hypothesis must be able to be tested for truth, be open, systematic, and in accordance with accepted principles and be able to explain the facts being studied.

3. Third stage: Verification

The hypothesis that has been formulated must then be verified, that is, proven to be true through testing of relevant facts. Verification is done by comparing hypotheses against reality or other data to draw general conclusions. This stage also involves a generalization process to form a broader postulate. If a hypothesis is proven to be true, then it can develop into a theory.

4. Fourth stage: Preparation of scientific theories and laws

The final step is to formulate a scientific theory or law based on the results of the verification. This theory is a comprehensive explanation of the symptoms that have been studied, and can be used as a reference in future scientific studies.

Inductive is a reasoning process that starts from one or several specific phenomena to then draw a general conclusion (inference). The inductive thinking method is used to construct an understanding based on specific things towards a general conclusion. This process begins with observation and evaluation of the facts or phenomena that occur. It is called a scientific mindset because in inductive reasoning logical and systematic steps are needed in accordance with scientific principles. (Sari 2017). This process goes through several important stages, namely data collection through observation and experimentation, hypothesis formulation as a provisional conjecture, verification to test the truth of the hypothesis, and the preparation of theories or scientific laws based on test results. By following these steps, inductive thinking is able to produce a logical, systematic, and scientifically accountable understanding.

Thus, it can be emphasized that the inductive method is an important basis in the development of science, because it serves not only to find patterns or general laws of particular facts, but also to formulate theories that can be used as a reference in future scientific research and studies.

4.2. *Deduktif*

Deductive reasoning is one of the logical and analytical ways of thinking, which grows and develops with increasingly intense, systematic, and critical observations. It is also supported by the increase in knowledge gained by humans, which will eventually lead to an effort to answer problems rationally so that the content can be accounted for, of course by putting aside irrational things. Solving problems rationally means focusing on human ratios in an effort to acquire the right knowledge. (Marnis Wanji et al., 2025)

The deductive approach is a method that is based on pre-agreed principles or rules. Deductive is a way of thinking that starts from a general statement and then descends into a more specific conclusion. In the context of learning, this approach begins with the presentation of general concepts or formulas, then continues with its application in the form of concrete examples to clarify understanding. The steps that can be used in the deductive approach in learning are (Winarso 2014):

1. Determine the concepts, principles, or rules that will be taught to students.
2. Convey general principles or rules clearly, accompanied by definitions and evidence.
3. Provide concrete examples so that students can understand the relationship between specific situations and general principles that have been conveyed.
4. Provide evidence or data to support or reject conclusions, so that learners can assess whether these specific examples represent a general principle.

Deductive reasoning is a logical, analytical, and rational way of thinking, emphasizing the use of general principles or rules as a basis for drawing more specific conclusions. This process develops as human knowledge increases and is carried out systematically and critically, so that the results can be scientifically accounted for. In the context of learning, the deductive approach functions as a method that leads students to understand general concepts or rules through clear explanations, then reinforced with concrete examples and supporting data. Thus, deductive reasoning not only strengthens conceptual understanding, but also trains students' critical thinking skills in assessing the suitability between general principles and specific facts they encounter.

4.3. *Alternatives (Performative and Constructive)*

1. Performative

This theory originated from the thought of John Langshaw Austin (1911–1960) which was later followed by other philosophers, such as Frank Ramsey and Peter Strawson. These philosophers oppose the classical theory of truth, which views the terms "true" and "false" as descriptive expressions, i.e. statements that simply state something. According to classical theory, a proposition is considered true if it corresponds to existing reality, and vice versa is considered false if it does not correspond to reality. However, it was this view that Austin and his followers rejected. In performative theory, a statement is not measured by its conformity to reality, but by its ability to create reality itself. In other words, a true statement is not just a reflection or representation of reality, but a statement that actually presents or embodies reality as expressed in it. Therefore, this theory is also known as "language action theory," because it emphasizes the close relationship between statements and actions. The truth of a statement is seen from the extent to which it functions as a real action and has an impact in reality.

In its application, performative theory can be both positive and negative. Positively, a statement can be used to create a reality that corresponds to what is stated, such as a promise or a valid statement in law. However, this theory also has a negative side when statements are used for the wrong purpose, thus creating a misleading or detrimental reality. (Atabik, 2014)

According to performative theory, a statement is considered true if it creates reality. A true statement is not a statement that expresses reality, but rather a reality as expressed in the statement is created. Example: "I hereby appoint you as the regent of Bantul." With that statement, a new reality is created, namely your reality as the regent of Bantul. On the one hand, this theory can be used positively but also on the other hand it can also be used negatively. Positively, with certain statements people try to realize what they are expressing. "I swear to be a faithful husband, or a faithful wife in wrestling or wrestling." But negatively, people can also be complacent with their statements or expressions as if they are the same as reality, when this is not the case. The reference to performative truth does not lie in the reality that already exists/occurred before, but lies in the reality that can then be formed by the statement/proposition. Truth is more determined by the power of the power of the statement to realize reality. It is not reality that determines propositions, but propositions determine reality. (Indarti Nunuk, 2020)

2. Constructive theory

It is understood as a generative learning approach, which is the process of creating meaning from the learning experience obtained. Everything we experience in our daily lives is actually a collection of experiences that continue to build and structure gradually.

In constructive theory, value is not seen as something dominated by power, but as an inherent basis in life itself. However, within this framework, constructivism often loses its main orientation, which is the critical function of encouraging emancipation or liberation of ways of thinking. In other words, while constructivism emphasizes the creation of meaning and the accumulation of experience, it has the potential to undermine the critical role that supposedly frees individuals from the shackles of oppressive views or structures. (Sukmawati & Tarmizi, 2022)

Constructivism places students as active subjects in the learning process. Students are given the widest possible space to understand the knowledge they have gained by relating the concepts they have, and then applying those concepts in their daily lives. Thus, learning does not only stop at the theoretical level, but is also embodied in real practice that is relevant to the student's life experience. It can be concluded that constructivism is a learning theory that encourages students' freedom of thought. This theory demands that students not only understand the theory cognitively, but also be able to implement it in daily life. In other words, constructivism emphasizes the connection between knowledge, understanding, and real application, so that students become more independent, critical, and creative in learning. (Suparlan, 2019)

5. Conclusion

The concept of truth in the philosophy of science shows that truth is not something singular, but can be understood through various theories and approaches. Classical theories such as correspondence, coherence, and pragmatism emphasize conformity to reality, logical consistency, and practical benefits. Meanwhile, inductive, deductive, and alternative approaches (performative and constructive) have an important role in the development of science. The inductive approach emphasizes on the observation of specific facts to then draw general conclusions, while the deductive departs from general principles or rules to be derived into a more specific understanding. Both use logical and systematic reasoning, resulting in scientifically accountable knowledge. Then alternative approaches are present to expand the horizons in understanding the truth and the learning process. Performative theory shows that language and statements are not just reflections of reality, but are capable of creating reality itself. Constructivism places individuals, especially students, as active subjects in building knowledge through real experience. Thus, the combination of these three approaches can enrich scientific methodology while providing a broader philosophical foundation in the development of science.

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