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Re-Understanding the Problem of Induction in Empirical Science

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ABSTRACT
A problem is a statement or truth based on experience that is used as a hypothesis. In formulating a hypothesis based on statements as an inductive way of thinking. The problem of induction can also be formulated as a question about the validity or truth of universal statements based on experience. Thinking based on logic gives humans the possibility to gain knowledge, which is deeper than the meaning of what is thought. In formulating a hypothesis based on statements as an inductive way of thinking. The problem of induction can also be formulated as a question about the validity or truth of universal statements based on experience. In the case of inductive logic, however, these relationships vary in strength, measures of conditional probability reflect the degree of rational confidence that a person should have in the hypothesis that empirical science should be so characterized by its methods. With this method, we deal with science with a system based on what we do to what is done. The difference between the psychological view of knowledge which is related to empirical facts, and the logic of knowledge which is only related to empirical facts. With logical connections, the belief in inductive logic is largely due to confusion between psychological problems and epistemological problems.

INTRODUCTION

In thinking, of course, there must be certain rules that must be used as standards to be followed. Almost thinking is a process that can be said to be the result of science and provide benefits to the public. The characteristics of critical philosophical thinking are thinking in terms of criticizing, suspecting and questioning everything, to the point of searching for and obtaining the basics of intellectual responsibility, or fundamental arguments that cannot possibly be doubted or questioned again by anyone at any time. A problem is a statement or truth based on experience that is used as a hypothesis. In formulating a hypothesis based on statements as an inductive way of thinking. The problem of induction can also be formulated as a question about the validity or truth of universal statements based on experience, such as hypotheses and theoretical systems of empirical sciences. As Albert et al. (1999:15) said procedures that are to test a subject's knowledge concerning a specific domain require addition to other prerequisites set of problems. The answers to these problems may serve as a basis for a hypothesis about the subject's actual knowledge.

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Empirical science can only be explored by the formal or logical structure of statements which cannot exclude them from the form of metaphysics which commonly results from the elevation of outdated scientific theories to irrefutable truth. According to this view, the logic of scientific discovery will be identical to inductive logic, namely with the logical analysis of the inductive method. An inference is usually called 'inductive' if it moves from a single statement (sometimes also called a particular statement), such as an explanation of the results of an observation or experiment to a universal statement, such as a hypothesis or theory. The theory to be developed is partly in direct conflict with all attempts to operate with ideas -the idea of inductive logic. This may be described as a theory of deductive testing methods, or as the view that hypotheses can only be tested empirically and only after they have been proposed.

METHOD

In this study, the researcher used a descriptive qualitative approach. Reason The qualitative approach was chosen as an approach in research because it follows the research objectives that have been formulated, namely to analyze in detail and detail how to re-understand the problem of induction in empirical science. Therefore, the data to be collected more specifically required in-depth data mining regarding the process of understanding induction in empirical science. The research method chosen by the researcher was qualitative literature studies. This method was chosen because this study will describe in more detail and detail the results of the analysis.

RESULTS AND DISCUSSION

Problem Thinking Concept

The problem in empirical science is the exploration of data and facts that direct researchers to think deeply through inductive direction. Thinking inductively looks at the extent to which the concept will be built from legal postulates for justification as science. Someone who seriously thinks about looking for answers to questions that arise from the complexity and uncertainty of life which can make him wonder (thaumasia) or doubt (skepsis). They do not call themselves wise humans, but simply as Pythagoras (+581-507 BC) defined himself, "lovers of wisdom" (Solomon & Higgins, 2002), in Etis (2019:3).

Not all thinking will produce knowledge and knowledge and not all thinking is said to be scientific thinking. In thinking, of course, there must be certain rules that must be used as standards to be followed. Almost thinking is a process that can be said to be the result of science and provide benefits to the public. The problem is that these very same instances will also confirm a different universal hypothesis (indeed, an infinity of them), which makes an opposite prediction about subsequent cases (Holyoak & Morrison, 2005:96). Exploring knowledge starts from thinking hypothetically which is the beginning of justifying the study optimally through a logical view of experience.

In the field of empirical science, in particular, he constructs hypotheses, or systems of theories, and tests them based on experience through observation and experiment. Furthermore, this is probably a hangover from the logical empiricist view of science that sought to avoid all reference to causal relations in favour of logical ones (Holyoak & Morrison, 2005:96). The Holist view of epistemology argues that is the idea that our hypotheses meet the tribunal of experience, not individually, but together; no single hypothesis is ever refuted but can be held come what may in the way of experience (Richardson & Ueebel, 2007:337). However, in the epistemological naturalism view of thinking, it is sometimes difficult to determine exactly what thinking can gain from experience.

Thinking based on logic gives humans the possibility to gain deeper knowledge of the meaning of what they think. The study of inference and of meaning relations between concepts are the two main pursuits of the discipline of logic (Prawitz et al., 1994:11). Therefore, the meaning of thinking is the

process of searching for something that is not yet known or known based on something that is already known through reasoning so that knowledge is obtained (Fadli et al., 2022:3). The characteristics of rational thinking share that both thinking activities and the results of philosophical thinking itself must be accepted logically, not just following common sense (lay thought). Furthermore, As he makes clear in his most mature presentation of his epistemology in "The Facts in Perception" of 1878, it is Helmholtz's view that philosophy considers the relationship between our representations and the external world from the mental or psychological side, while natural science considers it from the physical or physiological side (Creath, 2012:2). In line with Hakim (2020:3) that genuine philosophical issues are built on the use of language, or linguistic rules that provide understanding to humans.

The characteristics of rational philosophical thinking make philosophy called critical thinking or critical science. Philosophical critical thinking has 2 aspects, namely criticism and crisis. Critical thinking (critics) is, thinking not just to find phenomena or adapt to the reality of people's thoughts or views (including dogma or teachings, beliefs and any ideologies) (Harianto, 2023).

The essence of the characteristics of critical philosophical thinking is thinking in terms of criticizing, suspecting and questioning everything, to the point of searching for and obtaining the basics of intellectual responsibility or arguments whose basis cannot possibly be doubted or questioned again by anyone at any time. even. This philosophy with critical thinking (critical ratio), wants to carry out in-depth research studies to find the core of thought or the truth that is sought.

Category Induction problems

A problem is a statement or truth based on experience that is used as a hypothesis. In formulating a hypothesis based on statements as an inductive way of thinking. The problem of induction can also be formulated as a question about the validity or truth of universal statements based on experience, such as hypotheses and theoretical systems of empirical sciences. Many people believe that the truth of this universal statement is known from experience; however, it is clear that a record of an experience regarding an observation or experimental result is just a single statement and not a universal statement.

Therefore, one who says of a universal statement that we know its truth from experience usually means that the truth of this universal statement is somehow reducible to the truth of a single statement and that this single statement is known to be true through experience; which means universal statements are based on inductive inference. So, asking whether any laws of nature are known to be true seems to be just another way of asking whether inductive conclusions can be logically justified.

The preface of Empirical Sociology merely states “All scientific statements can be connected and constitute a uniform domain which comprehends only statements about observable states of affairs. For this, the name unified science has been proposed. If one wishes to stress that in this way everything becomes physics, then one may speak of physicalism (Richardson & Ueebel, 2007:261). But if we want to find a way to justify inductive conclusions, we must first try to establish the principle of induction. The principle of induction is a statement by which we can put inductive conclusions into a logically acceptable form. In the eyes of adherents of inductive logic, the principle of induction is very important for the scientific method.

According to Reichenbach, determining truth through scientific theory. Eliminating this theory from science means depriving science of its power to determine whether its theories are true or false. Without it being clear, science no longer has the right to differentiate its scientific logical theories from the imaginary and arbitrary creations of the poet's mind (Popper, 2002).

This principle of induction cannot be a purely logical truth like a tautology or analytic statement. It is true, that if there were a purely logical principle of induction, then there would be no problem with induction; for in this case, all inductive inferences must be considered purely logical or tautological

transformations, just as inferences in deductive logic are. So the principle of induction must be a synthetic statement, namely a statement whose negation is not contradictory but is logically possible. So the question arises as to why such a principle should be accepted and how we can justify its acceptance on rational grounds.

Some believers in inductive logic were eager to point out, along with Reichenbach, that 'the principle of induction is accepted unconditionally by all science and that no one can seriously doubt this principle. In everyday life, even if this were the case in this case because after all science can be wrong, I would still argue that the principle of induction is useless and that it inevitably leads to logical inconsistencies (Popper, 2002). Inconsistencies can easily arise for the principle of induction is clear from Hume's work as well, that such inconsistencies can be avoided, if they exist, only with great difficulty (Popper, 2002). Because the principle of induction in turn must become a universal statement. So, if we try to take the truth as something known based on experience, then the same problems that led to its introduction will arise again.

To justify it, we must use inductive conclusions; and to justify this we must take the inductive principle of a higher order; etc. Thus the attempt to base the principle of induction on experience fails because it inevitably leads to infinite regress. Hume proceeds to raise a fundamental question now known as "the problem of induction" (Holyoak & Morrison, 2005:95). Furthermore, the problem of induction may also be formulated as the question of the validity or the truth of universal statements which are based on experience, such as the hypotheses and theoretical systems of the empirical sciences. A principle of induction would be a statement with the help of which we could put inductive inferences into a logically acceptable form (Popper, 2002:4). In the eyes of the upholders of inductive logic, a principle of induction is of supreme importance for scientific method: '... this principle' (Popper, 2002:4).

Then Reichenbach said that 'the principle of induction is accepted unconditionally by all science and that no one can seriously doubt this principle in everyday life' (Popper, 2002:5). This principle of induction cannot be a purely logical truth like a tautology or analytic statement. It is true, that if there were a purely logical principle of induction, then there would be no problem with induction; for in this case, all inductive inferences must be considered purely logical or tautological transformations, just as inferences in deductive logic are.

So, the principle of induction must be a synthetic statement; that is, statements whose negation is not contradictory but logically possible. So, the question arises why such a principle should be accepted, and how we can justify its acceptance on rational grounds. Central to this approach is the belief that inductive logic, like deductive logic, concerns the logical relationships that exist between statements regardless of their truth. In the case of inductive logic these relationships vary in strength, measures of conditional probability reflecting the degree of confidence that a rational person should have in a hypothesis given the available evidence.

Induction Problems in Empirical Science

Imperial science

In studying problems, of course, science is needed to prove the truth using generalizations. Utama (2021:3) said that science is also one of human knowledge... and all truths have their benefits as long as they are placed in the proper place. Scientific proof is based on a problem statement as the initial justification for which the truth is sought.

The discovery of problems in empirical science is only explored from the formal or logical structure of the statements, which cannot exclude them from the form of metaphysics which commonly results from the elevation of outdated scientific theories to irrefutable truths. Schlick introduced affirmations not only to guarantee the certainty of the basis but to ensure that it was empirical, thus securing a role for experience in scientific knowledge (Giere & Richardson, 1996:287). Therefore, this reason can be

used as a suggestion that empirical science should be characterized by its methods. With this method, we deal with systems science based on what we do to what is done. So, we will try to establish rules, or if you want norms, which are based on the opinions of scientists as guides when carrying out research or discoveries, which can be understood.

Empiricism method

Etymologically, empiricism comes from the English words empiricism and experience. These words are rooted in the Greek word Excipia (empeiria) and from the word experietia which means "experienced in", "acquainted with". "skilled for". Meanwhile, according to Lacey based on the root word empiricism is a school in philosophy which holds that knowledge as a whole or in part is based on experience using the senses. Furthermore, terminologically there are several definitions of empiricism, including the doctrine that the source of all knowledge must be sought in experience, the view that all ideas are abstractions formed by combining what is experienced. sensory experience is the only source of knowledge, and not reason (Al Munir, 2004:236).

Empiricists are content with developing a system of knowledge that has a high probability of being true, although absolute certainty can never be guaranteed. Empiricists firmly hold the opinion that human knowledge can be obtained through experience discovered through the empirical method itself. Empirical can be characterized by the fact that they use inductive methods, as they are called. According to this view, the logic of scientific discovery will be identical to inductive logic, namely with the logical analysis of the inductive method. An inference is usually called 'inductive' if it moves from a single statement (sometimes also called a particular statement), such as an explanation of the results of an observation or experiment, to a universal statement, such as a hypothesis or theory. The inductive thinking method coined by Bacon was further complemented by theoretical assumptions in making observations and by combining the role of mathematics which further stimulates the growth of science (Utama, 2021:4).

Now, from a logical point of view, it is far from clear that we are justified in deducing universal statements from single statements, no matter how numerous they are; because any conclusion drawn in this way may always be wrong and no matter how many. For the example of the white swan that we observed, this does not justify the conclusion that all swans are white. The question of whether inductive conclusions can be justified, or under what conditions, is known as the problem of induction. According to Chisholm "If we know the answer to either one of these questions, then perhaps we may devise a procedure that will enable us to answer the other. If we can specify the criteria of knowledge, we may have a way of deciding how far our knowledge extends. Or if we know how far it does extend and can say what the things are that we know, then we may be able to formulate criteria enabling us to mark off the things that we do know from those that we do not (Bonjour, 1985:11). Thus the critical thinking method is thinking and based on experience. This method is thinking inductively, a way of thinking from the specific to the general with questions.

Problems as the logic of knowledge

The logic of knowledge is a decision on how to think in understanding the truth which is carried out logically from empirical matters involving the five senses in the past. Logic is a means of systematic, valid and accountable thinking. Therefore, logical thinking is thinking according to the rules of thinking (Utama, 2021:43). Furthermore, Hume was concerned with questions of both description and justification. In contrast, the logical empiricists (Carnap, 1950; Carnap, 1966; Hempel, 1965; Reichenbach, 1938) focused only on justification. Having successfully provided a formal account of deductive logic (Frege, 1880; Russell & Whitehead, 1925) in which questions of deductive validity were separated from how people make deductive inferences (see Evans, Chap. 8), philosophers attempted to do the same for inductive inference by formulating rules for an inductive logic (Holyoak & Morrison, 2005:96).

Central to this approach is the belief that inductive logic, like deductive logic, concerns the logical

relationships that exist between statements regardless of their truth. In the case of inductive logic, however, these relationships vary in strength, conditional probability measures reflect the level of rational confidence that a person should have in a hypothesis given the available evidence. This is probably a hangover from the logical empiricist view of science that sought to avoid all reference to causal relations in favour of logical ones. Contemporary philosophical accounts have striven to reinstate the notion of causality into induction. (Glymour, 2001; Lipton, 1991; Miller, 1987), and therefore Miller proposed a definition of inductive confirmation as a causal comparison: Hypotheses are confirmed by appropriate causal accounts of the data-gathering process (Holyoak & Morrison, 2005:96).

The theory to be developed is partly in direct conflict with all attempts to operate with the ideas of inductive logic. This may be described as a theory of deductive testing methods, or as the view that hypotheses can only be tested empirically and only after they have been proposed. From some of these views (which might be called 'deductivism', in contrast to 'inductivism'), however, it is necessary to explain the difference between the psychological view of knowledge which is concerned with empirical facts, and the logic of knowledge which is only concerned with empirical facts.

It is said by Lewis (2007) as empirical knowledge if there is anything that is distinguished by experience. With logical connections, the existence of belief in inductive logic is largely due to confusion between psychological problems and epistemological problems. Furthermore, Kopper defined epistemology as the study of scientific problems and problem situations, of scientific conjectures (Rootselaar & Staa, 1968:337). It may be worth noting that this confusion poses problems not only for the logic of knowledge but also for its psychology. Quine (1987:109) said I think that for scientific or philosophical purposes the best we can do is give up the notion of knowledge as a bad job and make it do so rather with its separate ingredients (Azzouni, 2000:118). Furthermore, the knowledge of a subject about a special knowledge domain is identified in the theory of knowledge spaces with his or her ability to solve problems from this domain (Albert et al., 1999:134).

CONCLUSIONS

Thinking based on logic gives humans the possibility to gain knowledge, which is deeper than the meaning of what is thought. The characteristic of critical philosophical thinking is thinking in terms of criticizing, suspecting and questioning everything, to the point of searching for and obtaining the basics of intellectual responsibility or arguments whose fundamentals cannot possibly be doubted or questioned by anyone at any time. This principle of induction cannot be a purely logical truth like a tautology or analytic statement. It is true, that if there were a purely logical principle of induction, then there would be no problem with induction; for in this case, all inductive inferences must be considered purely logical or tautological transformations, just as inferences in deductive logic are. The question of whether inductive conclusions can be justified, or under what conditions, is known as the problem of induction. Thus the critical thinking method is thinking and based on experience. This method is thinking inductively, a way of thinking from the specific to the general. In the case of inductive logic, however, these relationships vary in strength based on a measure of conditional probability to reflect the degree of confidence a person should have in a hypothesis given the available evidence.

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