Ground of Induction

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*[**Abstract :*** Induction as a process of inference provides us with new knowledge. This knowledge is revealed through observing particular instances using some general propositions. A question raises; what accounts for the justification of this leap from particular to general? Mill assumes that nature is uninformed and a particular instance is likely to produce the same effect under the same conditions. Hume, on the other hand, describes that the cause and effect relation is not a necessary connection but a matter of habit and this connection is inadequate to settle down the ground for the legitimacy of induction. Bradley, on the contrary, refuses that induction can move from particular to the general. Russell argues, more frustratingly, that the induction principle cannot be proved or disproved by appealing to experience. Despite being suspicious about the cogency of induction, it cannot be rejected as a process of reaching to the unknown from the known, as a method of producing new knowledge. For this, it is necessary to provide a rational ground for induction in which it is justified. First, this paper argues that there is no such universal logical principle to prove the justification of induction, and second, this justification is to be supported by appealing to the pragmatic worth of the process.]

Introduction

It is generally granted that in the process of argumentation induction provides us with probability while deduction provides certainty. Deductive reasoning deduces the truth of its conclusion from its premises which are greater in scope than the conclusion. It is easier to construct a logical method for deduction by appealing to the truth of its premises, which necessarily guarantees the truth of its conclusion no matter what the matter of fact is. However, human knowledge is not confined only within the world of abstract ideas and concepts; we must deal with the world of facts as well. While dealing with facts or experience, we cannot expect that the facts we are experiencing in a particular time that would remain the same in

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the future. The nature of our empirical world makes it difficult to construct and to prove any principle, which tries to explain or predict matters of fact, to be universal. This is one of the crucial reasons why induction cannot provide us with certainty in deducing a general proposition. Since it is expected that a process of reasoning must have a general ground to explain the validity of that process, questions have raised regarding the ground of induction as a method. Mill's (1843) account of induction has assumed a-priori general principle that has been criticized by Hume (1748) and Bradley (1928). Russell (1912) has argued that induction is based on our mere expectation that our future experience will resemble our experience and the ground of induction cannot be supported or unsupported by experience. This paper will examine the views of Mill, Hume, Bradley, and Russell regarding this issue and will offer no general proposition or law but a different perspective which can be considered as a ground for the acceptability of induction as a method of reasoning.

Mill on Induction

John Stuart Mill, in his *A System of Logic* (1843), has elaborated his method of induction. Induction is a mental operation that helps us to infer the truth of an instance from the truth of the previously observed instances under similar situations. Induction is not a mere summing up of similar instances or facts. We infer the unknown from the known, i.e., facts unobserved from facts observed through induction. The proposition that the course of nature is uniformed is the fundamental principle of induction. An induction is accepted if it is consistent with previously accepted inductions which have been tested them invariably. The logic of induction bases on certain and universal inductions which are used as criteria. The notion of physical cause is at the root of the Millian concept of induction. A certain phenomenon is believed to be followed by another certain phenomenon in a constant manner. The unchanging antecedent is considered to be the cause, and the invariable consequent is termed as the effect. The possibility of reducing the inductive process to rules rests upon the universality of the truth of the constant nature of cause and effect.

Mill (1843) has reflected on some principles or canons on which causation may be established:

1. Agreement: If several instances of a phenomenon all have only one circumstance in common, then that one circumstance is the cause (or the effect) of the phenomenon.
2. Difference: If a phenomenon occurs in some circumstances but not in others, that which is common to occasions when it does happen (but not the ones where it does not) is the cause.

3. Agreement and difference: If two or more instances in which the phenomenon occurs have only one circumstance in common, while two or more instances in which it does not occur have nothing in common, the circumstance in which alone the two sets of instances differ is the cause (or the effect) of the phenomenon.
4. Residue: Subduct from any phenomenon such part as is known by previous inductions to be the effect of certain antecedents, and the residue of the phenomenon is the effect of the remaining antecedents.
5. Concomitant Variations: Whatever phenomenon varies in any manner whenever another phenomenon varies in some particular manner is a cause (or an effect) of that phenomenon.

Being aware of the fact that in many cases there is the plurality of causes and intermixture of effects, Mill (1843) has suggested that we should depend on the deductive method. He claims that the deductive method is the primary method which helps us to acquire knowledge of the conditions and laws of the complex phenomena. It consists of three processes: induction, ratiocination, and verification.

It is clear that Mill tries to make induction stand on firm ground and praises this method as a process of discovering the new truth. However, he has overemphasized on deduction as a method of reasoning as it establishes new truth on the base of certainty. While doing so, he has forgotten that induction provides deduction with that hypothesis which works as the basis of its entailment of certainty. Despite being different in nature, these two methods of reasoning help each other in the process of discovering and testing truths. We should not emphasize particularly on one of these operations.

Mill considers nature's uniformity as granted as a law. The proposition that nature is uniformed cannot be proved to be a-priori; it can be considered as a mere expectation based on our experience. It seems that Mill has tried to establish induction on the ground of an expectation, not on a general principle or law, which itself depends on induction. His consideration that causal relations remain the same under the same conditions has been criticized by Hume (1748).

Hume on Causation

David Hume (1748) claims that reasoning concerning matters of fact is based on the relation of cause and effect. This relation can take us beyond the evidence of our senses and memories. From causation, we can find an explanation in the past for a present occurrence and also can predict future instances that may take place. However, we cannot arrive at the knowledge

of cause and effect by a-priori reasoning. The relation of cause and effect arises from experience by observing that particular objects are invariably conjoined with each other. Our objects of observation cannot reveal the cause of their production or the effect they will produce. Every effect is different from its cause, and it is not possible to discover the effect of the cause. Without the help of experience, our reason is unable to draw any inference about the fact. Hume boldly states that all the laws of nature are known by experience, not by a-priori reasoning.

Arguments from experience are based on the discovery of similarity among objects, and we expect similar effects from causes that seem similar. This connection of similarity is discovered by uniformed experiment and observation. A question arises: what is that process of reasoning which deduces a conclusion from similar instances different from the conclusion? No argument from experience can be considered as a logical ground for the expectation that similar type of causes will precede a similar type of effects because all the arguments from experience are founded on the same expectation. Even the number of incidents happened, in the same manner, cannot guarantee that the otherwise will never happen. Hume has concluded that there is no reason by which we infer that the past will resemble the future and the same effects will be produced from the same causes. All inferences concerning matters of fact are effects of custom (Hume, 1748).

It seems evident that any constant law or principle cannot explain the course of nature. There is the plurality of causes and effects, and we do not have any logical principle behind the relation of causality. We cannot claim that the course of nature will remain unchanged, and so will the relation of causation. The proposition that nature is uniformed cannot be the fundamental principle of induction because its truth cannot be established either through any logical process or by experience. Bradley (1928) has viciously attacked Mill's method of induction and claimed that it presupposes universal truth and all the canons illustrated by Mill are vicious.

Bradley's View on Induction

Francis Herbert Bradley, in his *The Principle of Logic* (1928), has argued that the base of induction is not particular facts. A proposition that perfectly talks about the specific elements in a known particular relation is not a proposition about a particular fact, and it is a universal proposition. For example, we say that 'under conditions F, G and H, the combination of object ab and object yz causes the production of st' and these incidents are particular instances that lead us to the general or universal proposition that 'the combination of object ab and object yz causes the production of st'.

The propositions that express the specific relation under different situations are not describing particular facts. The relation among objects ab,yz and st goes beyond the fact as the relation between these certain objects is revealed. The proposition that expresses the relation between certain elements is not a particular proposition but an impure universal proposition. Thus he claims that induction does not start from individual facts, it starts from universals and cannot be inductive.

Mill's canons are proved false in Bradley's (1928) account. He claims that the methods are not inductive because all of them have a fixed relation between certain elements of a whole and then by the removal of the related parts they established the relationship between the remaining elements. The method of agreement says that whatever is different in the different cases can be eliminated. If ABC causes pqr, ADE causes pst and AFG causes puv then according to this principle A is the cause of p. However, it is not necessary that p will always be produced by A. Thus, Bradley (1928) claims that this principle is false and this kind of generalization is vicious. The second canon, known as the method of difference, is no better than the method of agreement. It states that whatever cannot be eliminated is necessarily connected with the phenomenon. If one premise says that ABC causes pqr and other states that BC causes qr then the conclusion is A causes p. However, it is plausible that A accidentally became a part in the production of p and it is possible for p to be produced in the absence of A. It can be shown, in the same manner, that the joint method of agreement and difference is also founded on an erroneous principle. The method of residue suggests that by eliminating the part of a phenomenon which is known to cause the particular effect, we can discover the cause of the remaining effect. If the premises are, ABC produce pqr, B produce q, and C produce r then they will lead to the conclusion that A produces p. However, it ignores the possibility that B or C and both B, C can influence A. According to the principle of concomitant variation if AaBC cause paqr, AbDE cause pbst, and AcFG cause pcuv then we can conclude that A causes p. Bradley (1928) points out that to reach to the conclusion we had to eliminate all other possibilities but 'A causes p' without any acceptable reason. It seems that all these methods are based on the method of difference and assume a prefixed relation between certain elements of a phenomenon to establish the relationship between the remaining elements of that phenomenon.

Mill's system of induction has inherently assumed that relations between the objects of experience are constant and the certain object can be engaged with phenomena only in one particular manner. On the ground of this assumption, he tried to explain the multiplicity of empirical facts and complexities of causation. To determine or to generalize a particular

relation we need to observe and examine several different occurrences that show the relevant elements being connected expectedly. To reach to the proposition that under condition X, A causes p, we have to go beyond all the particular instances in which under condition X, A produced p. In this sense, the proposition that under condition X, A causes p does not express a particular instance. While concluding under all circumstances A causes p from the premises like, under condition X, A causes p, under condition Y, A causes p, under condition Z, A causes p, we are just moving from general propositions to another general proposition. However, what is the basis of general propositions, regarding matters of fact, accepted as laws and principles?

Russell on General Principles

In his *The Problems of Philosophy* (1912), Bertrand Russell has claimed that general principles are based on induction. All the scientific laws are believed on the basis that they worked nicely in the past and on the basis of the previous experiences we expect that they will work in the future. However, how many cases are needed to be observed to establish the claim that the same thing will happen in the future? There is no definite answer to this question and our expectations like the sun will rise tomorrow, and the laws of motion will remain in operation, are only probable. We do not have any reason to suppose that the future will resemble the past. The frequent repetition of an incident does not provide us with certainty, but it increases the probability. There is always a chance of happening the otherwise. Similarly, the belief that laws of nature will remain in operation is based on induction and repetitions increase the probability of general laws. All these general laws are accepted and believed because we have found countless instances of their truth and on the basis of induction, we anticipate that they will hold in the future. All arguments that deal with experience reveal the unexperienced part of past or present and speak of future by previous experiences adopt the inductive principle. Therefore, the experience cannot prove or disprove the inductive principle.

It is true that based on the frequent repetition of an incident we cannot be confirmed that the same incident will take place in the same manner, but we cannot be certain either that the instance will not take place in the future. From our previous observations, we can expect that the sun will rise tomorrow, but nothing can assure us that our expectation will be fulfilled or something will interrupt the rotation of the earth and our prediction will go wrong. However, can we abandon all our future expectations standing on our previous observations of various associations? Shall we give up on induction as we do not have any concrete principle,

except some general propositions which are again based on induction, as a ground of its validity?

Reconsideration of the Process of Induction

It is mentioned above that Mill (1843) has tried to establish induction on the ground of the uniformity of nature and considered it as a method of revealing the causal connections. It is evident that the concept of nature's uniformity cannot be derived from reason a-priori. We cannot reach to the proposition without seeking any help from experience. Thus, the general proposition that nature is uniformed is as probable as all other general statements concerning matters of fact and loses its significance as a ground of induction. In the same manner, Mill has assumed that there is a fixed relationship between cause and effect and the process of induction can be established relying on the universality of this constant relationship. However, Hume has shown that there is no necessary connection between cause and effect. On the basis of our experience, our mind makes an association between a prior (cause) occurrence and a subsequent one (effect). There is no reason to consider this type of association necessary. It seems clear that while trying to establish induction on a strong ground Mill, perhaps unintentionally, has made the acceptability of the process questionable. However, can we rightfully expect induction to be grounded on some principle?

Let us consider the expectation that induction should be grounded on a general principle. Induction is usually defined as a method of inference which reaches to a general proposition on the basis of particular facts. From the observation of past instances, it concludes that the same type of instance shall take place in future. If we consider that Hume and Russell are right in claiming respectively that there is no necessary connection between cause and effect and general principles like nature is uniformed are based on empirical observations certainty of which cannot be guaranteed, we understand that Mill was wrong in thinking that induction can stand on the ground of nature's uniformity and causation. The nature of empirical fact is that the denial of it does not make any contradiction. No matter how many times we have experienced that the sun rises in the east, we can think of the opposite without making any contradiction. However, we cannot guarantee either that the conceivability of the opposite can confirm the occurrence of it. We can question the certainty of all general principles, but the questions do not have the force to prove it wrong. In induction, we conclude with an expectation that the future will resemble the past if certain conditions remain the same. Observation of numerous instances of a particular fact feeds our expectation. It is not certain that the expectation will be fulfilled,

but we also can't be sure that the expectation will not be fulfilled. Induction has never been claimed to produce certain knowledge. We cannot expect any general principle to be the ground of induction because matters of fact, courses of nature cannot be explained by any a-priori principle that will establish the irrefutability of the principle. Because nature's uniformity is not guaranteed, we cannot confirm that the courses of nature will never change.

On the other hand, principles based on experience themselves assume the principle of induction. Based on our experience we can assume that a particular fact will happen similarly in the future and the increased number of our observations will increase the probability of our expectation to be fulfilled. Thus, induction provides us with probability degree of which depends on the number of the particular instance observed.

Bradley (1928) claims that induction does not start from the observation of particular facts; instead, it starts with universals which are not pure induction. Precisely, inductions are not inductive. When we claim that under certain condition a definite set of elements are related in a particular way we go beyond the particular facts. Bradley holds that this type of claims are impure universals and by this type of universals induction produces a result which is also universal. For example, consider the following argument:

> Under condition ab combination of sodium and chlorine produces salt.
> Under condition cd combination of sodium and chlorine produces salt.
> Under condition ef combination of sodium and chlorine produces salt.
> Therefore, the combination of sodium and chlorine produces salt.

According to Bradley's claim, the premises of this argument are asserting the specific relation between the combination of sodium and chlorine and salt. They are not asserting particular instances but universal propositions. From these universals, we come to another universal that combination of sodium and chlorine produces salt. It is true that propositions that represent certain relations among different elements are not arbitrary statements. Uniformed observation of the repetition of particular instances is required to construct this type of propositions. In the argument as mentioned earlier, all the premises asserts that a particular relation holds between certain elements under conditions ab, cd and ef. However, all these premises are constructed from the observation of particular instances that occurs under several conditions. The base of this argument is particular facts relevant to the generalization. It may seem that

induction starts with universals, but the universals are constructed after observing particular facts. Without observing individual instances, we cannot expect anything to happen in the predicted manner. However, the question is, do these expectations have any practical implications?

From our everyday life to scientific investigations all our actions are based on our expectation that associations which worked in the past will work in the future. When we feel bad, we play our favorite music to feel better; we try to get relieved from a headache by taking painkillers, we drink green tea to boost our metabolism - all these actions are based on the expectations that future will resemble the past. Physical sciences depend on the induction process that leads them to the expectation that a phenomenon can recur if the conditions that give rise to it are maintained. The general propositions inferred from inductions work as the hypotheses in the deductive process. All the empirical sciences are enjoying their success by advancing their investigations with the help of induction. It seems, our expectations grounded in induction are of great practical importance. If we consider that induction as a method is not sound, we will confine ourselves within a very limited sphere.

Conclusion

This paper argues that we cannot expect induction to be grounded on general principles. The world of experience cannot be explained by reason a-priori. There is no other way to reveal the mystery of nature but observing particular facts in a repeated manner and determining the associations by following the process of induction. The importance of induction is no less than that of deduction. The conceivability of the opposite of any empirical fact prevents induction to be based on general law. However, we cannot claim the fact that the denial of empirical fact does not make any contradiction, is sufficient to establish either the inevitability of knowledge that we acquire through induction or the legitimacy of the process of induction. We cannot deny the pragmatic worth of induction.

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