UNIT 15: PROBLEM OF JUSTIFICATION OF INDUCTION

UNIT STRUCTURE

15.1 Learning Objectives

15.2 Introduction

15.3 Problem of Induction

- 15.3.1 Can a Demonstrative Proof of Principle of Inductive Reasoning be Offered?
- 15.3.2 Can the Principle of Inductive Reasoning be Justified by Inductively?

15.4 Answers to the Problem of Induction

- 15.4.1 Inductive Justification of Induction: Answer to Hume's Objections
- 15.4.2 Pragmatic Justification of Induction
- 15.4.3 Justification by Principle of Uniformity of Nature and Law of Causation
- 15.4.4 Dissolution of the Problem of Induction
- 15.4.5 Falsifiability Principle

15.5 Let us Sum up

15.6 Further Reading

15.7 Answers to Check Your Progress

15.8 Model Questions

15.1 LEARNING OBJECTIVES

After studying this unit, you will be able to:

- explain the problem of induction
- evaluate the principles that support induction
- describe the different attempts to solve the problem
- analyse the different solutions offered to solve the problem.

15.2 INTRODUCTION

Inductive reasoning significantly differs from demonstrative ones. Deductive arguments are either valid or invalid. In a valid deductive reasoning truth of the premises guarantees the truth of the conclusion. Here, if rules of inference are not violated, there is no risk involved in asserting the conclusion on the basis of the truth of the premises. In this respect inductive reasoning is significantly different from them. Here it is possible that from true premises a conclusion is drawn following strictly all the rules of inductive reasoning yet that conclusion is false. Premises do not entail the conclusion.

Cogent inductive argument with true premise can have a false conclusion. Hence, questions of justification of inductive reasoning arise: Does inductive reasoning have any ground at all? On what ground can the premises of any inductive argument lead to their conclusion? What kind of support do the premises of inductive argument lend to the conclusion?

In inductive reasoning there is an evidential gap between the premises and the conclusion. Evidence and conclusions are neither logically equivalent nor the conclusion is an implicit part of premises. Conclusion contains more and newer information than what is contained in the premises. Therefore, there is a risk or hazard involved in the movement from premises to conclusion. Relying on certain principles of inductive reasoning we move from particular instances to universal conclusion.

15.3 PROBLEM OF INDUCTION

Inductive reasoning expands our knowledge of the matters of facts. Inductive arguments are of diverse forms. In the widely considered view of Induction, it is regarded to be an inference from particular observed premises to a conclusion regarding unobserved instances of the same kind. The problem of justification of induction relates to questions such as how does the truth of the particular observed premises guarantee the truth of the universal conclusion? This is the problem of justification of inductive method.

David Hume has focussed attention to this problem in his work *A Treatise of Human Nature*. According Hume inductive reasoning starts with

premises of which we have experience and proceeds to the conclusion of which we do not have any experience. Now the problem of induction is to justify this movement from observed to the unobserved. How can it be done? According to Hume, the only ground that appears to be possible is the relation of causality. It is generally assumed that the principle of causation yields certainty to the results of induction. Cause and effect are supposed to bear a necessary connection between two phenomena. In our experiences if instances of two kinds of events are uniformly associated in such a way that instance of earlier kind of event is constantly followed by instance of events of the other kind, they are supposed to be causally connected. Causal connection is believed to guarantee the necessity required for the truth of the conclusion. Now the problem of induction turns out to be the problem of justification of the necessary connection involved in causal relation.

According to Hume, to justify causal reasoning its principle has to be proved with justification. Inductive reasoning rests on the "principle that instances, of which we have had no experience, must resemble those, of which we have had experience, and the course of nature continues always uniformly the same". Now, the core of the problem of induction lies in the proof of this principle. Can any justification of this principle be given? Any proof or justification can conceivably come in either of the two ways: demonstrative or inductive.



CHECK YOUR PROGRESS

Q.1: Does the conclusion of inductive argument necessarily follow from premises?

.....

Q.2: Is it possible that a cogent inductive argument has true premises but false conclusion?

.....



ACTIVITY 15.1

How are the premises and conclusion related to inductive arguments? Discuss.

.....

.....

.....

15.3.1 Can a Demonstrative Proof of the Principle of Inductive Reasoning be Offered?

According to Hume, a valid demonstrative proof of the principle of inductive reasoning is not possible. The very nature of demonstrative proof is such that if the proof is valid then, if premises are true, conclusion cannot but be true. Conclusion is implied by the premises. Whatever is established by demonstrative proof is a necessary truth; its falsity is inconceivable. Like the established statements of mathematics, geometry or formal logic it has to be an a priori analytic statement based on definitions or meanings of the concepts. According to Hume, the principle that "instances, of which we have no experiences, must resemble those, of which we have had experience, and course of nature continues always uniformly same" is not an analytic statement. It is conceivable that instances of which we have no experience are different from the instances of which we have had experience. It involves no contradiction to think that the course of nature is not uniformly the same. Therefore, any deductive justification of principles of induction is not possible.

15.3.2 Can the Principle of Inductive Reasoning be justified by inductively?

If demonstrative proof does not work to justify the principle of inductive reasoning, can there be any justification of the same by inductive reasoning? This alternative is also possible. Again that

justification, as being an inductive argument, have to be based on particular observed instances and the generalised conclusion to be drawn will again be inclusive of non-experienced instances. It will be an argument from premises that in case of many inductive inferences, unobserved instances have been subsequently found to be similar to experienced ones, to the conclusion that in all cases of inductive reasoning the unobserved instances will be like the observed ones. Thus the argument has to presuppose the principle it is going to prove. It is arguing in a circle and hence is fallacious as a proof. Therefore, according to Hume neither an inductive proof can be offered to justify the principle of inductive reasoning.

Therefore, according to Hume no rational justification of induction is possible. However, according to Hume, psychological laws human nature, which we ascribe to causal certainty or necessity in inductive reasoning are inevitably working in inductive reasoning. Constant conjunction of antecedent and consequent in regular sequence of events makes us habitually inclined to expect the same sort of prior events to be followed by corresponding later events. This is psychological ground of inductive inference. There is no rational or logical ground of the same.



CHECK YOUR PROGRESS

Q.3: What is the fallacy involved in justification of induction by induction?

.....

Q.4: Is the relation between the premises and conclusion of inductive reasoning an implication?

.....



ACTIVITY 15.2

Explain after Hume why is demonstrative proof of the principle or ground of inductive reasoning is not possible?

.....

.....

.....

15.4 ANSWERS TO THE PROBLEM OF INDUCTION

There are different responses to the problems of induction. Some of the response comes from the contention that induction can be justified by induction itself. This is the rejection of Hume's thesis that induction cannot justify itself. Secondly there are pragmatic answers to the problem– that induction works, so its legitimacy cannot be questioned. J. S. Mill considers principles of uniformity of nature and law of causation to be the ground of induction and similar principles are cited by other logicians for the same purpose. Further it is also argued that problem of justification is a pseudo problem and hence requires no solution.

15.4.1 Inductive Justification of Induction: Answer to Hume's Objections

Thinkers like R. B. Braithwaite and Max Black argued in favour of inductive justification of induction. Hume's objection to such type justification is that it involves circular reasoning. Defenders of inductive justification of induction hold that such a defence is not circular in ordinary sense. Their contention is that induction has worked successfully in the past; so it is reasonable to suppose that it will work successfully in the future. It obviously works as a matter of fact and that is why science has been successful so far. It is not the case that inductive reasoning mostly leads to false or improbable conclusions. Had it been so we would have regarded induction to be

an unreliable practice. Its reliability and satisfactoriness cannot be questioned in the light of the evidence of continued and accelerated growth of scientific knowledge throughout the history of human civilizations. Of course its reliability in the past does not entail its reliability in extended field of other areas to the future; yet its success in the past gives us ground to believe that it will work in future and in other areas of investigation. This is not ordinary circular reasoning but a matter of self-consistency; i.e., induction works if it is applied to itself.

The vulnerability of this response consists in its admitted circularity. Circular reasoning in any form is logical fallacy. It is not a proof but the repetition of what is required to be proved.



CHECK YOUR PROGRESS

Q.5: Choose the right answer:

a) Past success is–

i) a conclusive evidence for induction

ii) only a consideration for its acceptance.

b) According to its defenders the circularity of Inductive justification of induction is–

i) ordinary circularity

ii) indicative of overall self-consistency.



ACTIVITY 15.3

What is the inductive justification of induction? Can it withstand the charge of circularity?

.....

.....

.....

15.4.2 Pragmatic Justification of Induction

If a principle works then it is worth adopting – this is the general criterion of pragmatic approach in philosophy. Therefore, the pragmatic justification of induction depends on the usefulness or workability of the same. Defenders of pragmatic justification are Hans Reichenbach, E Nagel etc. For them the significant question regarding inductive method is whether it works. Can inductive generalization or prediction lead to successful conclusions? Therefore, the only justification for induction is their actual success in the domain of scientific investigation where it is applied. It is a fact that principles of induction have been used successfully in the different fields of scientific investigations. Evidence of success is abundant. Relying on induction, true or useful propositions have been established in the past. It has passed the pragmatic test for justification.

In essence pragmatic test is empirical test for the method of empirical investigations. This is similar to inductive justification of induction. It is arguing from past success to future on the ground of earlier success. It is also a form of circular reasoning.



CHECK YOUR PROGRESS

Q.6: What is the criterion of pragmatic test?

.....

15.4.3 Justification by Principle of Uniformity of Nature and Law of Causation

According to John Stuart Mill, reliability of induction is based on the two principles– uniformity of nature and law of causation. Move from particular meagre data to universal conclusion is justified because whatever happens in one case will happen in any number of cases if the situation or circumstance is significantly the same.

This is the principle of uniformity of nature. All generalizations and predictions depend on this principle. This principle has its corollary in the form of law of causation which supports inductive reasoning by stating that under adequate degree of similarity of circumstances same cause will give rise to the same effect. Thus, from whatever has been observed to cause something in a particular instance can be stated, on the ground of law of causation and principle of uniformity of nature, to cause similar things in sufficiently similar circumstances by inductive generalisation. On these two principles inductive reasoning has to rest. However, Mill wanted to justify the principle of uniformity of nature from induction itself. This has given rise to the problem of Paradox of Induction.

J. M. Keynes suggests another variant of principle of uniformity of nature to justify induction as reasoning leading to probability statements. According to him, induction relies on the principle which he coined 'the principle of limited variety'. This is an assumption which states that "the amount of variety in the universe is limited in such a way that there is no one object so complex that its qualities fall into an infinite number of independent groups (i.e. groups which might exist independently as well as in conjunction) or rather that none of the objects about which we generalise are as this; or at least that though some objects may be infinitely be complex, we sometimes have a finite probability that an object about which we seek to generalise is not infinitely complex". Keynes has further added another assumption — the principle of atomic uniformity according to which natural occurrences can be regarded as complexities of small changes taking place according to mathematical laws. But such principles are assumptions only. Justification of induction consists in justification of such assumptions but not their mere elucidations.



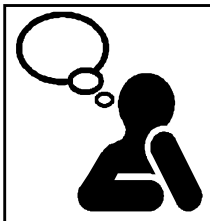
CHECK YOUR PROGRESS

Q.7: What are the principles offered in support of inductive method by Keynes?

.....

15.4.4 Dissolution of the Problem of Induction

Ludwig Wittgenstein hinted at the dissolution of the problem justification of induction in his *Philosophical Investigations*. Like many other philosophical problems this philosophical problem does not have any context of use in the form of life. This is an artificial problem invented by philosophers. Question of justification of induction cannot arise in any context apart from philosopher's ivory towers. There are contexts of use of induction but no context of situations for justification of induction. We can justify the statement "All ravens are black" by stating the evidence that all observed ravens are black. This is the proper use of the expression 'justification' and this is in actual practice in the form of life, i.e., in the context of scientific investigations and ordinary reasoning. But to ask for justification of how the particular instances of ravens being black can justify the corresponding universal statements like all the ravens are black is not a relevant or meaningful question. Such a practice of justification of inductive justification has no actual context of application except philosophical investigations. Therefore, problem of induction is a pseudo problem and it requires no solution.



ACTIVITY 15.5

How can the problem of induction be dissolved? Discuss.

.....

.....

.....

15.4.5 Falsifiability Principle

According to Karl Popper, the problem of justification of induction arises due to the misunderstanding the function of sciences. Scientific theories are not developed by the method of induction by the process of generalisation from particular instances. Aim of science is not to develop a theory which is likely to be confirmed by every possible experience of future instances. Scientific theories are conjectures only. Aim of scientific investigation is to search for evidence to falsify the conjectures. It is not the process of justification of theories by induction. Induction cannot justify the theories, hence the task of the scientist is to find and correct errors. Scientific investigation should not aim at formulating theories that will be not be falsified by evidence. Rather it should aim at developing theories that can be falsified in variety of ways. A theory that survives repeated attempt at falsification is well corroborated. However, according to Popper such theories are less likely to be true.

The falsifiability solution to the problem of induction offered by Popper is criticized by Wesley C Salmon. Salmon points out that while making predictions for scientific investigations or for some practical purposes it is customary to choose a corroborated theory. Why do we choose the more corroborated theory? The obvious reason is that it is more likely to make successful prediction. This selection is adopting the inductivists' standpoint only. If corroboration does not signify predicative power then there appears no rational ground for choosing the more corroborated theory.



CHECK YOUR PROGRESS

Q.8: Find out the correct answer:

According to Popper:

a) The best theories are those which will not be falsified by evidence. (True/False)

b) Scientific theories are conjectures/generalizations. (True/False)

c) A corroborated theory is less likely to be falsified. (True/False)



15.5 LET US SUM UP

- Problem of justification of induction consists of the risk or hazard involved in the move from observed premises to the unobserved conclusion. This problem is rooted in the very nature of inductive reasoning.
- David Hume highlighted this problem. Principles of uniformity of nature and the law of causation are supposed to be the grounds of induction. However, these two principles can be justified neither by reason nor by experience. Therefore, induction is based on our habit of expectations based on psychological laws of human nature.
- The inductive justification of induction is rejected by Hume for involving circular reasoning. But others defend the inductive justification considering it to be not circular reasoning in ordinary sense.
- The pragmatic approach to justification states that induction is justified by its practical success. This is also circular reasoning because the success of induction is claimed on the ground of success.
- Wittgensteinian solution to the problem consists of defusing the problem to be irrelevant. It does not make any sense to justify induction in any conceivable context.
- Karl Popper's view based on falsifiability principle also rejects the problem for being based on faulty notion of induction. Induction is not the process of greater confirmation of theories by more of evidence but falsifications of conjectures by evidence.



15.6 FURTHER READING

1) Hume, David (1988); *A Treatise of Human Nature*, Edited by L. A. Selby Bigge; UK: Oxford University Press.
2) John, Vickers; 'The Problem of Induction' in *Stanford Encyclopedia of Philosophy*.
3) Mill, John Stuart (1843); *System of Logic, Ratiocinative and Inductive: Being a Connected View of the Principles and Methods of Scientific Investigation*, (Volume I); London, UK: John W Parker.
4) Popper, Karl (2002); *Logic of Scientific Discovery*; London: Routledge.
5) Reichenbach, Hans (1971); *The Theory of Probability*, Translated by Ernest R. Hutton and Maria Reichen; Bekeley, USA: Bach University of California Press.



15.7 ANSWERS TO CHECK YOUR PROGRESS

Ans. to Q. No. 1: No

Ans. to Q. No. 2: Yes

Ans. to Q. No. 3: Arguing in a circle

Ans. to Q. No. 4: Yes

Ans. to Q. No. 5: a) Conclusive evidence for induction
b) Self-consistency

Ans. to Q. No. 6: If a principle works then it is worth adopting

Ans. to Q. No. 7: 'The principle of limited variety', the principle of atomic uniformity

Ans. to Q. No. 8: a) False, b) Conjectures, c) False



15.8 MODEL QUESTIONS

A) Very Short Questions:

Q.1: Do premises of inductive arguments entail conclusion?

Q.2: Does Hume accept necessary connection between cause and effect?

Q.3: What is the fallacy involved in inductive justification of induction?

Q.4: Who supported the inductive justification of induction?

Q.5: Who offered the principle of limited independent variety?

Q.6: Who supported the pragmatic justification of induction?

Q.7: What is the Wittgensteinian solution of the problem of Induction?

B) Short Questions: (Answer each question in about 100-150 words)

Q.1: How does the problem of induction arise?

Q.2: How does Hume challenge the legitimacy of the notion of causality to justify Induction?

Q.3: Why does the demonstrative proof for justification of Induction fail?

Q.4: What does inductive justification of induction signify?

Q.5: As a matter of fact induction works. Does it justify induction?

Q.6: Explain Mill's principles for justification of induction.

D) Long Questions: (Answer each question in about 300-500 words)

Q.1: Explain after Hume the problem of justification of Induction.

Q.2: Discuss the pragmatic and inductive justification of induction. Are both of them arguing in a circle?

Q.3: Can the falsifiability principle work for justification of induction. Explain.

Q.4: Is the problem of induction a pseudo problem? Discuss the approach to dissolve the problem.

*** ***** ***



REFERENCES

1) Baronett, S. & Sen, M. (2009); *Logic*. Delhi: Pearson.
2) Basson, A. H., O'Connor, D. J.; *Introduction to Symbolic Logic*; Kolkata: Oxford University Press.
3) Chakraborti, Chhanda (2006); *Logic: Informal, Symbolic and Inductive*; New Delhi: Prentice– Hall of India Private Limited.
4) Copi, Cohen (1995); *Introduction to Logic* (Ninth Edition); New Delhi: Prentice– Hall of India Private Limited.
5) Copi, Irving M.; Cohen, Carl and McMohan, Kenneth (2011); *Introduction to Logic* (14th Edition); Pearson Education INC.
6) Copi, Irving M. (1979); *Symbolic Logic* (Fifth Edition); Callier Macmillan International Editions.
7) Copi, I. M. & Cohen, C.; *Introduction to Logic*.
8) Eberle, Rolf A.; *Logic And Proof Techniques*; Kolkata: New Central Book Agency (P) Ltd.
9) Ghosh, B. N. (1982); *Scientific Methods and Social Research*; L-10, Green Park, Extension, New Delhi: Sterling Publishers Private Limited; Cunningham Road, Bangalore: G-2, Cunningham Apartments.
10) Halberstad, T.; William H.; *Introduction to Modern Logic*; Harper & Row, Publishers New York, Evanston And London.
11) Harel, D.; Kozen. D. & Tiuryn. J. (2007); *Dynamic Logic*; New Delhi: Prentice Hall.
12) Hausman, A.; Kahane, H. & Tidman, P. (2007); *Logic and Philosophy*; Wadsworth.
13) Hume, David (1988); *A Treatise of Human Nature,* Edited by L. A. Selby Bigge; UK: Oxford University Press.
14) Hurley, Patrick J. (2008); *Introduction to Logic*; Wordsworth. Cengage Learning.
15) Jain, Krishna (1998); *A Textbook of Logic*; D. K. Printworld (P) World.
16) Jain, Krishna; *Logic an Introduction*; New Delhi: Ajanta Books.

17) John, Vickers; 'The Problem of Induction' in *Stanford Encyclopedia of Philosophy*.
18) Mill, John Stuart (1843); *System of Logic, Ratiocinative and Inductive: Being a Connected View of the Principles and Methods of Scientific Investigation*, Volume I; London, UK: John W Parker.
19) Munshi, R.C. (1991); *Hand Book of Logic*; Calcutta: Baikuntha Book House.
20) Nolt, John; Rohatyn, Dennis Hille (2004); *Theory and Problems of Logic* (Second Edition)*;* New Delhi: Tata McGraw-Hill.
21) Popper, Karl (2002); *Logic of Scientific Discovery*; London: Routledge.
22) Read, Carveth (August, 1914); *Logic: Deductive and Inductive*, (4th Edition); London: Simpkin, Marshall, Hamilton, Kent & Co. Ltd, Stationers Hall Court, London, E.C. 4.
23) Reichenbach, Hans (1971); *The Theory of Probability*, Translated by Ernest R. Hutton and Maria Reichen; Bekeley, USA: Bach University of California Press.
24) Sharma. B. and Deka J.; *A text Book of logic*.
25) Singh, S. Shyam Kishore (2000); Modern Logic (Volume one); Lamyana Press.
26) Quine, W. V.; *Philosophy of Logic*; New Delhi: Prentice Hall of India Pvt. Ltd.
27) (https://www.lucidchart.com/blog/2013/01/17/a-history-of-the-venn-diagram)