UNIT 4 RELATION OF SCIENTIFIC AND PHILOSOPHICAL METHODS

Contents

4.0 OBJECTIVES

The main objective of this unit is to analyse the relation between scientific and philosophical methods. In this process we shall try to give a detailed account and definition of philosophical methods and scientific methods. Thus after knowing the two different methods we shall examine the relationship between the two. In this section we shall also study about the relation of science and philosophy. Finally, clarifying the importance of scientific and philosophical methods is yet another objective of this unit of study.

Thus by the end of this Unit you should be able:

- to have a basic understanding of scientific and philosophical methods;
- to understand the relationship between the two methods.
- to relate it with the day – to – day life;
- to understand the all-comprehensive character of scientific and philosophical methods;
- to know the importance of scientific and philosophical methods both at the theoretical and the practical levels.

4.1 INTRODUCTION

Science and philosophy, I would say, are the two pillars of the universe that make it revolve efficiently. Philosophy is the study of and the attempt to gain knowledge and truth. It is a way of looking at things. It is a collection of ideas and assumptions that are used to interpret reality. It is "the rational investigation of the truths and principles of being, knowledge, or conduct." If we understand that the scientific method is a way of attaining truth, then it falls under the definition of philosophy. Science and philosophy are on the way to finding the truth. In this journey both of them use their own methods to know the truth. In this unit we are going to analyse what is philosophical method and scientific method and how these two methods are related to each other.

4.2 DEFINITIONS OF SCIENTIFIC AND PHILOSOPHICAL METHODS

Philosophical method is the study and description of how to do philosophy. A method of doing some activity is a systematic or patterned way of doing that activity. So a method of doing philosophy, or a philosophical method, is a systematic or patterned way of answering philosophical questions. The scientific method is used in science as a means of gaining understanding about the physical universe. Scientific method is the basic steps that scientists follow in uncovering facts and solving scientific problems. Scientific method refers to a body of techniques for investigating phenomena, acquiring new knowledge, or correcting and integrating previous knowledge. The scientific method is essentially an extremely cautious means of building a supportable, evidenced understanding of our world. Now we know the definitions of scientific and philosophical methods. In the next section let us study the philosophical method.

4.3 PHILOSOPHICAL METHOD

Philosophy is the study of and the attempt to gain knowledge and truth. It is a way of looking at things. It is a collection of ideas and assumptions that are used to interpret reality. Philosophy is a quest for the best arguments. A good argument is a clear, organized, sound statement, the reasons which cure the original doubts in a problem. Philosophy is distinguished by the methods that philosophers follow in tackling philosophical questions. Philosophical method involves a commitment to reason and argument as a source of knowledge.

Methodology process: Methodology process is a systematic process of doubting or being skeptical about the truth of one's beliefs. In methodology process, methodic doubt which is a systematic process of doubting the truth of one's beliefs, arguments to support the solutions and dialectic, which is presenting the solution and arguments for criticism by other philosophers and helping them judge their own, are involved.

Doubt and the sense of wonder: Philosophy begins at wonder. Philosophy time and again begins with some simple doubts about accepted beliefs. We get the initial impulse to philosophize from the suspicion that we do not fully understand, and have not fully justified, even our most basic beliefs about the world.

Formulate questions and problems: The next step in the philosophical method is to formulate our doubts in questions to be answered or problems to be solved. Questioning is the first weapon of a philosopher with which one works. The more clearly the question or problem is stated, the easier it will be to identify critical issues, the assessment of which undergirds any genuine progress in coming to some sort of resolution. Here it is not enough to wonder at doubt but to state as clearly as possible what exactly the source of doubt is. Let us take the problem of freedom and determinism. We can say, suppose that, the universe operates according to deterministic causal laws, that is, for everything that happens, there are some laws which made it necessary that thing, and only that thing happened and as a result all events are determined. Suppose also this general principle applies to our choices. Our choices are events in, parts of, the natural world, and so we should fully expect to find a complete causal explanation of those too, explaining why we had to make those choices and no others. Hence all our choices are, on that accounting, determined or necessary. Nonetheless, most of us have a very keen sense that what we choose, we choose voluntarily; we could have chosen otherwise than we did choose. In short, it seems we have free will. But how is it possible, or is it possible, that our choices might be causally determined and free at the same time? This is one way of stating the basic problem of free will and determinism.

In this example of freedom and determinism how can we clarify the statement of the problem? According to the statement, for everything that happens, there are some laws which made it necessary that thing, and only that thing happened. But here we ask, what exactly is the sense of the word, 'necessary' here? Or in another place, the statement reads, we have a very distinct impression that what we choose, we choose voluntarily; we could have chosen otherwise than how we did. But what is the strength of this phrase 'could have'? The idea appears to be that it is in some sense possible for us to choose otherwise; but in what sense of 'possible' is it possible? An enquiry into the problem of freedom and determinism, or any philosophical problem, can only benefit from getting very clear about exactly what the problem is, and what the terms used to formulate the problem signify.

Enunciate a solution: To enunciate a theory, or to give a definition or analysis, which constitutes an attempt to solve a philosophical problem is another essential part of philosophical method. In just a sentence or two a philosophical theory by itself can be stated quite briefly very often all the surrounding philosophical text is offered by way of hedging, explanation, and argument. Here as an example let us take a philosophical theory which has to answer the question what actions are right? For this the answer is given by John Stuart Mill, an English philosopher, as the creed which accepts as the foundation of morals utility, or the greatest happiness principle, holds that actions are right in proportion as they tend to promote happiness, wrong as they tend to produce the reverse of happiness. Consequently, according to Stuart Mill, the rightness or wrongness of actions depends on their consequences; if they tend to cause happiness they are morally right, and if they tend to cause unhappiness they are morally wrong. Whether we accept the answer or not is a different question but it does answer the question, what actions are right.

Justify the solution: Another important part of philosophical method is philosophical justifications, or arguments. An argument is a set of statements,

one of which, the conclusion, it is said or implied, follows from the others which is called the premises. We might think of arguments as bundles of reasons which are logically interconnected statements. The reasons are the premises, the claim they support is the conclusion; together they make an argument. Normally philosophers are very good in giving arguments. They are constantly demanding and offering arguments for different claims they make. The reason for this is that it is only a good argument, a clear, organized, and sound statement of reasons to believe something that will ultimately cure us of the original doubts that motivated us to take up philosophy. Let us illustrate this point with an example of an argument. Say Susan has some doubts about religious matters, and she asks the question: Does God really exist? Susan's answer is, we will say, yes. How might Susan argue for her answer? Here is a very common, popular argument, called the argument from design.

The universe is made up of a huge variety of things, inanimate and living, natural and artificial from the hills and the oceans, to the houses and ships on them, from the stars and planets, to the cities and highways. All these huge variety of things are, as scientists well know, operating in a splendid order or harmony, much like a very complicated machine, only much more complicated and well-planned than anything that we humans have ever invented. Like a machine, this order or harmony could not have just sprung into existence all on its own; like a machine, it must have had a designer. Moreover, since the universe is so complicated and well-planned, this designer must be incredibly intelligent; and since everything is so well-made for the habitation of humans, this designer must be very benevolent. And of course, as the creator and planner of the entire universe, this designer must be extremely powerful. So the universe must have had a designer which is incredibly intelligent, very benevolent, and extremely powerful; and this designer is what we call God. Therefore, God exists.

This argument is called the teleological argument which is studied in the philosophy of religion. It offers a series of interconnected reasons to believe that there does exist the sort of entity that in various religions is called God. This sort of argument is just exactly what philosophers want from each other. To deserve our consideration, the argument does not have to be perfect. It might have some problems. In fact, it might be a very bad argument. But on the face of it, there should be something rather persuasive about it. That gives us something to analyse and learn.

Philosophical criticism: Philosophical criticism is common in the work of philosophers. It is this philosophical criticism that makes much philosophizing a social endeavour and so on. We offer definitions and explanations in solution to problems; we argue for those solutions; and then other people come along and, often, demolish those solutions, throw us into doubt again, and force us to come up with better solutions. This exchange and resulting revision of views is called dialectic. Dialectic is simply philosophical conversation amongst people who do not always agree with each other about everything. These are the five steps that a philosophical method involves in its journey towards finding the truth. Having studied the philosophical method let us move on to know about the scientific method.

Check Your Progress I

Note: Use the space provided for your answer

1) What is your general understanding of scientific and philosophical methods?

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2) Illustrate the components of philosophical method?

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4.4 SCIENTIFIC METHOD

The scientific method is the only scientific way accepted to back up a theory or idea. This is the method on which all research projects should be based. The Scientific Method is used by researchers to support or disprove a theory. People attempt to understand something sufficiently to reproduce an event and/ or accurately predict an event with the scientific method.

The Scientific Method has Four Steps:

- Observation and description of a phenomenon or group of phenomena.
- Formulation of a hypothesis to explain the phenomena.
- Use of the hypothesis to predict the existence of other phenomena, or to predict quantitatively the results of new observations.
- Performance of experimental tests of the predictions by several independent experimenters and properly performed experiments.

Iterations, recursions, interleavings, and orderings are the scientific method's essential elements associated with the above four steps. Iteration is the repetition of a process. It is a repetition in a specific form of repetition with a mutable state and recursion is a particular way of specifying or constructing a class of objects with the help of a reference to other objects of the class: a recursive definition defines objects in terms of the already defined objects of the class. Interleaving is a way to arrange data in a non-contiguous way to increase performance. Orderings formalizes the intuitive concept of an ordering, sequencing, or arrangement of the elements of a set.

Characterization: The scientific method depends upon a careful characterization of the subject of the investigation. Here the subject may also be called the problem or the unknown. Observation demands careful measurement and the use

of operational definitions of relevant concepts. Formally, these terms have exact meanings which do not necessarily correspond with their natural language usage. For example, mass and weight are quite distinct concepts. New theories may also arise upon realizing that certain terms had not previously been clearly defined. For example, Albert Einstein's first paper on relativity begins by defining simultaneity and the means for determining length. These ideas were skipped over by Newton with, "I do not define time, space, place and motion, as being well known to all." Einstein's paper then demonstrates that these widely accepted ideas were invalid.

Hypothesis: A hypothesis is a suggested explanation of a phenomenon, or alternately a reasoned proposal suggesting a possible correlation between or among a set of phenomena. A hypothesis includes a suggested explanation of the subject. It will generally provide a causal explanation or propose some correlation. Observations have the general form of existential statements, stating that some particular instance of the phenomenon being studied has some characteristics. Causal explanations have the general form of universal statements, stating that every instance of the phenomenon has a particular characteristic. It is not deductively valid to infer a universal statement from any series of particular observations. This is the problem of induction. Scientists use whatever they can, their own creativity, ideas from other fields, induction, systematic guessing, etc,; to imagine possible explanations for a phenomenon under study. There are no definitive guidelines for the production of new hypotheses. The history of science is filled with stories of scientists claiming a "flash of inspiration", or a hunch, which then motivated them to look for evidence to support or refute their idea. Michael Polanyi made such creativity the centerpiece of his discussion of methodology. The present-day system of methods in science is as diversified as science itself. We talk, for example, of experimental method, the method of processing empirical data, the method of building scientific theories and their verification, the method of expounding scientific results, i.e., the classification of methods based on the classification of stages of research activity. We have dealt with the scientific and philosophical methods and now with this background, let us move on to study the relation between the scientific and the philosophical methods.

Check Your Progress II

Note: Use the space provided for your answer

1) State the essential elements of the four steps of scientific method?

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2) Reflect the role of characterization and hypotheses in scientific method.

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4.5 THE RELATION

Can philosophy develop by itself, without the support of science? Can science 'work' without philosophy? Some people think that the sciences can stand apart from philosophy, that the scientist should actually avoid philosophising, the latter often being understood as groundless and generally vague theorising. If the term philosophy is given such a poor interpretation, then of course anyone would agree with the warning 'Physics, beware of metaphysics.' But no such warning applies to philosophy in the higher sense of the term. The specific sciences cannot and should not break their connections with true philosophy.

We can find the direct relationship between the scientific and philosophical methods by analysing the steps. Scientific method starts wish observation and description where in observation plays a vital role. It is this observation that opens the way to the sense of wonder and doubt which is the first step in the philosophical method. The second method in the scientific method is the formulation of hypothesis which includes a suggested explanation of the subject which helps one to formulate questions and problems which is the second step in the philosophical method. Use of the hypothesis to predict the existence of other phenomena, or to predict quantitatively the results of new observations is the third step in the scientific method. This prediction of results of new observations makes one to enunciate a solution to a problem which is the third step in the philosophical method. The fourth step in the scientific method is the performance of experimental tests of the predictions by several independent experimenters and properly performed experiments. This performance of repeated experimental tests in scientific method helps one to justify the solution that is enunciated in the third step of the philosophical method. Further it leads one to criticize the solution dialectically which is called the philosophical criticism, the final step in the philosophical method. This evidently shows how the scientific and the philosophical methods help one to arrive at a conclusion and how they complement each other in finding the truth.

In ancient times, as we have seen, nearly every notable scientist was at the same time a philosopher and every philosopher was to some extent a scientist. Which means both scientists and philosophers have used both the methods in their journey towards finding the truth. The connection between scientific method and philosophical method has endured for thousands of years. In the present-day conditions it has not only been preserved but is also growing substantially stronger. The common ground of a substantial part of the content of science, its facts and laws has always related it to philosophy, particularly in the field of the theory of knowledge, and today this common ground links it with the problems of the moral and social aspects of scientific discoveries and technical inventions.

Philosophy deals with experience rather than speculations. It deals with the same material as science and its methods and even shade into the method of science. The same relation holds with the reference with the use of hypothesis in thinking and in scientific investigation. Philosophers at some time regarded it as their function to examine the unrecognised hypotheses or assumptions which underlie the procedure of scientific workers. A slightly different function which is regarded as a special problem of philosophy is the setting up of hypotheses. It has been pointed out that fruitful hypotheses are sometimes suggested by speculative thinkers before they have been thought of, much less tested, by the scientists.

The scientific method has drawn many parallels with the philosophy of modern empiricism and its search for meaningful statements. The scientific method is a dynamic concept that has evolved from the first conscious thought to the present day. It appears to be changing all the time based not only on the views of individual scientists and philosophers, but also on the social situations and collective intelligence of the times, which interestingly has been affected by the method itself.

Philosophy cannot, for example, give physics specific methods for studying quantum mechanics. But it is concerned with the general approach to the discovery of truth in physics. It deals not with the 'tactics' of the research process, but with the strategy in the battle for truth. Philosophical methods work in science not directly, but mediated by other more specific methods. For example, the principle of historicism as a universal method evolved by philosophy has in biology taken the form of the theory of evolution, the methodological basis of the modern biological disciplines, and in astronomy this same principle has generated a whole set of cosmogonic hypotheses.

In science, methodology often decides the fate of a research project. Different approaches may lead to opposite conclusions being drawn from one and the same factual material. Describing the role of correct method in scientific cognition, philosophers have compared it to a torch illuminating the road for a traveller in darkness. Even a lame man who chooses the right road will arrive ahead of the aimless wanderer. It goes without saying that method in itself cannot guarantee success in research. Not only a good method but the skills in applying it are also required. Thus the connection between the philosophical and scientific methods is mutual and characterised by their ever deepening interaction which is an on-going process. Now we are clear about the relationship between scientific and philosophical methods. This knowledge will help us to understand the importance of scientific and philosophical methods in the forthcoming section.

4.6 THE IMPORTANCE OF PHILOSOPHICAL AND SCIENTIFIC METHODS

Philosophy plays a tremendous integrating role in scientific knowledge. The touchstone of the value of philosophy as a world-view and methodology is the degree to which it is interconnected with life. This interconnection may be both direct and indirect, through the whole system of culture, through science, art, morality, religion, law, and politics. As a special form of social consciousness, constantly interacting with all its other forms, philosophy is their general theoretical substantiation and interpretation. In ancient times, as we have seen, nearly every notable scientist was at the same time a philosopher and every philosopher was to some extent a scientist. Which means both scientists and philosophers have used both the methods in their journey towards finding the truth. The connection between science and philosophy has endured for thousands of years. Science and philosophy have always learned from each other. Philosophy tirelessly draws from scientific discoveries fresh strength, material for broad generalisations, while to the sciences it imparts the world-view and methodological impulses of its universal principles. Many general guiding ideas that lie at the foundation of modern science were first enunciated by the perceptive force of philosophical thought.

Any scientist knows in his/her heart that his/her creative activity is closely linked with philosophy and that without serious knowledge of philosophical culture the

results of that activity cannot become theoretically effective. All the outstanding theoreticians have themselves been guided by philosophical thought and tried to inspire their pupils with its beneficent influence in order to make them specialists capable of comprehensively and critically analyzing all the principles and systems known to science, discovering their internal contradictions and overcoming them by means of new concepts.

Truly scientific thought is philosophical to the core, just as truly philosophical thought is profoundly scientific, rooted in the sum-total of scientific achievements. Philosophical training gives the scientist a breadth and penetration, a wider scope in posing and resolving problems. Philosophy may be called the 'science of sciences' probably in the sense that it is, in effect, the self-awareness of the sciences and the source from which all the sciences draw their world-view and methodological principles, which, in the course of centuries, have been honed down into concise forms. As a whole, philosophy and the sciences are equal partners assisting creative thought in its explorations to attain generalizing truth. The philosophical approach enables us to overcome the one-sidedness in research which has a negative effect in modern highly specialised scientific work. It is philosophy that safeguards the unity and interconnection of all aspects of knowledge of the vast and diversified world whose substance is matter.

As the scientific knowledge in various fields develops, the stronger is the tendency to study the logical system by which we obtain knowledge, the nature of theory and how it is constructed, to analyse the empirical and theoretical levels of cognition, the initial concepts of science and methods of arriving at the truth. In short, the sciences show an increasing desire to know themselves, the mind is becoming more and more reflective. Self-knowledge is the present-day trend. This trend towards self-knowledge, of which much is said both by scientists and philosophers, is bound to show itself and should show itself in the relationship between the philosophical methods and the scientific methods. At this juncture I would say philosophical methods and the scientific methods are two sides of a same coin. They both complement each other and enhance our day-to-day life situation. We have had a panoramic view of the philosophical and the scientific methods and their relationship with each other and how they help us in our present day life.

Check Your Progress III

Note: Use the space provided for your answer

1) What is the relation between philosophical method and scientific method?

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2) Describe the importance of philosophical and scientific methods.

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4.7 LET US SUM UP

With a good introduction to the philosophical and scientific methods we have ventured into the methodology process which is a systematic process of doubting or being skeptical about the truth of one's beliefs. This methodology process comprises of doubt and the sense of wonder, formulate questions and problems, enunciate a solution, justify the solution and philosophical criticism. After dealing with the methodology process we moved on to the scientific methods where in we studied the four steps of scientific methodology and the four elements that are involved in that method. These two sections have presented us what is philosophical method and scientific method. Therefore, we have examined the relationship between the two methods and have seen that it mutual and characterised by their ever deepening interaction which is an on-going process. This understanding moved us to investigate the importance of the scientific and philosophical methods which tells us both methods are important in our everyday life and help us to have a clear self-knowledge. Thus we have concluded the unit with a note that philosophical methods and the scientific methods are two sides of the same coin. They both complement each other and enhance our day-to-day life situation.

4.8 KEY WORDS

Argument: an argument is a set of statements, one of which, the conclusion, it is said or implied, follows from the others which is called the premises.

Dialectic: Dialectic is simply philosophical conversation amongst people who do not always agree with each other about everything.

Hypothesis: Hypothesis is a suggested explanation of a phenomenon, or alternately a reasoned proposal suggesting a possible correlation between or among a set of phenomena.

Theory: A theory is an explanation of a set of related observations or events based upon proven hypotheses and verified multiple times by detached groups of researchers.

4.9 FURTHER READINGS AND REFERENCES

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