Indira Gandhi National Open University
School of Science

# MGG - 008
# ADVANCES IN GEOGRAPHICAL THOUGHT

## Search for Relevance
## Human Geography as Spatial Science
## Political Economy and Critical Geography

''शिक्षा मानव को बन्धनों से मुक्त करती है और आज के युग में तो यह लोकतंत्र की भावना का आधार भी है। जन्म तथा अन्य कारणों से उत्पन्न जाति एवं वर्तमान विषमताओं को दूर करते हुए मनुष्य को इन सबसे ऊपर उठाती है।''

*– इन्दिरा गांधी*



***"Education is a liberating force, and in our age it is also a democratising force, cutting across the barriers of caste and class, smoothing out inequalities imposed by birth and other circumstances."***

**– Indira Gandhi**

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# MGG - 008

# ADVANCES IN GEOGRAPHICAL THOUGHT

## BLOCK 1
## SEARCH FOR RELEVANCE

## BLOCK 2
## HUMAN GEOGRAPHY AS SPATIAL SCIENCE

## BLOCK 3
## POLITICAL ECONOMY AND CRITICAL GEOGRAPHY

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# ADVANCES IN GEOGRAPHICAL THOUGHT - COURSE INTRODUCTION

Geography is one of the oldest disciplines. The history of the discipline stretches over many centuries originating from the periods of the Greeks and the Romans. However, the discipline could establish its hold as an academic field of study and institutionalised discipline in the university system only by the second half of the nineteenth century. Over this period, the study of geography has evolved into a very important form of human scholarship and has come to occupy a place of pride amongst disciplines taught in the university system in India and the world. There exists a wide gap between geographers' view of their discipline and (mis)perceptions of the 'others' regarding its nature, methodology, approaches, tools and techniques, and applications. However, there have been remarkable advances in the field of geography since its beginning, especially in recent times. In view of these, studying the Advances in Geographic Thought in terms of the progress of geography as a discipline and its philosophy, methods, techniques, tools and applications would provide some important insights concerning the distinct property of the discipline. These insights about its fundamentals would also be helpful in gaining a better understanding of the nature of geography as an interdisciplinary subject. Its major objectives are to acquaint learners with the foundation and development of geography since World War II.

There are three modules called blocks based on their themes- 1. Search for Relevance, 2. Human Geography as Spatial Science, and 3. Political Economy and Critical Geography.

**Block 1: Search for Relevance** covers geography since World War II, geography in the early 1950s; critique of Regional Geography, the Hartshorne-Schaefer Debate; principles of Positivism, and the spread of scientific and quantitative methods.

**Block 2: Human Geography as Spatial Science** elaborates the Spatial Systems, Spatial Theory and Behaviouralism, Spatial Variables and Spatial Systems, Spatial Theory, Behaviouralism, critique of Systems Theory and critique of Spatial Science and rise of Humanistic Perspectives in geography, geography in the 20th Century; and conceptual and methodological developments and changing paradigms.

**Block 3: Political Economy and Critical Geography** deals with radical and liberal perspectives covering Structuralism and Structuration, the production of nature: contributions of David Harvey and David Smith; and critical geography with feminist perspectives- gender geography; geographies of difference, post-structural and post-colonial human geographies, the contemporary concerns and perspectives, the rise of technologies and the changing perspectives of space and place.

It is expected that after studying this course, you will be able to be acquainted with the evoluation of geography since World War II, understand Human Geography and Spatial Science and the rise of Humanistic Geography, and be aware of the advancement of geography in the contemporary period with reference to political economy and Critical Geography.

In this quest, our warmest wishes are always with you. If you need any assistance with this course, please contact us at vijaybaraik@ignou.ac.in.

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# MGG - 008

# ADVANCES IN GEOGRAPHICAL THOUGHT

BLOCK

1

## SEARCH FOR RELEVANCE

# MGG - 008
# ADVANCES IN GEOGRAPHICAL THOUGHT

## BLOCK 1 SEARCH FOR RELEVANCE



## BLOCK 2 HUMAN GEOGRAPHY AS SPATIAL SCIENCE



## BLOCK 3 POLITICAL ECONOMY AND CRITICAL GEOGRAPHY

# CONTENTS

# BLOCK 1: SEARCH FOR RELEVANCE

The widespread emergence of sentiments of dissatisfaction with government policies and justice towards the general public after World War II and also due to the slowdown of economic growth gave rise to radical views in American society, especially in the 1960s. During this time, the objectives of research in science and humanities also got affected and humans and their future received primary focus in the research in natural as well as social sciences. Geography was considered as medicine to help reduce suffering and long life. It was the period of 'Search for Relevance' known as the 'Relevance Movement' through a transformation in geography with radical thinking and views.

Block 1 (Search for Relevance), in the above background, tries to highlight the major points related to the search for relevance. It covers geography since World War II, geography in the early 1950s; critique of Regional Geography, the Hartshorne-Schaefer Debate; principles of Positivism and the spread of scientific and quantitative methods. It has two Units- 1. Geography since World War II and 2. Positivism, Empiricism and Geography.

**Unit 1: Geography since World War II** aims to discuss the status of geography in the early 1950s; explain the critique of regional geography; describe the scientific explanations in geography; and explain the Hartshorne-Schaefer Debate and the rise of Spatial Analysis.

**Unit 2: Positivism, Empiricism and Geography** attempts to trace the historical background of the scientific approach in geography, explain empiricism, discuss the emergence and spread of scientific and quantitative geography and give a critical overview of positivism and logical positivism. It includes the sub-themes like the principles of positivism, logical positivism, empiricism, the historical background of the scientific approach, some key elements in scientific thinking, scientific empiricism and the spread of scientific and quantitative geography.

It is expected that after studying this block, the students will be able to have an adequate overview of the evolution of geography since World War II and be able to understand Positivism, Empiricism and Geography. Our best wishes are always with you.

UNIT 1

# GEOGRAPHY SINCE WORLD WAR II

## Structure



## 1.1 INTRODUCTION

Geographical thought experienced a paradigm shift since the end of the Second World War in 1945. The outcome of geographical research/studies underwent a radical change because of multiple factors. These include the emerging geopolitical situation of the world, intensification of movements for independence in the colonies of the Western powers and emergence of independent states, wide acceptance of political ideologies in favour of democracy, rising aspiration for equitable economic and social development, continued intensification of resource extraction, particularly in the less developed countries, changes in people's livelihood patterns, etc. Factors such as shifts in resource utilisation patterns, ownership and control, large-scale industrialisation and urbanisation, and mass migration influenced geographical research and thinking. Also, advancement in scientific knowledge, methods and building of data storage through computer access and improvement in cartographic techniques enabled the geographers to collect a large number of social statistics and adopt mathematical and statistical methods for data analysis.

You have already studied the foundation and perspectives of geography, its development from cosmography to chorology and the regional concepts in your previous course, i.e. Introduction to Geographical Thought. In this Unit, you will study the developments of geographical ideas in the years prior to and immediately after World War II. This will cover a critique of regional

geography, the emergence of scientific explanations in geography, the Hartshorne-Schaefer Debate, and the rise of spatial analysis.

## Expected Learning Outcomes

After studying this unit, you should be able to:

- discuss the status of geography in the early 1950s;
- explain the critique of regional geography;
- critically evaluate the scientific explanations in geography; and
- explain the Hartshorne-Schaefer Debate and the rise of Spatial Analysis.

# 1.2 GEOGRAPHY IN THE EARLY 1950s

In general, geography in the early 1950s adopted deductive–nomological methods through the availability of huge data and computer facilities and became predictive like other natural sciences. At this point, the focus was on model building (Chorley & Haggett,1967) and applying these models in developing spatial patterns. The organisation of space in terms of topology became rather popular among Anglo-American geographers (Abler et al., 1971; Harvey, 1969; King, 1969, etc.), to name a few. Before this, geography was in the realm of inductive–regional approach in its analysis of human–nature interface/interaction, and various other associated discourses. The systematisation of data and predictive analysis was not much applicable in the study of physical and socio-economic phenomena of the world.

## 1.2.1 Scientific Explanations in Geography

Geography at this juncture put greater emphasis on geographical enquiries that culminated in the formulation of hypotheses and laws. A section of geographers started to build models based on statistical data and applied these to understanding spatial patterns of geographical activities and a number of theories were put forward by the geographers of the quantitative school. An example of this is the locational school. After the Second World War, geographers started measuring space and location in relative terms of time and cost. This was the fundamental shift in the geographical paradigm. A series of theories related to location and space and urban hierarchy emerged, such as Central Place Theory by Christaller (1933; translated into English in 1966), Industrial Location Theory by Weber (German in 1909 and English version in 1929), Losch's Theory of 'Profit Maximisation' (1954), Rank-Size Rule by Zipf (1949), Lorenz Curve by Lorenz (1905) to measure the distribution of income and wealth. All these and many other contributions were to understand the spatial arrangement and organisation of agricultural and industrial activities, movement of goods and services and people, etc., which began to transform spatial morphology and transport networks.

The quest also shifted from mapping spatial patterns to seeking explanations through the use of empirical and scientific data, which could also help in prediction and generalisations; and developing scientific laws. In very simple terms we can define scientific laws as 'a generalisation of unrestricted range in time and space'. It means generalisation with universal validity (Holt-Jensen, 2018, p. 102).

Two alternative routes of scientific enquiry were in vogue, namely 1. Induction proceeding from numerous particular instances to universal statements, and 2. Deduction proceeds from a priori premise to statements about particular sets of events leading to generalisation. In other words, the latter is also called the hypothetic-deductive method. This method became more popular among scientists and scholars in both- social, natural and biological sciences (see the figure below and understand the routes to the scientific explanation as proposed and summarised by Harvey, 1969).

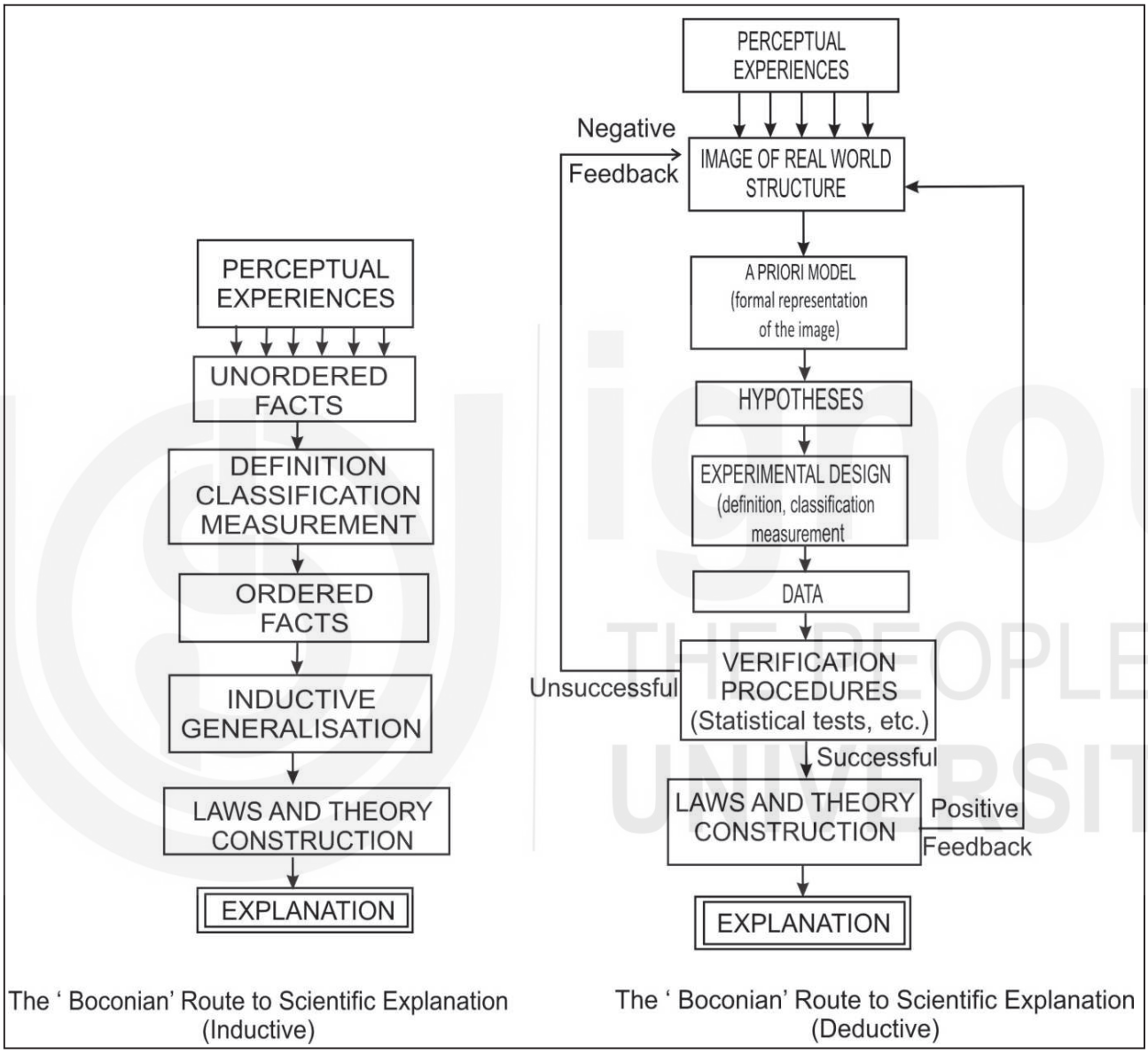


**Fig. 1.1: Inductive and hypothetic deductive routes to scientific explanation.**

(Source: Harvey, D. (1969): *Explanation in Geography,* London: Edward Arnold, p. 34.)

The rejection of the regional method and acceptance of the systematic method, which is analytical and predictive gave rise to regional science (Berry, 1964b; Isard, 1975) and the study of spatial organisation and spatial pattern became the main focus of geographical research.

## SAQ I

What are the scientific explanations in geography?

## 1.3 CRITIQUE OF REGIONAL GEOGRAPHY

Dissatisfaction with the regional geographical approach had begun more prominently in Europe and North America from the first quarter of the 20th century. Freeman (1961) suggests that the dissatisfaction with regional geography emanated from its descriptive approach and exceptionalism. Three reasons were identified- one, studies under regional geography were mostly 'naive', due to its scale (macro level studies); two, very little attention on the relationships between the physical environment and inhabitants (having just account of unrelated facts and physical history of an area), and three, complete neglect of theory and generalisation (Dikshit, p 116). It was defined as idiographic with nature-human interactions or interplay over time creating unique regions. Regional geography focussed on historical developments and not on the spatial relationships of things and phenomena.

The major points on which this approach were critiqued include its deterministic-idiographic and descriptive nature, neglect of theory and model building, lack of law formulations, non-predictive characteristics and absence of analytical rigour. The lack of quantitative data analysis and excessive focus on unique attributes of individual regions made regional geography descriptive rather than analytic. The views were that places and regions are comparable.

William Bunge's 'Theoretical Geography' (1962) brought about another significant impact on the rejection of the regional approach and acceptance of scientific methods in geography. He stated that geography is the science of spatial relations, since it is related to space and space is represented by geometry (shapes).

The exceptional nature of the regional approach as highlighted by Hartshorne was challenged by F.K. Schaefer who came up with the alternative approach in the light of positivism, theory building, law formulations and adaptation of deductive-hypothetic approach as opposed to the inductive-empirical approach. Schaefer's critique of regional geography 'Exceptionalism in Geography' (1953) led to a constructive debate leading to several articles contributed by Hartshorne in his defence, but Schaefer was not around to respond due to his untimely demise.

He projected this approach which gave rise to Quantitative Geography.

### SAQ 2

What is the main criticism of the regional approach in geography?

## 1.4 HARTSHORNE–SCHAEFER DEBATE

A new methodological debate arose in Geography during the post-war period, which generated a constructive debate and rethinking regarding the manner in which geographical research was being conducted. In 1939 Hartshorne's elaborate treatise 'The Nature of Geography' presented a comprehensive account of the evolution of geographical ideas and methods. Hartshorne emphasises that geography is the study of areal differentiation. As history is

exceptional in studying events which are unique in time, geography is to study the descriptions of unique regions, which are more or less homogenous from inside and heterogenous among various regions as no regions are the same due to varied characteristics resulting in each region as a unique entity. This led to the idea of exceptionalism in geography. Hartshorne, following the principles of Hettner, established that geography was chorological and that the regional approach formed the spirit and purpose of geography.

According to Hartshorne, geography was an idiographic discipline, describing the unique, as opposed to nomothetic disciplines, which search for universal laws. If all places are unique, there are as many laws as there are places (which defeats the purpose of laws). This methodological approach distinguished geography like history in terms of space and time from other sciences, such as physics, mathematics, or chemistry, which were nomothetic. Geography was exceptional. Geographers collected facts from places around the globe and therefore, created an inventory of knowledge that could then be classified.

Fred K. Schaefer (1953) criticised the idea of exceptionalism in regional geography and strongly advocated for taking up scientific positivism as its philosophy and methodology of explaining unique phenomena or events as other sciences do. He argued, 'the methodology of geography is too complacent'. His idea accelerated the movement towards what is popularly known as the Quantitative Revolution and Theoretical Geography. "A science is characterised by its explanations, and explanations require laws: 'To explain the phenomena one has described means always to recognise them as instances of laws... Hence geography has to be conceived as the science concerned with the formulation of the laws governing the spatial distribution of certain features on the surface of the earth" (Schaefer, p. 227). Geography's major regularities refer to spatial patterns. 'These spatial arrangements, not the phenomena themselves, should be the subject of geographer's search for law-like statements" (Johnston, 2017, p. 60). Schaefer considered geographical laws to be 'morphological' concerned with spatial forms and geography is a source of laws of locations. The other social sciences are morphogenetic concerned with processes.

Hartshorne, in his several thought-provoking responses to Schaefer's proposition, which culminated into a book: 'Perspective on the Nature of Geography (1959)', maintained that his account of geography is based on the evidence contained in the works of geographers and that Schaefer was completely oblivious of that. Schaefer is suggesting that 'it ought to be' and not what geography has been. His first reaction was that there was a flaw in the scholarship of Schaefer followed by limited references, unsupportable conclusions, misrepresentation of other's views, more of personal opinions lacking literary and historical analysis, Kant being the source of the exceptionalist view, (Johnston, 2017, p. 61). He strongly opposed Schaefer on his critique of exceptionalism. In the end, Hartshorne responded and addressed questions raised: i. meaning of geography as the study of Areal Differentiation; ii. meaning of earth surface; iii. integration of heterogenous phenomena a peculiarity of geography; iv. measure of "significance" in geography; v. distinction between human and natural factors; vi. division of geography by topical fields - the dualism of physical and human geography;

vii. time and genesis in geography; viii. geography's division between systematic and regional geography; and ix. geography's position whether as formulating scientific laws or as describing individual cases; with the need and the purpose in the beginning and the place of geography in the classification of sciences in the end. He argued for his idea of geography as the study of areal differentiation that it is the section of empirical knowledge that studies the integration of phenomena (the total reality). He was opposed to the division of geography into human and physical and said that it is 'the discipline that seeks to describe and interpret the variable character from place to place of the earth as the world of man (Hartshorne, 1959, p. 47 quoted in Johnston, 2017, p. 62). He also supported both - regional studies as well as topical (systematic) approaches in geography. On the formulation of scientific laws by geography, he pointed out the difficulty as these are established in the laboratory on individual cases, while geography studies the complex (human-nature) integration in unique places. Scientific laws are based on objectivity (deterministic and value-neutral) which restricts the human aspects in geography (possibilism with motivation and scope for humans to look beyond nature's restrictions and unpredictable human behaviour). He also talks of logical positivism to make observations and draw conclusions based on logic and rationale instead of laboratory experiments/observations for generalisation. In the end, he places geography as chorological science in the classification of sciences.

Some fundamental ideas have remained unchallenged for decades though there is ample reason to doubt their power' (Cloke et al., 1991, pp. 10-11). What he meant was that geography had become characterised by 'exceptionalism', an idea that it was 'quite different from other sciences and was thus 'methodologically unique' (Cloke et al.,1991, p. 231) in that it sought a description of unique occurrences: 'Geography according to Hartshorne is essentially idiographic. Whenever laws are discovered or applied, one is no longer in the area of geography. All it contributes is facts' (Cloke et al.,1991, p. 240). By contrast, he argued, geography should focus not on uniqueness but on similarity, by applying relevant laws in the manner of true science: 'Description, even if followed by the classification, does not explain the manner in which phenomena are distributed over the world. To explain the phenomena one has described means always to recognise them as instances of laws' (Cloke et al., 1991, p. 227).

Following the Hartshorne-Schaefer Debate, geographers got heavily influenced and inclined towards quantification in their zeal for law-making in geography.

The significance of the Hartshorne-Schaefer debate is immense as it gave rise to spatial analysis in geography based on nomothetic-systematic, law-making and generalised perspectives as against idiographic-chorological, specific perspectives propagated by Hartshorne. His approach was qualitative and he defined 'geography as that discipline, which seeks to describe and interpret the variable character from place to place of the earth as the world of man'. Schaefer on the other hand believed that 'geography must be a science, science is the search for laws and completely determinable by them' (Johnston, 1997). As an economist, Schaefer was much more focused on numerical forms of data collection, especially statistics. Schaefer's view of geography was that: "geography has to be conceived as the science

concerned with the formulation of the laws governing the spatial distribution of certain features on the surface of the earth and these spatial arrangements of phenomena, not the phenomena themselves, should be subject to geographer's search for law-like statements"(Schaefer, 1953, pp. 227-228). This article by Schaefer is seen as the beginning of the adoption of scientific methods in Geography, ultimately leading to the quantitative revolution (Kitchin, 2006). Schaefer further said that spatial relations are the ones that matter in geography and no others.

Hartshorne, however, discussed some of the points raised by Schaefer in his later publications in 1953 (Exceptionalism in Geography, AAAG, 44, pp.108-109) 1955 (Exceptionalism in Geography" Re-examined, AAAG 45(3), pp. 205-244), and 1959 (Perspectives on the Nature of Geography) as discussed above.

The methodological debate over spatial-chorological and nomological law-making approaches in the subsequent years gave birth to model–building phase in geographical thought pioneered by Burton, Bunge, Chorley and Haggett, Johnston and Harvey in the late 1950s and 60s.

## 1.4.1 The Rise of Spatial Analysis

Despite the counter-arguments, the period from 1960 saw a vigorous expansion of geographical research using the quasi-scientific method (Johnston, 1985, p. 137). The philosophical and methodological base for this was described by Harvey (1969) and a number of textbooks in both human and physical geography laid out the need for theory, laws, hypotheses, measurements and statistical testing (e.g. Abler, Adams and Gould, 1971; Young, 1972), but multiple problems emerged due to the fact that geography as a whole deals with multi-variable open systems and the human geography deals with knowing subjects (Abler et. al., 1971, p. 137). In order to put forth some arguments in favour of the regional method, a few points have been made by Hartshorne. He said that geography deals with unique events and generalisation in the form of laws and theories are doomed to be a failure (Hartshorne, 1939, pp. 378-97). Johnston (1985, pp.138-39) comments that "it is clear that uniqueness is a valid objection to a theoretically based hypothesis-testing approach, because a collection of unique cases may nevertheless confirm or reject a hypothesised relationship: uniqueness is only an obstacle to that if it can be shown that the causal relationships are themselves unique to each instance and change inconsistently from place to place, and from time to time. It is also arguable that uniqueness with respect to some trivial property or some peripheral relationship is an insufficient reason to invalidate the scientific method. The second point mentioned by Johnston is geographical systems being large open systems present difficulty in carrying out experimental tests. In this case, even in the field data collection process much of the control of extraneous variables is achieved by purely statistical means, which in theory allows the isolation of a two-variable relationship when 'all other variables are held constant'. Yet even such methods can only 'hold constant recorded variables; there is no way of controlling for the possible effects of unrecognized and unrecorded additional variables (Johnston, 1985, p.138). Johnston further opined that the multi-variable nature of geographic systems concerns the use of theory from other disciplines. Such borrowing is especially difficult if more

than one discipline is involved, each with a scale of analysis, a conceptual framework and definitions, which may not be compatible with each other or with the geographical terms of reference. Finally, he argues that despite these criticisms, scientific methods will be retained in both physical and human geography for three reasons. First, the scientific method does have the ability to provide coherent and testable theories about the nature of geographical phenomena. Second, the scientific method remains appealing because it is in many respects a codified and logically connected extension of thought structures developed in everyday life, including the willingness to correct theories or hypotheses in the light of experience. Finally, and partly as a consequence of these two points, knowledge of a scientific type is required by society for its purposes of managing social and natural systems (Johnston, 1985, p. 139).

It may be thus summarised that Hartshorne- Schaefer Debate brought in a new insight in geographical methodology and many scholars put forth their valuable comments in favour of scientific geography. At the same time, humanistic and phenomenological approaches also hold considerable ground in studying geographical phenomena. In recent years many geographers feel that a methodological heterodoxy and a combination of inductive and deductive approaches would bring in valuable results in terms of geographical research.

In the following Units, you will learn more about spatial analysis and the development of geography as spatial science.

### SAQ 3

a) What is the result of the Hartshorne-Schaefer Debate?
b) How would you differentiate the inductive-idiographic approach from the deductive-nomothetic approach?

## 1.5 SUMMARY

In this Unit, the focus of the study is on the scientific explanation of geography with the help of the theoretical-deductive method as the inductive-empirical method was rejected by many scholars. With the introduction of computers, a large number of data could be analysed and the geographers started applying quantitative techniques for building models in order to study spatial patterns of geographic activities. This enabled them to be predictive. This period is designated as the period of the Quantitative Revolution which lasted till the late 1960s. This period also witnessed a great debate between the two eminent scholars, notably Richard Hartshorne and F.K. Schaefer.

In this unit, you have studied:

- Geography in the early 1950s;
- Critique of regional geography;
- Scientific explanations in geography;
- Hartshorne- Schaefer Debate; and

- The rise of spatial analysis and geography as spatial science.

## 1.6 TERMINAL QUESTIONS

1. Discuss in detail the progress/nature of geography in the early 1950s.
2. Describe the basis and major arguments as a critique of regional geography.
3. What are scientific explanations in geography? Discuss in detail.
4. Critically evaluate the Hartshorne -Schaefer Debate and discuss the evolution of geography as spatial science.

## 1.7 ANSWERS

### Self-Assessment Questions (SAQ)

1. Scientific explanation in geography is the analysis and explanation of human-environment relationships through reasoning and logic as to why things and phenomena exist as they are in the spatial framework. It is beyond simple description of objects and phenomena.
2. The major criticism of the regional approach in geography (exceptionalism) is its nature of being completely descriptive and lack of scientific explanations with theory and generalisation.
3. a. The result of the Hartshorne-Schaefer Debate is about the sharp criticism of exceptionalism in regional geography and the rise of spatial analysis and spatial science involving scientific explanations in geography.

   b. These are the approaches of scientific studies where the inductive idiographic approach involves the process of observation, pattern, hypothesis and generalisation into established theories whereas the deductive-nomothetic approach involves the inverse process from general to particular- theory, hypothesis, observation and confirmation or rejection for generalisation. Inductive-ideographic approach to scientific studies is an explanation and description of a unique or particular event/phenomenon or connections based on empirical observation, which is on a single stance only not of a general trend. Deductive-nomological is an approach opposite inductive-idiographic approach to scientific studies, where empirical observation is made starting from general going to a search for a particular truth, which is not just an explanation and description but draws law-like statements.

### Terminal Questions

1. Give a detailed discussion on the progress and nature of geography in the early 1950s. Refer to Section 1.2.
2. Discuss the critique of regional geography as purely descriptive with exceptionalism lacking scientific law, theory and generalisation. Refer to Section 1.3.

3. Explain the main properties of the scientific explanations in geography with empiricism in the studies of human-environment relationships in geography. Refer to Sections 1.3 and 1.4.
4. Highlight the main point of the Hartshorne-Schaefer Debate including exceptionalism with critique of both followed by scientific explanations and the rise of geography as the spatial science. Refer to Section 1.4

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UNIT 2

# POSITIVISM, EMPIRICISM AND GEOGRAPHY

## Structure



## 2.1 INTRODUCTION

Positivism and empiricism are the philosophical concepts that have been incorporated into geography, which transformed its analytical system and approach. This brought a paradigm shift in geographical thought in the early 20th century and laid the foundation of what is popularly known as quantitative geography with its deductive-nomological approach. Geographers focused on formulating laws, building models, and applying inferential statistics, and simulation techniques to study spatial patterns and spatial organisation of geographical phenomena.

As such, during this period geographers like other natural scientists became engaged in prediction based on data collection, compilation, and data processing with the help of mathematical and statistical tools and techniques.

In the previous Unit of this Block, you have studied the progress and nature of geography since World War II. In this Unit, you will study the principles of Positivism, Empiricism and Quantitative Revolution and the spread of scientific and quantitative geography.

## Expected Learning Outcomes

After studying this unit, you should be able to:

- trace the historical background of the scientific approach in geography;
- explain positivism, logical positivism and empiricism; and
- discuss the emergence and spread of scientific and quantitative geography.

## 2.2 PRINCIPLES OF POSITIVISM

### 2.2.1 Positivism

Positivism is a philosophic system, which opposes metaphysics, and claims that 'science provides the only valid form of knowledge, and that sense perceptions of observable phenomena provide the only road to scientific knowledge' (Holt-Jensen, p. 132). It is a philosophy given by August Comte (1798-1857). Its core idea is that only science provides a valid form of knowledge and knowledge acquired through scientific observations through sensory experiences (collecting valid information) and interrelationships between the observations. It is value-free, neutral and objective and believes in the unity of science.

The philosophy of positivism dates back to the 19th century when the French social philosopher August Comte (1798-1857) brought a revolutionary change in the field of social science by introducing his concept of positivism. He was highly influenced by Turgot (1727-1781), Burdin and Saint-Simon (1760-1825), and the empiricism of John Locke and David Hume. Saint–Simonian doctrine emerged from a rejection of egalitarianism, individualism, and political sovereignty. Comte's main purpose was to distinguish science from both theology and metaphysics. He identified three stages in societal evolution which are: 1) the theological, 2) the metaphysical and 3) positive-scientific explanations in terms of universal law and focused on empirical testing of theories. The Comtian thesis was a rejection of abstract, metaphysical ideas on the basis of Kantian doctrine (Mann, pp. 59-60). Metaphysics was defined as that which lies outside our sense perceptions and, therefore, should be considered as unscientific.

Comte's lectures were published in a book entitled '*Cours de Philisophie Positive'* in six volumes (1830- 1842). Compte was of the opinion that the methods of natural science can be applied in the study of social phenomena. He argued that the scientific laws that are operative in natural sciences can also be adopted in social sciences to enable social science analysis to be predictive. These predictions based on laws then would be used to manipulate causal variables with a view to bringing about desired improvements in society through social-economic planning. Comte was convinced that "In a positive society, scientific knowledge would replace both religious belief and free speculation." (Holt-Jensen, p. 119)

Five basic precepts of Positivism are as follows:

- All scientific knowledge must be based on direct experience of an immediate reality since direct observation is the surest guarantee that the knowledge acquired is scientific,
- The direct experience of reality should be complemented by *la certitude*, that is the unity of scientific method. Sciences differ from one another in

what they study (i.e. subject –matter) rather than how they study (their method).

- The concept of the unity of scientific method required *la précis*, that is, a common scientific goal of formulating testable theories. This implied that there is no place for subjective value judgements in scientific enquiry, since based on ethical assertions, value judgements are not products of scientific observations and are as such not verifiable.
- The positivist view of science incorporated the principle of *l'utile*, which means that all scientific knowledge must serve some usual purpose – it should be utilisable; it should be a means to an end and a tool for social engineering.
- The fifth precept was *la relative,* which meant that scientific knowledge is essentially unfinished and relative because knowledge keeps progressing by gradual unification of the theories which in turn enhances man's awareness of social laws. Great awareness demands a more comprehensive theory.

This was the original view of positivism that dominated scientific thinking for almost a century.

SAQ I

a. What is positivism?
b. What are the five precepts of positivism?

## 2.2.2 Logical Positivism

'Logical Positivism' is the name given in 1931 by A.E. Blumberg and Herbert Feigl to a set of philosophical ideas put forward by the Vienna Circle. Synonymous expressions include 'consistent empiricism', 'logical empiricism', 'scientific empiricism', and 'logical neo-positivism'. Logical positivism is "an elaboration of positivism associated with Vienna Circle. Unlike Comte's positivism, logical positivism admits that some statements can be verified without recourse to empirical experience. Encompassing the rules of formal logic, it is possible to distinguish between analytical statements (i.e. priori propositions whose truth is guaranteed by their internal definitions, as in mathematics) and synthetic statements (whose truth has to be established by hypothesis testing)" (Holt-Jensen, p. 223).

Unlike positivism, logical positivism recognises two kinds of statements as scientifically meaningful: a) empirical or 'synthetic' statements, the truth of which is to be established by verification; and b) analytical statements of logic and mathematics, which were judged to be true by definition. Much of the specific critique of logical positivism, as opposed to the more general critique of positivism, has concentrated on the problems posed by this central 'principle of verification' and on the physicalism that it was often supposed to entail. Many geographers in the 1950s and 1960s in emphasising the importance of laws, theories and predictions adopted a logical positivist stance of science and scientific explanation.

SAQ 2

What is 'Logical Positivism'?

## 2.2.3 Empiricism

Empiricism is a philosophy, which says that all knowledge is based on experience derived from the senses empirically tested/experimented. It is that philosophy of science that advocates all hypotheses and theories must be based on/tested against observations of the natural world rather than resting solely on a priori reasoning, intuition or revelation. It believes that knowledge comes only or primarily from sensory experience. It is one of several views of epistemology, the study of human knowledge, along with rationalism and scepticism. Empiricism emphasises the role of empirical evidence in the formation of ideas, rather than innate ideas or traditions.

Empiricists advocate that all knowledge must be derived from experience, a posteriori. The debate as to whether a priori knowledge is possible continued through the following centuries. Bacon's (1561-1626) philosophy emphasising sense-experience as the source of scientific knowledge provided the foundations for the movement later known as empiricism, although he condemned the word. Most previous empiricists in his view were to be condemned for conducting random experiments without systematic organisation or trusting to chance experience instead of attempting to exercise control over discoveries. He placed a premium on originality, thus emphasising subjectivity rather than the sociology of knowledge, in a way that was to become characteristic of the whole empirical movement in the following century. Continental rationalism relied on the correct application of human reason, the use of mathematics and logical deduction from universal principles in science to achieve certainty during the first half of the 17th century.

Mechanistic world view favoured by the rationalist school provided an added complication for inquiries concerned with living organisms and particularly with man.

## 2.2.4 Scientific Empiricism

Scientific empiricism is defined by Merriam-Webster Dictionary as "A philosophical movement that denies the existence of any ultimate differences in the science, strives for unified science through a synthesis of scientific methodologies, comprises in addition to logical positivists thinkers with similar objectives, and is distinguished from earlier empiricism mainly by emphasis upon the analysis of language, which is also called unity of science movement" (https://www.merriam-webster.com)

Scientific empiricism is a philosophical movement that denies the existence of any differences in the sciences. It adheres to the principle of unity of sciences through a synthesis of scientific methodologies, comprises in addition to logical positivist thinkers with similar objectives, and is distinguished from earlier empiricism. Scientific empiricism moved to an extreme objectivist position, denying not only innate ideas but even the importance of a priori

knowledge in the form of concepts or expectations already in the individual's mind prior to present experience. The work of British empiricists is important for their contribution, which provided the main basis for the emergence of scientific empiricism in the 18th century, which was marked by the rise of positivism in the context of sensationist and materialist views. The major propounders of the British empiricist theory were J. Locke, G. Berkeley and D. Hume.

SAQ 3

a. What is Empiricim?
b. What is Scientific Empiricism?

## 2.2.5 Historical Background of Scientific Approach

In this context of discussing geography as a scientific enterprise, (Marshsll, 1985), a few points on methodological differences between inductive-empirical and deductive-nomological methods must be highlighted. In formal terms, induction is a type of reasoning in which the premises do not logically entail the conclusion. Another way of saying this is that induction increases content, or simply the conclusion goes beyond the available evidence. Deduction, in contrast, is a type of reasoning in which the conclusion follows necessarily from the same premises. Deduction, in other words, does not increase content, although one may require intellectual abilities of a high order in order to trace all the steps that lead from the premises of a deductive argument to its conclusion (Marshall, p.115). Induction is important in the scientific method because of the role it plays in the formulation of empirical generalisations. These generalisations may be divided into two types, namely the summative and extended. A summative empirical generalisation describes a property which has been confirmed by the actual observation of all the relevant cases. On the other hand, an extended empirical generalisation goes beyond the evidence on which it is based. It now becomes essential to differentiate between idiographic and nomothetic attitudes towards scholarly work. In brief, the idiographic attitude implies a concern with the uniqueness of individual phenomena or events, whereas the nomothetic approach implies a desire to subsume individual cases under law or law–like statements of very general, if not universal applicability (Hartshorne, 1961, pp. 378-97).

The premises of a deductive-nomological explanation are of two kinds, namely a) laws of nature and b) specific initial conditions (Marshall, p. 118). Scientists do spend a lot of time making observations and measurements and they look for regularities in their data. There are such things as deductive-nomological explanations and at least some scientists subscribe to the band of determinism implicit in the belief that all events can be subsumed under natural laws. Now another aspect of the scientific approach is the ability to make predictions. Here also the same difficulty arises. In the traditional view, it is possible to accurately predict an event which has not yet taken place provided we can specify a) the laws of nature which govern the occurrence of events of the type in question, and b) the initial conditions which describe the environment within which the event may or may not be about to take place. If

accordingly to purely deductive reasoning, these laws and initial conditions logically entail the event, then the occurrence may confidently be predicted.

It may be noted that the general form of the above predictive argument is identical to that of a deductive–nomological explanation. In both cases, a strictly deductive conclusion is derived from premises composed of general laws and initial conditions. This view of knowledge is known to philosophers as positivism (Marshal, p. 119).

There are the following logical steps in any scientific inquiry (Marshall, p. 124):

1. statement of the problem;
2. formulation of an appropriate theory;
3. derivation of actual propositions;
4. carrying out empirical tests; and
5. evaluation of results.

## 2.2.6 Some Key Elements in Scientific Thinking

According to Allan Hay (1985), there are four key elements which can be identified. These elements are theory, law, logic and reduction.

Theory refers to an organised and coherent body of assumptions and arguments (Theory of Continental Drift). The next important key is the law. Any fully developed scientific theory contains embedded within it certain statements about unvarying relationships (relationship between the pressure, volume and temperature of a mass of gas). These laws may be evident at the level of everyday experience (law of gravity) or only at the level of scientific investigation. The next is logic. It is often seen that a theory which consists entirely of laws based on experience and experiment is viewed with disfavour. It is seen as more satisfactory if most of the laws and other links in the theory can be shown to be logically derived from a much smaller number of fundamental assumptions and laws. Scientists have tended to use mathematics as the language for expressing and developing this logic, but other abstract languages are also used. The final key in much scientific thought is reduction- the idea that the laws and theories of a discipline can be reexpressed as special cases of the outworking of the laws of a more fundamental discipline. So for example it can be argued that meteorology is a special case of physics. Weathering is an example of applied chemistry, and some authors believe that all social sciences are reducible to psychology. In geography, reductionism leads from soil geography to soil chemistry and hence to studies of molecular behaviour and from urban geography to the behaviour of households and individuals and hence psychology (Marshall, p. 131). Hay is of the opinion that there is a fifth element - the research hypothesis - which provides a link to the area of scientific practice. In a well-developed natural science, a research hypothesis predicts the outcome of an experiment or observation if the theory is correct. Hypotheses in the research are statements to predict and test the relationship between independent and dependent variables.

SAQ 4

Name the four basic elements of scientific thinking.

## 2.3 SPREAD OF SCIENTIFIC AND QUANTITATIVE GEOGRAPHY

The acceptance of positivism in geographical analysis became popular in geography after the Second World War and in the 1950s after the Hartshorne-Schaefer debate, it emerged as a scientific geography that ushered in Quantitative Revolution. The geographers of the quantitative school followed the scientific path of empirical observation, data accumulation, and mathematical formulation of universal laws and presented law-like statements. The spatial analysis gave rise to geometric patterns, taxonomic analysis, and models of various types in the analysis of human activities, settlement growth, industrial locations, population growth, migration behaviour and diffusion processes. Geography became spatial science and new sub-disciplines such as Regional Science emerged. The universal law-making decision processes were based on three processes of modelling, observation and statistical analysis. Space and spatial patterns became the prime element in the analysis of quantitative geography. The application of inferential statistics as opposed to descriptive statistics became prevalent in geographical studies. The objectives of the quantification were: i) to make a prediction, ii) formulation of spatial pattern, iii) to study spatial behaviour, iv) building topology, and v) building of location theories. This exercise continued up to the 1950s and 1960s. A number of mathematical and stochastic models emerged (Richard J. Chorley & Peter Haggett, 1967; and Torsten Hagerstrand, 1968). The specific models include the simulation model, (Hagerstrand, 1953), the gravity model (William J. Reilly, 1931) input-output model (Walter Isard & Brian J.L. Berry, 1971), location models (Richard J. Chorely & Peter Haggett, 1965) and many others.

In the spread of quantitative geography, the names of the some of the geographers need special mention. They are William Bunge (Theoretical Geography, 1962), Ian Burton (The Quantitative Revolution and Theoretical Geography, 1963), David Harvey (Explanations in Geography, 1969), Walter Isard (*Location and Space Economy,*1956, and Methods of Regional Analysis, 1960), Brian J.L. Berry (Cities as Systems within Systems of Cities, 1964), King (A Note on Theory and Reality, 1960), etc. In America, four schools pioneered research in quantitative geography (Johnston, 1979, pp. 50-58). These are: 1. Iowa School led by H. McCarty, L.J. King, J.C. Hook and H.A. Stafford, 2. Wisconsin School led by J.C. Weaver and A.H. Robinson, 3. Washington School pioneered by W.L. Garrison and E.L. Ullman, and 4. Social Physics School, Princeton University led by J.Q. Stuart and W. Warntz. Each of these schools focused on specific aspects of quantification. McCarty and his co-workers emphasised how to establish the degree of correspondence between two and more geographical patterns, akin to the morphological laws as discussed by Schaefer (Johnston, p. 51). Wisconsin school focused on representing areal data by point and application of correlation and regression techniques in analysing agriculture and

population studies. The Washington school being the largest producer of quantitative papers in geographical studies emphasised the point and line patterns analysis, the dominant thrust being on the derivation from other systematic sciences of relevant theories, mathematical methods and statistical procedures with which to develop morphological laws (Johnston, p. 54). Garrison, one of the leading geographers of this school dealt with applications of the mathematical procedures of linear programming (Johnston, 55). The Social Physics School, however, focused on various aspects of population distributions, regularities which were akin to the laws of physics. The concept of macro-geography was developed by John Q. Stewart and William Warntz (Johnston, 58).

The spread of scientific methods in geography continued with Harvey's introduction to scientific routes (Harvey, 1969), and was further expanded by scholars like Berry, Isard, Haggett & Chorely, Zelinsky and others. Haggett and his associates stress that geography is a science of distributions, and their emphasis is on the regularities in various elements of these distributions (Harvey, 1969, p. 85). Morrill in his book 'The Spatial Organization of Society' (1970), emphasised the core elements of human geography which he termed as space, space relations and change in space that is how physical space is structured, how men relate through space, and how our conception and use of space change. In this context, he also identified five qualities of space that are relevant to the understanding of human behaviour, which are: 1. Distance, 2. The spatial dimension of separation, 3. Agglomeration, 4. Size and 5. Relative location. Thus quantitative geography established itself in spatial arrangements and spatial structures (Haggett,1965). In social physics the work of Stuart, Zipf and others, the distance was becoming an important parameter for understanding spatial relationships.

During the late 1960s, a group of British geographers at Bristol University started questioning the relevance of most statistical procedures in geographical investigations (Johnston, pp. 94-95). The forecasting and prediction issue was basic to the work of the Bristol group and their activities were focused on spatial forecasting which established trend patterns. From this, it was deduced that geography has a close association with geometry in its emphasis on the spatial aspects of events but at the same time, it was also admitted that geometry alone is insufficient as a basis for explanation and prediction (Johnston, p. 97).

In India, since the early 1970s, the Centre for the Study of Regional Development, Jawaharlal Nehru University, New Delhi has been engaged with intensive teaching and research in geography with quantification with specialisation in regional and urban development and planning.

## SAQ 5

What is the major academic event in geography, which gave rise to quantitative geography?

## 2.4 SUMMARY

After examining the spread of scientific methods in geography it becomes imperative to mention a few points that have been raised by the practising geographers of quantitative approach. Many scholars have written profusely about the geographical applications of scientific methods. There are some inherent problems in this approach. The main problem arises from the twin facts that geography as a whole deals with multi-variable open systems and that human geography deals with knowing subjects (Johnston, p.137). The debate has continued for the last half a century or so. However, among a number of arguments, some are highlighted. These have been summarised below:

There are critiques of positivism and empiricism as mentioned below:

- The sheer size of a geographical system makes the laboratory experiment impossible. Even if the system can be reproduced in the laboratory there is no assurance that all the variables relevant in reality have been included in the laboratory version.
- In field experiments also and certainly in field data collection much of the control of extraneous variables is achieved by purely statistical means which in theory allow the isolation of a two-variable relationship when all other variables are held constant.
- Another problem which arises in applying the scientific method in geography is the interference by the observer with the phenomenon observed. Moreover, the interaction between the observer and the observed may produce long-run changes, which would not otherwise have occurred (Johnston, pp. 138-139).
- It is true that the scientific method does have the ability to provide coherent and testable theories about the nature of geographical phenomena.

In spite of critiques, there are advantages of positivism and empiricism as mentioned below:

- The scientific methods remain appealing because it is in many respects a codified and logically connected extension of thought structures developed in everyday life, including the willingness to correct theories or hypotheses in the light of experience.
- The knowledge of a scientific type is required by society for its purposes of managing social and natural systems.
- At the level of practice, geography will need to retain most of the elements of the scientific method. The research hypothesis, the hypothesis test and the prediction as a testing device will be needed. But the idea that any one sort of observation conclusively proves or definitively falsifies a theory cannot be retained.
- It is also true that scientific geography in the future will require the retention, development and refinement of measuring devices, guided by the emergent geographical theories and by the cognate disciplines from which they are derived (Johnston, 141).

- At the same time, it is also viewed by many scholars that humanistic and phenomenological approaches may yield valuable new insights into the nature of geographical phenomena (Nagel,1953).

In a nutshell, in this Unit you have studied:

- Principles of Positivism and Logical Positivism;
- Historical background of scientific approach;
- Empiricism and Scientific Empiricism;
- Key elements in scientific thinking; and
- Spread of Scientific and Quantitative Geography.

## 2.5 TERMINAL QUESTIONS

1. What is the philosophical basis of scientific and quantitative geography? Critically analyse the merits and demerits of the quantitative approach in geography throwing light on the contributions made by the quantitative geographers.
2. Explain the principles of positivism and logical positivism in detail. How did positivism and logical positivism influence geographical thinking?
3. Discuss empiricism and logical empiricism in detail.
4. Elaborate the historical background of the scientific approach.
5. Give a detailed discussion on the spread of scientific and quantitative geography.

## 2.6 ANSWERS

### Self-Assessment Questions (SAQ)

1. a. Positivism is a philosophy given by August Compte which is the application of scientific theories and approaches to scientific knowledge validated with observable facts.

   b. Five basic precepts of positivism are direct experience is the basis of all scientific knowledge; direct experience of reality should be complemented by the unity of scientific method (*la certitude*); the concept of the unity of scientific method requires a common scientific goal of formulating testable theories (*la precis*); all scientific knowledge should be a means to an end and a tool for social engineering (*l'útile*); and scientific knowledge is essentially unfinished and relative (*la relative*).
2. Logical positivism is another philosophy which says that some facts in the form of statements can be verified without empirical experience encompassing the rules of formal logic.
3. a. Empiricism is a philosophy that all knowledge is based on experience derived from the senses empirically tested/experimented.

b. Scientific empiricism is a philosophical movement that denies the existence of any differences in the sciences. It adheres to the principle of unity of sciences through a synthesis of scientific methodologies, comprises in addition to logical positivist thinkers with similar objectives, and is distinguished from earlier empiricism.

4. The four basic elements of scientific thinking are theory, law, logic and reduction.
5. The major academic event in geography is the Hartshorne-Schaefer Debate, which gave rise to quantitative geography.

## Terminal Questions

1. Write the philosophical background of scientific and quantitative geography as how it got into existence out of the rejection of purely descriptive geography and discuss the merits and demerits of the quantitative approach in geography. You may give the arguments and counter arguments with main propounders and their work and criticisms of the approach. Refer to Section 1.2.
2. Explain the principles of positivism and logical positivism with their influences on geographical thinking. Refer to Sections 2.2.1 and 2.2.2.
3. Give a detailed analytical discussion on empiricism and logical empiricism. Refer to Sections 2.2.3 and 2.2.4.
4. Discuss the historical background of the scientific approach. Refer to Section 2.2.5.
5. Discuss in detail the spread of scientific and quantitative geography. Refer to Section 2.3.

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# GLOSSARY

**Deductive Method** : In this method of research, the approach is from general to particular. The observations are tested based on the general principles and hypotheses are tested on whether to accept the general principle or not. The research moves from known to unknown.

**Empiricism** : Empiricism is a philosophy, which says that all knowledge is based on experience derived from the senses empirically tested/experimented. It is that philosophy of science which advocates that all hypotheses and theories must be tested against observations of the natural world rather than resting solely on a priori reasoning, intuition or revelation.

**Hartshorne-Schaefer Debate** : During the post-Second World War period, geography was greatly shaped by an idea of spatial science through the Quantitative Revolution. During this period there was a series of articles by Richard Hartshorne and F.K. Schaefer where Schaefer argued that geography cannot remain with exceptionalism means just differentiation with uniqueness as regions, but it was more than that - emerging as the spatial science. This exchange of ideas between Hartshorne and Schaefer about the nature of geography evolving from exceptional Discipline to spatial science is called Hrshorne-Schaefer Debate.

**Idiographic** : It is related to the description of uniqueness very closely related to exceptionalism or regional geography or history both of which deal with a particular region or event.

**Inductive Method** : In this method of research, the generalisation is derived after making observations and measuring and testing the hypotheses. It is the method, which moves from particular to general. Here the research starts with the unknown.

**Logical Positivism** : Logical positivism is another philosophy, which says that some facts in the form of statements can be verified without empirical experience encompassing the rules of formal logic.

**Nomological Method** : It is a branch of the scientific method that is concerned with explaining natural phenomena leading to the formulation of law.

**Nomothetic** : It is related to the universal and the general by drawing or formulating general laws through the observations of common properties.

**Percepts of Positivism** : Five basic percepts of positivism are direct experience is the basis of all scientific knowledge; direct experience of reality should be complemented by the unity of scientific method (*la certitude*); the concept of the unity of scientific method requires a common scientific goal of formulating testable theories (*la precis*); all scientific knowledge should be a means to an end and a tool for social engineering (*l'útile*);

and scientific knowledge is essentially unfinished and relative (*la relative*).

**Positivism** : Positivism is a philosophy given by August Compte, which is an application of scientific theories and approaches to scientifically validated knowledge with observable facts.

**Regional Geography** : Geographical study of any region or unit of area holistically covering physical and human aspects as a synthesis or integrative study. In other words, regional geography is the geographical study of regions with their total features and phenomena as a single composition with their complex interrelationships through synthesis and integration of both the aspects- physical as well as human with causal relationships considering both as cause and effect simultaneously. Regional geography covers all topics of physical geography and human geography at the macro, meso or micro level region.

**Scientific Explanation in Geography** : Scientific explanation in geography means the explanation of what exists or what is going to exist based on answering the questions of why and how following systematic observation of data and formulation and testing of hypothesis (empiricism).

**Spatial Analysis** : The study of the distribution of specific features or phenomena from spatial perspectives or their locational perspective.

**The Scientific Empiricism** : Scientific empiricism is a philosophical movement that denies the existence of any differences in the sciences. It adheres to the principle of unity of sciences through a synthesis of scientific methodologies, which comprises in addition to logical positivist thinkers with similar objectives and is distinguished from earlier empiricism.