CONCEPTS AND TRENDS IN GEOGRAPHY

UNIT-IV

QUANTITATIVE REVOLUTION-CONCEPT-HYPOTHESES-LAW THEORIES AND MODELS-DESCRIPTIONS AND EXPLANATION-SYSTEM APPROACH AND ANALYSIS-INDUCTIVE AND DEDUCTIVE APPROACHES

The **quantitative revolution** (**QR**) was a paradigm shift that sought to develop a more rigorous and systematic methodology for the discipline of geography. It came as a response to the inadequacy of regional geography to explain general spatial dynamics. The main claim for the quantitative revolution is that it led to a shift from a descriptive (idiographic) geography to an empirical law-making (nomothetic) geography. The quantitative revolution occurred during the 1950s and 1960s and marked a rapid change in the method behind geographical research, from regional geography into a spatial science.

In the history of geography, the quantitative revolution was one of the four major turning-points of modern geography – the other three being environmental determinism, regional geography and critical geography).

The quantitative revolution had occurred earlier in economics and psychology and contemporaneously in political science and other social sciences and to a lesser extent in history.

Antecedents

During the late 1940s and early 1950s:

- The closing of many geography departments and courses in universities took place, e.g. the abolition of the geography program at Harvard University (a highly prestigious institution) in 1948.
- There was continuing division between human and physical geography – general talk of human geography becoming an autonomous subject.
- Geography was regarded as overly descriptive and *unscientific* – it was claimed that there was no explanation of *why* processes or phenomena occurred.
- Geography was seen as exclusively educational – there were few if any applications of contemporary geography.
- Continuing debates regarding what geography is – science, art, humanity or social science – took place.

- After World War II, technology became increasingly important in society, and as a result, nomothetic-based sciences gained popularity and prominence.

All of these events presented a threat to geography's position as an academic subject, and thus geographers began seeking new methods to counter critique.

The Revolution

The quantitative revolution responded to the regional geography paradigm that was dominant at the time. Debates raged predominantly (although not exclusively) in the U.S., where regional geography was the major philosophical school. In the early 1950s, there was a growing sense that the existing paradigm for geographical research was not adequate in explaining how physical, economic, social, and political processes are spatially organized, ecologically related, or how outcomes generated by them are evidence for a given time and place. A growing number of geographers started to express their dissatisfaction with the traditional paradigm of the discipline and its focus on regional geography, deeming the work as too descriptive, fragmented, and non-generalizable. To address these concerns, early critics such as Ackerman[3] suggested the systematization of the discipline. Soon thereafter, a series of debates regarding methodological approaches in geography took place. One of the first illustrations of this was the Schaefer vs. Hartshorne debate. In 1953 *Exceptionalism in geography: A Methodological Examination* was published. In this work, Schaefer rejected Hartshorne's exceptionalist interpretations about the discipline of geography and having the region as its central object of study. Instead, Schaefer envisioned as the discipline's main objective the establishment of morphological laws through scientific inquiry, i.e. incorporating laws and methods from other disciplines in the social sciences that place a greater emphasis on processes. Hartshorne, on the other hand, addressed Schaefer's criticism in a series of publications,[4][5][6][7] where he dismissed Schaefer's views as subjective and contradictory. He also stressed the importance of describing and classifying places and phenomena, yet admitted that there was room for employing laws of generic relationships in order to maximize scientific understanding. In his view, however, there should be no hierarchy between these two approaches.

While debates about methods carried on, the institutionalization of systematic geography was taking place in the U.S. academy. The geography programs at the University of Iowa, Wisconsin, and Washington were pioneering programs in that respect. At the University of Iowa, Harold McCarty led efforts to establish laws of association between geographical patterns. At the University of Wisconsin, Arthur H. Robinson led efforts to develop statistical methods for map comparison. And at the University of Washington, Edward Ullman and William

Garrison worked on developing the field of economic and urban geography, and central place theory. These institutions engendered a generation of geographers that established spatial analysis as part of the research agenda at other institutions including University of Chicago, Northwestern University, Loyola University, The Ohio State University, the University of Michigan, among others.[8][9]

The changes introduced during the 1950s and 1960s under the banner of bringing 'scientific thinking' to geography led to an increased use of technique-based practices, including an array of mathematical techniques and computerized statistics that improved precision, and theory-based practices to conceptualize location and space in geographical research.[9]

Some of the techniques that epitomize the quantitative revolution include:[1]

- Descriptive statistics;
- Inferential statistics;
- Basic mathematical equations and models, such as gravity model of social physics, or the Coulomb equation;
- Stochastic models using concepts of probability, such as spatial diffusion processes;
- Deterministic models, e.g. Von Thünen's and Weber's location models.

The common factor, linking the above techniques, was a preference for numbers over words and a belief that numerical work had a superior scientific pedigree.[1] Ron Johnston and colleagues at the University of Bristol have published a history of the revolution that stresses changes in substantive focus and philosophical underpinnings as well as methods.[10]

Epistemological underpinnings

The new method of inquiry led to the development of generalizations about spatial aspects in a wide range of natural and cultural settings. Generalizations may take the form of tested hypotheses, models, or theories, and the research is judged on its scientific validity, turning geography into a nomothetic science.

One of the most significant works to provide a legitimate theoretical and philosophical foundation for the reorientation of geography into a spatial science was David Harvey's book, *Explanation in Geography*, published in 1969. In this work, Harvey laid out two possible methodologies to explain geographical phenomena: an inductive route where generalizations are made from observation; and a deductive one where, through empirical observation, testable models and hypothesis are formulated and later verified to become scientific laws.[11] He placed preference on the latter method. This positivist approach was countered by critical rationalism, a philosophy advanced by Karl Popper who rejected the idea of verification and maintained that hypothesis can only be falsified. Both epistemological philosophies, however, sought to achieve the same objective: to produce scientific laws and theories.[12]

The paradigm shift had its strongest repercussions in the sub-field of economic and urban geography, especially as it pertains to location theory. However, some geographers–such as Ian Burton–expressed their dissatisfaction with quantification[13] while others – such as Emrys Jones, Peter Lewis, and Golledge and Amedeo – debated the feasibility of law-making.[14][15][16] Others, such as F. Luckermann, criticized the scientific explanations offered in geography as conjectural and lacking empirical basis. As a result, even models that were tested failed to accurately depict reality.[17]

By the mid-1960s the quantitative revolution had successfully displaced regional geography from its dominant position and the paradigm shift was evident by the myriad of publications in geographical academic journals and geography textbooks. The adoption of the new paradigm allowed the discipline to be more serviceable to the public and private sectors.[18]

Post-revolution geography

The quantitative revolution had enormous implications in shaping the discipline of geography into what it looks like today given that its effects led to the spread of positivist (post-positivist) thinking and counter-positivist responses.[19]

The rising interest in the study of distance as a critical factor in understanding the spatial arrangement of phenomena during the revolution led to formulation of the first law of geography by Waldo Tobler. The development of spatial analysis in geography led to more applications in planning process and the further development of theoretical geography offered to geographical research a necessary theoretical background.[20]

The greater use of computers in geography also led to many new developments in geomatics, such as the creation and application of GIS and remote sensing. These new developments allowed geographers for the first time to assess complex models on a full-scale model and over space and time and the relationship between spatial entities.[21] To some extent, the development of geomatics helped obscure the binary between physical and human geography, as the complexities of the human and natural environments could be assessed on new computable models.[22]

The overwhelming focus on statistical modelling would, eventually, be the undoing of the quantitative revolution. Many geographers became increasingly concerned that these techniques simply put a highly sophisticated technical gloss on an approach to study that was barren of fundamental theory. Other critics argued that it removed the 'human dimension' from a discipline that always prided itself on studying the human and natural world alike. As the 1970s dawned, the quantitative revolution came under direct challenge.[1] The counter-positivist response came as geographers began to expose the inadequacy of quantitative methods to explain and address issues regarding race, gender, class and war.[23] On that regard, David Harvey disregarded earlier works where he advocated for the quantitative revolution and adopted a Marxist theoretical framework.[24][25] Soon new subfields would emerge in human geography to contribute a new vocabulary for addressing these issues, most notably critical geography and feminist geography. Ron Johnston Ron Johnston (geographer) and Bristol colleagues have argued and documented how quantitative methods can be used in a critical geography.[26] One commentator described this as "an extraordinary contribution. This is a panoramic survey of the legacy of half a century of innovation in spatial science—put into a critical, constructive engagement with half a century of innovation in critical social theory".

GEOGRAPHICAL CONCEPT

A *concept* is a classifier that helps to organise thinking. It is a generalised idea about a class of objects, situations, actions, processes, relationships, qualities or whatever. Many concepts we use in geography relate to familiar experiences such as 'weather' or 'town centre' or 'journeys'. Others involve a higher order of abstraction, such as 'climate', 'accessibility', 'urbanisation' and 'interdependence'. But as Margaret Roberts (2013) explains, implicit in every concept in geography is a complex cluster of knowledge and understanding:

'*Even apparently simple concrete concepts such as 'street' are related to an array of ideas. What are the characteristics of a street? What does it include? Is it the same as a road? What kinds of roads are not streets? What wider uses of the word 'street' are there and what connotations does it have? Is the word 'street' used in the same way in different parts of the world?'* (p81)

Generalisations express relationships between concepts. A generalisation relies on knowing the meaning of the concepts it includes. For example, a generalisation such as 'Britain's weather and climate are variable due to Britain's position in relation to the global atmospheric circulation' presupposes a grasp of the meaning of 'weather', 'climate', and 'variability' as well as 'global atmospheric circulation' etc.

Models are conceptual tools that are also used in geography and can be useful aids to understanding. However, school textbooks sometimes refer to human geography models such as Rostow or Burgess and Hoyt; you must be aware that these reflect processes at the time of their construction which can be many decades ago and may not be applicable to today's world. Read Rawding, C. 'Putting Burgess in the bin', *Teaching Geography,* Autumn 2019 which challenges this model of urban development and proposes an alternative.

Geography is a content-rich subject and concepts provide an underlying structure. Many topics in geography exemplify the same conceptual understanding, so it is important for learners to understand concepts so that they do not see geography as an accumulation of 'content' and 'facts'. Students need to acquire concepts in geography so they can relate information and ideas to each other and make sense of them. They also need concepts in order to develop higher order thinking, such as to give explanations and to think abstractly.

An effective teacher builds students' understanding of concepts so that geography becomes accessible to them and they can progress. They make concepts transparent to students, to help them to think geographically and to develop transferable geographical understanding. This will take students beyond learning a set of dislocated facts and move them into the realms of informed geographical thinking. All this relies, of course, on teachers having a good grasp of the key geographical concepts themselves

For students to think geographically and become effective geographers they must have a good grasp of the subject's key ideas or 'big concepts'. These are often described as *threshold concepts* which, once understood, can transform the student's perception of a subject, and without which the student's learning cannot progress. However, geographical concepts develop and change so there is no consensus amongst geographers about a fixed list. Some sets of concepts for geography are listed in Roberts (2013) fig 9.2 and Biddulph etc. (2015) p 49. Although there is no definitive list, those that were identified in the 2007

Geography National Curriculum have been widely adopted in schools at key stage 3 and are often described as 'organising' concepts.

- The concepts identified in the 2008 Geography National Curriculum were: Place; Space; Scale; Interdependence; Physical and human processes; Environmental interaction and sustainable development; Cultural understanding and diversity.

  Geography teachers have found that identifying 'big concepts' such as these for their curriculum helps them to shape geographical content, focus geographical learning and plan their teaching. The level of sophistication with which students handle these 'big concepts' defines their progress in learning geography.

  The 2014 National Curriculum does not include a list of key concepts. The 'big' concepts of the 2007 curriculum still apply, although they do not always appear explicitly in the current Programme of Study. For example, the concept of 'environmental interaction' is implied in 'how *human and physical processes interact to influence, and change landscapes, environments* ……' The 2014 curriculum includes more concrete concepts, such as 'latitude' and 'weathering'.

  The GCSE specifications are required to have a focus on 'forming generalisations and/or abstractions, including some awareness … of the subject's conceptual frameworks' and students are required to demonstrate 'geographical understanding of concepts and how they are used in relation to places, environments and processes'. The Eduqas GCSE specifications list in the detailed content sections a number of specific concepts and provide a conceptual framework of six ' big concepts': place; sphere of influence; cycles and flows; mitigating risk; sustainability; and inequality. The other GCSE specifications are less explicit, yet the content is full of terms, such as globalisation, that demand conceptual understanding

  David Lambert sees the main organising concepts of geography to be *place, space and environment*. These are high-level ideas that can be applied right across the subject. Beneath these he recognises a multitude of substantive concepts e.g. 'from river basin to glacial ice; from city to rural fringe; from production to consumption'.

- Read more about how David Lambert sees these three ‘big’ organising concepts and how they define geographical thinking in Jones, M. (ed) (2017), *The Handbook of Secondary Geography,* Sheffield: Geographical Association, pp 26-7.
- Read the support sheet on *The concepts of place, space and scale* and the concepts of *Environmental interaction and sustainable development*.

Take time to read what geography educators and teachers have written about geographical concepts and their role in learning, so that you are ready to use them in your planning and teaching. Some of the articles listed below were written in relation to the 2007 National Curriculum, but the principles about concepts in geography are still very relevant to teaching now.

HYPOTHESES

An idea or explanation that can be tested through study and experimentation. A well written **hypothesis** is clear, directional and measurable. e.g. 'There is an inverse relationship between the index of multiple deprivation and the clone town index in north Suffolk.

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The six most common forms of hypotheses are:

- Simple Hypothesis.
- Complex Hypothesis.
- Empirical Hypothesis.
- **Null Hypothesis** (Denoted by "HO")
- **Alternative Hypothesis** (Denoted by "H1")
- Logical Hypothesis.
- Statistical Hypothesis.

THEORIES

The usefulness and need for **theories** was often disputed, despite the oft-repeated argument that **theories** of location explained the laws of spatial distributions, **theories** of interaction explain the laws of movement and spatial behaviour, **theories** of growth and development explain the nature of past, present, and future

LAW

The First **Law** of **Geography**, according to Waldo Tobler, is "everything is related to everything else, but near things are more related than distant things." This first **law** is the foundation of the fundamental concepts of spatial dependence and spatial autocorrelation and is utilized specifically for the inverse distance **...**

MODELS

geography, **models** are theoretical frameworks that let us predict things like spatial relationships, interaction with or across space, and other issues of **geography**. Geographers base **models** on large patterns and test these theories against real-world data to help determine how and why things happen as they do.

DESCRIPTIONS AND EXPLANATION

Geography is the study of places and the relationships between people and their environments. Geographers explore both the physical properties of Earth's surface and the human societies spread across it.**Geography** seeks to understand where things are found, why they are there, and how they develop and change over time.

Explanations in geography to **explain** general and empirical Laws are as follows: (i) Cognitive Description (ii) Morphometric Analysis (iii) Cause and Effect Analysis (iv) Temporal Analysis (v) Functional and Ecological Analysis.

SYSTEMS APPROACH AND ANALYSIS

A general **systems** model is a composite in which variables are linked in a human/land **system**. Some of the variables may be measured quantitatively and some may not. The **systems approach** involves relationships between variables, and a change in one variable will reverberate throughout the entire **system**.

Geography deals with complex relationships of living and non-living organisms in an ecosystem. System **analysis** provides a framework for describing the whole complex and structure of activity. It is, therefore, peculiarly suited to **geographic analysis** since **geography** deals with complex multivariate situations.

The main difference between **inductive** and **deductive reasoning** is that **inductive reasoning** aims at developing a **theory** while **deductive reasoning** aims at testing an existing **theory**. ... **Inductive reasoning** moves from specific observations to broad generalizations, and **deductive reasoning** the other way around.