

THEORY AND METHODS IN GEOGRAPHY

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Summary

Different methodological positions exist within geographical work, mainly related to the two main branches of the field, physical and human. While in physical geography the scientific, rational method used in natural sciences is the dominant one, in human geography the historical, descriptive approach has been traditionally more common. This makes of geography scientific field based on both inductive and deductive principles, and idiographic and nomothetic explanations.

Regional geography deals with the social and cultural construction of places, regions or territory, with the relationships that bind humans and society to environment. This approach is justified by the fact that things are different in different areas of the world. In the systematic approach, the geographical study concentrates on a specific kind of phenomena irrespective of its location and applies the methods of the natural sciences. Both proposals have shaped the geographical tradition.

The contributions made by geographers to the development of techniques for observation, display and analysis of data are related to the practice of field research. This derives from the discipline's emphasis on location, distribution, spatial patterns and synthesis. For that reason, the principal laboratory for geographic investigation is the field. Many of geography's most compelling questions centre on changes in the physical

and built landscape. Addressing those questions usually requires field observation and spatial sampling.

1. Theories

1.1. Introduction

Because geography is a science of multiple approaches, being at the crossroad of various sciences, it takes methods from many other associated fields. For the one side, it is located amongst the earth or natural sciences, from geology to meteorology and biology, and on the other side, amongst the social sciences, from history to economy and sociology.

It is for this reason that geographers are continuously discussing about the objectives, methods and unity of geography. However, the unity cannot be methodological because it uses the methods of natural and social sciences. This variability of orientations makes it a science very sensible to conjectural issues in relation to the need of global knowledge inherent to social worries

1.2. The Basic Scientific Principles

As in all natural sciences, research in physical geography follows the principles of rational science, that is, considers science as an ordered, logical activity, with judgments based on reasons, and has developed and progressed from the classical approach to the modern critical rationalism.

Classical, or empirical, science, issues from Francis Bacon in the sixteenth century, for whom the scientific knowledge is certain because it is based on observation, experience, and measurement. The experience provided by observation and experimentation is what distinguishes science from other sources of knowledge.

The classical tradition asserts that knowledge grows by the patient accumulation of well-attested facts, on data perceived by the senses. A key element is the concept of *induction*, the process by which reliable generalizations are obtained from a set of observations of reality. Induction generalizations are made once all the facts on a matter have been assembled. An example of the methods of classical science is the work by Charles Darwin.

In the twentieth century, the logical positivist accepted the view of the classical tradition but sought to give a more rigorous justification of this approach by trying to solve three problems: verification, induction and theory-dependent observation. Verification, that is the gap between the reality that is experienced and the interpretation of it by the observer or scientist, who can never be certain that his senses are trustworthy and unprejudiced. Induction or the fact that there is no principle that can justify the truth of a conclusion derived from a set of statements about a particular event, the justification of a universal statement on the basis of a set of particulars. The dependence of observation on theory, because theoretical terms always enter into observational reports.

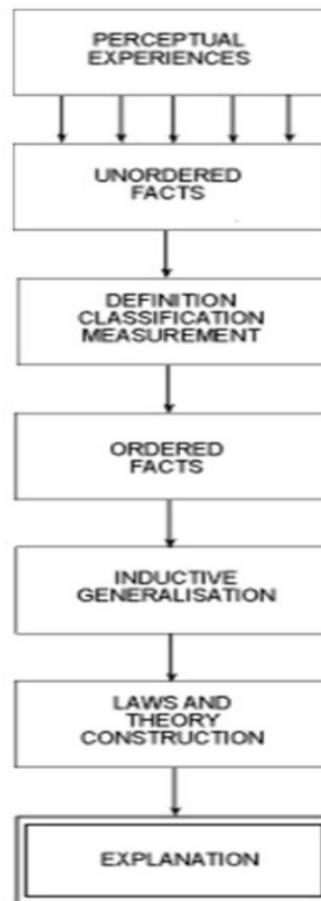


Figure 1. Inductive (Baconian) classical science. (simplified from Harvey)

The critical rationalist view of Karl Popper is an important alternative to the classical tradition. He argues that scientific method is essentially *deductive* in character, and that it is the ability to falsify scientific statements, rather than to verify them, which distinguishes scientific statements from all others.

The term critical comes from the fact that scientific method is essentially critical in character. The term rationalism is used because such critical investigation is supposed to provide good, rational reasons for holding some theories rather than others.

The main principles are those of falsification, criticism and demarcation. The first principle indicates that universal statements and theories can only be refuted and not verified. In the second place, because all scientific knowledge is speculative and it grows by a process of trial and error rather than by accumulation of facts, the only rational attitude to adopt towards it is a critical one.

Finally, the principle of demarcation asserts that the essential characteristic of scientific statements is that they are empirically testable and capable of refutation.

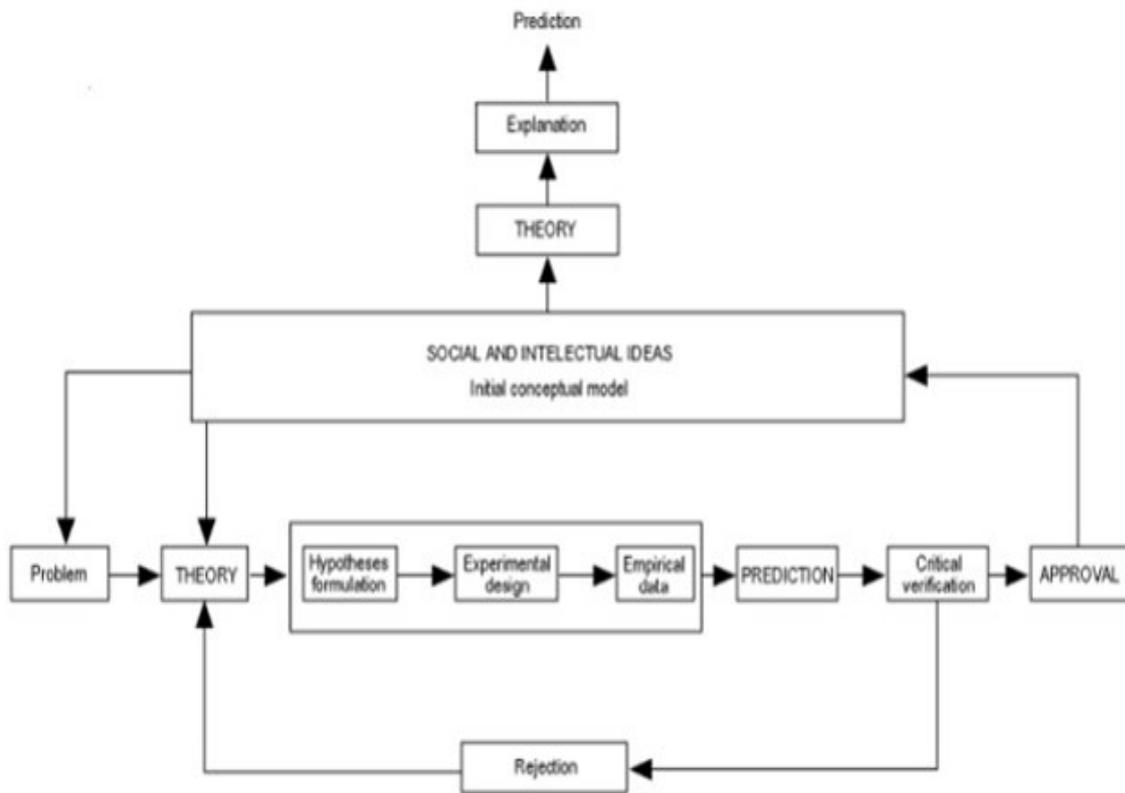


Figure 2. Hypothetic-deductive reasoning (from Sala & Batalla)

1.3. The Main Conceptions in Human Geography

Johnston, in his book on human geography, identifies three types of approaches in this field: *empirical*, *hermeneutic* and *critical*. In the *empirical* (or analytic), knowledge comes from direct experience and empiricist work is the recording of information within an agreed and approved conceptual framework. For geographers in the decades prior to 1945, this involved the collection and recording of material within a framework, which identified the physical environment as the major determinant of the pattern of human activity on the earth's surface. In a particular form of empirical science, generally known as positivism, the goal is not only to describe but also to explain. Presenting individual occurrences as examples from which general laws are issued, thereby providing a predictive device of future occurrences. While successful positivist physical science is used to manipulate and control the environment through the application of known physical laws, successful positive social science can be used to manipulate and control society through the application of known social laws.

The *hermeneutic* approach denies the existence of a separate empirical world outside the individual researcher. No observation and description can be neutral, because it involves interpretation of the world as it is perceived through a system of meanings, which are human constructs developed by individuals through a continuous process of socialization in contact with others. These characteristics influence how we act. In addition, our interpretation of what they mean guide our thinking and acting. Therefore, general laws of human behavior are impossible, because humans, with their powers of memory and reason, cannot be treated as equivalent to machines that always respond in

the same way to an identical stimulus. Hermeneutic science does not offer explanations, but rather understandings. Its goal is to appreciate what people believe, how those beliefs develop within societies, and how they are drawn upon as the bases for actions.

The *critical* approach does accept neither the determinism of the positivist nor the voluntarism of the hermeneutic. According to critical sciences, people live within societies that are complex organizations created to ensure both individual, day-to-day and collective, inter-generation survival. Those organizations involve rules that must be operated if the society is to continue. People are free to interpret a society's rules in a variety of ways, as long as they do not transgress its boundaries between the acceptable and the unacceptable. In the critical approach, therefore, it is necessary to appreciate the basic rules by which a society operates in order to achieve a fundamental understanding. Its goal is to ensure that people understand the rules by which a society operates. Once people understand the rules, and then they understand the fundamentals of the society - in technical terms, they are emancipated. They are then freed from constraints to their understanding, and can, if they wish, become involved in the transformation of society, changing the rules to a set that they find more acceptable.

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Biographical Sketch

Maria Sala is Titular Professor of Physical Geography at the Department of Geography and Regional Science, University of Barcelona, and has a BA (Honours) degree in Geography (Physical Landscapes) and a PhD (Honours) degree in Geography (Fluvial Geomorphology) from the University of Barcelona. Maria Sala leads the GRAM, Mediterranean Environment Research Group, which is recognized and funded by the University of Barcelona and the Catalan Autonomous Government. Her current research interests lie in the fields of fluvial geomorphology, soil and slope erosion, catchment hydrology and water quality. Work in these fields has mainly been undertaken in the Catalan Coastal Ranges although through cooperative work she has done research in UK, German Alps, Tunisia, Portugal, Argentina, Mexico. Fundamental research is applied to environmental problems, mainly increased runoff and flooding as a result of expanding urban land use and forest fires. Recent and current research has attracted substantial funding from a number of sources including CICYT (Spanish Ministry of Education), CIRIT (Catalan Council for Research), EU.

Current investigations include: *Hydrology and sediment dynamics in Mediterranean mountain catchments*, *Effects of prescribed burning in soil parameters and in the increased runoff and erosion*, *Morphological changes and sediment transport in the bed of a Mediterranean river*, *Fluvial transport of suspended material: sources, routing, storage and yield*.

She has been visiting scientist at the Centre de Géographie Appliquée, Université. Louis Pasteur, Strasbourg, under the guidance of Professor Jean Tricart (Climatic geomorphology, 1975) and at the Department of Geological Sciences, Seattle, under the guidance of Professor Thomas Dunne (Fluvial and slope processes, 1984)

Regular courses taught include: Physical Geography, Geomorphology, Erosional Processes in the Slopes, Hydrology of Surface Waters, Theory and Methods in Physical Geography, Fluvial Geomorphology, Hydrography and Soil Geography. Invited courses include: Geomorphological Processes, at the Departamento Geografía, Universidad Autónoma, México, (1983), and Fluvial and Slope Processes, at the

Departamento de Geología, Universidad de Salta, Argentina (1991). At an European level she is the Spanish coordinator of an ERASMUS Inter-University Cooperation with the Universities of Strasbourg, Amsterdam, Barcelona, Berlín, St. Andrews, Upsala and Cáceres

Maria Sala has contributed to several research groups, like the European Society for Soil Conservation (ESSC), where she has served as Vice-President (1988 -1992) and Council Member (1988-1996), and the International Geographical Union, where she has been the Chair of the *Study Group on Erosion and Desertification in Regions of Mediterranean Climate* (1992-1996) and of the *Commission on Land Degradation and Desertification* (1996-2000). She is member of several International Journals Editorial Boards, such as *Earth Surface Processes and Landforms*, *Zeitschrift für Geomorphologie*, and *Geomorphology of Brazil Journal*. And she belongs to the Technical Advisory Committee of the Centre for Environment and Development for the Arab Region and Europe, CEDARE (since 1990)

Scientific publications include more 80 articles, 33 at an international level. Chapters in books amount to 19, the most significant of the international ones on Regional Geomorphology of the Iberian Peninsula and on Mediterranean fluvial and slope erosion. Books published are 17, the one considered most significant being Conacher,A.& Sala,M. (Eds.)(1998): *Land Degradation in the World's Mediterranean Environments. Nature and Extend, Causes and Solutions*, John Wiley, London.