



RELATIONSHIP IN PHYSICAL AND HUMAN GEOGRAPHY

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ABSTRACT: Human geography or physical geography is the branch of geography that studies spatial relationships between human communities, cultures, economies, and their interactions with the environment, examples of which is studied in schools are urban sprawl, and urban redevelopment.^[1] It analyzes spatial interdependencies between social interactions and the environment through qualitative and quantitative methods.

KEYWORDS-physical, human, geography, relation, environment, social, interactions

I. INTRODUCTION

Geography was not recognized as a formal academic discipline until the 18th century, although many scholars had undertaken geographical scholarship for much longer, particularly through cartography.

The Royal Geographical Society was founded in England in 1830.^[4] The first professor of geography in the United Kingdom was appointed in 1883,^[5] and the first major geographical intellect to emerge in the UK was Halford John Mackinder, appointed professor of geography at the London School of Economics in 1922.^[5]

The National Geographic Society was founded in the United States in 1888 and began publication of the National Geographic magazine which became, and continues to be, a great popularizer of geographic information. The society has long supported geographic research and education on geographical topics.

The Association of American Geographers was founded in 1904 and was renamed the American Association of Geographers in 2016 to better reflect the increasingly international character of its membership.^[1,2,3]

One of the first examples of geographic methods being used for purposes other than to describe and theorize the physical properties of the earth is John Snow's map of the 1854 Broad Street cholera outbreak. Though Snow was primarily a physician and a pioneer of epidemiology rather than a geographer, his map is probably one of the earliest examples of health geography.

The now fairly distinct differences between the subfields of physical and human geography developed at a later date. The connection between both physical and human properties of geography is most apparent in the theory of environmental determinism, made popular in the 19th century by Carl Ritter and others, and has close links to the field of evolutionary biology of the time. Environmental determinism is the theory that people's physical, mental and moral habits are directly due to the influence of their natural environment. However, by the mid-19th century, environmental determinism was under attack for lacking methodological rigor associated with modern science, and later as a means to justify racism and imperialism.

A similar concern with both human and physical aspects is apparent during the later 19th and first half of the 20th centuries focused on regional geography. The goal of regional geography, through something known as regionalisation, was to delineate space into regions and then understand and describe the unique characteristics of each region through both human and physical aspects. With links to possibilism and cultural ecology some of the same notions of causal effect of the environment on society and culture remain with environmental determinism.

By the 1960s, however, the quantitative revolution led to strong criticism of regional geography. Due to a perceived lack of scientific rigor in an overly descriptive nature of the discipline, and a continued separation of geography from its two subfields of physical and human geography and from geology, geographers in the mid-20th century began to apply statistical and mathematical models in order to solve spatial problems.^[1] Much of the development during the quantitative revolution is now apparent in the use of geographic information systems; the use of statistics, spatial modeling, and positivist approaches are still important to many branches of human geography. Well-known geographers from this period are Fred K. Schaefer, Waldo Tobler, William Garrison, Peter Haggett, Richard J. Chorley, William Bunge, and Torsten Hägerstrand.

From the 1970s, a number of critiques of the positivism now associated with geography emerged. Known under the term 'critical geography,' these critiques signaled another turning point in the discipline. Behavioral geography emerged

for some time as a means to understand how people made perceived spaces and places, and made locational decisions. The more influential 'radical geography' emerged in the 1970s and 1980s. It draws heavily on Marxist theory and techniques, and is associated with geographers such as David Harvey and Richard Peet. Radical geographers seek to say meaningful things about problems recognized through quantitative methods,^[6] provide explanations rather than descriptions, put forward alternatives and solutions, and be politically engaged,^[7] rather than using the detachment associated with positivists. (The detachment and objectivity of the quantitative revolution was itself critiqued by radical geographers as being a tool of capital). Radical geography and the links to Marxism and related theories remain an important part of contemporary human geography (See: Antipode). Critical geography also saw the introduction of 'humanistic geography', associated with the work of Yi-Fu Tuan, which pushed for a much more qualitative approach in methodology.

The changes under critical geography have led to contemporary approaches in the discipline such as feminist geography, new cultural geography, settlement geography, "demonic" geographies, and the engagement with postmodern and post-structural theories and philosophies.[5,7,8]

II. DISCUSSION

Fields

The primary fields of study in human geography focus around the core fields of:

Cultures

Cultural geography is the study of cultural products and norms - their variation across spaces and places, as well as their relations. It focuses on describing and analyzing the ways language, religion, economy, government, and other cultural phenomena vary or remain constant from one place to another and on explaining how humans function spatially.^[8]



This picture shows terraced rice agriculture in Asia.

- Subfields include: Social geography, Animal geographies, Language geography, Sexuality and space, Children's geographies, and Religion and geography.

Development

Development geography is the study of the Earth's geography with reference to the standard of living and the quality of life of its human inhabitants, study of the location, distribution and spatial organization of economic activities, across the Earth. The subject matter investigated is strongly influenced by the researcher's methodological approach.

Economies



Economic Geography: Shan street bazaar, market in Myanmar

Economic geography examines relationships between human economic systems, states, and other factors, and the biophysical environment.

- Subfields include: Marketing geography and Transportation geography



Health

Medical or health geography is the application of geographical information, perspectives, and methods to the study of health, disease, and health care. Health geography deals with the spatial relations and patterns between people and the environment. This is a sub-discipline of human geography, researching how and why diseases are spread and contained.^[9]

Histories

Historical geography is the study of the human, physical, fictional, theoretical, and "real" geographies of the past. Historical geography studies a wide variety of issues and topics. A common theme is the study of the geographies of the past and how a place or region changes through time. Many historical geographers study geographical patterns through time, including how people have interacted with their environment, and created the cultural landscape.

Politics

Political geography is concerned with the study of both the spatially uneven outcomes of political processes and the ways in which political processes are themselves affected by spatial structures.

- Subfields include: Electoral geography, Geopolitics, Strategic geography and Military geography

Population

Population geography is the study of ways in which spatial variations in the distribution, composition, migration, and growth of populations are related to their environment or location.

Settlement

Settlement geography, including urban geography, is the study of urban and rural areas with specific regards to spatial, relational and theoretical aspects of settlement. That is the study of areas which have a concentration of buildings and infrastructure. These are areas where the majority of economic activities are in the secondary sector and tertiary sectors.

Urbanism

Urban geography is the study of cities, towns, and other areas of relatively dense settlement. Two main interests are site (how a settlement is positioned relative to the physical environment) and situation (how a settlement is positioned relative to other settlements).[9,10] Another area of interest is the internal organization of urban areas with regard to different demographic groups and the layout of infrastructure. This subdiscipline also draws on ideas from other branches of Human Geography to see their involvement in the processes and patterns evident in an urban area.^{[10][11]}

- Subfields include: Economic geography, Population geography, and Settlement geography. These are clearly not the only subfields that could be used to assist in the study of Urban geography, but they are some major players.^[10]

III. RESULTS

Physical/Time geography or time-space geography is an evolving transdisciplinary perspective on spatial and temporal processes and events such as social interaction, ecological interaction, social and environmental change, and biographies of individuals.^[1] Time geography "is not a subject area per se",^[2] but rather an integrative ontological framework and visual language in which space and time are basic dimensions of analysis of dynamic processes. Time geography was originally developed by human geographers, but today it is applied in multiple fields related to transportation, regional planning, geography, anthropology, time-use research, ecology, environmental science, and public health.^[3] According to Swedish geographer Bo Lenntorp: "It is a basic approach, and every researcher can connect it to theoretical considerations in her or his own way."^[4]

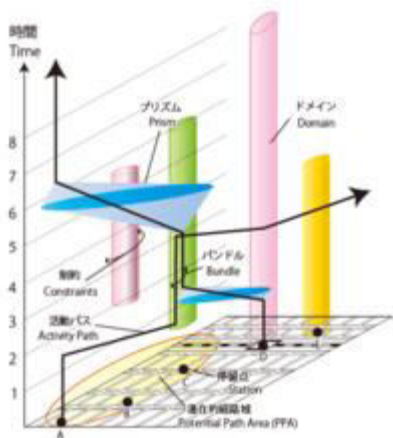
Origins

The Swedish geographer Torsten Hägerstrand created time geography in the mid-1960s based on ideas he had developed during his earlier empirical research on human migration patterns in Sweden.^[5] He sought "some way of finding out the workings of large socio-environmental mechanisms" using "a physical approach involving the study of how events occur in a time-space framework".^[6] Hägerstrand was inspired in part by conceptual advances in spacetime physics and by the philosophy of physicalism.^[7]



Hägerstrand's earliest formulation of time geography informally described its key ontological features: "In time-space the individual describes a path" within a situational context; "life paths become captured within a net of constraints, some of which are imposed by physiological and physical necessities and some imposed by private and common decisions".^[8] "It would be impossible to offer a comprehensive taxonomy of constraints seen as time-space phenomena", Hägerstrand said, but he "tentatively described" three important classes of constraints:

- capability constraints — limitations on the activity of individuals because of their biological structure and/or the tools they can command,
- coupling constraints — limitations that "define where, when, and for how long, the individual has to join other individuals, tools, and materials in order to produce, consume, and transact" (closely related to critical path analysis), and
- authority constraints — limitations on the domain or "time-space entity within which things and events are under the control of a given individual or a given group".^[9]



Examples of the visual language of time geography: space-time cube, path, prism, bundle, and other concepts

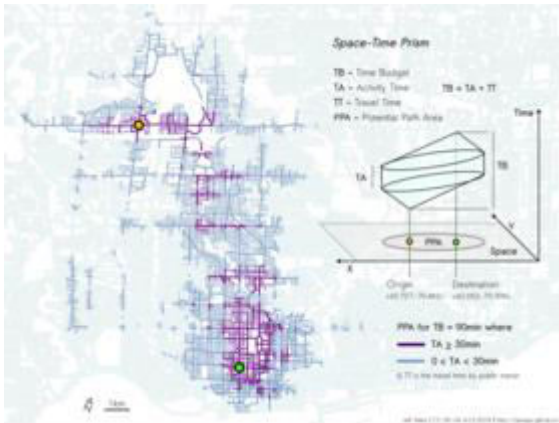
Hägerstrand illustrated these concepts with novel forms of graphical notation (inspired in part by musical notation),^[10] such as:

- the space-time aquarium (or space-time cube), which displays individual paths in axonometric graphical projection of space and time coordinates;
- the space-time prism, which shows individuals' possible behavior in time-space given their capability constraints and coupling constraints;
- bundles of paths, which are the conjunction of individual paths due in part to their capability constraints and coupling constraints, and which help to create "pockets of local order";
- concentric tubes or rings of accessibility, which indicate certain capability constraints of a given individual, such as limited spatial size and limited manual, oral-auditive and visual range; and
- nested hierarchies of domains, which show the authority constraints for a given individual or a given group.^[11]

While this innovative visual language is an essential feature of time geography, Hägerstrand's colleague Bo Lenntorp emphasized that it is the product of an underlying ontology, and "not the other way around. The notation system is a very useful tool, but it is a rather poor reflection of a rich world-view. In many cases, the notational apparatus has been the hallmark of time geography. However, the underlying ontology is the most important feature."^[12] Time geography is not only about time-geographic diagrams, just as music is not only about musical notation. Hägerstrand later explained: "What is briefly alluded to here is a 4-dimensional world of forms. This cannot be completely graphically depicted. On the other hand one ought to be able to imagine it with sufficient clarity for it to be of guidance in empirical and theoretical research."^[13]

By 1981, geographers Nigel Thrift and Allan Pred were already defending time geography against those who would see it "merely as a rigid descriptive model of spatial and temporal organization which lends itself to accessibility constraint analysis (and related exercises in social engineering)."^[14] They argued that time geography is not just a model of constraints; it is a flexible and evolving way of thinking about reality that can complement a wide variety of theories and research methods. In the decades since then, Hägerstrand and others have made efforts to expand his original set of concepts.^[15] By the end of his life, Hägerstrand had ceased using the phrase "time geography" to refer to this way of thinking and instead used words like topoecology.^[16]

Later developments



Schematic and example of a space-time prism using transit network data: On the right is a schematic diagram of a space-time prism, and on the left is a map of the potential path area for two different time budgets.^[17]

Since the 1980s, time geography has been used by researchers in the social sciences,^[18] the biological sciences,^[19] and in interdisciplinary fields.

In 1993, British geographer Gillian Rose noted that "time-geography shares the feminist interest in the quotidian paths traced by people, and again like feminism, links such paths, by thinking about constraints, to the larger structures of society."^[20] However, she noted that time geography had not been applied to issues important to feminists, and she called it a form of "social science masculinity".^[21] Over the following decades, feminist geographers have revisited time geography and have begun to use it as a tool to address feminist issues.^[22]

GIS software has been developed to compute and analyze time-geographic problems at a variety of spatial scales. Such analyses have used different types of network datasets (such as walking networks, highway networks, and public transit schedules) as well as a variety of visualization strategies.^[23] Specialized software such as GeoTime has been developed to facilitate time-geographic visualization and visual analytics.^[11,12]

Time geography has also been used as a form of therapeutic assessment in mental health.^[24]

Benjamin Bach and colleagues have generalized the space-time cube into a framework for temporal data visualization that applies to all data that can be represented in two dimensions plus time.^[25]

In the COVID-19 pandemic, time geography approaches were applied to identify close contacts.^[26] The pandemic imposed restrictions on the physical mobility of humans, which invited new applications of time geography in the increasingly virtualized post-Covid era.^[27]

IV. CONCLUSIONS

Behavioral geography is an approach to human geography that examines human behavior by separating it into different parts. In addition, behavioral geography is an ideology/approach in human geography that makes use of the methods and assumptions of behaviorism to determine the cognitive processes involved in an individual's perception of or response and reaction to their environment. Behavioral geographers focus on the cognitive processes underlying spatial reasoning, decision making, and behavior.

Behavioral geography is the branch of human science which deals with the study of cognitive processes with its response to its environment through behaviorism.

Issues

Because of the name it is often assumed to have its roots in behaviorism. While some behavioral geographers clearly have roots in behaviorism^{[1][2]} due to the emphasis on cognition, most can be seen as cognitively oriented. Indeed, it seems that behaviorism interest is more recent^[3] and growing.^[1] This is particularly true in the area of human landscaping.

Behavioral geography draws from early behaviorist works such as Tolman's concepts of "cognitive maps". More cognitively oriented, behavioral geographers focus on the cognitive processes underlying spatial reasoning, decision making, and behavior. More behaviorally oriented geographers are materialists and look at the role of basic learning processes and how they influence the landscape patterns or even group identity.^[4]

The cognitive processes include environmental perception and cognition, wayfinding, the construction of cognitive maps, place attachment, the development of attitudes about space and place, decisions and behavior based on imperfect knowledge of one's environs, and numerous other topics.

The approach adopted in behavioral geography is closely related to that of psychology, but draws on research findings from a multitude of other disciplines including economics, sociology, anthropology, transportation planning, and many others.[13,15,17]

The Social Construction of Nature

Nature is the world which surrounds us, including all life (plants, animals, organisms, humans, etc.) and physical features. Social Construction is the way that human beings process the world around us in our minds. According to Plato's 'Classical Theory of Categorization', humans create categories of what they see through experience and imagination.^[5] Social constructionism, therefore, is this characterization that makes language and semantics possible.^[5] If these experiences and imageries are not placed into categories, then the human ability to think about it becomes limited.^[5]

The social construction of nature looks to question different truths and understandings for how people treat nature, based on when and where someone lives. In academic circles, researchers look at how truths exist (ontology) and how truths are justified (epistemology).^[5] Construction is both a process and an outcome, where people's understandings of the word nature can be both literal and metaphorical,^[6] such as through giving it a human quality (Mother Nature).^[7] It can also be used to discredit science or philosophy.^[6]

As a subset of behavioral geography, the social construction of nature also includes environmental ethics and values, which affect how humans treat, and interact with, the natural environment. It incorporates ideas from environmental science, ecology, sociology, geography, biology, theology, philosophy, psychology, politics, economics, and other disciplines, to bring together the social, cultural and environmental dimensions of life. Social constructionism uses a lot of ideas from Western world thinking, but it is also incorporates truths from other world views, such as the Traditional Knowledge of Aboriginal groups, or more specifically ecofeminism^{[8][9]} and cosmology^[9] in India or ubuntu^[10] philosophy in Africa, for example. It is also related to postmodernism^[11] and the concept of the Anthropocene,^[12] that views humans as a force that is redirecting the geological history of Earth,^[7] destroying nature.^[13]

The Role of Linguistics



Raymond Williams, author of *Keywords: A vocabulary of culture and society* (1983).

There are many ways of understanding and interpreting nature.^[7] According to Raymond Williams, there are three ways to give meaning to (or define) nature:

1. Nature as a quality, character or process^[7] (e.g. human nature)
2. Nature as a force^[7] (e.g. weather)
3. Nature as the material world^[7] (e.g. the physical environment)

According to Raymond Williams, language plays a role in how we understand, interpret, and give meaning to nature.^[7] This is how multiple truths can be valid at the same time.^{[5][7]}

The Role of Mental Maps

Humans have the ability to create images of their environments through experiences in their mind.^[14] These experiences allow us to create mental maps where we can create memories associated to space.^[14] It is a two-way process where the environment provides suggestions for what should be seen, and then the observer gives meaning with those suggestions.^[14]

These images have three parts:

1. An identity^[14]
2. A pattern^[14]
3. A practical or emotional meaning^[14]

According to Kevin Lynch, the environmental images (or mental maps) that we make can either be weak or strong, where the process is ongoing and never stops.^[14]

The Role of Science

Science occurs at many dimensions and scales that do not consider culture, but can be motivated by politics, economics and ethics.^[15] Scientific knowledge consists of concepts and analysis, and is a way to represent nature.^[11]

According to Michel Foucault, a truth does not have to be close to reality for it to be worth something or have power.^[15] For Carolyn Merchant, science can only be given power if a truth is interpreted as having worth.^[15]

Schools of Thought

Relativism is important in the social construction of nature, as all truths are relative to the perspective they are coming from. There are two schools of thought on how the social construction of nature is relative:

1. Critical Realism (being realistic)^[11]
2. Pragmatism (being practical)^[11]

Critical realists reject the idea of relativism and rely more on natural sciences.^[11] Pragmatists have no set opinion on the matter and rely on social science and ethics, instead.^[11]

According to Richard Rorty, relativism is relevant to pragmatism in three ways:

1. Every belief is equally valid^[11]
2. There are no criteria for what a truth can be^[11]
3. That any truth can be justified by the society it comes from^[11]

According to Gilbert White, pragmatism has four main assumptions:

1. That human existence is based on putting labor into the land^[11]
2. That the idea of owning anything is a conception^[11]
3. That humans learn from their experiences^[11]
4. That engagement of the publics is what allows for commitments^[11]

Richard Rorty also associated three characteristics to pragmatism:

1. That all theories characterize some form of truth^[11]
2. That there is not difference between what can and should be done when it comes to the truth^[11]
3. That knowledge is constrained by the conversations we have^[11]

Being pragmatic is the more accepted school of thought for social construction being a relative concept.^[11]

Historical Overview



Rachel Carson, author of Silent Spring (1962).

Recovery Narratives

- 1500s: Francis Bacon (that human intervention in nature is needed to gain back the Garden of Eden on Earth)^[8]
- 1600s: René Descartes (that the world is a machine we can control)^{[5][8]}
- 1600s: John Locke (that private property makes humans civilized)^[8]
- 1700s: Adam Smith (that capitalism will bring progress)^[8]
- Present-day: The Christian narrative and the narrative of the Scientific Revolution have merged to become the 'Recovery Narrative of Western Culture'^[8]

Transitions in Thought

- 1500s-1600s: The belief that man is responsible for environmental problems^[16]
- 1700s-1800s: The idea that progress is attained through controlling nature^[16]
- Mid-1800s: The realization that humans are having unintended impacts on the environment^[16]
- 1800s-1900s: The belief that technology has all the solutions to our problems^[16]
- 1920s-1930s: The belief that technology is destroying nature^[16]
- 1950s-1960s: The belief that humans risk being annihilated if they do not control technological impacts^[16]
- 1960s-1970s: The public awakening of human impacts on the environment with the publication of Rachel Carson's *Silent Spring*^[16]
- 1980s: The belief that no matter the costs, unrestricted growth is needed for progress^[16]
- 1987: The spreading of public awareness of impacts with the publication of the Brundtland Commission Report: *Our Common Future*^[16]

How Nature becomes Socially Constructed



Vandana Shiva, author of *Staying Alive: Women, Culture, and Development* (1988).

Nature can be socially constructed by both culturally interpreting and physically shaping the environment.^[17] This can happen in three ways:

1. Using non-human symbols to represent nature (Totemism)^[17]
2. Using non-human animals to relate to nature (Animism)^[17]
3. Viewing nature as an 'Other' (Naturalism)^[17]

Constructions can also be categorized by giving them meaning through the process of embodiment,^[5] which has three components:

1. The 'habitus' (the individual)^[5]
2. The practice it originates from (the culture)^[5]
3. An associated taxonomic group (i.e. homo sapiens)^[5]

No matter how nature becomes socially constructed, though, the process itself is limited by three dimensions:

1. The physical dimension^[5]



2. The mental dimension^[5]
3. The social dimension^[5]

The physical dimension is limited to the human body, where the brain is responsible for creating and selecting thoughts.^[5] The mental dimension is used to understand the physical dimension and is limited to human logic.^[5] The social dimension needs moral and social order and is used to give meaning to both what is physically present and what is culturally constructed.^[5] All three dimensions must be present and linked to be able to socially construct nature.^[5]

Criticism on the Social Construction of Nature

The social construction of nature has room for improvement in four main areas:

1. By giving more importance to how realities are culturally constructed through social interactions^[6]
2. By acknowledging that all science should be analyzed by the same standard^[6]
3. By gaining a better understanding of the role language plays in constructionism^[6]
4. By giving more importance to how truths exist and how they are justified, using Actor-Network Theory^[6]

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