



CHANGING PARADIGMS OF GEOGRAPHY

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Abstract

Nowadays for an appropriate way to deal with geographic space there is an axiomatic need to accept an integrated approach both in terms of the way we regard geographic space and how we investigate it. This leads to a two-prong position: First, that geographic space constitutes a dialectic entity and second that the spatial methodological approaches presently in use are now absolute. That is, Geography has recently undergone a paradigm shift from Geoinformatics, which in their own way have replaced traditional concepts, towards an integrating approach, bringing Geography into a new paradigm, called in this paper Choroinformatics.

Keywords: *Geography, Paradigm, Multidisciplinarity, Integration.*

1. INTRODUCTION

In epistemology, in the last few years, important differentiations have occurred related to the way we view the problems of sciences as well as their basic principles. The most important of these differentiations are the changes in the way we regard:

- Environment: from an externally given creation to the faith that an ecosystem exists as an independent natural and cultural process.
- Location: from the acceptance of the uniqueness of geographic location to the admission of interdependence of phenomena in geographic space.
- Geographic space: from the assumption that the phenomena exist in order to be discovered to the perception that they constitute social constructs, our own creations.

The last perception is of particular importance, because it clearly shows the need for a social epistemology of Geography, as the science of geographic space.

All scientists accept that the way we practice our science is limited almost exclusively by our "**myths**". These myths work as lights that illuminate our fields of perception, allowing us to have a clear picture of only certain problems and not seeing the others, while simultaneously they give

us the intellectual calm we need, since the judgments we make are revealed in our mind as reflections of the objective reality.

If this is the case, then a major concern in any scientific discipline will be the sources of its myths. Most scientists accept the notion that all sciences should satisfy certain functional conditions that qualify their nature and require systematic ways in order to satisfy basic methodological needs. These conditions and needs in turn are the result of values that the scientific community accepts and they constitute the basis for the way each member and the community as a whole faces the world and acts. It is essentially this system of values that justifies the other acts and provides the motive force, creating what is particular and differentiating for each science.

From this perspective, it should be clear that if we are to establish the right approach in considering geographic space, it is necessary to face the reality of our myths. Because in this way we contribute creatively in the achievement of our scientific objectives, which in turn constitute an inseparable part of our scientific envisagement of space as well as of our methodological approaches. What we need therefore is the means to determine the scientific approach that will clarify our myths, justify our values and provide the framework for us to face the issues encompassed in the term “geographic space”. As a result, the question that we need to ask in the current academic and socioeconomic situation is: which are the "myths" and the "values" with which we have to scientifically approach geographic space?

Unambiguously and categorically, I would like to declare that at the centre of the scientific approach towards geographic space, should be the concept of **integration**, as this constitutes the source of our myths and values not only in terms of the way geographic space is regarded, but also with respect to the methodologies of spatial investigation. This leads us to the position that present approaches to geographic space, known as the **Geoinformatics** paradigm, are now absolute and we find ourselves in the period of **Choroinformatics**.

More specifically, the position presented here is simple in its explanation, but radical when considered in terms of the current practices of Geographers. That is, Geographers have the scientific background which allows them to examine the surface of the earth, to analyze spatial patterns and processes and finally to present the results of these analyses to enhance scientifically sound and efficient planning. But these processes cannot be dealt with unless we accept the fact that they represent different manifestations of “a whole”, the dialectic entity of geographic space. Therefore, an integrated approach towards geographic space is required, an approach that is not possible without the help of Choroinformatics.

The term Choroinformatics can be defined as being composed of two components: Choros + Informatics. The component “choros” (space) refers to the integrated dimension of geographic space, when considering the use of information technology. This is equally important with the integrated efficiency of informatics, the second component, and consequently implies that an integrated approach in considering geographic space is imperative. But understanding such an approach to geographic space is possible only through an examination of the nature and the evolution of Geography, which in turn determines how we perceive geographic space as well as how we investigate it.

However, these two dimensions have recently been involved in changes representing what epistemologist Thomas Khun (1962) has termed paradigm shifts and which “are not rare events in subjects like Geography” (Openshaw 1991, 621). As a result, it is necessary to examine the current consideration of space and the approaches of investigating it as well as the way they have reached their present form.

2. CONSIDERATION OF GEOGRAPHIC SPACE

The way we view geographic space has altered in the last 60 years following changes in the way we consider development, for space and development are the two sides of the same coin of societal concern. Indeed, even a cursory review indicates that our interest in the spatial dimension is inevitably connected with society's approach to growth and development, which is briefly examined next.

2.1 Monodisciplinary approach

For some years following World War II, growth or development constituted the main objective of all countries and political systems. It consisted of a single dimension, the economic. That is, location was a variable that society systematically ignored and considered it as a factor that was not worth taking into consideration in development planning. Moreover, under this perspective, every particular science would be concerned with its own subject area. As a result, concern for geographic space was treated, like most subjects at that time, in a **monodisciplinary** manner. In other words, the spatial aspects of geographic space represented the exclusive subject matter of Geographers who were the only ones that could offer the methods, techniques and knowledge to handle the spatial dimension. In this monodisciplinary approach geographic space was faced by the scientists of every science through their "exclusive" disciplinary paradigm, creating a "**fragmented**" space. In the case of Geographers they followed the well known and long lasting traditional paradigm.

2.2 Multidisciplinary approach

It was the strong questioning of these practices by the scientific community that resulted in the development of an alternative to monodisciplinary considerations. In the 1970's with the standard-bearer Brundtland UN committee, development was considered to be as the one, which satisfies the needs of the present, without sacrificing the needs of future generations, introducing, therefore the concept of sustainable development. In addition, the significance of geographic space was recognized and the notion of location acquired a place at the centre of human activities and interests. This led to a **multidisciplinary** approach towards geographic space. Under this perspective, development was treated as if it consisted of the sum of all the distinct parts of a multidimensional spatial, social, environmental and economic reality. In other words, because human knowledge necessitates "abstractions" of reality, geographic space was expressed in the form of a set of separate relations, interdependences and interactions, creating a "**sustainable**" geographic space. But this notion of a sustainable-multidimensional space requiring a multidisciplinary approach forms the basis of the geography paradigm presently in use, known as Geoinformatics.

2.3 Interdisciplinary approach

It is my strong belief that today this multidisciplinary approach cannot be acceptable anymore. It is suggested that a need exists for an integrated approach which is simultaneously ecological, economic, social, technical/technological, political and cultural, in dialectic harmony and respecting all aspects of geographic space (natural and man-made), an integral part of which are people. For as Openshaw (1991, 622) has stated the "basis for the integration is purely

geographical”, stressing the fact that “the holistic nature of the space-time data model is simply Geography”. In other words, it can be argued that an integrated approach is required in order to express the multidimensional relationships and interdependencies of all the factors that constitute the specific entities or parts of geographic space, which is the ‘whole’. As a result, an **interdisciplinary** approach is required, which leads towards the integration of all possible approaches in order to overcome the compartmentalization of knowledge. However, such a regard of geographic space establishes an “**integrated**” space and leads towards a new paradigm in Geography, named in this paper choroinformatics. It should be obvious, therefore, that there has been a continuous evolution in the ways that we regard geographic space. It commenced with a disregard of space, resulting in a “fragmented” space, the basis for the traditional paradigm in Geography. It then evolved into considering space as a fundamental component of development, creating a “sustainable” space and necessitating the geoinformatics paradigm. It has resulted in the present notion that all geographic entities and factors constitute a dialectic unit, an organic “whole”, establishing an “integrated” space, the foundation of choroinformatics the new geography paradigm (Koutsopoulos, 2005).

3. GEOGRAPHIC METHODOLOGY

Methodology provides tools for geographers, but “which of them are used?”, “what they are used for?” and “how to make best use of them?”, depends on the attitudes and mind set of the users and the way they regard geographic space. As a result, in the integrated consideration of Geography, in order to describe, analyze and comprehend geographic space, a corresponding integrated methodological approach will be required. That is, the methodological tools used in examining geographic space have also undergone an evolutionary process of change, which has been driven by the increased necessity of integration. The key to understanding these changes, however, is the appreciation of the swift changes in our discipline from an old model filled with traditional methods to another anchored in computer technology and finally to a new one where integration plays the central or the determining role. Therefore, it is suggested that geographic methodology has, in the span of a half century, undergone the following transformations.

3.1 Traditional model

The traditional model, which lasted until a few years after the end of WWII, was very simple, it was derived from manual, analytical, and hand-crafted theory-based approaches, reconciling social and spatial sciences and performed exclusively by and for geographers. It started with observations and data capture and ended usually with a map as the final output. In other words, using **qualitative or quantitative** methods, widely accepted in our discipline (i.e. fieldwork, photogrammetry, remote sensing etc.), the data was collected, processed and analyzed, terminating in presenting the information derived, using various maps (Figure1) This model, of course, represents the methodological tools of the traditional paradigm of Geography.



Figure 1: The traditional approach

3.2 Computer technology model

The increased use of microprocessors altered the traditional model creating a new one based on **computer technology**. It was accepted by academics and professionals alike that Geographers had to be in the information business (or no business at all) and all their tasks in the field, the lab or the office had to be accomplished by utilizing **informatics**. This resulted in the emergence of a new computational geography in the context of a world of computers and cybernetic thinking. Geographers had to cope with data-driven and computer-based, knowledge-creating technologies. This model included three distinct and **independent** approaches, namely: Processing, Analyzing and Planning (Figure 2), instead of the one-phase traditional model (Koutsopoulos, 2008).

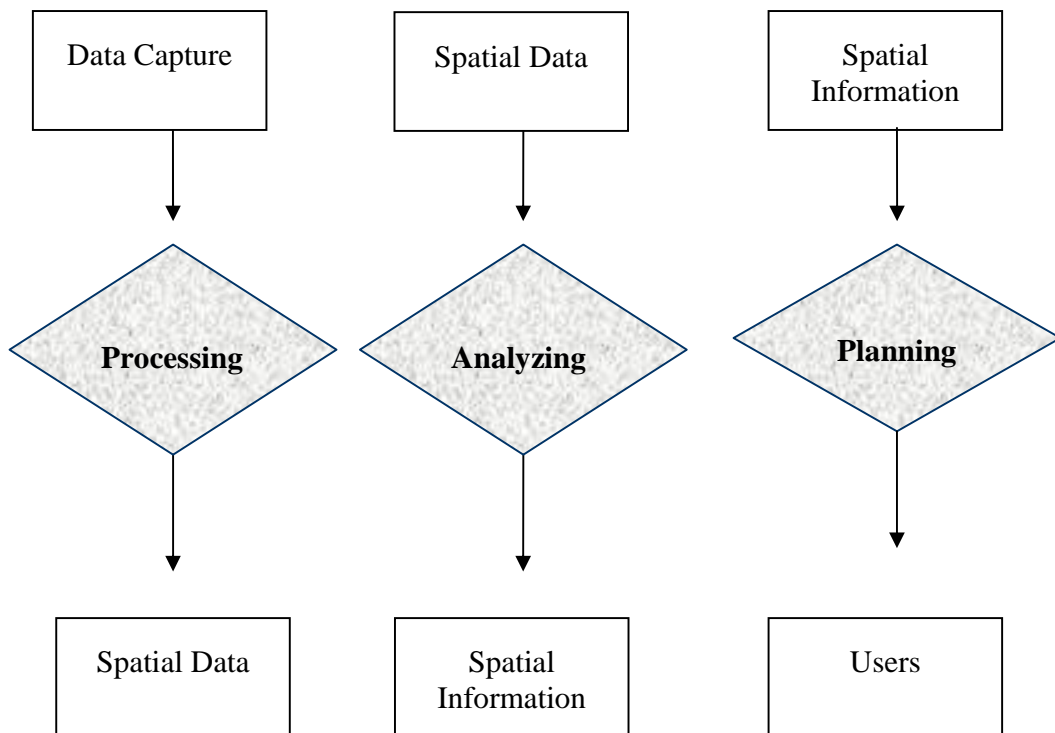


Figure 2: The computer technology approach

More specifically, the first independent approach, **processing**, changed the ways data was captured and processed, by acquiring it in digital form and by setting the mechanisms for data storage, processing and manipulation. These changes resulted in an information system replacing the map of the traditional paradigm. As a result, the outcome generated contained digital “layers” of diverse land or human-related spatial data.

The second independent approach, **analysing**, was the process of transforming spatial data to spatial information and was related to a spectrum of methods and processes that could come to

fruitful completion mainly through the help of informatics. It was for this reason that this approach occupied schematically and in real terms the centre of the informatics model, as it was demonstrated in the work of many Geographers (i.e. Openshaw, 1990, 1991; Fischer, 1991 Goodchild, M. F., 1991).

Planning was the third independent approach and was related to the effective use of spatial information in providing solutions to everyday spatial problems and issues. These tasks, however, required effective tools for decision making that could not be accomplished without the help of informatics.

These three distinct approaches represent the current quiver of methodological tools available to Geographers, which characterize and support the geoinformatics paradigm in use in the past few years.

3.3 Integration model

The three approaches of the computer technology model (processing, analysing and planning) are considered by Geographers as independent and conflicting endeavours (Koutsopoulos, 2008,). However, such an approach is clearly scientifically shallow, logically unsound and mainly lacking in the necessary **integration** required in the more complicated, but mainly dialectic present day scientific and societal environment. Certainly, within the computer technology model, the techniques can be considered as information systems but they are not exclusively utilized as such. The same is true in terms of their application as analytic or planning tools. Clearly, they are involved in planning but are not only planning tools. They are spatial analysis methods, but they are not only that. A Geographer can certainly design informative maps using these methods, but that does not exclude a researcher from executing a very complicated spatial analysis with them. That is, the three approaches of the computer technology model are scientific fields, which have as common background their spatial dimension. But most importantly, they are closely interrelated and not independent, inadvertently complementary and not conflicting and thus they can be integrated into an organic “whole” (Koutsopoulos, 2005). As a result, they should be considered as components of an integrated spatial approach representing different manifestations of a **holistic** methodology, the foundation of choroinformatics, the new paradigm of Geography.

From the previous discussion, it should be clear that the integration model approaches, although similar to those of the computer technology model, in addressing spatial issues differ in one significant aspect. More specifically, they represent the pieces of a holistic and integrating framework by providing an information system domain within which virtually all of Geography can be performed. This dialectic model, by emphasizing a holistic view of Geography, is broader than data or informatics; it is open rather than closed; it can accommodate pluralistic research styles; and offers no restrictions on subject matter or approach. As a result, the ideas expressed by such diverse researchers as Geertman, 1997; Goodchild, 1991; Maquire, 1991; Openshaw, 1991 and Tomlin, 1991, who have practiced different aspects of informatics, have simply presented the participating parts of the three integrated stages of our new holistic model (Figure 3).

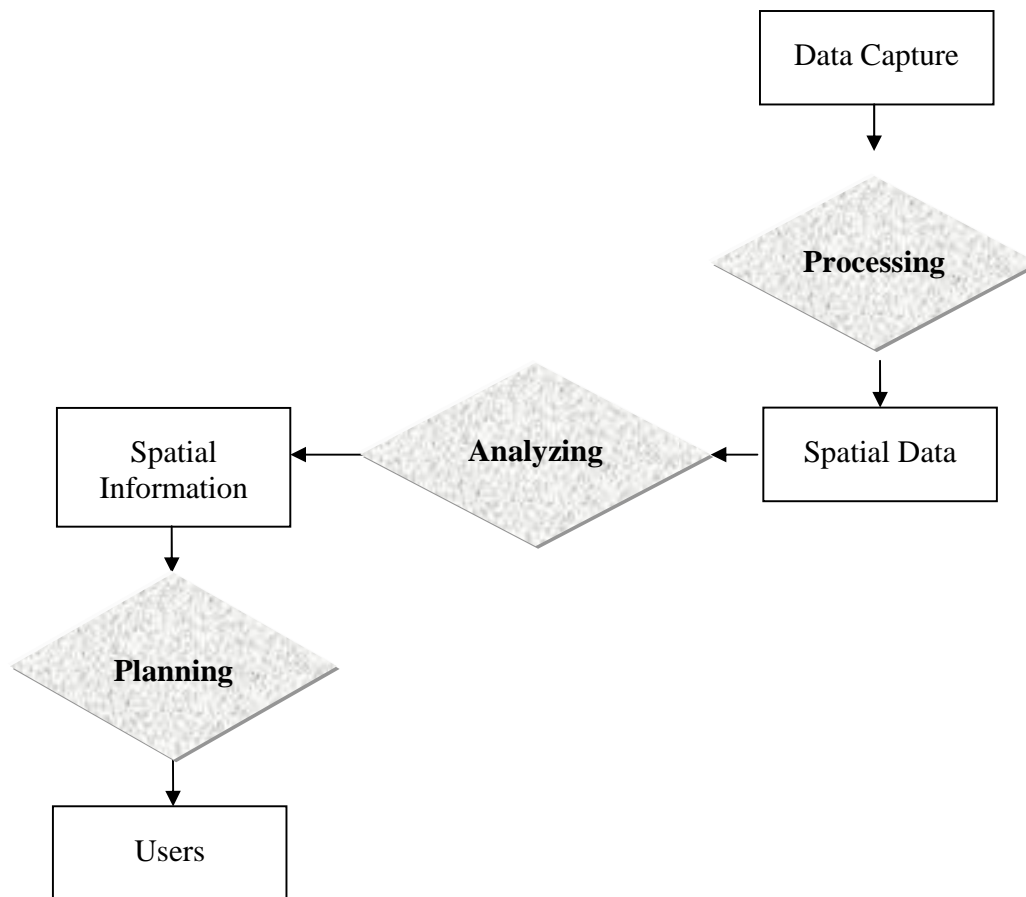


Figure 3: The integration approach

It should be clear that changes in the spatial tools utilized have also taken place. They started from traditional methods (a mix of quantitative and qualitative tools), resulting in a single phased methodological model expressing the traditional paradigm. They changed into computer-based, knowledge-creating technologies forming a computer technology model, the basis of the geoinformatics paradigm. They ended in the present day integration techniques establishing a holistic-dialectic model, the foundation of the choroinformatics paradigm.

4. THE NEW PARADIGM OF GEOGRAPHY

In summary, it is suggested that in the last few years our discipline, through two parallel changes in the way geographic space is perceived and is investigated, has gone through two paradigm shifts. That is to say, from the traditional paradigm characterized by a monodisciplinary approach to geographic space and traditional spatial methods, to the geoinformatics paradigm represented by a multidisciplinary approach to space and informatics and finally to the new choroinformatics paradigm expressed by an interdisciplinary approach and integration as shown in Figure 4.

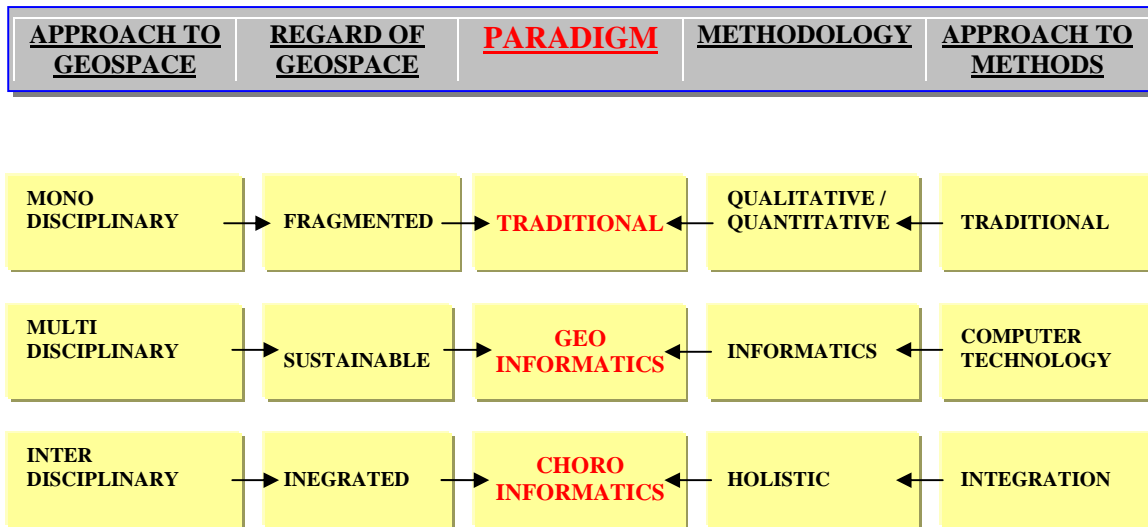


Figure 4: Paradigm Changes

This new paradigm is based on two pillars- interdisciplinarity and integration- embedded in a foundation of informatics. That is, choroinformatics can be defined as the process of answering spatial questions, solving regional problems, or addressing geographic topics which can not be dealt with adequately by a simple independent mono or multidiscipline approach. But most importantly, in approaching these spatial issues choroinformatics draw on various perspectives that express multidimensional relations and interdependencies of the elements that constitute or represent specific entities or parts of the problem, topic, or question under consideration. For these are simultaneously ecological, economic, social, technical-technological, political and cultural. In this way organic integrations and not mechanistic sums are achieved, through the construction of a holistic perspective, based on modern day tools and in dialectic harmony with man and geographic space. As a result, choroinformatics is not a simple supplement but is corrective of the geoinformatics paradigm.

The basic philosophical and methodological issues of choroinformatics, however, are not new to Geography. Historical precedents date from the classical era, in the model of Plato's academy to the nineteenth century, in the integrative theory of von Humboldt, and finally to the present work of many Geographers and other scientists (Harvey, 1969; Fisher, 1991; Klein, 1996). All of which, however, emphasise either interdisciplinarity or integration, ignoring the possibility that a combination is necessary in order to meet the pressing weight of social and technological problems, the urgent demands on the environment and society, the breakthroughs in research, and the required scholarship.

4.1 The case for the new paradigm

In closing this brief presentation, I shall identify and rebuke three of the arguments regarding choroinformatics as they have developed in an ongoing discussion the last few years within the HERODOT network for Geography.

First, a basic argument presented by those used to work within past paradigms, is that choroinformatics rest on a conceptual confusion or as professor Benson (1998) has stated

“integrated studies are a fool’s project, propounding equations where all terms are unknown.” However, choroinformatics as a connection between integration and interdisciplinarity should be understood as representing the confrontation of Geographers with the world, be it a spatial problem, an event or even a question. But out of this phenomenological confrontation rises a situation which is too broad to be handled by a mono or multidisciplinary approach and traditional or informatics models, with no regard for the holistic nature of that world. That is, the purpose of choroinformatics is more than just to address questions that transect discipline boundaries or integrating insights or methods to illuminate spatial issues. It involves an articulate spectrum of principles to help Geographers to determine when and how to confront the world by seeking out a holistic approach to interrelations and interdependencies.

Second, there has been the claim that all forms of the integrated-interdisciplinary approach advanced in this paper are attempts to solve problems that do not really exist. Given, however, that the IDS task force findings have confirmed beyond any doubt that knowledge, including spatial knowledge, has become increasingly interdisciplinary, we need to redefine and redirect the way we approach it. Therefore, the previous claim is not valid for the simple reason that the issue is not the problems themselves, which always exist, but the way we approach them.

Finally, another misunderstanding that has been presented in connection with the proposed paradigm is that integration and interdisciplinarity are attempts to create discipline generalists. It is self evident that one cannot improve a situation in which there are people who know everything about nothing (a well known definition of the specialist), by urging that we must now move to a situation in which we have people who know nothing about everything. The position advanced here is that the natural and socioeconomic reality represents an unbroken dialectic entity of multidimensional and intricate relations as well as interdependencies of elements, phenomena and actions. Thus, a different approach in examining and teaching that reality is required, resulting in an approach characterized by a holistic knowledge that people should have (which is neither everything nor nothing) and pertaining to specific aspects of a given dialectic entity.

5. THE ROLE OF THE NEW PARADIGM

Based on the previous discussion on the changes that have taken place in our science and the existence of a new paradigm, a basic question arises: what is the role that our discipline can now play in the realms of sciences and society?

In a scientific community, where every discipline has raised defensive boundaries to defend its purity and importance, Geography offers an interdisciplinary base which can be used to address the integrated issues of our community. Indeed, the distinct and independent contributions of each individual discipline do not lead any more towards scientifically sound approaches. To the contrary, there is a need for a unifying base, a common language for all disciplines to communicate with each other, something that the new geography paradigm can offer.

Moreover, in a society that continuously demands increasing speciality, the science of Geography offers the necessary integration, which is the only way to solve its problems. I would thus contend that the approach to societal problems has to be simultaneously ecological, economic, social, political and cultural and so on, in a dialectic harmony with nature and man, something that Geography’s new paradigm can certainly provide.

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Planning