

## **Geographic Science and the Development of its Aims and Methods. An Essay.<sup>1)</sup>**

Supplement 2 to the treatise „Processes Constitute Our Complex Reality“ (2005).  
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### ***Introduction:***

In a general sense, Geography deals with a number of thematically differently defined phenomena on the surface of the earth (as just a glance at any map show). These phenomena which come into contact with, overlap and restrict one another. Their chronological, hierarchic and spatial co-existence are affected by man and nature, who interact and initiate processes which in turn alter their different environments. Seen from this point of view, the task of the geographer may be defined as drawing attention to the complexity of this reality and explaining how mankind, in the course of his cultural evolution, has been able to assert himself by adaptation and formation of structures.

### ***1) On the idiographic and nomothetic approaches:***

Geography has become engaged in this task step by step. In its earliest stage it studied countries and described regional units, i.e. it was dedicated to understanding the Individual and therefore tended, idiographically, to individualise (WINDELBAND 1894, pp. 10 and RICKERT 1902, pp. 226). The aim of an idiographic science is to study what is special in its historically determined nature. General geography was aimed at categorising and explaining forms observed in nature and landscapes shaped by the influence of human culture. Its intention was to ascertain certain basic laws and was therefore nomothetic, or generalising, in its alignment.<sup>2)</sup>

At that time, general geography regarded itself as closely related to the natural sciences. Causal methods of examination were applied (von RICHTHOFEN 1903), not only in physical and mathematical Geography, but also in anthropogeography. The principle of causality states that every cause has an effect (or several effects) and every effect a cause (or several causes). According to this method, geography is founded on the observation of materially defined forms. The form represents the effect in the chain of cause and effect. By proceeding inductively, it is possible to deduce the cause from it and transpose the result to other corresponding forms.

Geography has retained its methodical position between the idiographic and nomothetic approaches up to the present, even if the classification of the fields of study has altered to some extent in the course of development. Over the years, "regional geography" as an idiographically oriented field of research has become less important. In case of general geography, the nomothetic approach is still dominant in physical geography, whereas anthropogeography, which is the subject of this paper, has been less uniform in its development since about 1920.<sup>3)</sup>

The idiographic approach finds its principal application in historical geography. It makes most use of the hermeneutic method. It is mainly due to the work of DILTHEY

(1910/70, e.g. pp. 98, 255) that hermeneutics have become the principal method of investigation in the humane sciences. It determines, among other things, the way in which texts are handled. In history and historical geography, the evaluation of historical sources and archaeological findings is most important. Only what is corroborated directly by sources is known to be true. The rest has to be carefully deduced in order to obtain an overall result which is as free as possible from contradictions. The investigation can only proceed step by step with reference to the overall and often complex argumentation network. The finer the mesh of the network and the more sources (which may be spatially, materially and chronologically remoter) are brought in, the more certain the result. The most accurate interpretation is the one which allows all the facts known about the object of study to be fitted logically and consistently into the context. This method requires previous knowledge and sensitivity because the investigators use many of their own ideas in coming to their conclusions. Their judgement is also affected indirectly by their own development and surroundings (see below).

The nomothetic approach should form a definitive basis for future studies, although the kind of explanation has changed in the course of time. In the following decades, natural-scientific approaches dominated. In the 1920s and 1930s, deterministic laws were applied (e.g. Newton's Law of Gravity in the description of migration fields) or developed anew (Theory of Central Places; CHRISTALLER 1933). In this way it was possible to define and explain patterns of economic and social dissemination adequately from the point of view of the time.

The general demands made by POPPER (1934/89, pp. 7) from a higher theoretical standpoint, were as follows:

1. that the theory should be examined by logical comparison of the conclusions with one another to determine whether it is intrinsically free of contradiction;
2. that the logical form of the theory should be examined to determine whether it has the character of an empirically scientific theory, i.e. that it is not, for example, tautological;
3. that it should be determined whether the theory under scrutiny (compared to other theories) can be regarded as a scientific improvement;
4. that the theory be tested by the "empirical application" of the conclusions derived (verifiability);
5. that the theory should be formulated in such a way that the conclusion may be proven wrong by experience ("falsifiability", p. 15).

Probabilistic and statistical methods then became popular (e.g. GARRISON 1959/60; HÄGERSTRAND 1953/67) as a result of the "quantitative revolution" and the expansion of the statistical basis in the 1950s and 1960s. This meant abandoning the deterministic basis for forming models. The conditions formulated by Popper from a positivistic viewpoint became less and less capable of fulfilment in the social environment of anthropogeography. The fundamental perspective was also shifting (BARTELS 1968; HARD 1973): Human society itself and human behaviour were becoming the subject of research and analysis. Thus anthropogeography became increasingly separated from physical geography and research in these fields demanded different approaches.

Initially, the main focus was concentrated on the social group which consists of individuals behaving and adjusting in certain ways. This prepared the ground for

applied social geography (and economic geography), even if this only found practical fulfilment in the 1970s after the Geographers' Conference ("Geographentag") in Kiel.<sup>4)</sup>

On closer scrutiny it becomes apparent that this concept was inspired by the system model. Entities were studied which consist of elements. Both refer to one another, and represent partners of equal importance. In the field of biology, things went even further. It was discovered (BERTALANFFY 1950) that systems and their elements are situated in a flow of information and energy ("flow equilibrium systems") i.e. are open towards their environment. They regulate themselves by means of feedback (WIENER 1948/68, pp. 124). The path to abstraction and formation of mathematical models was now marked out. Ecologically oriented biogeography, and after some hesitation, the (inorganically oriented) physical geography partially adopted the concept, similarly in anthropogeography, economic geography, whereas in social geography, the changes were only accepted at the fringe.

The "quantitative revolution" on the other hand, was soon over. At the level of the elements it was less than adequate. In social geographic studies with nomothetic aims, the free application and combination of facts mostly inductively obtained, mostly developed into generalised statements. If we do not wish to confine this approach strictly to the original idiographic aims, we may describe the methods as hermeneutic or phenomenological. In the last resort, all the activities by which mankind familiarises himself with the characteristics of his environment are based on a general process of perception, which is, on the one hand, as wide as possible to take in all available information (hermeneutics) and on the other hand as deeply as possible to clarify the notions and meanings involved (phenomenology).

## ***2) Constructivism and method of discourse in social geography:***

This methodical procedure found its continuation in the 1980s and 1990s, mainly because in social geography it came to be accepted that man was the "agens" and that society was shaped, so to speak, "from the bottom up". The focus of interest (particularly WERLEN 1995-97) was directed at action-based social geography. A new dimension had been opened up, although no real advantage could be gained from it, because there was no structural categorisation of actions which meant that the context remained unclear. The aim of nomothetics, i.e. of giving a generally accepted firm base, became vague and inexact. Moreover, the discussion was overshadowed by the statements of so-called constructivism which questioned the possibilities of human perception (see e.g. Wardenga, Gebhardt and Pohl, in: MÜLLER-MAHN and WARDENGA, publ., 2005).

In the 1960s and 1970s, MATURANA and VARELA (1984/87) developed their theory of autopoietic systems and illustrated it using the example of living organisms. Unlike the flow-equilibrium systems, the autopoietic systems regulate not only their behaviour themselves, but also create themselves materially and spatially. Of particular interest for our train of thought is the spatial inside-outside relationship which is linked with this theory. In contrast to the open flow-equilibrium systems, the authors regarded the autopoietic systems as "structurally determined" systems, which, as such, did not permit "instructive" interactions. "Everything taking place in them, takes place as a structural change which has its base at all times in their structure, whether through their own inner dynamic force or triggered (but not specified) by the circumstances of their

interactions" (MATURANA 1998, p. 322). This statement implies substantial epistemological consequences. It goes on to say "Nothing lying outside a living system can, within the system, determine what happens inside it, and since the observer is a living system, nothing lying outside the observer can determine within him or her, what happens within him or her. This means that the observer, as a living system, cannot constitutively make any assertions or statements which reveal or connote anything independently of the operations by which he or she generates his or her statements and assertions".

This position of "radical constructivism" stands or falls with the assumption of a closed cognitive circuit in the system of the organism (MATURANA and VARELA 1984/87, p. 260). To date however, this has neither been proven nor verified. On the contrary, the autopoietic system also seems to be an open system, i.e. that information (as in the flow- and non-equilibrium system, or the hierarchic system) can penetrate it from outside and have a decisive effect on how it organises itself materially and spatially.<sup>6)</sup>

This would make it clear that we see reality as such as existing independently of us and that we can therefore explore it. However, we must realise that, because of the filter of our own habits and intentions, this cannot take place by direct access as maintained by POPPER (1987, p. 29) but only with a number of individually differing concessions. In other respects too, there are increasing doubts as to whether constructivism in its radical form represents a methodically relevant basis. There are now a number of different variants (a list of quotations and a bibliography can be found in BEATS BIBLIONETZ 2005).

It appears to me that the present methodical discussion in social geography reflects this situation to a certain extent. There is a wide variety of hypotheses, ideas and opinions. These may have been developed using the hermeneutic or phenomenological method, or based on well-known theories in other fields (e.g. Giddens' "Structuration Theory" or Luhmann's "System Theory" (GIDDENS 1984/88 and LUHMANN 1984: "import of theories"; SCHMIDT 2004) or put forward spontaneously. With regard to method, the impression is of a post-modern "anything goes" situation (FEYERABEND 1975/86, p. 21).

In order to subject them to a critical examination, theoretically defined discourses evolved; the individual theses are exchanged among participants in discussion groups or dialogues. This means that communication i.e. language is of considerable importance. Here, language should not be seen purely from a technical point of view as a means of transmitting information, as demanded by WITTGENSTEIN in his "Tractatus" (1922-1953/1990). It should be remembered that it is moulded by the speakers as individuals in their own way. In his later "Philosophische Untersuchungen", Wittgenstein developed a doctrine of "language games" ("Sprachspiele") in which each "game" forms a functional unit and as such reflects a form of life, i.e. every train of thought, every idea is bound up with the mentality of the person speaking (see also GADAMER II, p. 428).

This hinders understanding in the communicating community. In order to achieve a reasonable consensus for everyone concerned, certain rules have to be observed (HABERMAS 1981, especially I, pp. 25).

- Everyone taking part must have the same rights – a requirement, which, as experience shows, is seldom fulfilled. In most cases (particularly in smaller groups) an internal

hierarchy develops in which certain persons dominate and the discussion can quickly become a contest for power or prestige. APEL (1992, pp. 44) therefore appeals for a climate of discussion which is free of dominance and pressure, but admits that it would probably be impossible to realise.

- Everyone should agree that the best arguments are given preference. Here too there are reservations because understanding something else or other people requires a willingness to exercise self-criticism. One must be able to listen and accept the possibility that one's own perception of the truth may be placed in doubt (GADAMER 1960/90, II, p. 116). This delays the adoption of innovative ideas.
- Another rule demands that the participants behave cooperatively and are committed to forming a consensus, e.g. in order to avoid conflicts of interest brought in from outside. This too is difficult. FOUCAULT (1973/81, p. 42) rightly asks "how is it that a certain statement appeared, and no other instead of it?" He was unable to answer it. "If every discourse has an outside, if its validities are subject to conditions which may change but cannot, in the last resort, be made understood and put into practice, there can never be an 'overriding discourse' which would settle a conflict between discourses" (WALDENFELS 1990, p. 201).

At the end of a discourse there may be a result which is accepted by a majority. It may be a truth (according to Pierce, quoted from APEL 1990, p. 115) in the sense understood by the self-regulating process of research, i.e. it may legitimise proceeding with further work. Discourse is without doubt able to create a climate for producing good ideas – something which should not be despised, as many pioneering impulses in the field of social geography show (summarised e.g. by PEET 1998; HUBBARD, KITCHIN, BARTLEY und FULLER 2002). To this extent, discourse is of considerable heuristic value.

But how sound is such a "truth" over the long term? Does it provide a firm base for scientific research? This is by no means certain. An answer to this question is urgently needed since the demands on precision of scientific statement have increased substantially over the past decades. Researchers should come as close as possible to results which are objectively sustainable. That means that the focus is once again on scientific accuracy.

### ***3) The Theories of Process and Complexity:***

The discourse method finds perhaps its natural-scientific counterpart in the Chaos Theory and Synergetics (HAKEN 1977/83) which have emerged partially from the System Theory since the 1970s in the fields of physics, chemistry and biology. They describe the behaviour of non-linear systems, each of whose parts (elements) obey deterministic laws, whereas the behaviour of the entireties is unpredictable. A "deterministic chaos" is created in which the elements join to form patterns.

The development of research continued and increasingly accurate methods were used. The Chaos Theory forms the basis for the Complexity Theory, which attempts to explain how parts of different kinds act, react and interact with one another with the aim of understanding complex phenomena such as language, life and society. The collective behaviour differs from the behaviour of the individual parts. This finds expression in so-called self-organisation. As with the System Theory and the Chaos Theory, the Theory of Complexity is one of the great basic interdisciplinary theories. A

number of institutes in the USA (such as the Santa Fe Institute in New Mexico and the New England Complex Systems Institute in Cambridge, Mass.) as well as several university departments are dedicated to research in this field. Attempts to come to terms with problem of complexity (especially in physics, chemistry, biology and, in their train, sociology) have produced a number of hypotheses and ideas (e.g. BAR-YAM 2003) but they have still been unable to do justice to the fundamental problem: They have still not succeeded in describing ubiquitous complex structures (characterised by processes, hierarchies and spatial differentiation definable by self-organisation and emergence) in a single theory and explaining their effect convincingly. These disciplines seem to have reached the limits set by their medium and methods of study.

This is where the Process Theory starts. It joins the anarchic "from the bottom up" with the generalising "from the top down". The argumentation used here is therefore based on the natural-scientific approach. It aims to produce solutions which give rise to laws.

Let us pause for a moment here. Initially (since approximately 1880) geography organised perceptible phenomena (forms) on the surface of the earth mainly according to material criteria and explained them causally (with a nomothetic aim) or with the assistance of hermeneutic method (with an idiographic aim). Increasing knowledge of the complex structure of reality and the refinement of (e.g. phenomenological) methods yielded (from around 1920) an insight into the structure and the functional interrelationships. In this way, the foundation was laid for understanding the system-based links in the flows of energy beneath the level of material phenomena (from approx. 1960). Studies which were idiographic in aim as well as nomothetic, contributed to this.

At the present stage of development (since about 1980/90) as we see it, this system-structured network of flows of information and energy is also defined by its hierarchic order, its spatial extent and its differentiated dynamic transformation down to the level of actions ("Process Theory"). The spatially limited non-equilibrium systems and the chronologically limited processes of conversion connected therewith, are prominent as the actual centres of activity. We are dealing with spatially and chronologically intricate formations with individual profiles, but which obey generally valid laws both internally and in the group. They are of a different type than the traditional regional geographies ("Länderkunden").

More than any other discipline, geography is able to make a significant contribution in this area. The reason for this:

- 1) The reasonable "dimension" studied by geography, is the mesocosmos (VOLLMER 1985-86, I, p.57), i.e. the world we experience daily. Mankind as a society is the preferred medium of study, and the researcher can, as a participant, observe and evaluate its phenomena.
- 2) He is also assisted by the thematic division of society and its manifestation in institutions, because it illustrates the qualitative association and location of processes and systems. In this way, insights can be gained into the complicated structure of processes.
- 3) The deeper research penetrates into the object being studied, i.e. the greater the degree of abstraction, the more it becomes concerned with the general (rather than the specific) and the closer disciplines come to one another. Not only disciplines dealing with subjects similar to geography (such as history and social sciences) have to deal with complexity, non-equilibrium systems, conversion processes, self-organisation,

emergence etc., but also the natural sciences (e.g. biology and theoretical physics; FLIEDNER 2007).

Methodologically speaking, geography can act as a bridge between the natural and the social sciences. In this case, the wide variety of objects characteristic of the study of geography may be regarded as an advantage.

On the other hand, the interdisciplinary concern with the subject of complexity may provide geography (which, as a science, defines itself spatially) with important impulses. Because space, according to one result of theoretical study<sup>7)</sup>, is formed by self-organisation and emergence. It would appear that geography has new interesting tasks ahead of it.

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## Notes:

- 1) Several Passages in the text correspond to the Preface in German to the book (FLIEDNER 2006, p. 5-10).
- 2) Explained in more detail in FLIEDNER 1993, p. 25-53 f.
- 3) Dito, p. 63-94 f.
- 4) Dito, p. 112-159 f.
- 5) Explained in more detail in FLIEDNER 2005, p. 69f.,119f.,202f.
- 6) Dito, p. 245 f.
- 7) Dito, p. 119 f.,287 f.