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FIRST AND SECOND ORDER DISCONTINUITIES IN WORLD GEOGRAPHICAL THOUGHT AND THEIR PRIMARY RECEPTION IN SLOVAK GEOGRAPHY

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Abstract
In the introductory part of the paper, we outline the conceptual framework of research with an emphasis on the concept of discontinuity in scientific thought and its reception in geography. Subsequently, we define our understanding of discontinuity and define first-order discontinuities and second-order discontinuities in the world geographical thought. In the next part of the paper we will focus on the primary reception of these discontinuities in Slovakia. These are the first responses and applications of new paradigmatic approaches imported from the world geography into the geographical thought of Slovak geographers. This research effort is situated in the broader context of the research of convergent and divergent features of "domestic" discontinuities in confrontation with the discontinuities identified in the development of geographical thought in the world. The aim is to point out which discontinuities identified in world geographical thought have been reflected in Slovakia and which have not yet been reflected. Paper is focused on the primary reception of world geographical thought in the geographical literature of Slovak provenance.

Key words
Discontinuity, geographic thought, Kuhn´s model, paradigm, Slovak geography, scientific revolution.

The research of geographic thinking belongs to the main tasks of metageography. Lately, we have registered an increased interest of geographers in this issue (Wilczyński 2009). It is confirmed by the activities of the IGU Commission „*On The History Of Geography*" and other geographic scientific societies that organize special events in respect of this topic. The Slovak geographic community also deals with it with increased intensity (napr. Matlovič 2006, Paulov 2012, Matlovič, Matlovičová 2012, 2015, Korec, Rusnák 2018, Oťaheľ et al. 2019). The topic that has not been sufficiently discussed in the literature of Slovak provenience is the problem of reception of discontinuities in world geographic thought in Slovak geography.

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The introductory part of this paper outlines the conceptual framework of the research focused on the concept of discontinuity in scientific thought and its reception in geography. After that, our understanding of discontinuity will be outlined together with the outline of 1st order discontinuity and 2nd order discontinuity in world geographic thinking. The third part of the paper deals with the primary reception of these discontinuities in Slovakia. We aim to zoom in the first reactions and applications of new paradigmatic approaches imported from the world geographic environment into the environment of Slovak geographers. These exploration efforts are situated into a wider context of the research of convergent and divergent features of "domestic" discontinuities confronted with discontinuities identified within the development of geographic thought in the world. Our objective is to point out which discontinuities identified in world geographic thought were also reflected in Slovakia and which have not been reflected yet.

THE CONCEPT OF DISCONTINUITY IN THE DEVELOPMENT OF SCIENTIFIC THOUGHT

The idea of discontinuity in scientific thought broke through in connection with the refusal of positivistic historiography of science and its linear-cumulative model of history of science. Well known are Koyré's observations about the crucial difference between speculating about the nature and the possibilities of human knowledge in medieval and modern age science (Špelda 2009, s. 78). However, Cohen pointed out to the older roots of the application of the idea of discontinuity within researching of scientific thought in the form of scientific revolution concept in his survey study Cohen (1976).

Koyré (1939) was followed by T. S. Kuhn (1962/1970) Kuhn who conceptualized discontinuity as a scientific revolution in the form of paradigmatic shift. He understood it as a crucial qualitative transformation of ontological, methodological and axiological level of scientific discipline. Kuhn presented several interpretations of the key concept of a paradigm. Simply said, he understood it to be generally acknowledged scientific results shared by scientific community that in the given time of normal science present a model of problems and a model of their solution (Kuhn 1997, s. 10) for the relevant community of scientists. According to Kuhn, the development of a scientific discipline that reached a certain level of maturity, that is a paradigmatic stage, happens according to a 3-phases cyclic model: a period of normal science (dominance of a certain paradigm) – a period of scientific crisis – a period of scientific revolution – a period of new normal science (dominance of a new paradigm). The concept of scientific revolution is crucial from the point of the needs of our reasoning. It is the outcome of the crisis of the scientific discipline which occurs upon the increase of empiric anomalies to a critical level that is impossible to be solved by the existing paradigm and the modification of its

theories. Scientists are open to new ideas and create alternative theories. The scientific crisis terminates by choosing one of the alternatives whereby the old paradigm is supplemented by a new one and the new period of normal science (Kuhn 1997) begins. Kuhn interpreted the scientific revolution from the position of the sociology of science. Scientific revolutions appear to be revolutionary only to those, who the paradigms relate to. He did not explain the change of a paradigm only by determination of logical and empirical criteria and the reconstruction of objective standards of scientific activities, but also by the sociological and psychological analysis of conditions in scientific community. The driving force of choosing a new paradigm is not only rational criteria, but crucial is also the overall social context and namely a shared conviction of the scientific community of the adequateness of a new paradigm (Kuhn 1997, s. 187, Woleński 2014, s. 105). Another aspect of Kuhn's model is incommensurability of paradigms that is given by the fact that the empiric facts and the contents of the terms of competitive paradigms fail to mutually correspond. Kuhn considered his own model to be the suitable one for disciplines on the higher level of maturity, especially sciences. The disciplines that failed to reach the paradigm stage, namely the social sciences and humanities, are typical for competitiveness between various scientific schools in the privileged position in the field and so they miss the general agreement of the scientific community on one paradigm (Kuhn 1997, s. 177). Later, Kuhn reconsidered the designation of these sciences as pre-paradigmatic and admitted that they are multiparadigmatic sciences (Kuhn 1970b, s. 272). This way, Kuhn significantly relativized his initial conception.

Apart from Kuhn, the idea of discontinuity in scientific thought was worked up by other authors. Interesting contribution is I.G. Cohen's (1987) work, especially from methodological point of view. He preferred historical analysis to logical analysis when identifying scientific revolutions. He presented four tests that are universally applicable to identify scientific revolutions in the last four centuries. According to him, it is possible to rely on the statements of the scientists and other evidence of that time as well on the reflections of scientific revolutions in scientific literature published after the revolution in question, opinions and findings of professional historians and philosophers of the science and the general consensus of the scientists working in the relevant sphere of knowledge (Cohen 1987, s. 41-42). Thus, Cohen's approach implicitly presumes the existence of an objective and subjective dimension of research of discontinuities in scientific thinking.

Kuhn's work raised an intensive critical discussion in the community of philosophers. Lakatos (1970) presented an alternative concept of scientific research programmes in relation to a paradigm. He separated a hard core of theories resistant to refutation from a protective belt of adaptable theories. Discontinuity in a revolutionary type occurs when changing the hard core of a programme,

which is a rare event in the development of science. L. Laudan (1984) disputed a totally discontinuous character of a paradigmatic change in the form of a 3-level of science hierarchic model – an ontological, a methodological and an axiological one. Kuhn's model presumes that a revolutionary change on the ontological level is necessarily connected with the changes on the methodological and axiological levels. Laudan presented an alternative network model that presumes a mutual dependence between the levels, but refuses their hierarchy. Thus, this model interprets a paradigmatic shift as a progressive one and not necessarily requiring any changes on all the levels at the same time (Laudan 1984). Other author M. Foucault, instead of a paradigm, worked with the concept of epistemé in the meaning of the demarcation of the space and the organization of the way of cognition, thinking and speaking about things and events. His main argument became the interconnection between knowledge, truth and power. So, the truth is a relative concept, dependent on power relations in society that produces them. According to Foucault, the transition between epistémé does not lie in necessary continuity based on causal principles or a different type of mutual dependence, but it is the result of a historical coincidence or a power triumph of a certain type of thinking (Foucault 2000 in Ježková 2013, s. 114).

The analogy of reasoning about discontinuities can be also found in other spheres. As an example can be mentioned the Schumpeter's concept of creative destruction in economy or a sphere of innovations in industrial products that are characterised by the Abernathy-Utterback's model of discontinuous innovation. The analogy of paradigmatic shift can be seen in its transition phase in which the transition of dominant designs (Utterback 1994) occur. When retrospectively assessing the Kuhn's model, Cohen M. Cohen (2015, s. 181) marked the term *paradigmatic shift* as a certain type of intellectual virus that was spread out from sciences to social sciences and humanities and in the end to a daily political discourse.

THE RECEPTION OF THE DISCONTINUITY CONCEPT BY GEOGRAPHERS

In geographical literature the idea of discontinuity in scientific thought appeared in connection with the reflection of formation of quantitative and theoretical geography in 1950' and 1960'. In this connection, the work by Burton (1963) becomes relevant because it was published almost at the same time as the Kuhn's book. Burton did not reflect Kuhn then, but he used the term *quantitative revolution* to describe the mentioned changes in geographic thought. Burton's concept of discontinuity is an intellectual revolution whose revolutionary ideas become a part of conventional knowledge (Burton 1963, s. 153) after it ends.

Kuhn's model caused an intensive reaction in geographical community. Its inventory and classification was made by Mair (1986). He identified two basic applications of Kuhn's model in geography. The first application had a normative

character and was based on using the model as a recipe to increase the scientific status and reputation of geography. So, it was about searching and suggesting new paradigms for geography. P. Haggett a R. Chorley (1967) promoted a paradigm of geography based on modelling (model-based paradigm), R. Chorley a B.A. Kennedy (1971) a paradigm based on a system analysis, B. Berry (1973) a paradigm of localisation and environmental decision-making in complex systems. D. Harvey (1972) assumed an individual position in these efforts. He criticized the idealistic nature of Kuhn's model and conceptualized a revolutionary theory and contra revolutionary theory. While the first one presents an interesting progress of thought with a potential to generate a social change, the purpose of the second one is to prevent it. This overview of prescriptive applications of Kuhn's model may be concluded by the work of Hard (1973, s. 24) according to whom geographers should accept the new paradigm with enthusiasm.

The second group of works according to Mair (1986) is created by studies that endeavoured to apply the Kuhn's model as an analytical tool in the research of the history of geographic thought (for instance Johnston 1978, 1979, Graves 1981, Harvey a Holly 1981, Holt Jensen 1982, Paulov 2012). In this group, there already appear critical views that dispute the suitability of Kuhn's model for geography (Chisholm 1975, Johnston 1979, Graves 1981). According to them, the problem lay in the requirement for monoparadigmatic nature of the normal science period and for a revolutionary character of changes of paradigms with the attendance of a notable part of geographers.

According to Mair (1986) the geographers failed to fully appreciate the potential of Kuhn's model and made many inaccuracies and misinterpretations. According to him, they were frequently only superficial comparisons of Kuhn's model with the development of geographic thought. The geographers were unable to agree on the designated paradigms of geography despite Kuhn's opinion that if paradigms existed, then they should be easily identifiable (Mair 1986, s. 359). One of the causes could be that many authors worked with secondary resources (Mair 1986, s. 346) only and did not pay sufficient attention to a critical discussion about the Kuhn's model in the philosophy of science (Stoddart 1977/1981 in Wheeler 1982, s. 1). Based on its reflection, Kuhn was later more specific about his model and the concept of a paradigm. Agnew a Duncan (1981, s. 42) pronounced in general that geographers tend to underestimate the philosophical compatibility of ideas that they often uncritically borrow from other scientific disciplines. However, Johnston and Sidaway (2004, s. 11) warn about the problem of unobvious determination of the paradigm concept by Kuhn himself, and refer to M. Masterman (1970, s. 61) who identified three levels of the definition of a paradigm from more than 20 different ways of handling with the term, as follows: a metaparadigm, a sociological paradigm and a construction paradigm. Kuhn later partially accepted the classifica-

tion, and concentrated on being more specific about the second and the third level of definition of a paradigm. In their analysis of geographic thought development, Johnston and Sidaway (2004) work with all three hierarchic levels of a paradigm definition, more concretely the paradigm as the world view, the paradigm as disciplinary matrix and the paradigm as an exemplar. These definitions may be viewed as the hierarchic concept of scientific communities sharing similar values, namely from the level of all the scientists to small scientific communities sharing a paradigm as an exemplar.

An important contribution to the discussion is the work by D. Livingston (1992) who refused the concept of a paradigm because it is too simplifying. Instead, he offers a summary of main "conversations" or discourses that appeared in the course of the development of geographic tradition. He sees the term *geographic tradition* as one of a rather subjective, flexible and context-dependent character. On one hand, geographic thought is influenced by the status of studied reality and, on the other hand, by employed philosophical basis. According to him, the social context also contributes to the formation of geographic thought and emphasises the situation of geography in contemporary social and spatial contexts (Spedding 2008, s. 157).

From the methodological point, the contribution of Keighren et al. (2012a) are inspirational. When looking into the changes of geographic thought, they think the important role is to research geographical texts from which we learn about geographers' notions about the past, the present and the future of the scientific discipline they cultivate. They separated the classical texts from canonical ones (Keighren et al. 2012a, s. 299). The classical texts are the ones that played an important role when forming geographic thought and remained intellectually and pedagogically relevant, they depict the state of the discipline precisely in the context of that time and at the same time contain a prediction of its future development, so they carry a message that goes beyond modern intellectual trends. Canonical works are the ones that played a crucial role in forming geographic thinking in the past, however, now they do not continue. They have lost their dialogic function and potential. Classical texts carry their aura of immortality, but the canonical ones are considered to be a memento of the past times we do not necessarily wish to return (Keighren et. al. 2012a, s. 299). Agnew (2012) formed his sceptical opinion in relation to canons. He does not see the contribution of their conceptualization as important in relation to understanding of current development of geographic thought. According to him, a canon does not exist in geography and cannot exist despite it would be necessary. "Fanons" are typical for geography. They characterize the tendency of digressing from one intellectual modern tradition to another without thinking about what was there before. This tendency is also partially stimulated by current academic policy that is obsessed with preferring innovations, so

it does not take "the old one" into account (Agnew 2012 s. 322-323). As a reaction to this Agnew's comment, Keighren et al. (2012b) admits that there was no canon in geography at all and what more, not even in the first phase of initial academic institutionalization despite the fact that some texts also reached the status. The main reason is the fact that geography was too robust and diversified to be exhaustively defined by one text product (Keigren 2012b, s. 342). This opinion is supported by argumentation in favour of multiparadigmatic form of geography.

In general, it is possible to state that geographers in their reflections notably focused on the concept of a paradigm and the period of a normal science. To the lower extent they had a nuance discussion about the concept of scientific revolution. Mostly, they limited themselves to its relativization with reference to the evolutionary character of some movements in geographic thought – e.g. Johnston (1979) in connection with the behavioural paradigm – or coming out of Popper's critical rationalism; they urged the interpretation of geography as a science in the mode of permanent revolution (Bird 1975). Only rarely we can see the efforts to explicitly determine scientific revolutions or the paradigmatic progress in geographic literature (napr. Malik 2014). Johnston and Sidaway (2004, s. 405) characterize geography as a science in a multiparadigmatic situation on the highest metaparadigmatic level of the world view and there is a competition between the paradigms as disciplinary matrixes in two paradigms of the world view and many microparadigms as the examplars. This situation is caused by many human geographers who do not have an unequivocal affiliation to one disciplinary matrix, not even to one microparadigm because there are various ways to practice geography as a scientific discipline. Some geographers have gone through a paradigmatic shift on the metaparadigmatic level (Johnston, Sidaway 2004, s. 406) in their scientific career.

DISCONTINUITIES IN WORLD GEOGRAPHIC THOUGHT

When determining discontinuities in world geographic thought we follow the hierarchic conception of paradigms as interpreted by Johnston and Sidaway (2004, s. 11) based on the Masterman's (1970) classification. Similar thinking can be found in Peet (1998), who demarcated five levels of abstraction when classifying the streams of geographic thought. Discontinuity is understood as a new stream discovered in geographic thought that has specific and by a part of scientific community shared features relating mainly metaphilosophical and philosophical rooting, the philosophical basis, theoretical and methodological approaches, research methods and techniques, the thematic orientation of interests and problem-solving and the key text products. In our reasoning, we are to focus on two levels of discontinuities. In general features, first order discontinuities correspond to the highest hierarchical level of paradigm as the world view within the interpretation framework of John-

ston's and Sidaway's (2004) approach and the intersection of metaphilosophical and philosophical level of abstraction by R. Peet (1998). In general features, second order discontinuities correspond to the second hierarchical level of paradigm as a disciplinary matrix within the interpretation framework of Johnston's and Sidaway's (2004) approach and the intersection of philosophical and social-theoretical level of abstraction by R. Peet (1998).

Based on our classification of the stages and streams in geographic thought (Matlovič, Matlovičová 2015, s. 33-34) it is possible to think about 4 first order discontinuities and 16 second order discontinuities (tab 1). We do not pay attention to third order discontinuities in this study.

The first order discontinuity of the Enlightenment period represents the transition from pre-modern exploration geography to modern exploration geography. The Enlightenment period as an intellectual movement developed fully in the 18th century. However, it followed the impulses from the previous centuries. Rationalism, empiricism, critical and free thinking and definitive detachment of science from theology got to the front. The birth of modern geography dates back to this period. According to Stoddart (1986, s. 33) the decisive moment of its constitution was Cook's first exploration voyage in 1769 to the Pacific that had explicit scientific aims using three scientific methods – observing, classification and comparison (Stoddart 1986, s. 29). The important contributions to establish modern exploration geography were works by I. Kant, mainly his conception of time and space and the epistemological conception. The highlight of the period of forming modern geography was the first half of the 19th century and the work by German geographers Alexander von Humboldt and Carl Ritter. Thanks to them, geography was established and institutionalized as an individual academic discipline. Their conception was holistic; they saw unity in diversity in the world (Matlovič, Matlovičová 2015, s. 56).

The positivistic first order discontinuity is represented by the transition from modern exploration geography to modern positivistic geography. Due to it, the exploration tradition in geography ended because its heuristic potential was extinguished in the first half of the 19th century thanks to mapping the last blank places in the world map. Positivism became the determining philosophical basis and geography was forced to find its theoretical framework that would provide it with scientific status in this new situation. It found it in evolutionism that integrated the natural and the social world into one explanatory platform (Livingstone 1992 s. 210). These efforts showed themselves most significantly in geomorphology (W.M. Davis), geopolitics and in the conception of environmental determinism (F. Ratzel) that were stroke by this evolutionistic and deterministic discontinuity. Harvey and Holly (1981) considered „*Antropogeographie*" by F. Ratzel, which was published in 1882-1891, to be the key text in respect of this discontinuity. An alternative

Table 1 First and second order discontinuities in world geographical thought

Discontinuity	Time definition in the world	Time definition of response in Slovak geography
I. Enlightenment discontinuity	18th century and 1st half of 19th century	-
II. Positivist discontinuity	last quarter of the 19th century	-
Evolutionary and deterministic discontinuity	last quarter of the 19th century	-
Anarchist discontinuity	turn of the 19th and 20th century	-
Regionalist discontinuity - French possibilism - Berkeley School of Cultural Geography - Landschaft school - Chorology	early 20th century	1930s
Quantitative discontinuity	1950s	2nd half of 1960s
Behavioral discontinuity	turn of the 1950s and 1960s	1980s
III. Postpositivist discontinuity	late 1960s	2nd half of 1960s
Systemic and complex discontinuity - systems theory - synergetics and complexity theory	1950s, (1990s)	2nd half of 1960s
Humanistic discontinuity	first half of 1970s	1980s
Structuralist discontinuity	turn of the 1960s and 1970s	2010s
Structuration discontinuity	first half of 1980s	-
Critical-realistic discontinuity	first half of 1980s	beginning of the 21st century
New regionalist discontinuity	first half of 1980s	beginning of the 21st century
Feminist discontinuity	first half of 1980s	2006
New cultural discontinuity	first half of 1980s	-
IV. Postmodern discontinuity	1980s	1997
Poststructuralist relational discontinuity	1990s	2010s
Postcolonial discontinuity	1990s	-
Posthumanist discontinuity	beginning of the 21st century	-

Source: *own processing*

approach was brought by anarchistic discontinuity, mainly thanks to P. Kropotkin and E. Reclus. The key text is Kropotkin's „*Mutual Aid: A Factor of Evolution*", which was published in 1902. Regionalism (Hubbard et al. 2002, s. 25) became the main stream of geographic thought in the first half of the 20th century. Regionalistic discontinuity is connected with the French school that brought a possibilistic alternative for Ratzel's environmental determinism. Harvey and Holly (1981) consider „*Tableau de la Géographie de la France*" by P. Vidal de la Blache, published in 1903 to be the key text for this discontinuity. Regional discontinuity caused the formation of other modifications of this style of holistic thinking while two of them considered landscape to be the central concept. It was the Berkeley school of cultural geography with the key work by C. Sauer „*The Morphology of Landscape*" published in 1925 and the Landschaft/Landscape school developed by German and Russian/Soviet geographers. The key works are those by Passarge's 3-volume „*Die Grundlagen der Landschaftskunde*", which were published in 1919 and 1920. A very influential flow became the chorological conception of geography by A. Hettner and R. Hartshorne. Harvey and Holly (1981) consider Hartshorne's „*The Nature of Geography*" published in 1939, to be the key text of this conception.

The crisis of the chorological conception of geography brought significant 2nd order discontinuity which was quantitative discontinuity (revolution) in the 1950'. Harvey and Holly (1981) consider the key text to be the Schaefer's paper „*Exceptionalism in Geography*" published in 1953. This discontinuity caused the establishment of a paradigm of geography as a spatial science that maintained its strong influence by the end of 1960'. In the second half of 1960' geographic thought was enriched by another stream of thought thanks to behavioural discontinuity, despite Johnston (1979) saw in it not only the evolutionary progress of the paradigm of geography as a spatial science. The key text of behavioural discontinuity is Wolpert's paper „*The Decision Process in Spatial Context*" from 1964.

Post-positivistic 1st order discontinuity is represented by the transition from modern positivistic geography to modern post-positivistic geography. This discontinuity was the result of dissatisfaction with the paradigm of geography as a spatial science and with logical positivism as its philosophical basis. This critic caused the formation of two dominant streams of geographic thought. From the first stream, that pointed out to the inability of the spatial science to contribute to the solution of socially relevant problems (social injustice), was created critical geography that found its philosophical basis in structuralism and Marxism. It was a product of structuralistic discontinuity whose key representative was D. Harvey with his works „*Social Justice and the City*" from 1973 and „*The Limits to Capital*" from 1982. The second stream that pointed out to a very narrow look of spatial science at a human and the ignorance of human subjectivity formed humanistic geography whose philosophical base was in phenomenology, hermeneutics and existentialism (Daněk 2013). Humanistic discontinuity is represented by the key works by

A. Buttimer „*Values in Geography*" published in 1974 and Yi Fu Tuan's „*Topophilia: a Study of Environmental Perception Attitudes and Values*" published in 1974. The third stream of thought formed in this time was the paradigm of the theory of systems and the theory of complexity whose philosophical rooting lay in critical rationalism (Matlovič, Matlovičová 2015). System and complex discontinuity was initiated by the paper by A. Strahler „*Dynamic Basis of Geomorphology*" published in 1952, while the canonical text became "*Physical Geography. A System Theory Approach*" by R. Chorley and B. Kennedy, which was published in 1971. In human geography the system approach was extended mainly thanks to the key text by P. Haggett „*Locational Analysis in Human Geography*" from 1965. Later, thinking was enriched by the concepts of the theory of complexity and synergetics that resulted in the study of non-linear dynamics of complex systems. One of exemplary key works representing this stream of thought is Allen's monography „*Cities and Regions as a Self-Organizing Systems*", which was published in 1997.

Another feature of post-positivistic discontinuity was the transition from the substantial to constructivist way of thinking (Osman 2014, s. 37). An ongoing debate of humanistic and structuralistic geographers about the importance of structure and agency when forming social life (structure-agency debate; Cresswell 2013, s. 197) resulted in the attempts to create conceptions spanning this dichotomy. An example can be structuration discontinuity that drew inspiration from the Giddens theory of structuration. Its establishment was supported by D. Gregory, A. Pred and B. Werlen. Another example is scientific-realistic discontinuity represented by the key work by A. Sayer „*Method in Social Science: a Realist Approach*", published in 1984. New regionalistic discontinuity brought reconstructed (new) regional geography. An exemplary key text is the one by Paasi „*The Institutionalisation of Regions: a Theoretical Framework for Understanding the Emergence of Regions and the Constitution of Regional Identity*", published in 1986. Feminist discontinuity brought an accent to the diversity of people and unequal relations between them. This discontinuity is represented by the key collective work titled „*Geography and Gender: An Introduction to Feminist Geography*", which was published in 1984. A new cultural discontinuity brought new cultural geography as a stream of thought that is characterised in the key works by D. Cosgrove „*Social Formation and Symbolic Landscape*" from 1984 and P. Jackson „*Maps of Meaning*", which was published in 1989.

Postmodern 1st order discontinuity is represented by the shift from modern post-positivistic geography to post-modern post-structuralist geography. It was mainly about the refusal of epistemological program of the Enlightenment period and its fundamental presumptions. It is characterized by resistance and scepticism against metanarrative stories, covered essences and distrust in relation to the possibility to find the universal truth and representation of the world. The

world is understood as a continuously changing social construct that is created by a common language. Through language we create our own world and so there are as many different worlds as there are world-creating languages. Post-modern world is only an arena of "fight of interpretations", an arena of language games (Matlovič, Matlovičová 2015). Post-structuralist reversal resulted in three 2nd order discontinuities. Post-structuralist relational discontinuity caused the formation of relational geography as a stream of thought that emphasize the topic of relations. The interest of geography does not focus on individual places and spaces as such, but on the ways that interconnect the relations. The key works of this discontinuity is Doel's „*Poststructuralist Geographies: The Diabolical Art of Spatial Science*" published in 1999, Murdoch's „*Post-structuralist Geography: A Guide to Relational Space*" published in 2006, Massey's „*For Space*" published in 2005, Soja's „*Third-space: Journeys to Los Angeles and Other Real-and-Imagined Places*" published in 1996 and Thrift's „*Non-Representational Theory*" published in 2007. Another one was post-colonial discontinuity that was conditioned by post-structuralist critic of Marxism and humanism and brought an accent to the agenda of difference. It comes out of post-colonial theory of E. Said. This reversal in geographic thought is represented by the key papers such as Gregory's „*The Colonial Present: Afghanistan. Palestine. Iraq*" published in 2004. Post-humanistic discontinuity draws inspiration from post-humanism and transhumanism that have a close relation to philosophies accentuating the embodied, material and vital nature of human life. Post-humanistic geography shows an increased interest in hybrid formations. It shows the ways of how the human and non-human or the perceiving and non-perceiving aspects of the world can be interconnected with the bridging of dualism between physical and human geography. The key text of this discontinuity is Whatmore's monography „*Hybrid Geographies: Natures, Cultures, Spaces*" published in 2002.

THE PRIMARY RECEPTION OF DISCONTINUITIES IN WORLD GEOGRAPHIC THOUGHT IN SLOVAK GEOGRAPHY

When analysing the primary reception of discontinuities in world geographic thought in Slovak geography it is important to take its late establishment caused by political and social-cultural factors (Matlovič 2018, Matlovič, Matlovičová 2018) into account. For this reason it makes no sense to look for the reception of 1st order discontinuity in the Enlightenment period and 1st order positivist discontinuity and evolutionary and determinist discontinuity and 2nd order anarchist discontinuity.

The beginnings of modern Slovak geography formation reach back to the interwar period, which is the period after the 2nd order regionalistic discontinuity. The first academic geographic workplace at the Comenius University in Bratislava started its activities in 1922. With regard had to the lack of educated Slovak geographers, it was substituted by professors from Prague. Certain faculty stabilisation

occurred in 1930' when the head persons became J. Král and J. Hromádka. Král considered himself to be an opponent of the German geographic school. He especially refused the genetic and the statistical approach. He regarded himself as a supporter of the French geographic school and he put a stress on researching the human influence on the formation of geographic environment (Král, Kondracki 1951). Hromádka devoted himself to geomorphology and regional geography. In 1931-1932 he spent study visit in Paris with A. Demangeon and E. de Martonne. He acquired the approaches and concepts (especially lifestyles/*genre de vie*) of the French school of regional geography school which he applied in his regional-geographic synthesis. A typical example is his book „*Všeobecný zemepis Slovenska*" ("*General Geography of Slovakia*") published in 1943. Hromádka worked in Bratislava until 1946 and educated the first generation of professional Slovak geographers (Matlovič 2018, Matlovič, Matlovičová 2019). A certain exemption was the student of J. Král., F. Bokes, who in the initial phase of his professional career devoted himself to geography and was the first director of the Geographical Institute of the Slovak Academy of Sciences and Arts in Bratislava. His book „*Slovenský životný priestor v minulosti a dnes*" ("*Slovak Living Space in the Past and Today*") from 1943 was written in a spirit of environmental determinism and used the German concept of the life space (Lebensraum), although defensively understood. However, Bokes does not explicitly reflect his affinity to environmental determinism in this book.

The character of Slovak geography started to change 1950'. In world geographic thought there was quantitative discontinuity. In Slovakia, the development was specific and conditioned by geopolitical and social-ideological influence. Slovakia, as a part of Czechoslovakia, fell under the influence of the Soviet Union after 1948. The monopoly of the power of the Communist Party manifested itself by ideological indoctrination of the science on the basis of dialectic and historic materialism. This Marxist discontinuity was represented by K. Ivanička who, at a theoretical conference in 1961, criticized geographical determinism for its connection with social Darwinism and its misuse to cover the political and economic expansion of the imperial powers. Ivanička also criticized geographical nihilism for complete underestimation of the influence of the geographical environment on the society. His criticism did not even spare the French geography school for its connections with positivism. He considered Marxism to be the only right world view, namely the study of forces and relations of production (Ivanička 1963). According to the resolution adopted at the mentioned conference organized by K. Ivanička, Slovak geography fought off geographical determinism as well as geographical possibilism together with the morphological tendency of anthropogeography and claimed allegiance to the dominant influence of Soviet geography. The resolution outlines the main tasks for physical, economic, historical geography, cartography and school geography. The tasks showed a tendency to complex approaches

(development of complex physical geography, study of territorial complexes in economic geography) and the need to draw up the methods and ways to process territorial regionalization (Ivanička 1963, s. 223-225). This paradigmatic doctrine was practically binding in Slovak human geography until 1989.

The first systematic reception of quantitative discontinuity in Slovak geography was the papers by Paulov (1966, 1968, 1969). They reflected Schaefer's criticism of the Hettner-Hartshorne's chorological conception. He paid significant attention to the reception of the book by W. Bunge „*Theoretical Geography*" from 1962 and pointed out to the cybernetization of geography and the application of system's theory in geography. Paulov's interest in the new paradigm of geography as a spatial science was influenced by the papers by Polish (Z. Chojnicki, R. Domański) and Russian geographers (J.V. Medvedkov). The key role was played by the monography of D. Harvey „*Explanation in Geography*" published in 1969, based on which J. Paulov prepared lectures in theoretical geography for students (Paulov 2009). Thanks to him, Slovak geography relatively early captured quantitative discontinuity in the world geography. Apart from Paulov, the paradigm of geography as a spatial science in Slovakia was firstly developed by A. Bezák, Š. Poláčik and J. Krcho (Matlovič, Matlovičová 2015). This paradigm became a sort of asylum for the part of geographers who had a moral problem to adapt to the requirements following from the ideological contamination of geography by dialectic and historical materialism. The Communist regime tolerated their activities because in mathematical modelling and the use of quantitative method the Communists saw no ideological threat for their interests in power. Despite this fact many key profile monographies representing this stream of geographic thought were published just after the social changes in 1989 – such as Paulov's monography „*Entropia v urbánnej a regionálnej analýze*" ("*Entropy in Urban and Regional Analysis"*) and Bezák's monography „*Problémy a metódy regionálnej taxonómie*" ("*Problems and Methods of Regional Taxonomy*"), both published in 1993. The reflection of quantitative discontinuity did not remain only as the inventory of the new approaches, but resulted in many applications and key papers that had already been inventoried in other papers (Bezák 2008, Paulov 2009).

As a follow up to the reception of quantitative discontinuity, Slovak geography relatively early reflected to the system and complex discontinuity. The system approach in the geomorphological research of slides and slope modelling was developed by Urbánek (1968). Slovak geography experienced a creative interconnection between the new approaches and the traditional Landschaft school developing as long as from the first decades of the 20th century. M. Lukniš (1963) pointed out to the application of the Landschaft approach and J. Drdoš (1965) brought theoretical knowledge of this school of thinking in Slovak geography. The landscape concept became the domain of physical geographer's research and

in it is possible to identify the influence of the conceptions of Soviet geographer Isačenko and German geographer Haase. J. Krcho (1968, 1974) connected the approaches of the Landschaft school with the system approach. He applied the system approach in the study and modelling of the landscape as a spatially organized system. He elaborated a complex digital model of relief. One of the most important is his monography *„Morphometric Analysis of Relief on the Basis of Geometric Aspect of Field Theory"*, which was published in 1973. The geosystem approach and inspirations form the approaches in the work of British geographer P. Haggett *„Geography a Modern Synthesis"* from 1972 were applied when making a conception of the landscape synthesis (Mazúr, Drdoš, Urbánek 1983). On the initiative of Slovak geography a Commission IGU (International Geographical Union) *„Landscape Synthesis – Geoecological Foundations of the Complex Landscape Management"* started in 1980 and operated until 1988. Within IALE (International Association of Landscape Ecology) there was a working group *„Landscape Synthesis – in Environmental Management"*. Complex discontinuity caused a less significant reaction in Slovak geography. Its theoretical bases were discussed by K. Ivanička (1988). Another author who implicitly discussed the relation of the theory of complexity and geography was J. Paulov (2002). In the concrete research we later meet the application of the theory of complexity, more concretely in the evolutionary analysis of the landscape system (Lehotský, Novotný, Grešková (2008). Only recently, Slovak geography discussed the concept of complexity in the context of economic geography (Rusnák 2012).

Behavioural discontinuity caused the first responses in Slovak geographic community in the second half of 1970'. It was thanks to V. Ira (1984), whose first papers in this field were focused on the evaluation of environmental quality in Bratislava via the study of evolutionary-preferential aspects of its perception (Ira, Paulov 1976, Bašovský, Paulov, Ira 1981) and on the reflection of the Lund school of time geography (Ira 1989, 2001). The study of the designation-structural aspects of perception in the research of the image of a city was reflected in Slovakia by Radváni (1983, 1985). However, this stream of geographic thinking could not be fully developed earlier than after the social changes in 1989. Work by Kollár (1992, 1994) and Matlovič (1992) are the examples of it.

Post-positivistic discontinuity initiated the first reflection in the paper of J. Paulov *„Spory o pozitivizmus v súčasnej západnej geografii"* (*"Controversies about Positivism in Current Western Geography"*), which was published in 1986. The response to post-positivistic 1st order discontinuity in Slovak geography was connected with the reflection of humanist 2nd order discontinuity. However, it was relatively modest. The application of humanist approaches in their pure form absents and no Slovak researcher can be marked as a humanistic geographer par excellence. A certain reflection or at least a marginal reference was received by humanistic geography in some mostly extensive works about the philosophical

issues of geographic thought or, a humanistic-geographical interpretation and a reinterpretation of traditional geographical concepts (Paulov 1986, Kasala 1994, Matlovič 2007). A certain intersection of humanistic geography is evident mainly in Slovak discussions about the constitution of reconstructed or new regional geography (Kasala 2005, Lauko, Kasala 2009). From the methodological point of view, the discussions about the application of the concept of understanding in regional-geographical (Kasala 2003) research and the use of qualitative methods in humanistic-geographical research (Rochovská et al. 2007) are relevant.

From the beginning, structuralistic discontinuity did not cause any reflection in Slovak geography. It was because of the fact that during the Communist regime dialectic and historic materialism was the dominant and binding ideology in its vulgarized Marx-Lenin version. University education, scientific education and social-scientific research were indoctrinated by it. It was precisely characterized by J. Demek (1987, p. 13), according to whom thanks to the cooperation with Soviet and Polish geographers we have developed the Czechoslovak Marxist geography school with several differences in individual schools, the Bratislava one, the Prague one etc. After the important social and political changes in 1989 the Marx-Lenin ideological doctrine was discredited whereby we can explain a relatively long period of Slovak geographers' unwillingness to reflect the western Marxist and Neomarxist ideas. The situation has become to change not earlier than in the recent years when some participants of the youngest generation make their efforts to encompass some topics in the way that they take into account at least a partial perspective of critical geography inspired by Marxism and neomarxism (these include works by Šuška, 2014 and Michalko, 2012, 2013, 2014). Smith and Rochovská (2006) used the perspective of critical geography when researching poverty and social-economic inequalities.

So far, scientific-realistic discontinuity has not caused any notable reaction in Slovak geography. It is mentioned in several theoretically oriented review articles. M. Lehotský (2003), M. Lehotský and J. Novotný (2006) pointed out to the use of the conceptions of transcendental realism in fluvial geomorphology.

New regionalist discontinuity was reflected in theoretical discussions relating the development of geographic thinking or the theory and methodology of regional geography -J. Paulov (1996), V. Lauko (2000), V. Lauko, K. Kasala (2009), R. Matlovič (2006, 2009). In empirical research the approaches of new regional geography started to be applied mainly in the researches of local and regional identity - S. Bucher (2012), K. Kasala (2005, 2012), K. Kasala et. al. (2009, R. Nikischer (2013) and P. Šuška (2010) a territorial marketing and place branding - K. Matlovičová (2007, 2015).

Feminist discontinuity was reflected only marginally in Slovak geographical literature. The summary of theoretical-methodological problems of feminist geography was brought by the monography of Blažek and Rochovská „*Feministické*

geografie" ("*Feminist geographies*") published in 2006. A. Rochovská partially relied on the feministic perspective in a widely designed research of poverty in which she pointed out to women as a vulnerable group that is more endangered by poverty (Rochovská 2005). New cultural discontinuity has not been reflected in Slovak literature yet.

Post-modern 1st order discontinuity was reflected in the review articles by Paulov (1997) and Matlovič (1999) by the end of 1990'. Post-structuralistic relation discontinuity, post-colonial discontinuity and post-humanistic discontinuity were informatively discussed in the book by Matlovič and Matlovičová (2015). The concrete applications of relational geography approaches can be found in the papers by Némethyová (2012) and Blažek, Šuška (2017). Generally, the potential of post-modern post-structuralist geography remains only minimally used in Slovak geography.

CONCLUSIONS

Summarizing the found facts it is possible to state that in Slovak geography two of four 1st order discontinuities of world geographic thought were reflected as well as 10 of 16 2nd order discontinuities of world geographic thought.

Our analysis shows that, as a result of its late institutionalization, Slovak geography could join the reflection of world geographic thought not earlier than after regionalist 2nd order, and so after 1st order positivistic discontinuity. This was the reason why the first two 1st order discontinuities of world geographic thought (the one of Enlightenment period and the positivistic one) and first two 2nd order discontinuities (evolutionistic-deterministic and anarchistic) could not have been directly reflected by Slovak geography.

The beginnings of Slovak geographic thought are mainly linked with the French school of regional geography the concepts of which were applied by J. Hromádka in his regional geography synthesis. Slovak geography diverted from this paradigm in 1950' due to the transition to the paradigm of dialectic and historic materialism. It was the result of power-motivated forced sovietisation of Slovak education and research practice. Despite the fact that this paradigm was binding until social-political changes in 1989, Slovak geographers managed to reflect almost all relevant discontinuities of the period.

Quantitative discontinuity was reflected a decade after its establishment in western geography. Its reflection showed itself not only as an inventory of the new approaches, but resulted in many applications and key works. Following the reception of quantitative discontinuity, Slovak geography relatively early also reflected system and complex discontinuity. Its creative interconnection with the Landschaft school brought many precious results and the creation of the separate Bratislava school of landscape synthesis, the results of which were appreciated by the institu-

tionalization of this research agenda in the structures of IGU and IALE. Behavioural discontinuity produced first responses in the Slovak geography community in the second half of 1970'.

Post-positivistic 1st order discontinuity was associated with the reflection of humanistic 2nd order discontinuity. Initially, structuralistic discontinuity did not cause any reflection in Slovak geography. It was caused by discredited Marx-Lenin ideological doctrine in the period after the end of the Communist regime and Slovak geographers' unwillingness caused by it to reflect the western Marxist and Neomarxist ideas. Scientific-realistic, new regionalist and feminist discontinuity caused a relatively modest reaction. Structuration discontinuity and cultural discontinuity and the concepts of new cultural geography have not been discussed in Slovak geography yet.

Post-modern 1st order discontinuity was reflected in summary studies and in Slovak geographical literature we can also find the first applications of the concepts as the result of post-structuralistic relational discontinuity. Post-colonial and post-humanistic discontinuities have been only informatively discussed in a wider reviews of geographic thought. In general, the potential of post-modern post-structuralistic geography remains only minimally used in Slovak geography.

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