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Is Science About Power and Money?

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Abstract

This article presents some modern philosophical reasons that lay behind the introduction of the concept of the hermeneutical horizon to explain scientific change; cf. [1], chapter 17. These reasons reveal arbitrariness of sociological variabilism following from its elimination of the objective intellectual factors, essential in knowledge creation.

Keywords: Philosophy of Science, Phenomenology, Hermeneutics, Knowledge Creation

1 Introductory Remarks: business or science?

The vastness of scientific achievements changing almost every domain of human life and – in many aspects – human being far beyond imagination creates the illusion that scientific and technological methods are the remedy both for theoretical and practical problems. The illusion goes too far: the only possible way to obtain valuable cognition is by using scientific, e.g. experimental, sociological, psychological, physical etc., methods.

However, we are still “at crossroads”: we do not have a fundamental “theory of everything”. Science creates only a part of human understanding, though of great importance.

In my opinion, the development of a new episteme of knowledge sciences adequate for knowledge civilization, (cf. [1], [3]) should not be based only on scientific basis due to some very substantial reasons. For instance, the development of science (e.g. genetics) puts us face to face with many ethical questions and to answer them one needs the philosophical recognition of “what being human really and truly is?”.

There is no opportunity to give a detailed

solution of the problem in the scope of the present paper. Nevertheless, it is possible to treat briefly one aspect of reducing the mechanisms of knowledge creation to some sociological, psychological and economic causes and at the same time neglecting (all or almost every one) objective, material components of knowledge creation. “Science is a function of social and psychological factors only”, “science is power and money”, (or even: “science is money and money”), “everything is historically changeable”, i.e. “anything goes” in science. Only a disenchanted researcher or methodologist thinks of science as a branch of economy and social policy.

At first glance, such a historical variabilism is reasonable and “drummed up” with much historical evidence. The “plunge” of Newtonian physics and the emergence of Quantum Mechanics and Special or General Theory of Relativity showed that science is not the straightforward consequence of experimental data, since one and the same data can be explained in many, quite different ways. Science is a free *interpretation* of experimental data rather than one-to-one isomorphic rewiring. Another example is the emergence of non-Euclidean geometries. Some absolutely self-evident truths (the fifth Euclid postulate of parallel lines) “happened” to be wrong or at least not absolutely right. It is because our convictions and the sense of evidence are only psychologically valid in a given social and historical context. One can identify something just as *subjectively* valid: for one person something seems valid; for another not. What is true for the contemporary working scientist was not true in antiquity.

The crisis of objectivity and truth as real scientific virtues originates also in the crises of the intuition as *a priori* knowledge and the infallible source of knowledge and science.

The ancient self-evident axiom that a part is smaller than the whole lost its infallible footing

from the time of Bolzano and Cantor. (Almost everybody knows that there are so many natural numbers as many as even numbers alone.)

Thus, there are many reasons behind the conviction that *anything goes* in science. However, in my opinion, it is a kind of personal intellectual tragedy, like a mental handicap, to see science as being “power and money” alone. It is rather a testimony to the inability to analyze scientifically the mechanisms of the emergence of new scientific theories and scientific change. However widespread, this view is *false*.

A similar situation is with the view that the value assessment of a masterpiece, say Van Gogh’s painting, may be based on market value, so at some time it was worth nothing. One must be capable of using one’s unbiased mind and his own eyes to see the real value of the painting.

The next part of the paper centers around the possibility of a two-sorted approach to empirical and psychological data and possible consequence thereof for sociovariabilism and rationalism.

2 Natural and phenomenological attitude

The general aim of this part is to provide a kind of philosophical primer concerning phenomenological methods in philosophy. The best explanation together with broad discussion of some problems can easily be found in the original works of Edmund Husserl, the creator of phenomenology; cf. [5], [6], [7], [8], [9] etc.

Postmodern philosophy widely accepted by many scientists in social sciences, economy, history and, in general, the soft as well as hard sciences, (cf. [3]) originates from a hermeneutical critic of phenomenology given by Martin Heidegger in his *Sein und Zeit* [10].

However, in science and the humanities, only few advocates of the postmodern vision of the world are aware of what the phenomenological method in philosophy is and they are unable to add even one essential point to the discussion between hermeneutics and phenomenology. In my opinion, the discussion is still a subject of current interest and from the historical point of view was the central one and necessary for understanding the emergence of the most important philosophical schools in the last century.

Many philosophers begin their considerations

with methodical doubts. It is strongly recommended to the reader to methodically doubt and even once in a lifetime take into question all his convictions, knowledge, experience, attitudes and ask why I am so convinced they are valid or true.

2.1 Everyday life and scientific attitude as the parts of the natural attitude towards the world and science

The natural attitude is based on the conviction – at first glance the only reasonable one – that we are the real participants of the vanity fair: the real world. I am, as the others are, the real representative of the biological genre *human*, living in biological, social, economic, political and other environments. I know that I am a citizen of the planet Earth moving around the Sun in the Galaxy, a part of the bigger Local Group, etc.

Of course, I am also convinced of many facts concerning my internal, mental qualities. For instance, I like or dislike many things, I remember many past situations as well as knowing that I was born after the Second World War. I am aware that I am writing this paper now and I can see the computer screen in front of me. I know many scientific facts including the fact that mankind is the result of the process of biological evolution and the facts of some theories, e.g. the General Theory of Relativity or Quantum Mechanics. I can feel pain and pleasure, I can see and hear, I can move. There is a real world behind the walls of my room, however it is not possible to see it through them now.

What is wrong with all these? Nothing! However, we know that the classical Newtonian picture of the world is not the only one possible. In the times of Laplace, the picture was considered as infallible and firm. On the other hand, neurophysiology, psychology, inform us that all qualities (colors, sounds, other sensual data) are, “in reality”, some impulses transformed by brain machinery. They are *subjective* qualities rather than *objective*, i.e. sensations and not real qualities of real things. “Things” are not some continuous 3-dimensional bodies anymore, but discrete systems of atoms, particles or “quantum states”.

Many kinds of epistemologies follow from natural attitudes: monistic, naturalistic, psycho-physiological, empiricistic, materialistic,

evolutionary, historicism etc.

One can see that there are good reasons to doubt some of the elements of natural attitude. There is also various historical evidence indicating that almost all data of natural attitude is questionable and debatable.

However, which components of natural attitude are sound, if any?

2.2 Phenomenological (transcendental) attitude

What is a pure phenomenon? Let us notice, that one sees a color of an orange in “first hand testimony” even if there is no orange in reality. It is possible that the orange is an illusion, phantom caused by illness, ghost image etc., but all the same *something is instantly given* as a phenomenon. It is not questionable that some empirical data consciously felt. There is only the question if they are “true”. One can see that something is actually given in eyewitness’ awareness and some other things are merely extra convictions, presuppositions etc.

Phenomenology concentrates only on what is actively given as an actual “direct” phenomenon. For instance, in our example of the vision of the orange, non-actual is the conviction that the orange has an other side which actually is not visible. However, the phenomenon of expectation of the possibility of seeing this hidden side is given as an actual.

The analysis of what is actually given needs great skill and is not easy to perform for novices.

The first “purification” of the given phenomena is to “parenthesize” the non-active components of the given phenomenon. To the scope of operation of “taking into brackets” the non-active components of experience, i.e. so-called *phenomenological reduction* or *epoché*, belong in Husserl’s opinion all *existential presuppositions* concerning the real existence of the experienced objects. One sees not the Sun, i.e. the real star in space, but the phenomenon in which one actively grasps a single object in many sensations (an object is so-called *unity of aperception*).

Phenomenological reduction does not consist in the “suppression” or obliteration of some indirect phenomena. They all remain, but we take into brackets what they suggest.

We also have our scientific image of the world “in brackets”: it is not possible to see photons,

electromagnetic waves or neural impulses. Everybody actively sees only colorful things or colorful dreams, things imagined etc.

Of course, it is possible that, “in reality”, they are composed of waves and particles. However, we simply notice that waves and particles are not any sensual objects, but they touch the active phenomena as second order non-active presuppositions.

On the other hand, science and scientific theories are given to us in many other, very specific phenomena. It is important to note that the scope of the notion of a phenomenon is very wide. It not only contains sensual but also purely intellectual phenomena. For instance, mathematical theories, even strictly formalized, are given mostly in such non-sensual phenomena. Also, it is possible to analyze the kind of phenomena a work of art, a picture, or poem, movie, or opera is given in.

Phenomenology is more than one hundred years old and I suggest to the uninformed reader to turn to the original phenomenological works to see how many situations the phenomenologists have studied.

Early (Husserlian) phenomenology is sometimes considered as “the quest for certainty”, cf. [11]. Correctly speaking, it is rather the method to return to “the paradise lost” of our everyday evidence and experience. This direction of phenomenology becomes noticeable later in philosophical hermeneutics, which transforms the field of purified phenomena previously obtained in phenomenology into the *being-in-the world* structure.

The second factor in the phenomenological area of experience (containing also many non-sensual intellectual phenomena) to be purified by phenomenological reduction is personal consciousness.

The phenomena are not seen by me, you or - in general - any concrete person. Of course, everybody knows that it is he or she, equipped with personal history, a living body, a name etc., that is aware of the experienced phenomena. This however, is part of our everyday attitude and needs parenthesizing.

The personal history of *ego* is not an active part of the experience. As a result, one obtains the pure field of purified and directly grasped phenomena, i.e. so-called *transcendental consciousness*. The only important fact in this field is the opportunity of instant occurrence of

the given phenomena.

In many detailed studies, Husserl explained that phenomenology is not a science of singular, one-time disposable phenomena. It is not by state policy. It follows from the visible character of the pure phenomena: every singular phenomenon is a manifestation of the general essence. For example, in the perception of an orange, it is possible to obtain a general idea of the color "orange" as admitting different moments: the specific brightness, color saturation, the connection of the phenomenal manifestation of it with the spatial extension etc. in one and the same color "orange". The phenomenological essence of the given pure phenomenon is not extracted but is lucidly seen with the "eye of the mind" i.e. it is grasped in transcendental consciousness.

There are also some phenomenological methods such as *ideation* i.e. the imaginary change of some moments of the given phenomenon without the "destruction" of the essence, which make it possible to detect and grasp the essence. (The essence is seen and not only "theoretically conceived" or "thought up".)

Phenomenology can be seen as a trial to separate what exactly is given in a "bodily" immediacy and what is given as merely unclear conviction or prejudice. Phenomenology is conceived as a strict philosophy.

A good question is to what degree natural science is based on purified phenomena? One can obviously consider in what pure phenomena the *ego* is given. As a result, the phenomenological counterparts of "natural" psychology, "natural" logic etc., that is *transcendental psychology*, *transcendental logic* etc. are obtained. In general, however, sciences do not need phenomenology to realize their own goals. It follows from the fact that science is not closed in the field of pure evidence but rather is open for the *interpretation of data*. One can see that science is not the only possible way of valuable cognition.

One can undoubtedly establish that, from the phenomenological point of view, the theories of knowledge creation reducing or neglecting *objective* and overstressing *subjective* mechanisms of scientific change (i.e. economic, social, political) are not true. The economic, psychological or social factors are secondary (it does not mean they are unimportant!) and do not originate in the real and original intellectual conscious experience - the most important factor in knowledge creation.

2.3 Phenomenological concept of intuition

There are two general conceptions of intuition in Western philosophy, cf. [2]. The first group of conceptions considers intuition not as a contrary to rational ability of human being but as the main source and base of scientific and rational knowledge. This attitude is predominant.

The second group, probably closer to Eastern philosophy, treats intuition as a-rational (H. Bergson), sometimes non-rational power of mind or – which makes a big difference – an irrational or even mystical capability. Sometimes the mystical, purely intellectual vision of God or a divine, religious reality is a kind of development of strictly rational intuition grasped as an instant and direct cognition (Plato, Aristotle, Plotin, St. Thomas Aquinas – cf. the notion of *intellectio* in neo-thomist philosophy, St. John of the Cross, etc.).

An intuitive factor of scientific creation has been taken into account recently. The works of Nonaka, Nakamori, Wierzbicki and Motycka are given as examples; for the corresponding bibliography cf. [3].

After the phenomenological reduction is carried out, one obtains the infinite field of pure phenomena experienced instantly. Many properties of experienced objects are seen immediately. There is an evident opposition between what is "seen" and what is "thought up" or invented with the use of the intermediate, indirect means: logical reasoning, argumentation, interpretation, hypotheses, suppositions, suggestions, assumptions, conjectures etc. We say that what is instantly experienced is *given in pure intuition*.

From this point of view also, the results of a revelation, or even hunch, if they are of "unknown origin", are not the parts of pure intellectual intuition. However, every premonition is presented in transcendental consciousness as given in the specific straightforward *acts of consciousness* with the essence different than the acts of, say, revelation and imagination or recollection. We parenthesize only what is suggested by them as real and true.

It does not mean that what is indirect must be false. Nevertheless, one "sees" that what is experienced as such is absolutely different from what is suggested by sociologists, economists, natural epistemologists, empiricists, etc. What they do suggest is mostly arbitrary prejudices.

Phenomenological inquiries are essential for the possible creation of artificial intelligence. In my opinion, without the phenomenological recognition of what exactly consciousness is, it is impossible to know what is – strictly speaking – to be modeled. For instance, without phenomenology probably no one will know that every conscious act is equipped with moments of *protension* and *retention*.

3 Hermeneutics

It is necessary to say in advance that phenomenology gives only a partial answer to the question “what is given in pure intuition?”. However, let us not jump to any conclusions.

3.1 Hermeneutical attitude and hermeneutical phenomena

There are many *external* criticisms of phenomenology. They point out its fundamentalism, abstractness, difficulty and remoteness from everyday life and practice. Many scientists and philosophers (even very famous) are evidently unable to live in the phenomenological attitude and they simply proclaim the impossibility of phenomenology.

The most important, however, is *internal* criticism: to find out some moments in instant experience essential for experience but unattainable with phenomenological methods or even, contradict some phenomenological results.

Internal criticism bore fruit in many different phenomenological schools and, from a different angle, in the rise of philosophical phenomenological hermeneutics and fall in the postmodern vision of the world.

Martin Heidegger has shown the limitations of early phenomenology. Phenomenological *epoché* takes into brackets existential moments of the experience as well as so-called *toolness* of every purely experienced object. For instance, a hammer is, from the phenomenological point of view, “the hammer in a display cabinet”. The reductions deprive this object of its “toolness”, i.e. the field of possible use. But this field is primordial for a hammer. The primary essence of a hammer is its toolness. But, the phenomenological essence of a hammer does not contain the field of possible “applications”. Moreover, from the human point of view, one can

even use a stone or piece of wood as a hammer. The specific toolness is the essence of such objects as “home”, “forest”, “vehicle”.

Heidegger noticed that with the hammer, there is all manner (“the world”) of possible applications of this tool given to us. Other *indirect, non-active* i.e. *horizontal* phenomena indicate the “structure” of a hammer-user i.e. *ego*, consciousness etc. The field of possible use of the hammer is not precisely given in concrete acts of consciousness. The field is also not a result of reflection, consideration, calculation or cogitations. The field is simply *given* without any act of consciousness as a *horizon* determining our experience. Immediately, we are *in* the world.

Heidegger described the fundamental phenomenological situation: the *being-in-the world* as a basis for the constitution of other (also pure) phenomena and creating the base of *fundamental ontology*.

The ontology of the real, historical world is founded in some *hermeneutical phenomena*. For example, what “the existence of the world” consists of and even the “structure” of the world is given to us in our conviction that there is an external world outside the room.

3.2 The concept of the hermeneutical horizon

The analysis of the hermeneutical phenomena is a very difficult task because there is no act of consciousness for which the phenomena are the objects or correlates. It is necessary to analyze such phenomena within the framework of the *hermeneutical horizon*.

The concept of a horizon was already known to Husserl:

“Even if I stop at perception, I still have the full consciousness of the thing, just as I already have it at the first glance when I see it as this thing. In seeing I always “mean” it with all the sides which are in no way given to me, not even in the form of intuitive, anticipatory presentifications. Thus every perception has, “for consciousness”, a *horizon* belonging to its object (i.e., whatever is meant in the perception).” (cf. [13], § 45, p. 157.)

Heideggerian hermeneutics is commonly connected with the humanities. On the other hand, the analysis of the phenomenal pure base for science and, especially for mathematics, shows its source in the *being-in-the world* structure; cf. [13].

In mathematics, there is a possibility to demonstrate exactly the role of phenomenological and hermeneutical phenomena in the creation of mathematical knowledge (cf. [1], chapter 17).

On the other hand, hermeneutical phenomena, especially *toolness*, are of great importance for technology and proper explanation of the creation of technology and analysis of the content of hermeneutical horizon in technology.

I have shown that mathematical knowledge is given in the hermeneutical phenomena, to the essence of which belongs the active acceptance of the existence of the given object, theory, reasoning etc. This *hermeneutical platonism* is a condition *sine qua non* for the creation and understanding of mathematics. This mathematical platonism manifests itself in the strictly determined methods of mathematical enquiry. Platonism is essential in the sense that removal of all platonistic methods makes mathematics impossible.

This creates the first sign of proof for the limitations of the methods of pure phenomenology because it is not possible to “take into brackets” some existential assumptions without the destruction of the given phenomena.

The second follows from the analysis of mathematical practice of working mathematicians of the past.

Let us take one more example: the intuitive notion of a polyhedron. The history of the notion is described by Imre Lakatos in his famous *Proofs and Refutations* [4]. Brilliant and famous mathematicians tried to define the concept of a polyhedron for about two hundred years and every definition was wrong or incomplete, as each had some *intuitive counterexamples*. It is necessary to mention intuitive counterexamples because they were created beyond any definition. All these indicate that there are some *intuitive concepts* given in the corresponding hermeneutical phenomena and it is simply impossible to analyse such concepts *only* within the frames of the purely phenomenologically conceived phenomena. They are created and analyzed in a kind of tough objective intuitive environment.

One can observe that the intuitive environment is previously *given, present* and has some implicit, i.e. presupposed, content and qualities that *precede* any kind of possible construction or decision.

It is possible to reconstruct such actively felt

and grasped qualities because they manifest themselves as hidden assumptions, tacit knowledge, prejudices, etc. It is because of their implicit character that they are *intuitive*. They absolutely determine every informal step in intuitive mathematical reasoning, which means they are *active*. When they “disclose themselves” during the creation of mathematical knowledge, the working mathematician feels that something is *evident*, and sometimes, *apodictically evident* – “it cannot be any other way”.

Thus, it is possible and reasonable to reconstruct *what* is assumed intuitively, i.e., as a tacit or a hidden assumption within the informal holes invariably present during the creation of “all mathematics”, be it formal or informal. Let us call this process the *reconstruction of the hermeneutical horizon*.

The reconstruction of the hermeneutical horizon is possible both for different mathematical theories in the same historical epoch and for different epochs; the reconstruction of the horizon of ancient mathematics, for example, needs a purely historical apparatus – that is, it should be based on historical sources. Sometimes, however, the reconstruction needs new mathematical methods and theories. The idea of the construction of formal languages can be seen as part of such reconstruction, for formal languages were originally created to bring under explicit control the means and methods used by mathematicians and to eliminate hidden assumptions.

3.3 Historical changeability of concepts

The reconstruction of the hermeneutical horizon shows that the meanings of the concepts – even in mathematics – are not unchanged and unchangeable. This is because of the hidden (active and passive) horizontal determinants of the meaning. Every meaning has “two sides”: one side consists of explicitly described elements; the other is the implicit way of understanding these elements, determined by some rational conditions, suitable for rational explanation. Examples are given in [1], chapter 17. It is possible, then, to operate with original sense of a concept after the reconstruction and this sense stays “the same” during the study because of the described platonism connected with rational intuition. So, the sense is, in a word, *ideal*, and it is this ideal sense that evolves.

The intuitive analysis of concepts is not connected only with mathematical concepts; in the hermeneutical horizon one can analyse almost every concept such as truth, art, work of art, or beauty, as well as some fuzzy concepts, e.g., forest, bald, etc. It is mandatory to reconstruct the necessary part of the hermeneutical horizon in which these concepts are understood and from which they receive their meaning for each of them.

The emergence of different notions of truth is connected with the difficulties with the classical notion. Classical theory describes truth as a propositional truth only and relies on the comparison of the content of assertion with the objective state of things. However, every formulation of a true proposition is derivative and based on the previous non-sentential recognition of the state. Propositions are not the only “places” where the truth lives. In the hermeneutical horizon, something is evident, obvious, and true in a non-propositional way. The emergence of different notions of truth belongs to the analysis of the intuitive concept of truth.

Changes in science are caused not only by social, economic, political, and psychological factors. If they were, and if “anything goes”, we could change our intuitive notion of a polyhedron by political decision or “decide” that there are six regular polyhedra in 3-dimensional standard Euclidean space. “Anything goes” only within the framework of the hermeneutical horizon. Most important for the change of science is the objective “common ground” of the horizon; cf. [1], chapter 17 and the notion of the horizontal change. For this reason, it is absolutely necessary to distinguish primary and secondary levels in theories of knowledge creation. Not everything is on the same level and of equal importance.

For the proper understanding of the concept of the hermeneutical horizon, it is necessary to know that the horizon is a field of pure phenomena enriched with the necessary hermeneutical and ontological phenomena and, as such, the horizon is part of the wider *being-in-the world* structure

Thus, the horizon is not a psychological or subjective structure, it is ontological and objective, although evolving historically and given in hermeneutical phenomena. The explanation of the mode of existence of the horizon is deeply connected with the mode of existence of a human being and as such is connected with *being-in-the world*.

4 Conclusions

From the hermeneutical and phenomenological points of view science is not just “a human made fabric” – a conglomerate of random opinions interwoven into the frames of social, historical, political and economic factors. These factors are secondary. The “hermeneutical and phenomenological point of view” means that the socio-economic factors are not source-based in the pure phenomena. And nothing more. Now then, the question arises: what, if any, is the real base for maintaining such views?

On the other hand, one can reconstruct the content of the horizontal structure “behind” the socio-economic perspective and to recognize the natural attitude as its point of departure. But even as a starting point it is artificially deformed by arbitrary prejudices. Scientific *consensus communis* should and can be based on the rational base.

“Knowledge is satisfactory in itself” (an old truth of *zen*) – and this reveals the real essence of science and knowledge as truly independent from external influence. However, there is a possibility to use knowledge for any other kind of reasonable satisfaction and purpose or to try motivating scientists “externally” to work in the given field.

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References

- [1]. Creative Environments: Issues for Creativity Support for the Knowledge Civilization Age. A. P. Wierzbicki, Y. Nakamori eds. Chapter 17, pp. 415-442, Springer Verlag, Berlin-Heidelberg, 2007. (Chapter 17, Król Z. The Emergence of New Concepts in Science. Pp. 415-442.)
- [2]. Król Z. *Intuition and History: Change and the Growth of Mathematical Knowledge*. International Journal for Knowledge and

- Systems Science, Japan Advanced Institute of Science and Technology (JAIST), Japan Vol. 2(3):22-32, 2005.
- [3]. Wierzbicki A. P., Nakamori Y. Creative space: models of creative processes for the knowledge civilization age. Springer Verlag, Berlin-Heidelberg, 2006.
- [4]. Lakatos I. Proofs and Refutations. The Logic of Mathematical Discovery. Worrall J., Zahar E. eds. Cambridge University Press, Cambridge, London, New York, Melbourne, 1976.
- [5]. Husserl E. Philosophie als strenge Wissenschaft. Logos 1. Tübingen, 1910-11: 289-341. [Philosophy as Rigorous Science. Translated by Lauer Q. In: Husserl: Shorter Works. McCormick P. and Elliston F. A. eds. Notre Dame. University of Notre Dame Press 1981, pp. 166-97.
- [6]. Husserl E. Ideen zu einer reinen Phänomenologie und phänomenologischen Philosophie. Erstes Buch: Allgemeine Einführung in die reine Phänomenologie 1. Halbband: Text der 1.-3. Auflage - Nachdruck. Edited by Schuhmann K. The Hague, Netherlands. Martinus Nijhoff 1977. [Ideas Pertaining to a Pure Phenomenology and to a Phenomenological Philosophy, First Book: General Introduction to a Pure Phenomenology. Translated by Kersten F. In: Husserl E. Collected Works: Volume 2. The Hague, Netherlands, Martinus Nijhoff 1982.]
- [7]. Husserl E. Phenomenological Psychology. Translated by Scanlon J. The Hague, Netherlands: Martinus Nijhoff, 1977.
- [8]. Husserl E. Cartesianische Meditationen und Pariser Vorträge. [Cartesian meditations and the Paris lectures.] Edited by S. Strasser. The Hague, Netherlands: Martinus Nijhoff 1973.
- [9]. Husserl E. Logische Untersuchungen. Erster Band: Prolegomena zur reinen Logik. Zweiter Band: Untersuchungen zur Phänomenologie und Theorie der Erkenntnis, I. Teil. Vierte Auflage (unveränderter Abdruck der 2. umgearbeiteten Auflage). Halle a.d.S.: Max Niemeyer 1928.
- [10]. Heidegger M. Sein und Zeit. (1927). Elfte unveränderte Auflage Max Niemeyer Verlag, Tübingen 1967.
- [11]. Kołakowski L. Husserl i poszukiwanie pewności. Polish translation by Marciszuk P. Aletheia, Warsaw 1990.
- [12]. Husserl E. The Crisis of European Sciences and the Transcendental Phenomenology. Translated by Carr D. Northwestern University Press, Evanston 1970.
- [13]. Król Z. Plato and the foundations of modern mathematics. The concept of number in Plato. (in Polish) Wydawnictwo Rolewski, Nowa Wieś 2005.