

CARTOGRAPHICAL SIMBOLIC

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Abstract

The terms 'sign' and 'symbol' are often used as synonyms at the Cartography literature. There is exposed the difference between them and it is indicated that the sign is more general term but the symbol is a kind of sign. The symbol is a permanently connected in the consciousness of many people by the marked object. In view of this, its meaning is known beforehand, thereby to execute its function over/upon the map, even though it is not explained in the legend. Shown are several kinds of symbols. The meanings of the "subconscious" symbols are based on the ability of the symbol to absolutely direct the attention toward its object which is a result of predetermined similarities of the characteristics. Absolute symbols are rooted from the culture, concepts and beliefs of the people. Traditional symbols at the cartography are signs, which establish recognition for designation of determined objects. There are shown the priorities at the time of the use of the different symbols during the identification of the signs and understanding of their meaning.

1. INTRODUCTION

In the classical Cartographic, theory is considered that the meaning of the signs evolves from the legend, which describes it thoroughly. However, the practical usage of the maps denies that thesis: more often, there are appearing maps without a legend, as well, as maps which a geographical content is not described in the legend but they perform precisely their purpose. There are so many examples, especially in the Internet.

Even though all of the used symbols of the map are described in the legend, the fact is that the particular readers do not read the map equally, because the signs of the map only activate the creation of particular imaginary models, which are formulated on base of the previous skills and knowledge. We see by eyes but we understand and interpret the signs by our brain. It can be obtained individual information of the objects (a size, a location, a characteristic) which is not contained in the legend, by using the signs of the map. Consequently, besides the legend, the map has other sources of the signs' meaning.

The meaning of the signs we apprehend as *a sheaf of possible attributes of the sign*. Its meaning is to the sign as the adjective is to the noun. In a specific communicative situation in which the sign belongs to the map, it is arising. That is why, it is not brought to the type of the illustrated object, but we consider *three components of the meaning of the cartographic sign*: *sense* (a particular object of the reality, which the sign illustrates), *value* (correlations with the rest of the signs of the map – closeness, one-many etc.) and *characteristics* (individual characteristics of the object, which the sign delivers or they are coded within the sign). We can describe only part of the defined meaning of the sign in the legend – sign' meaning by general, abstract concepts.

We discuss four sources of the meaning of the cartographic signs: a) from the *cartographic symbolic*; b) from the *internal components* of the map, as such as a title and a legend; c) from the *functioning of the sign* in the field of the map – the connections, which the sign establishes with the rest of the signs; d) from *cartographic rules and the experience* of the map' reader. We are going to talk about the first of the fourth of the sources of the signs' meaning in Cartography – *the cartographic symbolic*.

2. UNDERSTANDING OF THE TERM "SYMBOL"

The word 'symbol' (σύμβολον) has a Greek origin. It means literally "throw together" but very often, it is used to designate a *deal* or an *agreement*. "In Greek, a watch-fire is a 'symbol', that is, a signal agreed upon; a standard or ensign is a 'symbol', a watch-word is a 'symbol', a badge is a 'symbol'; a church creed is called a symbol, because it serves as a badge or shibboleth; a theatre-ticket is called a 'symbol'; any ticket or check entitling one to receive

anything is a 'symbol'. Moreover, any expression of sentiment was called a 'symbol'. Such were the principal meanings of the word in the original language." (Peirce 1897, CP 2.298)

There is often placed a sign of an equation between the terms 'a sign' and 'a symbol'. Is it correct? Generally, three methods in the correlation 'a sign - a symbol' can be differentiated:

2.1 Sign = Symbol

Thesis that 'sign' and 'symbol' are synonyms, it comes from the daily usage of those words. For instance in *Oxford Student's Dictionary of Current English*, the **sign** is described as "mark, object, symbol etc used to represent something" and the explanation of the **symbol** is: "sign, mark, object etc used to represent something".

2.2 The symbol is a kind of a sign

The sign is a general concept of the symbol: "A sign, ... is something which stands to somebody for something in some respect or capacity." (Peirce 1897, CP 2.228). "A Symbol is a sign which refers to the Object that it denotes by virtue of a law, usually an association of general ideas, which operates to cause the Symbol to be interpreted as referring to that Object" (Peirce 1903, EP 2.292). The symbol is permanently connected with its represented object by *the law, a conditional agreement* between people or practice, which is traditionally established within a particular society or culture. "A symbol is a sign which would lose the character which renders it a sign if there were no interpretant" (Peirce 1897, CP 2.304). In view of the fact, that between the symbol and the object there is not neither physical nor a logical connection so if we remove the meaning of the sign (designant), the sign itself stops operating.

2.3 Sign ≠ Symbol

The symbol and the sign are distinguished in general essential features. "The symbol is something more than a simple sign: It is spread out of the meaning, it is a product of the interpretation." (Chevalier and Gheerbrant 1991, p. 14). According to the authors, **the signs** are "a method of the communication, ... which play the role of a mirror and they do not go out of the boundaries of the performance; ... a random conventionality, which alienates one from the other, the designated and the marked" (1991, p.14).

From the three methods of approaches mentioned above, we accept the Peirce's thesis, that **the symbol is a type of a sign**, because the symbols as the other signs substitute their objects in some correlation. The difference is in the permanently established meaning of the symbol. The meaning between the scientific terms 'a sign' and 'a symbol' and the words from the daily speech 'a sign' and 'a symbol' in many languages is different. The symbols have their own specificity, which differentiates them as an individual type of signs.

3. CHARACTERISTICS OF THE SYMBOLS AS SIGNS

The symbols are a specific type of signs because of their steady connection with the illustrated objects by them within time goes by. That connection raises a set of characteristics of the symbol, some of them we are going to discuss further below:

1. The symbol exceeds **the bounds of the common sense**, because it acts on the subconscious level.
2. The symbols have always **many dimensions**. There are stratified additional meanings and thoughts into them, because of their prolonged usage. They do not come consecutively in the reader's consciousness but 'simultaneously'. Therefore, the full meaning of the symbol cannot be described by few words in the legend.
3. The signs are *understood* but the symbols are **interpreted**. The meaning of the symbol is formed on the base of the ideas, knowledge, and conceptions of the one's interpretation. Therefore, its meaning is different in details with the particular people (a connotative component of the meaning) but its general meaning is retained (a denotative component).
4. As a result of the interpretation, **the marked one is more completed than the designated one**. "The symbol is connected to the general experience. We cannot sense its value if we do not jump over imaginarily into the general surrounding where it is truly lives." (Chevalier and Gheerbrant 1991, p. 23).

5. The symbols have always **a reason**. C.G. Jung calls it *an essential similarity*. There is always a prime cause more or less significant to be converted one sign in a real symbol. The sea is connected to the blue color, and the forest to the green, because of their own color. The cross is a symbol of the Christianity because of the Christ's crucifixion over it. The book is a symbol of knowledge, because it consists of information.

6. "The one, who notices the symbolic connection, she/he appears to be in a condition of **the center in the universe**. The symbol exists only for someone or a community, which members are identified into some aspect to be able to build one unique center. That is way **the most holy symbols for ones are vile object for the others**, which shows the tremendous variety of conceptions ... the symbol exists in a connection with that center." (Chevalier and Gheerbrant 1991, p. 23).

7. **The meaning of the symbol is general**; it does not mean a specific object but an abstract conception. According to Pearce, the meaning of the symbol has an independent existence. Having the Platoon's ideas, he considers the symbol as a matter of common knowledge. In every specific case, the used symbol is a remark or actualization of the public symbol. Therefore, *Pearce considers the symbol as a law or regularity*¹; it is created in a society of the traditional meaning of the symbol.

4. THE SYMBOLS IN THE CARTOGRAPHY

The cartographic symbols are graphical signs, connected permanently with the illustrated by them in the consciousness of the large number of people. During their functioning on the map, they are apprehended easily and quickly, because they are previously known and they have the ability, unconditionally by association to orientate the reader's mind toward its objects or toward their characteristics.

4.1. Types of symbols in Cartography

A sign to be transformed into a symbol i.e. its usage to become steady, there is a need of **a reason**. Depending on that what is the thing that transforms a sign into a symbol, we are discussing three varieties of the cartographic symbolic: *a subconscious symbolic, a traditional cartographic symbolic and an obligatory cartographic symbolic*.

4.1.1 The subconscious symbolism

The subconscious symbolism is originated from the cultural, religious, communities etc. *concepts, beliefs, illustrations which are got into the life*. Every symbol used in the society, which is illustrated in the map, belongs to that group. The symbols, which come from that type of symbolic we are going to call **real symbols**. They have *the abilities to associate themselves with specific objects, subconsciously*. During the sign's recognition over the map, its symbolic meaning appears in our consciousness, and as George Berkley says, "it is not in our power to keep aside one thing without excluding the other thing".

The subconscious symbolism has a steadier component, evolving from psychophysics characteristics of the human being's apprehension, and another one, freer, evolving from the surrounding.

The apprehension of the subconscious symbolism at first sight is relatively simple. To have illustrated a church by a cross or a mosque by a crescent is so natural that very few people will not understand the symbolic. In that case, the difficulties come from the possible ambiguous interpretation. For instance, the pentagram (figure 1) is one of the oldest symbols, used since the prehistoric man. For the druids it is a symbol of the God, for the Jews – the Pentateuch, but during the Christian Middle Ages, it is recognized as "a devil cross". In the ancient Babylon, it was a sign of the happy return home and it was worn as an amulet. Among others nations it kept away from demons and it was adopted as a symbol of the security (Koch 1930, p. 14). At the same time the pentacle star was one of the symbols of the Communism (in red color), but it is used by the American army (in blue). Therefore, in one side it is necessary the symbolic to be well known, before the symbols are used, in the other side, they need to act upon the reader, it demands some knowledge from him/her. The ambiguity of some of the symbols makes them very dangerous for usage. In the example with the pentagram, it is not felicitous to be used at the politics or religious context but it must be used its traditional cartographic symbolic, to illustrate countries' capital cities (figure 2).



Figure 1

4.1.2 Traditional cartographic symbols

¹ "A symbol is called a sign, which representative character is consisted of that so it is appeared correctly, which determines its imaginary model in the human being's head" (Pearce 1897)

Illustrations on the maps are frequently met; they are established through the years. There is not an internal connection between them and the illustrated objects, because they do not possess the ability to direct presumptively toward the object or its characteristic. They are often used at a particular context of the different maps, from where the steady connection with the illustrated object by them in days gone by. That category of signs attains its symbolic meaning only over the map. Out of it as graphical signs, they are not symbols of the society or they have other meaning. If their meaning on and out of the map is covered so they can be real symbols.



Figure 2

Figure 2 shows a map, which can be read without a legend. In the original, the hydrographic objects are in blue color, the artifacts (cities, boundaries) are in black etc. It is easily to recognize the Balkan countries.. Even though, a sign is not clear enough it can be defined. For instance, as we know that Sofia is the capital city of Bulgaria, we can without hesitation to show, which the capital cities of the rest of the countries in the region are, as a star illustrates them as well. It considers only people with some knowledge. The beginners that work with a map, most likely they would have some difficulties.

The traditional symbols continuously bear and die. They are born, when signs begin to be used in a specific context, and they illustrate a specific type of objects. They die if they are not in use in that sense. Before a traditional symbol becomes such, *every symbol has been an index, an icon or a no motivated sign* (look down). If it was, an index or an icon it has saved its specific connection with its object. However, if there is a subconscious symbolism, its meaning is obliterated at the expense of the attained of the map a traditional meaning.

4.2 The statutory cartographic symbols

The meaning of those symbols is normatively established. A typical example for statutory symbols is the topographic maps. There the sign system is regulated and it is strongly defined in the tables with the arbitrary signs and at the instructions of their creations. It is not changed during the decades, which allows the topographic maps to be read without an illustrated legend.

The statutory symbols in contrast to the traditional ones can be changed quickly because they are created by normative acts. Their outward type cannot be changed. The subconscious and traditional symbols can have a different kind (within limits) but they can keep their meaning. If the sign of the statutory symbol is changed even a little bit it stops being such one. At the best, it can transform itself into a traditional cartographic symbol.

4.3 Bearers of cartographic symbolic

Which are the bearers of the symbolic in Cartography? We discuss four levels in the structure of the signs in Cartography: on the lowest level are *the graphical primitives*, which represent the smallest graphical units that can be bearers of meaning by its *visual variables*. The primitives, the meaning of which (to illustrate abstract concepts) appears in *the legend*, construct *the graphical signs*. In the field of the map, one or several graphical signs assemble one *cartographic sign*, that thankful to its location illustrates a *specific object* of the reality. The reader unites imaginarily the cartographic sign of the higher level – *supersigns* – with the purpose of obtaining information of the objects of the reality by researching of their models of the map. Bearers of the cartographic symbolic are first two levels in the structure of the sign: *the visual and spatial variables of the graphical primitives and the outward type of the graphical signs*.

4.2.1 A symbolic of the visual variables

According to the *Bertin's* (1967) influential theory, *the signs have six visual variables*, which determine their outward type. Those are *size, value, texture, color, orientation and shape*. We apprehend them as *variables of the graphical primitives* not of the sign because one sign can contain some components with different visual variables. Each of those variables is loaded with a specific symbolic. Even when we do not apprehend it by our brain, the symbolic takes affect on a subconscious level.

▪ **A color**

The colors are loaded with a symbolic, affected by the cultural, religious, communities etc, concepts. It is distinguished in the different parts of the world. (Table 1)

Outside of the subconscious symbolism of the color, there is a traditional cartographic symbolism. Usually, we designate the rivers in blue, the vegetation in green and the relief – in brown. Artifacts are in black color.

A country	red	blue	green	yellow	white
USA, Europe	Jeopardy	peace, manhood, power	security, reliability, apathy	attention, timidity	cleanness
France	Landed aristocracy, nobility	freedom, peace	criminality	Preliminary actions	neutrality
Russia	Error, stopping, aggression, passion, fire	stability, harmony, confidence, manhood	inexperience, youth, novice, fertility, nature,	optimism, risk, warning, hazard	simplicity, accuracy, sterility, innocence
Egypt, Arabic countries	death	virtue, justice, faith, confidence	fertility, health	happiness, contentment, life	merriment
India	life, creation		charity, fertility	success	deaths, cleanness
Japan	anger, hazard	Shame, contempt	energy, youth, future	dignity, landed aristocracy, childhood	death
China	happiness, joy, merriment	climate, sky, cloud	honor, dignity	wealth, birth, force, power	death, cleanness

Table 1. Symbolic of the color around the world

The colors have a direct influence over the human being’s nerve system. The cold colors (green, blue) tranquilize and decrease the stress, and the warm colors (yellow, red) they lead to increase of the activity and the efficiency.

▪ **A shape**

The symbolic of such forms as a cross or a crescent is clear that is why it is not going to be discussed. However, even the simple geometrical forms as a circle, a square, a rectangle a rhomb etc. have its own symbolic. A circle, for example symbolizes a motion, perfection, eternity, a divine beginning. A square, symbolizes earth, narrow, it is an anti-dynamic form; when it lies on its base it carries a message of a stability and balance. Two concentric squares carry a message of an order. The trapezium symbolizes failure, suspended motion, and unbalance. The rhomb is definitely a female symbol.

▪ **Orientation**

The guidance of the signs or their parts in a definite direction has always carried a specific message. The directions up and down are connected to the creator, who is in the sky and to the death, and the underground kingdom of the dead. In our valuable system, the motion up (rising) is connected to the progress, to the work and it is considered as a positive, and the motion down (fail) is a scar of a regress, decline, decrease of something and it is considered as negative.



Figure 3. Orientation of some topographical signs

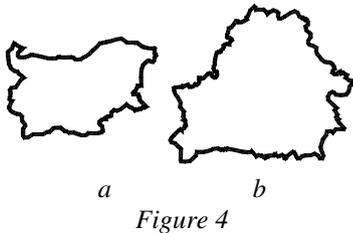
Almost everywhere around the world (excluding the Far East), **the right is a positive side**, and it is related to the male, an active beginning; of the day and divine. **The left side is negative** and it is related to the female, passive, the night and devil. Therefore, the graphic primitives of the signs must be orientated on the right when we want to express a positive attitude toward the illustrated object (figure 3).

Even the turn of the simple geometric figures can change the message. The square, when it lays on one of its faces, it loses the message of the balance. The triangle is stepped on its base, it symbolizes the female beginning, if it is stood on its apex – the male beginning.

▪ Value

The traditional cartographic symbolic “decrees”: the more the darker. The more important objects are illustrated by a bigger graphical weight and the presence of the quantitative characteristics follows to be illustrated by darker color. A good example for that is the coloring of the zones between the isolines for the illustration of the depth of the water reservoirs.

4.2.2 Spatial variables of the graphical primitives



The graphical primitives possess one more system of variables - *spatial variables*, which describe their specific form or indicate their location within the boundaries of the graphical sign. Exactly the curves of the contours of the primitives are the bearers of the symbolic meaning. For instance, on figure 4a, each Bulgarian can recognize the contour of Bulgaria. However, most of the foreigners can have difficulties as well as the Bulgarians cannot recognize the outlines of Belarus, on figure 4b.

4.2.2 A symbolic of the graphical sign

The symbolic of the graphical primitives is rather subconscious. The meaning of the graphical signs must be understood on the conscious level. We are going to discuss two types of a symbolic of the graphical signs:

- **Pictograms** – symbols, which are approved by the society, they carry a symbolic meaning when they are used over the map. They show general concepts and they can be used for an illustration of different objects.
- **Emblems** – they can only illustrate an exact defined object or a group of objects, because they are created specially for them. For instance, on an advertising map, its emblem can illustrate the branches of a bank.

The graphical signs have two sources of meaning: from the legend and from their symbolic. When there is a conflict between the two sources, the legend has a bigger weight. However, when the symbols are used out of the context of their established meaning, they trouble the reading of the map greatly, because the reader must get over his original tendency to connect the symbol with the steadily marked by it and then to understand its conditional meaning, described in the legend.

5. CLASSIFICATION OF THE SYMBOLS AMONG THE REST OF THE SIGNS

Pearce classifies the signs depending on their connection with the illustrated by them object of an icon, an index and a symbol. *The icon*, according to him, has an outward similarity with its object. *The index*, illustrates through a logical reason – a consequent connection with its object, thankful to which the index orientates the thought toward itself. *The symbol* is a steadily connected to its illustrated object by a law, a conditional agreement between the people or a practice, which is established traditionally within a particular society or culture.

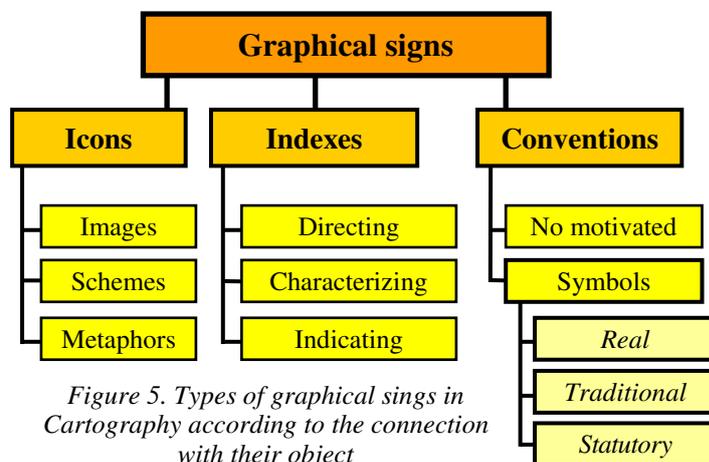


Figure 5. Types of graphical signs in Cartography according to the connection with their object

Pearce subdivides the icon signs into *images* (between the sign and the object has an analogical relations between their own parts), *schemes* (the sign represents the object by the parallelism correlation) and *metaphors* (the connection is realized by the transfer of the object over the sign of the specific indications, common for them). That subdivision of the icon signs can be applied successfully in Cartography.

The index signs in Cartography, we divide of *directing* (when a human being sees a sign, his mind is orientating not toward the illustration of the sign but toward other object, which is a logical connected with the first one); *characterizing* (letterings of a quantitative and qualitative characteristics); *indicating* (letterings of geographical names).

As a third group of signs, we go into the *conventional signs*. We called them as that because their meaning is a result of an agreement between people. The agreement can be steady and then the conventional signs are *symbols* or only for a specific map. In the second case, the meaning of the graphical sign evolves from the legend of the map. Between the sign and its object, there is not any other connection. In the view of the fact, that there is a devoid of foundation of illustration, we call that type of signs *no motivated*.

The symbols, as it was mentioned above, we divide in *subconscious*, *traditional* and *statutory*.

6. ADVANTAGE IN USAGE OF THE SYMBOLS OF THE MAP

The symbols are familiar to the reader. From here, follow some different priorities.

6.1 The symbols are recognized by a quick process 'from the top down-wards'.

The contemporary theories of the method of the apprehension, assume that the human being uses two different processes at the specific situations. When there is not any idea what kind of image to expect she/he uses the process 'from the top down-wards' where first, we can differentiate the bright and dark places, areas with related colors and added details consistently until the object is recognized. When is possible to be made a reasonable assumption about the seen, she/he uses the process 'from the top down-wards' where on the base of some key characteristics the assumption can be verify. The second process is many times quicker than the first one. (Roediger et al 1991)

Since the symbols are familiar, they act in the conscious of their apprehended reader, the process of the recognition 'from the top down-wards', in view of that, the period of their apprehension is shorter than the time needed for the unfamiliar signs.

6.2 The meaning of the symbol is apprehended more reliably

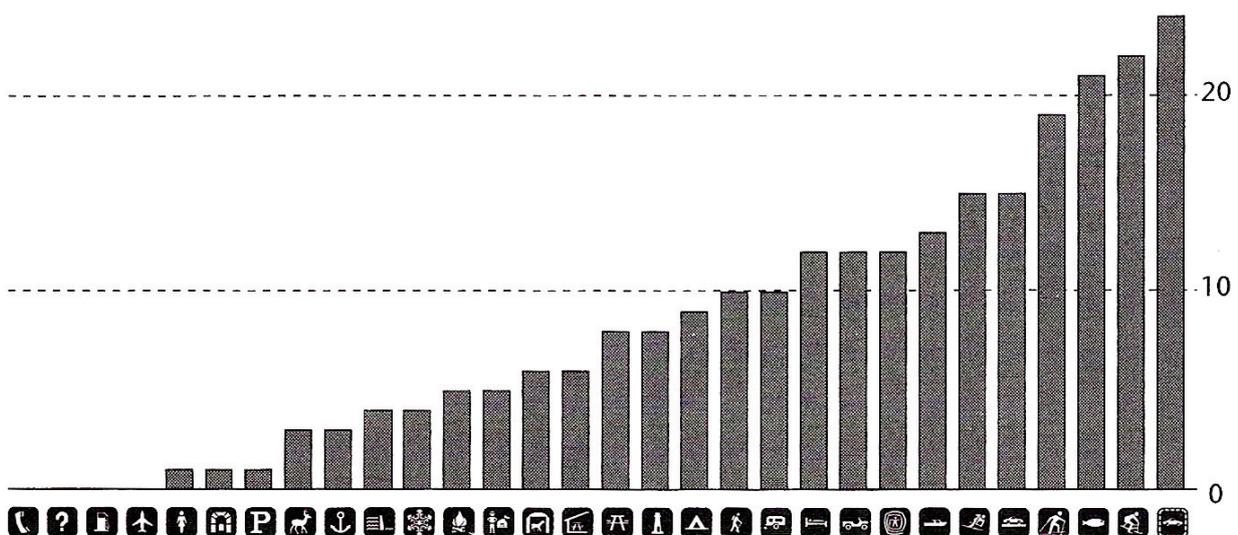


Figure 6. Number of identifications errors of different types of signs (MacEachren 1995, p. 129)

The sign-vehicle and its meaning are associated steadily, when they appear always together. Afterward, it is not necessary that the meaning of the symbol has to be understood-it appears automatically in our conscious by the

recognition of the sign-vehicle. That relieves largely the reading of the map and decreases the possibility of errors during the apprehension of the signs' meaning.

G. Johnson made the following experiment: He showed a composition of pictograms to the testing group of people. He researched the identification of the signs in two cases: when the signs are accompanied by a legend and when they are not. He read the amount of the mistaken identifications of the signs. (MacEachren 1995, p. 129, 130) from figure 6, it can be detected that very often the used signs (on the left) can always be recognized practically.

6.3 More attention is paid to the symbols

A *very quick analyzer* on a low level works in the sensuous memory, which assesses the importance of the message. Its work does not depend on the conscious and the action that it is occupied at that time. If it 'catches' something important, it either concentrates its attention toward it or keeps it in the longtime memory without occupying the conscious with it. (Hothersall 1985, p. 188).

This analyzer explains how we identify known things quickly than unknown things. This leads to more quickly and more certainly identifying of symbols than other signs.

6.4. The meaning of the symbols is evoked in the memory quickly

In 1956 G. Miller published an article, titled '*The magical number 7 plus-minus 2*', which is considered as very influential even today (Hothersall 1985, p. 188). The conception of the author is that a human being can memorize in his *brief memory* seven units, whether they are digits, words or signs. The particular individuals have a different capacity of a brief memory – from 5 to 9 units. That is why, we memorize a 6 digit telephone number considerably easy, when very few of us can memorize by one hearing a 9 digit number. When the memory is overfilled, the earlier received unit is discarded.

That theory allows preparing one analogy with the cartographic signs. The reader of the map can operate by 7 signs in his working memory. If there is necessary to work with a bigger amount, she/he must discard from his brief memory part of them. When the discarded sign is met again it needs to get a meaning. When it is a familiar one, the meaning is "taking" from the long-time memory. If the sign is not familiar to the reader, she/he needs to make inquire about it in the legend.

6.5. The symbols are evoked in the memory more quickly

In 1972, **E. Tulving** offered a conception, according to which *the long-time memory* has two branches: *a memory for episodes and a semantic memory*. Within the first one, personal experiences are preserved in some chronological order. The semantic memory serves for a preservation of conceptions and ideas in a hierarchical structure of nets of a set of levels. On the lowest level, the ideas about some particular things are preserved, and on the higher levels – more and more abstract conceptions. It is necessary either the stimuli to be enough powerful to be repeated many times, if the information is going to be transferred from a brief memory to a long-time memory. The information from a brief memory to a long-term memory is transferred easily within the memory of the episodes. Therefore, when the semantic information is connected with particular experiences or memories it can be memorized more easily, and then quickly, and effectively it can be found and reconstructed within the brief memory. The symbols are connected to the personal memories largely than to the rest of the signs.

The above mentioned and so many other priorities of the symbols, allow to draw a conclusion, that the usage of the symbols in Cartography leads to quick and effective apprehension and easier work with them. The maps, which use the symbolic illustrations, can be read quickly than those that have a specific sign system.

7. DEFECTS DURING THE USAGE OF THE SYMBOL

7.1. The symbols must be well known before their usage

A negative effect may be appears when the symbols are used improperly. Over an administrative map of Sofia, a black flag illustrates the buildings of the taxation offices. Therefore, the black flag is a pirates' attribute, the reader can make an association between the taxes and the robbery.

7.2 The symbols are read slowly if they are used in other context

When signs, having a symbolic meaning are used in different context, it is appeared some difficulties during the identification. As an illustration of the mentioning above, we can show the Stroop's (1935) effect: there is a word on a piece of paper; its meaning does not respond to the color that the written word. For instance, the word "yellow" is written in blue color. The examined person is instructed to report the color of the presented word, as the meaning of the word is ignored. If the meaning and the color of the word are different, usually, the examined person has difficulties to answer. In that case, two conflicted reactions have an action: one from the color of the word, and the other – from its meaning. Obviously, a human being is able to recognize more information than she/he desires consciously (the examined persons are instructed to ignore the meaning of the word and to concentrate themselves only over its color).

8. CONCLUSION

One of the fourth sources of the meaning of the signs – the cartographic symbolic has been discussed on the paper. The symbols are a type of signs, which have their own specific and because of this the reader of the map can apprehend them easily, quickly, affectively. Therefore, when the maps are created, particularly to the readers with less experience, it must be used symbols, bearers of their own symbolism, which is apprehended by the society and understandable for them. However, when maps are created for a specific groups of users, who have an experience with the work in a particular sign system, it must be used the traditional symbolism of the signs.

An especially attention must be paid during the designing of the sign systems of the cases, when the proper meaning of the graphical signs goes into contrast to their meaning, described in the legend. Then either the reader does not read carefully the legend, because she/he considers that she/he is very well acquainted with the meaning of the sign, or his apprehension is delayed, because she/he needs to get over his familiar symbolic meaning, and then to apprehend its meaning from the legend. We need to take into consideration the nationals, ages, educational differences in the understanding of the symbols during the usage of the symbolism in Cartography.

References:

- Bertin, J. 1967.** *Semiology of Graphics: Diagrams, Networks, Maps*. Madison: University of Wisconsin Press, 1981.
- Chevalier, Jean and Alain Gheerbrant 1991.** *Dictionnaire des Symboles*, 1991 Editions Robert Laffont S. A. et Editions Juppier, Paris.
- Hothersall, D. 1985.** *Psychology*. Columbus, OH: Charles E. Publishing Co, 1985.
- Koch, Rudolf 1930.** *The Book of Signs*. First Edition Club, London, 1930.
- MacEachren, Alan M. 1995.** *How maps work: Representation, Visualization and Design*. New York, London: The Guilford Press, 2004.
- Peirce, Charles Sanders 1897.** *Collected Papers*. 8 volumes, vols. 1-6, eds. Charles Hartshorne and Paul Weiss, vols. 7-8, ed. Arthur W. Burks. Cambridge, Mass.: Harvard University Press, 1931-1958.
- Peirce, Charles Sanders 1903.** *The Essential Peirce. Selected Philosophical Writings*. Vol. 1 (1867-1893), edited by Nathan Houser & Christian Kloesel, 1992, vol. 2 (1893-1913), edited by the Peirce Edition Project, Bloomington and Indianapolis: Indiana University Press, 1998.
- Roediger, H. L. et al. 1991.** *Psychology* (III изд.). New York: Harper Collins Publishers. (Roediger, H.L. Capaldi, E.D., Paris, S.G. and Polivy, J.)



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