PERCEPTION AND REPRESENTATION AS LIMITS OF KNOWLEDGE

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Abstract:

The problem of perception is fundamental for a general epistemology. In the history of philosophy every analysis of the possibilities of knowledge had a foundation in the problem of reality perception. Even today this problem is still recent and unsolvable. The modern anatomy and psychology give a new vision of this problem, but it is not enough. In relation with the traditional epistemology and modern science, we try to explain the limits of perceptive realism, and how it is possible to construct a unitary vision of reality.

Keywords: *visual, perception, knowledge, Gestalt, holism, imaginary*

Due to the relationship we have with the environment, for which we will use the concept of media[1] in the future, the perceptual image and the primary representation of the world are built. As the conscious information, taken from the im-mediate is in a considerable percentage (80%) of visual nature, the way in which sight works fundamentally influence our cognitive structure and the way we integrate all the information. The question in these circumstances can be regarded as one of the fundamental problems of the realism and refers to the extent to which our means of knowledge may reflect, even with errors, the im-mediate. If this is manageable, then we continue to identify the degree of restoration fidelity. Situated between the phenomenological perspective and the empiricist one, the problem still remains.

To perform this analysis we will use the tools developed in the psychology of perception and we will pursue the nature of the perceptual images, if they have the same essence and structure with the imagined or projected mental images. We are also interested in how the person constructively participates in the precise delineation of the image. This issue summarizes the subject-object relationship by identifying the role of the subject in constructing the perceptual image. In other words we will try to deepen the answer to the question whether the perceptual image is subjective and therefore subject-specific or objective, common to all subjects. Can we consider the creation of perceptual image of ourselves or reception of an external stimulus? It is preferable to follow the relationship as being a gradual one? To these we add the analysis of the epistemic problem that retains the elements of the visual image in the case of scientific knowledge.

Here the generality of the concept of "scientific knowledge" is lost in the diversity of the private science of the present epistemological panel. If in multiple domains (geography, biology, anatomy, etc.) the visual component and the imagistic representation still preserve an important role, the physics, as seen by Hilary Putman[2], together with Niels Bohr is beyond the capacity of the human specific representation. It was tried to maintain its representations within imagination by developing visualizing patterns together with the further development of physics lose all their capacity for representation. Today, the quantum and sub-quantum world can be reduced to numerical and tabular representations and eliminates any reflection in the picture, even the intuitive part of an im-mediate close to the non-mediated dimensionality in relation to the visible world.

How is it that this non-imagistic "knowledge" of the world not to determine aporetical situations at the level of the human intellect? For this several components of reducing the scientific dissonance occurred. The social ones occurred first. Despite the present communication possibilities on current scientific information, they are transmitted through the soft load of the media to Varia or curiosities chapter[3]. Thus, the synthesized information, of short stretch, are

naturally treated, among the other information without a systematic and integrated mental representation of a cognitively normal complex.

In what concerns the few who understand beyond the information superficiality, they have the ability to integrate the information in an epistemic way starting from different "levels of reality". This is the way of the epistemological integration of the differences between the common perception and the scientific representation of the im-mediate. After the development of the astronomy and the transfer from the Aristotelian universe to a complex universe since the beginning of modernity the idea of the two infinities is introduced[4]: macrocosmic and microcosmic. Through his perceptive structures, the man has access to none of them, but he develops optical instruments in order to get by research to both opportunities. The image degree of complexity of the universe exponentially grows at the beginning of the twentieth century and why the idea of "levels of reality"[5] occurs in response to the new scientific discoveries. This explains the major differences that appear in the image of the im-mediate provided by different sciences.

Within the limits that occur in any depth knowledge offered by the science, the man still remains at the necessity of world representation within his own understanding based on perceptual image.

1. PERCEPTUAL IMAGE: RECEPTION OR PROJECTION

In the process of perceptual image formation, the sensory system, specific to each species plays a key role in building its media image. Besides this the personality of the one who receives the message is also very important. When we refer to the personality we consider the whole bio-psycho-social complex, including both cognitive aspects and the organic and affective ones. The individual personality projects towards the image causing variations. Therefore we can talk about pictures of the individualized world. These factors create a different perceptive image different from individual to individual, and the perceptual process is not a static, but rather a dynamic and interactive one.

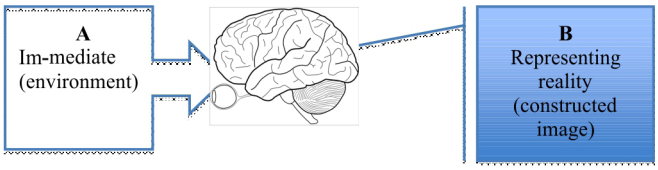

Fig. 1.
The representation of the perceptual knowledge possibilities

Based on the pattern of the black box used by behaviorists to represent the cognitive process we firmly believe that the only known element is subjective, and not behaviorist: the self-image, which we consider a representation of reality. But how different are the individual images? Can they play the im-mediate as it is? The answers are different. We cannot rule as Mielu Zlate does in his synthesis "the psyche can reproduce within itself the surrounding reality as it is, but in a modified shape, so that the reality of the human mind not to resemble with the reality out of his mind."[6] This moderate perspective which tries to reconcile the realism with a form of perceptual bias may be a solution through which neither any error possibility of perception is negated, nor the ability to play in the proper context of the im-mediate. Thus B reflects A and the distortions that can occur are just accidents.

The way in which the description of the psyche is used highlights the fact that the perceptive image is not the result of a mental construction, but it renders the reality, at times with distortions that result in the subjective component. We believe that this perspective close to the classical realism, even if it tries to solve the problem of the perceptual errors, which nobody denies, does not respond to the draft of its own images of what is the primary perceptive image. It has a long tradition and the empiricism of the modern era by Francis Bacon's vision summarizes it perfectly. "We can also say in this regard that the mind is a mirror which receives and reflects the rays of things, not on a single level, but on a lot of different arranged facets so that there is no one who, because of his education, studies and his own nature, is not under the influence of a seductive power as usual as prey of an enemy who is cheating on him and disturb his mind with a lot of vain appearances."[7]

The "metaphor of the mirror that distorts the reality was subsequently metamorphosed in those four idols[8], that captures all the sides of the human knowledge. The four idols were divided according to the following criteria: quantitative - that particular man (individual) and the universal man (society) and qualitative (culture) - the man in his naturally and culturally state. Doing a summary of his idols we can represent them as follows:

man	Individual	Society
Natural	***Idols of the tribe***	***Idols of the forum***
Cultural	***idols of the cave***	***Idols of the theater***

Briefly, the **idols of the tribe** regard the individual with his powers of knowledge, the ones **of** the **cave** regard the person from their own cultural view, the idols of the **forum** are the idols that link the people, limiting the communication within the society, and those of the **theater** regard the society through its cultural consequences.

This example shows that if we prefer the theoretical version that **B** is a more or less faithful reproduction of the im-mediate itself, then we can identify a multitude of elements that occur among the creation of errors. From our point of view a more interesting and with a higher explanatory potential is the perspective developed by Christensen and Klivington. They believe that the role of the brain is not that of filming the reality but rather it "reconstructs and in some measure it creates it"[9].

The image of the world we have from our perspective is not the "reality" as a faithful restoration of the im-mediate, but a subjective form of its decoding. As the general image starts from what it might be called common sense which is not the reality in an "objective" manner, the source / sources of perceptual image must be identified. If the perceptive image is not the reality but a construction of it, it belongs to the imaginary level, it only exists as a mental image and therefore it is subjective. Therefore, we must consider that unreal is an integral form of "reality" and the "reality" is an integral form of the unreal.

Thus, to support this idea is necessary to identify if the image has the same structure as the sensory representation of mental representations. The image constructed by the sensation is not a holistic whole of the surrounding area. It is limited, and any full explanation of it is a subjective construction. We build our own world through specific forms of operating our own brain: analysis, generalization, abstraction etc. The overviews of the world are self-made, but is it possible that reality to be as we perceive? Is the world built on the mechanisms that play like a mirror? The mental image is the same with that part of the im-mediate. Or is it possible to design our own imagination on the surrounding reality and thus to be the builders of our own reality we perceive?

There are no major differences between the mental images which are achieved as a result of perception and those which do not have the object as a support. In order to support our point of view we will describe Perky's experiment made in 1910.[10] In front of a translucent screen marked with a dot a person is placed in the center of the experimenter, who must focus his/her mental attention in the center and to imagine a tomato. On the rear screen the outline of a red tomato is projected at a lower intensity to the perceptive one. Gradually, the intensity increases until it becomes noticeable. The subject exposed to the experiment does not make any difference, he continues by saying that the tomato is imagined. We conclude that there is no substantive difference between the projected image and the outside perceived mental. Being of the same kind there may be an interrelationship between the brain and the received image. The lack of radical measurements allows us to conclude that the mental images are of the same structure, the source of the pulse being different. If case of perception the energy resulting in the image is external, and in case of the imagination this has the inner energy as its own source.

It should however be noted that in this experiment we used simple images. Are the mental images not real-like just in the case of the only simple ones? What happens if in the complex images the similarity is no longer valid? To perform complex image analysis we will perform them following the two experiments of Perky.

The first was conducted by Shepard and Metzler[11], 1976, in which the second screen were given different geometric shapes adjacent to each other. These were representing the same picture in different angles. The time was clocked until the person on whom the experiment was carried out spotted the differences between the two figures. It is noted that the period of time is directly proportional to the angle of image rotation. The behavior was such as if the images had physical stiffness and a measurable rotational speed. This experiment shows that mentally we tend to make the same movements with the skills that we have on the outside world. For us there aren't too many differences in structure between the two types of image.

The second experiment conducted by Kosslyn[12] in 1980 has resulted in some conclusions similar to those presented above. The experiment consists in making an imaginary expedition. Initially the subject is asked to draw a map of the islands. Subsequently, in the absence of this map he is asked to imagine that he is on the beach, and the experimenter asks him to identify certain objects on the island. It measures the time required to identify, and it is directly proportional to the distance from the beach to the point as if the person walks in imagination the way to the object. The mental map contains the same information as the real and the identification is done as if the subject was sought on a real map. The two experiments led us to conclude that the mental image is similar to the real and the imagination activities belong to the same type as those belonging to thought or perceptual identification. The differences between imagination, perception and other cognitive processes are not essential, but they are developed as a different theoretical foundation.

It can be concluded from the above that the perceptual image and the images have the same structure, the differences between them being the source. But the question that arises now is: does the man play a role in the construction of perceptual image, which is the basis for the image of the world we call reality? The answer that we want to give is positive and we first present what J. Rock argues in his book *The Logic of Perception*[13]: perception is intelligent. In fact we are obliged to point out that not the perception is the one that is smart, but the way in which the perceptive image is constructed is the smart one. This method of constructing the image is due to a complex relationship between mental processes. So when we talk about the human psyche we must have a holistic view, with no breaks between the mental processes.

2. HOLISM AND THE IMAGE OF THE WORLD

The basic rule that the perception functions is to achieve a holistic view of the world from individual images or fragments of images. First, the general perceptual image is constructed from individual images which are in the "*Attention window*"[14] by combining them so as to obtain an overall picture of reality. This tendency to integrate into a whole image is reinforced by the perceived image projection images already in memory. These two elements are fundamental to what we called "perception intelligence." To support this idea the way in which the object is recognized if incomplete picture should be pursued.

Experiments in this direction have highlighted how the existing memory image is projected on the object perceived. Summarizing these experiments the following types can be included[15]:

1. "Degraded outlines" by Biederman and Binckle in 1985 are experiments in which parts of the outline of an object have been removed, trying to identify it. This has been possible due to the already existing mental images.
2. "Missing parts" are experiments that have been moved parts of an object and object identification possibilities have been followed. Such experiments were carried out by Biederman in 1987, Cave and Kosslyn in 1993 and Biederman and Cooper in 1991, 1992.
3. "Crumb images" are experiments in which the image was fragmented to be rebuilt. Cave and Kosslyn's experiments in 1993 showed that there is a tendency to associate parties around, and not those that fit in logically. But in the process of checking the existing image, they were reorganized and were made, eventually, coherent image.

4. "Spatial switch sides" are experiments (Cave and Kosslyn 1993) in which moves were made between the parts of some objects. The objects were reconstructed based on what was considered the original image. This image could be identified based on verbal targeting.

These experiments have led to a certain perspective on perceptual image synthesized in the Gestalt laws of perception:

"a) *the proximity* – elements in spatial proximity are grouped into a single perceptual unit;
b) *the principle of similarity* – similar elements are grouped in the same perceptive, that is opposed to another;
c) *the principle of good sequel* – at the intersection of two contours they are perceived as continuing the simplest;
d) *the principle of closure* – the occlusive outline of a figure is inside its configuration visible."[16]

Both experiences described above and the Gestalt laws already stated based on the idea that perception tends to unify the image, create a holistic structure. Because of this trend toward unification, using our existing images, the subject becomes an important element in creating the surrounding reality. The outside image is a construction that is based on the relationship between subjective - objective.

We can say that the relationship between the self and the environment is an interactive one, that the man taking the energetic impulse from the environment builds his own mental image that is subjective. From this point of view we can consider according to Ittelson that perception is "a transaction, kind of interrelation or exchange between the body and the environment, but each part of the situation comes as active and owes its existence to this very active participation."[17] The interaction between the environment and the subject does not necessarily occur by changing the environment, but the seen image is not the same with that taken by it. The unity between the gnoseological universe and that of perception is very tight, so the perceptive image is made on the basis of the two, unable to make a radical break in the human being. Human images are of the same type regardless of their source and the image of the world is one and it is part of the human psyche. Here we come to the widely debated issue in the mid-twentieth century, of the difference between the specific common sense of the knowledge and the scientific one. We do not support that the two types of knowledge would lead to the same images, but rather their construction is done in different ways resulting in different images.

3. The Construction of the World Image

However, the trend of the theoretical psychology is to divide the human psyche between cognitive and perceptual components between these two elements being a strong connection. The cognitive level affects the way in which the image is constructed being a matrix of this kind. There are a large number of experiments aimed at identifying the relationship between image and word. I think the most representative of these are the psychologists Carmichael, Hogan and Walter, 1932[18]. They presented a series of ambiguous images to two groups of subjects. In the first group, the images were accompanied by various names. The trend of the experimental group was to recognize the image that was induced by verbal stimulus. So, due to the association between image and word they were distorted in the direction of the associated word. Why is this done? Our explanation is the following: the word in the mind of the individual is projecting an image. This image is the image needed to direct perception as we have seen in previous experiences. When the overall image is regarded as known, the perceptual image is identified with it. In this experiment the word plays only an intermediary role between the mental image and perception.

If case of the double images, we can perceive different objects looking at the same image on the basis of subjective criteria. These double images emphasize that the subject projects his own states, his own cognitive structure upon the image that he perceives. Perception is a subjective phenomenon, not only that each receptor system is proper but also by the fact that the image constructed at the mental level is a synthesis between the their own cognitive, affective structure and the external elements. Because of the relationship that exists between the cognitive and perceptive, the problem of the complex images system appeared to be specific to each person. Following the cognitive system and its

activation, we concluded a partial awareness of mental processes. The "attention window" is too narrow to capture and sustain each specific cognitive activity. Skills are those operating in most human actions, the awareness of these actions being even reduced or absent. The same phenomenon is also seen with the perception as the perceived image is based on the already existing knowledge, by projecting the brain image upon more or less complete of the perceived image. Moreover, the understanding and the image integration are all based on existing construction. An image that is not integrated into the system is perceived as a dilemmatic image, and not integrated in its imaginary system.

I have argued so far that the perceptual image is constructed by the action of each specific cognitive structure. But why does this involvement occur and why the cognitive the image is not a faithful copy of reality? First, there are several stages in the transition from the external energy to our mental image.

1. The first stage is the one that was called *image activation*[19] and consists of two complementary processes. First, we can talk about a surface representation of the *imaging* process that determines the *primary*[20]. This is an outline of the image to be charged at this stage, the contours being extracted. At the same time, we have a depth process which enabled images in comparison with the primary images. Based on these processes *the secondary image* forms, the one by which the contour becomes that picture.
2. The second stage is called *image inspection*[21], and it is the process by which the details of the image are captured. At this stage the cognitive processes already intervene that some of the details may be also built.
3. The third step is the *image maintenance*[22] and it represents the process by which the perception is established and recognized. The process is complex and it is based on the relationship between cognitive and perceptive.
4. The last step is the *image transformation*[23] and consists in transforming the image so as to be integrated in its own cognitive complex. This step is the one that determines the imaginary construction of the picture. Each of the images is integrated to be compatible with the imaginary person, otherwise they are marginalized and/or they are simply removed from the image structure.

These steps are required to integrate the new images from other images and to create the imaginary of a person. Each stage plays its role in setting the imaginary perception.

But most of the experiments described had the simple static images as the starting point. Are there the same processes at the level of the complex images? What is the movement in fact and how does it form at a mental level?

To answer these questions an item to be pursued is the perception of succession. In this case we can follow the subjective intervention upon the "objective reality". Also, at the level of the motion perception and of the sequence, the temporal perception problem should be followed. The problem here is that perception is a form of "real" succession or of mental construction. One of the main features of the movement is due to the inertia of the image. Thus, the static images that follow at a speed that is greater than 1/25 second give the feeling of movement. The inertia of the system can be the source of the sensorial perceptual changes so that the static images can create an apparent motion.

Such motion must be pursued in several ways. Mielu Zlate identifies a classification of five types of motion perception into: *real* (when the object moves from one place to another), *apparent* (when the object seems to be moving even if it doesn't), *induced* (when the object is included or close to a moving object and seems to move), *self-kinetic* (when you look at a bright spot in a dark room without another landmark that point it as moving), *consecutively* (after we follow the track of a moving object, if we follow another this will seem to move)[24]. These types of psychic perception of motion show a tendency to create continuity, connections between the components of perception. This continuing trend does not solely rely on the inertia of the sensory systems but also show cognitive interference in the perception of motion.

The subjective time is also a form of movement perception. This is the apparent speed of movement, which is in the form of a ratio between the speed of the own action at a time and the

average speed of action. In the absence of motion perception there would be time for what is the extent of the movement. All motion is relative to causation. Without motion we cannot identify links between objects, events, photos. A flash perception would be the source of a world without time and causal relationships. This would be a torn world, a perpetual present time. Also, without the idea of causality and temporality there is no psychology of movement. The relationship between the perception of motion and time is one of influence and mutual support.

Still talking about perception and about the way of networking between the existing cognitive image and the perceived image the problem of the modalities for looming the existing imagery is outlined. What kind of information or knowledge do we bear with us at birth, we learn and what is already in us is trying to answer the questions below. We will not try and we still cannot solve the problem of the sources of knowledge now. However, we try to present how the world forms the image of the world for each person. This problem can be analyzed starting from J. Piaget's genetic psychology. The relationship between perception and the cognitive universe is a constructive one that develops over time. He starts from a pure empiricist conception to birth eliminating the idea that there is any form of knowledge. He believes that even the a priori intuitions of space and time[25] are not specific to humans. Jean Piaget considers space and time as the perceptual construction done in childhood. "Approaching the spatio-temporal structures first, we find that at the beginning there is no single space or time sequence, incorporating objects and events as container includes its contents. It is given only a set of heterogeneous spaces, all centered on the child's own body: mouthpiece area, tactile, visual, auditory, postural space, and some time impressions (waiting, etc.) but without objective coordination."[26] The time and space that develop inside will be externalized together with other specific elements.

Thus, the objective reality is a subjective construction to be gradually objectified with development. "The study of sensory-motor or practical intelligence during the first two years of development has shown us how the baby from the outside summed up his work, then builds to extend this assimilation, a growing number of schemes in the same time more mobile and able to coordinate with each other."[27] Piaget's genetic concept is a way by which we can track the specific development ways of the imaginary. The establishment of "intelligence" is gradually, learning is done gradually and thus the image of the world is built step by step. Our world is a world of subjectivity, the narrative is built inside the natural environment and the social relationships and then it is projected out as a form of objective reality. The reality created inside the mental image is projected after the object: "it is clear that recognition does not lead in any way by itself and without further complications to the notion of object."[28] The mental establishment of the object will be done step by step according to the children's mental age. The cognitive development involves the development of the perceptive universe based on the schemes that the child will learn to act. Even if Piaget is a realist in his conception, putting no doubt for a moment upon the surrounding reality his theory and experiments can support a total perceptual bias. It is not imperative that the natural environment to be in the form in which it is perceived by us, the social media is enough to project a naturally agreed reality.

It is therefore possible to only consider the perception of a subjective imaginative design each of our images and other individual make a contribution. Doing a summary of how the perceptive imagination is constructed, we come to the following conclusions. The perceptive image is the synthesis of the visual, auditory, and kinesthetic sensory-motor images. All the forms of perception are different, they appear on the distance at different times, but they are assembled into a single image perception. Thus, the psyche comes in to make a picture of reality through cognitive level that actively participates in shaping it. That imagination should not be reduced to the idea of visual image may be supported by ways of perceiving the reality specific to the blind. They have an imagistic imagination, even if they have never seen a visual image. Their construction was done in a distorted way, but through other senses they were able to build a picture of their own world.

The differences between the images of a normal person and a blind are not of essence but of accuracy, which indicates that the image is one of the crucial ways of operating within the cognitive system. In fact the picture is considered by us as the building block of the human psyche, being the way of forwarding, structuring and creating knowledge.

Imagination is built on perceptual image. This topic is constructed through the subject-object networking that has the specific construction requirements as its own basis. These could be summarized as:

1. The perceptive image is influenced by the already existing imagery of each other, built on the relationship between subject and object.
2. Each imaginary construction is done in a gradual, natural, yielding an overall vital social and spatial integration. Any sudden change of imaginary causes a personal discomfort that can be reached by trauma.
3. Human psyche tends to build more order, even where it does not exist. This leads to a unified picture of the cosmos, and where there are inaccuracies they are tailored to the personal order or the images are rejected.
4. Psyche works on holistic picture, the "interpretation" of the world plays a very important role in "training" it.
5. Perception is an assembly made of the interlinked visual, auditory and sensory-motor. They are completed by a picture of the im-mediate.

Because imagination is the main manifestation of the cognitive universe we must follow the relationship that exists between the human personality as a whole and the individual imagination.

5. INSTEAD OF CONCLUSIONS: PERCEPTUAL ERROR AS THE FOUNDATION OF IMAGE REPRODUCTION

Reconstruction and image reproduction play an important role in the theoretical development. Thus, the spatial image by the transfer from the two-dimensional to the three-dimensional space is based on how we perceive the angle and the holistic picture, respecting the principles of Gestalt. The painting, as the representation of reality is based on a way of reconstructing, starting from the visual reflections and the way in which they render the colors, light and shadows. Within this frame, the reconstruction based on the three-dimensional "indirect perception" is repeated from the point of view of the mental.[29] By projecting the previous image the three-dimensional image is projected and the object is recognized based on previous experiences. The visual is rendered by the limits that our own receiver has and therefore any reproduction of the image must speculate these limits.

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References

1. Bacon, Francis (1976) *Despre întelepciunea anticilor*. Bucureşti: Editura Ştiinţifica şi Enciclopedică.
2. Bacon, Francis (1957) *Noul Organon*. Bucureşti: Editura Academiei.
3. Changeaux, Jean Pierre (1983) *L'Homme neuronal*. Paris: Fayard.
4. LaFollette, Marcel C. (1990) *Making Science our own*, Chicago: Chicago University Press.
5. Rock, John (1983) *The logic of* perception. Cambridge: M.I.T. Press.
6. Kosslyn, Stephen M. (1995) *Image and Brain: The Resolution of the Imagery Debate*. Cambrige Massachusetts: Bradford.
7. Mirandola, Giovani Pico della (1991) *Despre demnitatea omului*. Bucuresti: Editura Stiintifică.
8. Miclea, Mircea (1999) *Psihologie cognitivă*. Iaşi: Editura Polirom.
9. Nicolescu, Basarab (2002) *Noi, particula, lumea*. Iasi: Editura Polirom.
10. Pascal, Blaise, *Cugetări*. Bucuresti: Editura Stiintifică, 1992.
11. Piaget, Jean, Inhelder, Barbel, *Psihologia copilului*, Editura Didactică şi Pedagogică, Bucureşti.
12. Piaget, Jean (1976) *Constituirea realului la copil*. Bucureşti: Editura Didactică şi Pedagogică.
13. Putman, Hilary (1990) *Realism with a Human Face*. Cambrige Massachusetts: Harvard University Press.

14. Irvin Rock (1997) *Indirect Perception*. Cambrige Massachusetts: Massachuset Institute of Technology.
15. Zlate, Mielu (2000) *Introducere în psihologie*. Iaşi: Editura Polirom.
16. Zlate, Mielu (1999) *Psihologia mecanismelor cognitive*. Iaşi: Editura Polirom.

Endnotes

1. We use the term "im-mediate" instead of "reality" as we want to eliminate the ontological implications of the last. The im-mediate is what is in direct connection with our sense-organs and on which the perceptible image and the primary representation of the world is built.
2. Hilary Putman (1990), *Realism with a Human Face,* Harvard University Press, p. 5
3. A very interesting analysis of scientific public images generated for a period of epistemological paradigm shift and Communication (1910-1955) is performed by Marcel C LaFollette (1990), *Making Science our own*, Chicago: Chicago University Press.
4. The description of the two infinities is a common image in the early modern era. It is interesting to watch the human positioning by Giovanni Pico della Mirandola in *Despre demnitatea omului*, Bucuresti: Editura Stiintifică, 1991, p.122 in the center of the world as undefined, being able to choose any shaping in the metaphorical position of the man as an intermediary between the two infinities performed by Blaise Pascal in *Cugetări*, Bucuresti: Editura Stiintifică, 1992 pp. 120-122.
5. See Basarab Nicolescu, *Noi, particula, lumea*, Iasi: Editura Polirom, 2002
6. Mielu Zlate, *Introducere în psihologie*, Editura Polirom, Iaşi 2000, p. 222.
7. F. Bacon, *Cugetări si observări* in *Despre întelepciunea anticilor*, Editura Ştiinţifica şi Enciclopedică, Bucureşti, 1976, p. 265.
8. Fr. Bacon, *Noul Organon*, . I, XLI-XLIV, Editura Academiei, Bucureşti, 1957, pp. 42-57
9. Mielu Zlate, *Introducere în psihologie*, ed.cit, p. 222.
10. Jean Pierre Changeaux, *L'Homme neuronal,* Fayard, Paris, 1983, pp. 177-178.
11. idem p. 175.
12. ibidem p.175.
13. J. Rock, *The logic of perception,* M.I.T. Press, Cambridge 1983.
14. Stephen M. Kosslyn, *Image and Brain,* Bradford, Cambrige Massachusetts, 1995, pp. 187-194.
15. idem p. 265.
16. Mircea Miclea, *Psihologie cognitivă,* Editura Polirom, Iaşi 1999, p.82.
17. Ittelson *Visual space perception* apud Mielu Zlate *Psihologia mecanismelor cognitive,* Editura Polirom Iaşi 1999, p.129.
18. Mielu Zlate *Psihologia mecanismelor cognitive,* Editura Polirom Iaşi 1999, p.128.
19. Stephen M. Kosslyn, *Image and Brain,* Bradford, Cambrige Massachusetts, 1995, p. 146.
20. Mircea Miclea, *Psihologie cognitivă,* Ed. Polirom, Iaşi 1999, pp. 66-75 şi Jean Pierre Changeaux, *L'Homme neuronal,* Fayard, Paris, 1983, pp. 187.
21. Stephen M. Kosslyn, *op. cit.*, p 149.
22. idem p. 150.
23. ibidem p. 151.
24. Mielu Zlate *Psihologia mecanismelor cognitive,* Editura Polirom Iaşi 1999, p.157.
25. Immanuel Kant, *Critica Raţiunii pure,* Editura IRI, Bucureşti 1994, pp. 71-94.
26. Jean Piaget, Barbel Inhelder, *Psihologia copilului*, Editura Didactică şi Pedagogică, Bucureşti, p.16.
27. Jean Piaget, *Constituirea realului la copil*, Editura Didactică şi Pedagogică, Bucureşti 1976, p. 3.
28. idem, p.10.
29. Irvin Rock (1997), *Indirect Perception,* Massachuset Institute of Technology