

Ways of Vision in Cognition and Communication

Leonid Tchertov

International Association for Semiotics of Space and Time, Binn, Germany

The concept “vision” covers a series of psychical processes from reception of optical data to transformation of visual images in free imagination and purposeful thinking. Different parts of this series with their own elements and structures are involved in communication processes, including arts. They are discussed not only by psychologists, but also by art researchers and semioticians. The notion “ways of vision” gives a common point of view on formation of visual images in diverse intra-subject and inter-subject processes, in particular, creation and interpretation of art pieces. The ways of vision are considered in the paper as modes of highlighting various mental components of seeing processes and their using in cognition and communication. The concept, “ways of vision” helps to describe some related psycho-semiotic concepts. In particular, the distinction of sensorial, perceptual and apperceptual ways of vision gives a possibility to consider forms of participation of visual images in the expression and content planes of diverse visual-spatial codes. Among their semiotic means, the sensograms, perceptograms, pictograms, and conceptograms can be described as different ways to form visual images, to interpret them, and to use in communication. The pictorial means of objects representation and inter-subject communication can be distinguished according to their focus on certain ways of vision and visual codes that regulate their formation and interpretation.

Keywords: visual images, modes of formation and interpretation, direct and shifted perception, pictorial representation and communication

Introduction

“Vision” is an ambiguous concept. It can be regarded to different stages of reception of optical data and their interpretation on diverse levels of mental activity. A viewer can see contrasts between patches of colors, the volumes of objects in space, the recognisable houses on a street, their stylistic features, their dilapidated condition, etc. The visual images of different levels can be represented in memory and imagination; they can also be shared from one person to another through medias like art pieces.

Various disciplines have their approaches to understanding of the vision. The external approach to it, as in geometrical or physiological optics, is limited with optical processes and organic reactions to them. Another approach is developed in psychology studying internal processes of visual perception and its interpretation. Different approaches to art studying have distinguished “forms of vision” using by artists and viewers in creation and interpretation of art pieces in diverse historical periods. Semiotics has its own approaches, and some of them develop concepts for description of different visual-spatial codes that mediate distinct ways of vision. The researches of psychological processes, art communication and their semiotic means have a common feature that differs them from the physical and physiological approaches. They intend to reconstruct not external optical and neuronal processes, but intra-subjective and inter-subjective processes of mental modelling with visual images.

All these processes of subject's activity can be considered as *vision*, which is understood as a creation of various visual images that are connected with optical stimulation and included into mental modelling of objects. These images are formed at different levels of cognition and used in diverse processes of communication including visual arts. Such diversity can be described using the concept *ways of vision*, which gives a possibility to connect ideas developed in different approaches to processes of vision in cognition and communication.

Psychological discussion of the vision forms and discussion of the “forms of vision” in art history can receive a common ground, if both individual-psychological and cultural-historical approaches will be considered semiotically—as fields, where some visual-spatial codes are functioning. In these relationships, different ways of vision can be understood as a psycho-semiotic concept, which help to distinct modes of internal modelling and conscious or unconscious methods to form visual images according to norms of these codes.

The sections of the article below contain an overview of different approaches to processes of vision and visual communication, a distinction between different ways of vision formed in these processes, and a discussion of their participation in cognitive and communicative processes including pictorial means of representation.

Vision Ways in Different Perspectives

Psychologists on Diversity of Vision Ways

As far as ways of vision are interesting for different scientific disciplines, they can be considered in distinct conceptual systems. Different modes of vision are discussed primarily in psychological studies.

In particular, H. Helmholtz (1910/1925, pp. 10-11) differed three logically possible notions: the *immediate perception* considered without any connections with previous experience; the *perception* (*Wahrnehmung*), which combines the sense-impressions with the images of objects in memory; and the *representative idea* (*Vorstellung*), the pure image of memory, which can appear without accompaniment by any present sense-impressions. Helmholtz mentioned that “idea and immediate perception may be combined in the apperception in the most different proportions”, and one does not realise “how much of it is due to memory and how much to present perception”, because “the perceptual-image (*Anschauungsbild*) can ultimately be traced back to the pure memory-image (*Vorstellungsbild*) and may gradually pass into it” (pp. 11-12).

After Helmholtz, some psychologists distinguished the *levels of vision*: “The visual system operates on three levels: the sensory level (sensations), the perceptual level (perceptions) and the apperceptual level (representations)” (Ananiev, 1977, p. 127). This distinction implies that the earlier stages serve as prerequisites for the subsequent ones. Optical data must be imprinted in sensations in order the perception of an object to be formed, which, in turn, becomes a prerequisite for memory and visual imagination at the level of apperception.

A similar succession of stages in ontogenesis of vision ways is found in the genetical epistemology by J. Piaget. A development of visual imagination by a child of two years is connected with, “a Copernican revolution”, when the child's actions are decentred regarding own body, and it begins to be perceived as an object among other spatial objects (Piaget, 2004, p. 19).

However, an understanding of the vision levels as stages of cognitive processes was undergone to doubts by many other psychologists. Gestalt psychologists did not agree to see the perception as a result of summation of sensations and consider it as the formation of a visual gestalt with “a good form”—as something with properties of regularity, symmetry, simplicity, etc. (Koffka, 1935, p. 110).

J. Gibson rejected even more categorically the idea that perception is secondary to sensations, and suggested that their relationship is formed in the opposite direction. He distinguished two ways of seeing: the *visible world*,

in which objects have constant forms, sizes or colors, and the derived from it *visual field*—a kind of introspective experience, which “is the momentary patchwork of visual sensations” (Gibson, 1979, p. 114; 1950, Chap. 3). The visual perception of the objects, different from the mosaic of sensations, is considered by him as a direct extraction of certain invariants of optical information from the environment.

Unlike the ecological approach by J. Gibson, the cognitive approach by U. Neisser supposes more internal activity of perceiving subjects. Their “visual cognition” is understood in a broad sense including sensation, perception, imagery, retention, recall, problem-solving, and thinking (Neisser, 1967). All these processes use schemata of different levels as plans of vision with various purposes. A schema is involved in the “perceptual cycle”, where it is corrected and, in its turn, direct new visual researches (Neisser, 1976). In this key, also J. Bruner researched a dependence of the perceptual images on a subject’s “readiness” to it and on ways of categorization the perceived objects (Bruner, 1973).

According to R. Arnheim (1969), processes of *visual thinking* penetrate perception, and the perceptual activity include a preference of more grounded “visual hypotheses”. The variable optical data received in perception are formed with help of relatively stable patterns, “perceptual concepts”, which like logical concepts stand for their objects (Arnheim, 1974, pp. 44-46). In a similar way, R. Gregory (1970) considered the visual perception as an ability to solve some tasks and believed that the formation and selection of “perceptual hypotheses” are the necessary functions of the “intelligent eye”.

The psychologists of different directions pay a special attention to differences between visual perception of real environment and pictures. R. Gregory (ibid, Chap. II) mentioned the paradoxicality of pictures, because they are visible both in their own right and as something entirely different from the mere sheet of paper on which they are drawn. A similar idea was expressed by J. Gibson (1979, p. 273): “A *picture* is a surface that always specifies something other than what it is”.

Distinction of Vision Forms in Art Study

It is not surprising that the features of painting perception became a subject of study for art researchers. Even Leonardo wrote on twofold ways of vision in perspective constructions in paintings: “The perspective is such that it makes flat things look relief and relief things look flat” (Leonardo, 2005, p. 92). Long before H. Rorschach, he had described an active way of vision transforming some unshaped spots into internal pictures of certain objects or events (ibid, p. 37). After him, G. Vasari and F. Zuccari told on the *idea* in mind of an artist as on a visual image forming “an internal drawing” (*disegno interno*), which is expressed through an “external drawing” (*disegno esterno*) (see Panofsky, 1969, pp. 66, 85). E. Panofsky (1927/1991) studied the historical changes of “internal” and “external” drawings in different methods of perspective.

The concept of *vision* (*Sehen*) is introduced into art studies by the sculptor and art researcher A. Hildebrand (1893/1907). He compared the artistic vision to reading in accordance with certain rules and distinguished between the “near” (“haptic”) vision of sculptors, which is associated with touch, and the distance (purely “optical”) vision of painters. A. Riegl (1901/1985), made a similar distinction from a historical perspective connecting artistic vision of diverse epochs with different modes of perception. In particular, he distinguished the “tactile” way of perceiving in ancient Egyptian art from the “tactile-optical” vision of ancient Greeks and from pure “optical” way preferred by the artists of ancient Rome. H. Wölfflin (1915/1950, p. 229) also had written on “the progress from a tactile apprehension of things in space to a type of contemplation which has learned to surrender itself to the mere visual impression”.

Some later art historicists also differed connections of seeing with other modes of feeling in diverse periods. S. Daniel (1990, Chap. 1) wrote on differences between the “haptic eye” of the ancient Greek culture, “the listening eye” of medieval painting representing words of the Sacred Scripture, and the eye of Renaissance painters concentrating on properly visual perception. In accordance with him, I. Danilova (2002) wrote on the shift from “loudly speaking” medieval paintings to “silence” in paintings of Renaissance.

H. Wölfflin (1950) introduced in studying of styles evolution the important distinctions between *forms of vision* (*Seheforms*), or of *contemplation* (*Anschaunungsforms*). He linked them to preferences of linear or painterly vision, flatness or depth, closedness or openness, multiplicity or unity, and clarity or unclarity.

Another school of art history—iconology (E. Panofsky, E. Gombrich, and others)—focused on differences of content interpretations at diverse levels, from simple recognition of depicted objects to their understanding as symbols of complex ideas (see Panofsky, 1955, pp. 40-41). In a similar way, some aestheticians considered a “layering” of the art pieces into several levels, which are seen and interpreted differently (see Hartman, 1953/1966; Ingarden, 1962/1989).

Many art researchers compare an analysis of differences in formation and interpretation of artistic images with studies of languages. In particular, E. Gombrich (1960, Chap. II) considered an idea of the “language of art” in connection with various schemata mediating ways of pictorial representation. At the same time, he did not agree with an “extreme conventionalism”, which erases the difference between a visible image and a conventional word (Gombrich, 1981, p. 14).

Semiotic and Psycho-Semiotic Approaches

A development of semiotic studies and their dissemination to the area of arts stimulate views to art pieces as to signs and their constructions regulating with rules of certain semiotic systems. The concept of iconic sign by Ch. Peirce gives a possibility to relate it to a picture as far as it looks similar to object depicted (Peirce, 1960, pp. 143, 157). The impression of such similarity depends not only on relations between the picture to the object, but also on its “interpretant” (in Peirce’s terms) that can be evoked by a subject on distinct mental levels. As W. Nöth (2003, p. 383) clarifies: “The *interpretant* of a pictorial sign are the ideas, thoughts, conclusions, impressions or actions the picture evokes”. The visual perception of the object depicted should be included into this series foremost. Another follower of Peirce, Ch. Morris has considered the “esthetic perception” as a process of interpretation of the art work as an “esthetic sign”, which is an iconic sign of a value (Morris, 1971, pp. 416, 421).

Critics of this approach emphasised not the similarity of the painting and the visual image it evokes to some particular objects, but rather the way in which the perception of picture depends on cultural conventions. In particular, U. Eco has shown, how the “perceptual sense” of pictures depends on these conventions and on “iconic codes” used in the culture (Eco, 1976, p. 194). In another book, he especially considered “a semiotic aspect of perception” and a “perceptual inference”, which are treated as “a process of primary semiosis” or as “perceptual presemiosis” (Eco, 2000, p. 125 -127). He had described also the “codes of recognition” using for connection of visible objects with their meanings (Eco, 1972, p. 246).

In analogy with linguistic patterns, the semioticians became to distinguish the denotative and connotative meanings of a “pictorial sign” as different levels of its interpretation (Barthes, 1964). A more detailing approach treats a picture not as a single sign, but as a complex visual text, which has several levels of formation and interpretation that can be compared with phonological, semantical, grammatical, and symbolical levels of verbal

language (Ouspensky, 1995, p. 243). A semiotic analysis of “four figurative layers of the visual syntax” that are open for a viewer in the processes of visual perception of a picture is supposed by Lagopoulos (2022, pp. 609-610). A transit from one of these layers to another changes a way of vision and interpretation of the picture.

A development of spatial semiotics gives theoretical instruments for the considering a complex structure of pictorial spaces, which are semiotized with help of an ensemble of semiotic systems, first, visual-spatial codes (see Tchertov, 2005; 2019; 2024a; 2024b). A correct understanding of differences between these codes needs considering distinctions between methods to form and to interpret visual images created in their expression and content planes. So, an interaction of semiotics and psychology is useful, and some psycho-semiotic concepts are formed.

Among them, the concept *ways of vision* is formed at the intersection of different disciplines. It is connected with *psychological* differentiation between *vision levels* (as by Ananiev) or between the *visible world* and *visual field* (as by Gibson). It has relation also to the distinguishing of *vision forms* in studies of *arts theory* (as by Hildebrand) and *arts history* (as by Wölfflin). This concept can be considered in frame of *psycho-semiotics*, insofar it is related to differences of *visual-spatial codes* (as by Eco), which set various methods of structuring and interpreting of visual images as bearers of messages.

Ways of Vision as Modes of Internal Modelling

Vision as a Subject's Activity

Although the external optical processes of light transformation are the natural grounds for all further activity of seeing system, this activity cannot be reduced to them. Of course, everything encompassed by an imaginary celestial sphere is projected onto the small sphere of the eye's retina, where the lens serves as a point of inversion, connecting two centrally symmetric cones and two concave hemispheres in accordance with the laws of geometrical optics. In this relation, a comparison of an eye with a camera is appropriate.

However, receiving optical influence and *vision* is by no means the same thing. Like a mirror or photographic film, the retina itself does not see anything. At least, the transformation of optical signals through neural systems into sensations differs human's seeing apparatus from these technical devices. Meanwhile, the causal signal chain of the neural processes is also a natural process that is not fixed itself in visual images. Neither physical, nor neurophysiological processes are yet vision as a psychical act; they just form the conditions for it.

On any level of the psyche, the image of an object is experienced by the subject not as a consequence of the preceding link in the causal chain, nor as a series of neural signals, but as a *phenomenon* of something visible. *To see* can only a *subject of activity*, only somebody, who can form and consider some mental phenomena. Such vision is not passive reception, but it is the result of gnostic actions aimed at extracting information from these data and their inclusion into a system of subject's knowledge and skills.

The visual images that are formed by a seeing subject are *internal models* of relations between objects. This mental modelling can have diverse purposes and be done in different ways. In particular, different ways of vision can be used for creation of images that are distinguished by their structures and functions. These images can be included in both cognitive and communicative activity of the modelling subject (see Tchertov, 2019, pp. 316-338; 2025).

Ways of Vision as Modes of Formation and Interpretation of Visual Images

Independent of their relations to stages of interpretation process, the *ways of vision* can be distinguished as

modes of seeing, which differ depending on purposes of vision. For example, a book can be found around other books after searching and actualization of its visual image from memory. It can be recognized by some visible cues: color, figure, size, etc. The book in hands can be visually perceived in detail—its appearance, condition, possible damages, etc. Its pages can be viewed not only as rectangles, but also as trapezoids or quadrilaterals with non-parallel sides, if the observer pays attention to the perspective foreshortening of its distant parts. The reading of the book is one more way of its vision, when the letters become “transparent for the meaning” opening events described with their help, instead of themselves. Book pictures are even more “transparent” for the vision through them some depicted objects. Not all of these visual images are directly drawn from the current optical stimulation; some of them stay “beyond the information given”, using term of J. Bruner (1973). Each of these cases is another way to create visual images with their specific structures and functions.

Vision can be both *direct* and *indirect* (or *shifted*). If viewers see a smiled face in the figure ☺ or a face of a man at his portrait (Figure 1a & 1b below), their vision shifts from the direct perception of lines or colors at a surface to indirect seeing of the represented objects.

The concept “vision” can be applied to all of these phenomena. Accordingly, the notion “ways of vision” is referring not only to different levels of the processing of optical information, but at all—to different *modes of formation* visual images using diverse schemes. Each of these modes has its specific *elements* and *structures*; it is motivated by various purposes and fulfils its own *functions*.

The different ways of vision are distinguished also as *methods to make sense* to the images created with their help—their incorporation into some mental models, and thus their *interpretation*. As the conscious or unconscious methods of interpretation, distinct ways of vision differently connect new data with information that was already received by the subject. In-formation—as a *form* received from the outside (see Tchertov, 2019, p. 45)—enters into a relationship with formations of knowledge and skills that are already mastered by the subject. However, the interpretation of the visible is not limited to the visual system alone. Verbal categorisation and the assignment of logical concepts also are involved in the interpretation of visible objects. Although various ways of vision as modes of formation and interpretation of visual images can be distinguished, it is useful to highlight the sensorial, perceptual, and apperceptual ways, which have clearest distinctions.

Sensorial Way of Vision

The *sensorial way* of vision is formed in a reflection of viewers on their own states. The optical stimuli are interpreted in this modus of vision as gradations of light and colors localised in different areas of the *visual field* (cf. Gibson, 1950, Chap. III). A “patchwork of visual sensations” in this field has its own elements and structure. Its elements are changeable colored spots of various qualities and configurations. Its structure is a constant set of relationships between the centre and periphery, left and right, above and below, which the subject relates to the schema of own body and coordinates with it. The stable framework formed by the system of locations within this field differs from its content, which, by contrast, is highly unstable and consists of changing configurations of color patches with variable outlines. The space is modelled by this way of vision as the *world of optical phenomena* that are abstracted from some external objects.

The sensorial way of vision is not usual in everyday life, and its achievement needs a certain skill. This special way can be a professional ability of a psychologist, who develops an “analytical introspection”, or an artist, who mastered a skill to separate visible forms and colors from their functions and meanings.

In particular, the sensorial way of vision is important for the painters, if they work “in live” and try to represent the three-dimensional relations between the depicted objects on the two-dimensional depicting surface. For creation of a flat projection of the depicted spatial objects, a painter should compare their relative sizes, as they are fixed in own visual field and see, for example, the height of the far edge of a house as appearing shorter than the near edge, even though both are equally. The eye of the painter should be in this case artificially fixed—as, for example, A. Dürer (2000, p. 172) had advised. In a similar way, the painters working in live should bear in mind that sharper contrasts between light and shadow within their visual field indicate that objects are nearby, unlike the less contrasting relationships between patches of colour that are indexes of distant objects.

Perceptual Way of Vision

Unlike the sensorial way of vision concerning on sensations of the subject’s visual field, the *perceptual way* emerges as an internal modelling of the external *visible world*, in Gibson’s terms. In the spatial perception, the subject separates own movements from those of external bodies and contrapose them. The subject’s own features are maximally reduced from the formed perceptual image, and the objects’ relations are maximally reconstructed in it. The perceptible objects have a relative *constancy* of their forms, colors, distances, and other their features. Their images retain their characteristics regardless of which part of the subject’s field of view these images fall into, at what angle, under what lighting conditions, and so on. Owing to the constancy of perception, images of solid bodies prove to be *invariants* of transformations of optical stimulation (see Gibson, 1979).

This way of the internal modelling creates a *world of visible three-dimensional bodies*, which is divided in usual environment into “impenetrable” bodies and “empty” space, where they can move. By distinguishing object forms from the spatial environment and even “figures” from the “background”, vision already carries out a primary division of the phenomena open to it, which can be compared in this function with logical categorization.

At the same time, the pure world of perceived three-dimensional bodies excludes their usual meanings. For concentration on it, one must, as it were, cease to recognise familiar objects in them. Such detachment is not characteristic of everyday perception and requires a special skill, just as does the abstraction of the world of optical phenomena. Thus, like the sensorial way of vision, the pure perceptual way is also an abstraction from the natural process of seeing. Both are artificially separated from the subject’s experience relating to the perception of objects seen previously, which have been retained in memory and are linked to their meanings.

Apperceptual Ways of Vision

The world as seen at a single moment and from a single point of view is realized as a fragment of the world earlier perceived and retained in the images of memory. Images of three-dimensional objects integrate into a system of ideas about their functions and significance in human activity. Therefore, when perceiving an object’s form, a person usually sees not only, and not so much, its physical and geometric qualities, but rather its purpose in practical activity. This is the *world of recognisable objects*.

The perceived objects are *recognized* as far as certain their shapes or properties are identified and connected with certain *schemes*, which are formed at different levels of generalization. It is possible that more than one visual scheme is applied for a recognition of perceptual image. A choice of a recognition scheme as one of “visual hypotheses” about the viewed object influences a formation of its image (see Gregory, 1970).

Recognising the shape of an object—for example, as a knife or a fork—constitutes an act of *visual categorisation*. It relates a considered form to a “visual lexicon”, which is stored in memory like the verbal lexicon, but not identical to it (see Glezer, 1966, Chap. III, §2). The recognized objects also can be *categorized*

verbally, or *named*, if certain verbal meanings are connected with them. The nomination of the visible object may also be accompanied by its *logical categorization*, if the named object is thereby included in a certain logical class. However, the visual recognition is differed from the verbal nomination or logical categorization, as it is not logical, but infralogical operation, using J. Piaget's terms.

In all these cases, the vision of objects in everyday experience is not only perceptual, but also *apperceptual*—as far as it contains the recognition of these objects, their involving into certain frames, their connection with certain functions and meanings. In these cases, the new data are incorporated into the subject's existing system of representations, which influences its interpretation. Apperceptual images are not added to current perceptions; rather the opposite: the perceived information gets included into the existing array of what is already known.

At the same time, it is possible *pure apperceptual way of vision*, when a subject deals with visual images independently on the current optical stimulation. Unlike sensorial and perceptual images, that appear directly in result of this stimulation, the apperceptual images can be actualized or formed without such external influence. They can be viewed with closed eyes—as images of memory or imagination.

What remains visible with the closed eyes belongs to the *world of the visual representations*. This world of *ideas* (in the pre-Platonic sense of the word, as visual images) is quite diverse, owing not only to the variety of objects imagined, but also to the subjective forms of such imagination. With the eyes closed, one can see dreams, memories, phantasy, plans of forthcoming actions, etc. An artist sees in such a way a future paintings and its "internal drawing". Therefore, one may speak on apperceptual ways of vision in the plural.

Visual Thinking as Ways of Vision

The apperceptual ways of vision take place in various operations with visual images that can be performed without direct contact with optical data, their perceptions or sensations. The object of these internal operations is visual images reconstructed from memory and transformed in more or less degree using various schemes of internal modelling. These visual images can be combined in different ways in free imagination or in more purposeful thinking.

The visual thinking is aimed at solving certain tasks: planning of movements, internal building of spatial constructions, inventions of some mechanical tools, etc. Like the logical thinking deals with verbalized concepts, the visual thinking deals with senso-motoric images at level of "infralogical operations" (Piaget, 2005, p. 47). However, as J. Piaget noted, the schemes of spatial thinking do not relate species to genes, unlike the logical concepts, but they are dealing with the relationships of parts to the whole and to each other.

Different ways of inner visualization are used to create mental images with various qualities and functions. These can be imagined operations in the continuous Euclidean space, mental movements of figures in the discrete chess space, or imaginary actions in a space with some other features. In any case, operations with spatial images in the processes of visual thinking can be considered as ways of vision, even if these images are created and combined without perception of current data.

Relations Between the Ways of Vision

The considered above sensorial, perceptual and apperceptual ways of vision are only reference points in cognitive processes. The sensorial way of vision focuses on the state of the beholder's own visual field with its constant structure and changed configurations of patches with various shapes and colors. The perceptual way focuses on the current relations between objects in the external space. The visual images can be formed by pure

apperceptual way without current sensations and perceptions continuing to be objects of internal manipulations in imagination and visual thinking.

These ways of vision are differently included in subject-object relations. Whereas the sensorial way of vision is centred on feelings of the subject-viewer, the perceptual way contraposes to the viewing subject the viewed objects as some volumes in the external space. The apperceptual ways of vision differ from these two, insofar as they can occur in an internal space of imagination without current optical stimulation. Each of the ways of vision can be purposeful developed by a subject as a special mode of internal modelling.

At the same time, the ways of vision are connected and interacted. Perceptual images can be richer in sensory details or, on the contrary, more general and schematic. In their turn, the ideas of the apperceptual level permeate the perception of three-dimensional objects and enable the “vision of the invisible”, like reverse or internal surfaces of perceived objects. Unlike the mechanical stopping of visual sensations and perception when closing eyes, opening them back up doesn’t stop the involvement of apperceptive schemes in creating visual images. The structures of the apperceptual ways of vision participate not only in formation of perceptual images, but also in the ordering of the pure sensations—as placing the sensed colors into relationships of greater or lesser saturation, brightness, lightness, and so on.

The very act of distinguishing colors from a continuous spectrum is linked to their designation by words such as “red”, “yellow”, “blue”, etc., and the system of such designations varies from language to language. The “seven colors of the rainbow” that are distinguished in the modern European culture are only one of many other ways of color categorising (see Gage, 2013, pp. 93-94). It is clear that a unification of different colors around a few verbal categories is another way of their vision, than visual distinguishing hundreds and thousands of their shades, which needs rather not verbal, but numerical indexing.

In processes of various kinds, a using of distinct vision ways can follow each other in different successions. For example, an ability to create sensorial images with certain qualities can be achieved in result of some special development—both individual and collective. A person studying to draw and to paint should especially learn to a technique of vision, where a reflection on its distinct stages is developed. A professional painter should reflect elements and structures of own visual field for creation on the surface a certain configuration of lines and paints that will be able to evoke perception of depicted objects. In a similar way, a reflection of some sensorial feelings appears in visual culture of a collective at later stages of art evolution—as a special reflection on color sensations was developed in impressionists’ paintings.

Depending on cognitive or communicative purposes, various ways of vision can be highlighted in the complex processes of formation, transformation, and interpretation of visual images. For example, it is not always necessary to distinguish the finer details of color shades; to understand whether it is safe to cross the road, it is enough simply to categorise the color as “red” or “green”. Similarly, the red tomatoes and green cucumbers can be viewed in their constant colors independent of different lighting of their parts. However, the painters depicting volumes of these objects learn to change this way of vision and pay attention to the color differences in object’s parts that are lighted differently, to their contrasts, nuances, reflexes, and other relations which are redundant for objects’ recognition.

In various art forms, there is a correlation between aims of vision and its ways. Vision of architects, sculptors, painters, and graphic artists use different methods of internal modelling. A painter focusing on color tasks can limit himself artificially with sensorial way of vision. A draughtsmen depicting forms in pictorial space is

concerning more on the perception of the “world of three-dimensional bodies” separated from their meanings. Some masters of drawing spoke of the need to focus on these volumes, as if “forgetting” any other knowledge about them (see Favorsky, 1988, p. 297).

The working of an artist “from life” need a special combination of the perceptual way of vision with the sensorial one. Another combination of perceptual and apperceptual ways of vision takes place, when an architect planning future building should first internally construct its visual image at the apperceptual way of vision and then create its perspective depiction related to the perceptual way of vision.

Ways of Vision in Communicative Processes

Ways of Shifted Comprehension in Visual Communication

The ways of vision discussed above are involved not only in cognitive processes, but also in the processes of communication, which are regulated by appropriate codes. Like the verbal language mediates both these dimensions of activity, the visual-spatial codes influence ways of vision in both intra-subjective and inter-subjective processes. The dissemination of visual-spatial codes in culture introduces into consciousness their infralogical schematism, compliance with which is a necessary condition for the appropriate perception and interpretation of meaningful visible objects in a certain visual culture.

Some of these codes regulate the *shifted comprehension* of the visible bearers of meanings, their correct reading, in a broad sense. For example, a picture can be viewed directly—as a hard impenetrable object on a wall among other similar objects. It can be viewed also indirectly—as a penetrable space, where depicted objects are placed. So, the painted canvas artificially stimulates a *shifted perception* of depicted objects that really absent in the space for the viewer (cf. Gibson, 1979, pp. 283, 291). The correct vision of the picture needs a selection of relevant elements and structures for this shifted perception.

It is possible to distinct types of the shifted comprehension connected with different ways of forming visual images and their interpretation, which are mediated by the relevant semiotic systems (see Tchertov, 2018; 2022; 2024a). Among them, the sensography, perceptography, pictography, ideography, and phonemography can be distinguished as various ways of visual communication, which are formed and interpreted with different visual-spatial codes.

In particular, the *sensograms* can be considered as the means of communication intended to *shifted sensations*—such way of vision, which links sensed shapes and colors with some quasi-sensorial images of other modalities: sounds, tastes, smells, warmth sensations, etc. The connections of the sensorial visual images with these infralogical meanings are provided by various *synesthetic codes*: color-sound, color-thermal, morpho-tactile, and similar (see Tchertov, 2019, pp. 438-447).

Another way of visual communication takes place, when a sender of a message deliberately stimulates formation by a viewer of quasi-perceptual images, i.e. the *shifted perception* of depicted objects. In these cases, the sensorial data prepared by a painter serve as a *perceptogram* evoking its perceptual meaning. This way of vision becomes a psycho-semiotic ground for the *perceptographic way* of communication through pictures. There are different methods of the perceptography due to diverse possibilities to find indexes of depicted objects in artists’ reflection of their seeing processes. Unlike the impressionistic way of vision that is directed firstly on the organization of the sensed colors, or a “painterly” mode of vision by Baroque painters, the older tradition is directed first on the organization of lines and linearly treated forms (cf. Wölfflin, 1950, Chap. I). The method of the linear perspective elaborated by Renaissance artists gives the means for fixation of a linear structure of optical

data that the artists sense in their own visual field, its externalisation on a painting surface, and thereby stimulation of shifted perception of depicted objects. Each of these methods, including the linear perspective, can be considered as a version of the *perceptographic code* (see Tchertov, 2005; 2024b).

Unlike the perceptograms, *pictograms* do not need detailed sensory data to the shifted recognition of objects depicted in simplified form. With the *pictographic code*, just a few cues are enough to trigger a recognition scheme that functions in this case as the infralogical meaning of a pictogram. In such a way, a *shifted recognition* of the depicted object is performed. However, the pictograms usually have more complex symbolic or emblematic meanings, if themselves objects denoted by them serve as signs of some ideas, emblems of institutions, heraldic symbols, etc. In these cases, another semiotic system is added to the pictographic code. For example, a pictogram of an eagle can serve due to the *heraldic code* not only as a simple depiction of the bird, but also as an emblem of the Habsburg's house.

The *ideograms* do not open denoted objects for viewer's perception, but connect them to certain logical concepts. The *ideographic way* of visual communication is regarded to their *shifted understanding*, when graphical signs are "transparent" for their logical meanings. At the same time, the perception and recognition of these signs are direct. For their recognition, some minimal sensorial and perceptual images should be formed in the expression plane of an *ideographic code*.

In this relation, the ideograms are similar to the letters of the alphabetic writing, but are different from them by ways of reading, that is, by ways of the shifted vision. The *letters* have as their direct meaning certain phonemes of a verbal language, and only through them they mediate the meanings of the words. They are therefore the *phonemograms* disposed to such way of the shifted vision that connects their visible shapes with phonemes of a verbal language. However, unlike sensograms with color-sound synaesthesia or musical notes, these connections are regulated by the conventions of this language and alphabetic writing.

In the same series of notions, it is possible to speak on the *conceptograms* as on such graphical means of object's representation and inter-subject communication, which help to visualise relations between some abstract concepts. These semiotic means participate also in intra-subjective activity of thinking, where they connect both logical and infralogical levels of mental modelling. Their externalization can take forms of mathematical graphs or diagrams representing some invisible relations through visible spatial configurations. The famous examples of the conceptograms are the Euler's circles and Wenn's diagrams, which represent the relations between logical classes through visible relationships among geometric figures. The conceptograms are not ready recognisable signs, but their meaningful forms should be built by authors and readers as spatial models representing some non-spatial relations (see Tchertov, 2023).

Different Participation of Vision Ways in Structures of Spatial Codes

Visual images formed by various ways can be differently included in structures of visual-spatial codes, and accordingly have different functions in them. Firstly, sensograms, perceptograms, pictograms, ideograms, or phonemograms can be included in the *expression planes* of the appropriate codes (in their "psychical substance of expression", using terms by L. Hjelmslev, 1961) and function there as their elements. Each of the codes connects these means of the shifted comprehension to their meanings, which can belong to logical or infralogical levels of interpretation (cf. Tchertov, 2024a). However, not all of these meanings are formed as visual images.

Some visual images take place as infralogical meanings in the *content plane* of certain spatial codes. So, a perceptographic code helps to form in its content plane the shifted visual perception of the depicted objects. In a

similar way the content plane in pure pictographic codes (without their connotative meanings) is formed by the simplified images of recognised objects. However, the visual images absent in the content plane of ideograms, because, by definition, their meanings are formed by logical concepts. The visual images are absent also in such sensograms, which have in their content planes quasi-sensorial images of other modalities.

Meanwhile, some sensograms can have different visual images in both their expression and content planes. They can be included in perceptograms—as it is often in impressionist and post-impressionist paintings. For example, “the green grass” in the content plane of the perceptographic code is represented often there with many other colors of its expression plane.

At the same time, the visual images, which are created in the content planes of pictures as in result of their shifted vision, can be themselves interpreted using other spatial codes, where these images will be included in their expression plane. An example of such double shifting by the means of the pictographic and heraldic codes was already mentioned in case of the Habsburg’s emblem with the pictogram of the eagle. In a similar way, the figures depicted in the content plane of the perceptographic code can be interpreted using spatial codes of gesticulation, face expression, dress codes, and other semiotic systems.

In such a way, *diverse psycho-semiotic types* of visual codes can be distinguished depending on participation of certain vision ways in their planes of expression and contents (see Tchertov, 2018). In particular, the synesthetic codes belong to the *sensorial-quasi-sensorial* psycho-semiotic type—as far as both units of the expression plane and their meanings are formed with sensorial way of images formation. The perceptographic code belongs to the *sensorial-perceptual* type, insofar as it connects sensorial data presented in its expression plane with shifted perception of objects represented in its content plane. A simple pictographic code connecting perceptual images with recognition schemes belongs to the *perceptual-apperceptual* type of codes. As far as some other codes connect objects recognized on the apperceptual level with ideas of the conceptual level, like the heraldic code, they should be related to the *apperceptual-conceptual* type. The same type includes also *ideographic codes* as well, because their units also are recognized signs connected with certain concepts. The *conceptograms* can be related to the *perceptual-conceptual* type of connections between the expression and content planes, as far as certain links between a modelling configuration and modelled objects are established.

The visual-spatial codes influencing the ways of vision can have their natural roots, if they are determinate by natural seeing processes. So, synesthetic codes participating in the creation of sensograms are grounded on some natural connections between images of different modalities. In a similar way, the perceptograms formed by a version of the perceptographic code have connections with natural processes of interpretation of linear and color configurations in visual field as spatial objects of the visible world. However, all these codes undergo to cultural influences of different degrees, especially in art creativity.

Ways of Vision in Pictorial Representation and Communication

The psycho-semiotic distinctions in diverse ways of vision and connected shifted comprehension can be useful in studies of pictorial means of objects representation and inter-subject communication (see Tchertov, 2025). The artists of different periods and stylistic directions preferred diverse “forms of vision”, as H. Wölfflin and other art historians have shown. Some of such differences in art culture can be described also as distinct relations to the pictographic, perceptographic, and sensographic ways of vision.

These differences are revealed still in the primitive art of diverse stages between the “art of hunters”, and more last “art of the agriculture”. While hunters had to look for animals, anticipating their outlines and depicting

them in more or less detailed perceptograms, people, who did not need to do this and who were engaged in agriculture, were more inclined to use simpler pictograms meant rather for symbolic interpretation.

A domination of pictographic ways of vision in pictorial representation and communication is clear in depictions of Ancient Egypt that have much common with the hieroglyphs of the same epoch. As hieroglyphs evolved, early pictograms transformed into more abstract ideograms, where the connection to meaning no longer depended on the recognition of a visual object's image in a graphical unit (cf. the G. Möller's (1919) table of development of some hieroglyphic signs in: Gelb, 1963, p. 76).

A contraposed evolution had place in Medieval European painting, where the pictographic way of communication was important, insofar as depicted figures should be firstly recognizable due to certain attributes. There are medieval compositions that contain even some features of conceptograms, like mathematical graphs—as depictions of genealogical trees. However, in the historical development at the Renaissance epoch, the early pictograms are transformed into more detailed perceptograms that are able to evoke more complex shifted perception of the depicted objects.

Various versions of the perceptographic code were developed by artists of different places and times. Their variety is revealed, particularly, in diversity of methods to depict visible objects by the means of orthogonal projection, parallel, reverse, and linear perspective (cf. Mochalov, 1983, Panofsky, 1991, Raushenbach, 2001). The distinguished by H. Wölfflin (1950) “linear form of vision” as in Dürer's works, and the “painterly form” as in Rembrandt's pieces, also develop different versions of the perceptographic code (Figure 1a, 1b).



(a)



(b)

Figure 1. a. Albrecht Dürer. *Self-portrait with Landscape* (detail). 1498. Oil on wood. Museo del Prado;
b. Rembrandt van Rijn. *Self-portrait*. 1628. Oil on canvas. Rijksmuseum, Amsterdam

The diversity of this code is connected also with different its relations to the sensorial way of vision and involving of sensograms as special expressive means. An important quality of painting is a using of synesthetic

codes, where quasi-tactile feelings were be evoked by visual images. A famous art historicist B. Berenson (1965, p. 62) wrote even that the giving tactile values to visual impressions is the most essential in the art of painting. An example of such “tactile” approach to depictions is the *trompe’l oil*, which artificially concentrates in the depiction indexes of tactile qualities of represented objects and deliberately makes viewers want to grab them.

The impressionistic form of vision changed such disposition and, on the contrary, weakened the visual-tactile synaesthesia of the depicted objects. Instead, an importance of some other synaesthetic codes was increased, and, for instance, the color-thermal synaesthesia is essential for many works of C. Monet, like his series of paintings with the Rouen Cathedrale (Figure 2a). An attention to the sensorial way of vision and reflection on the color senses by such painters gives the reasons to consider the “records” of their vision on the canvas as the sensograms.

At the same time, a contraposition of the sensorial and perceptual ways of vision and, accordingly, sensographic and perceptographic ways of depiction can become an important moment of the esthetic perception of paintings. A clear example of their comparison and contraposition gives the painting of post-impressionists. On the one hand, their pointillistic painting intends to reconstruct a “mosaic” of color sensations from the visual field of a painter and to present for a viewer a combination of discrete paints selected from a “color alphabet”. In such a way, a sensogram with its quasi-sensorial meanings is created. On the other hand, the painted canvas functions as a perceptogram, insofar as it evokes a shifted perception of the depicted objects (Figure 2b).

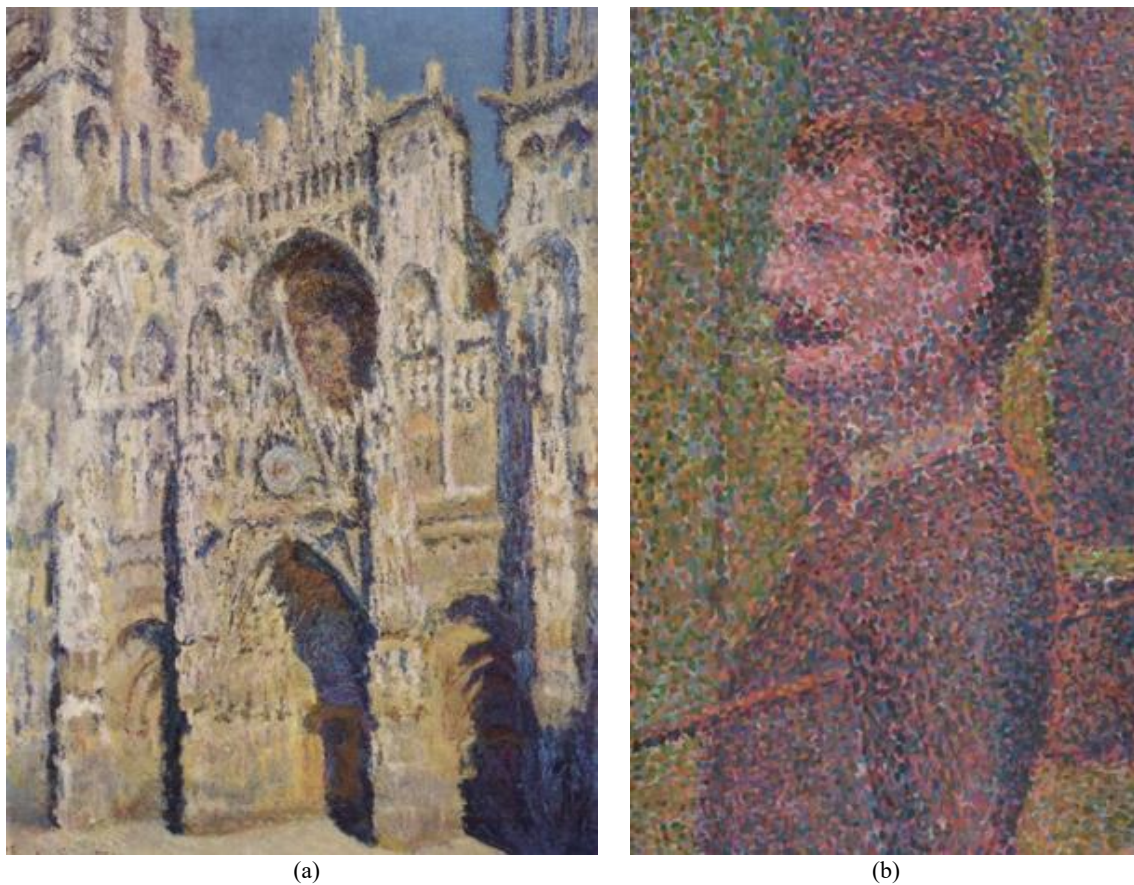


Figure 2. a. Claude Monet: *Rouen Cathedral, Portal and Tower Saint-Romain in the Sun. Harmony in Blue and Gold*. 1893. Oil on canvas. Musée d'Orsay, Paris; b. Georges Seurat. *Circus Sideshow* (detail). 1887-1888. Oil on canvas. Metropolitan Museum of Art, New York.

In the “competition” of the perceptographic and sensographic ways to form visual images, the latter can sometimes completely replace the former. This has place in the sensograms created with the abstract paintings by W. Kandinsky, who himself described a “language of form and color” with synesthetic ways of their interpreting (Kandinsky, 1946, Chap. VI). At the same time, the abstract works of other artists, who also reject the perceptographic way of communication, move to other ways of visual interpretation. For example, the abstract paintings by P. Mondrian, where the pure yellow, red, and blue together with the white and black are selected, should express not sensorial, but conceptual ideas by the author (cf. Mondrian, 1925, p. 24).

The diversity of the vision ways used by artists of different flows demands from viewers an ability to vary their modes of seeing. Therefore, diverse *strategies of vision* should be used by viewers to understand of such variety (see Tchertov, 2019, pp. 471-478).

Conclusion

Thus, it is possible to differ ways of vision as distinct modes of formation and interpretation of visual images in processes of cognition and communication. The images formed with help of the sensorial, perceptual, and apperceptual ways of vision have different elements, structures, and functions in knowing processes. Their differences influence distinctions between the sensograms, perceptograms, pictograms, and other visual mediators of communication. Diverse visual-spatial codes, which connect these visual means with logical or infralogical meanings, regulate their formation and interpretation. Although some of these codes have still natural roots, they are developed in culture and are historically depending on it. In particular, the codes mediating pictorial modes of representation and communication influence vision of painters and viewers. An individual development of artists depends not only on own personal abilities, but also on the “forms of vision” and visual codes, which are dominated in a given visual culture. In its turn, personal features of vision can influence common visual culture—as it were many times in history of paintings.

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