

OPTIC ARRAY: NATURAL AND ARTIFICIAL

VANDA BOŽIČEVIĆ
Filozofski fakultet u Zadru
Faculty of Filosofy in Zadar

UDK/UDC: 18
Izlaganje sa znanstvenog skupa
Conference paper

Primljeno: 1989 — 01-13
Received

The article deals with J. J. Gibson's account of Paintings as arrested images, inadequate for the study of the principles of natural vision. Accepting most of Gibson's insights, the author discovers some incongruities of his account which lead Gibson to treat paintings as being less informative than an ambient optic array. Stressing the fact that a chirographic picture is an intentionally produced visual pattern, an extract of visual information, an informational constant which is invariant in every respect, the author reaches the conclusion that the complexity of pictorial codes may neither be considered as an evidence supporting the thesis about pictorial invariants being weaker and formless, nor does it prove the study of paintings to be irrelevant for the study of perception.

The aim of this article is to characterize the relationship between the perception of a natural optic array and the perception of pictures, in this case — of artistic paintings. The question whether and to what extent do principles of natural vision correspond to the principles of perception of an artificially produced optic array is brought to focus by the recent discussion between the psychologist of perception J. J. Gibson and the theoretician of art E. H. Gombrich. It is our intention to proceed with the discussion commenting and criticizing some of Gibson's views.

The importance of immediate visual experience for the creation and understanding of paintings seems an undeniable and trivial fact. Less trivial seems to be the claim that this experience be not only necessary, but also sufficient to explain the activities performed by the painter and the recipient. This claim is obviously not true in the case of painters who are recognized not only as extremely sensitive percipients but also as artists endowed with special skills — partly innate, partly mastered by training. On the other hand this claim was believed to be true of recipients. Our ability to perceive the visual world seemed to be all that was needed for the understanding of paintings. To the extent to which artists themselves believed their aim was to copy reality they supported this common opinion according to which each percipient is a competent recipient.

The line connecting the perception of a natural and of an artificial optic array was believed to be straightforward and unproblematic, not only by the painters and their public, but also by the researchers of perception. Transferring to psychology the geometric rule that relations of forms on twodimensional plane are more elementary than the relations of bodies in threedimensional space, psychologists considered the perception of the twodimensional static picture to be the simplest case of vision, out of which the main principles of vision may be inferred.

Perception of moving bodies in threedimensional space was regarded as a more complex case which presupposes not a single projection on the retina, but a series of them. The key for understanding vision, the formation of the retinal image, was explained using the laws of classical optics considering the reflection of light and the emergence of a picture in a dark chamber. The problem psychologists strived to solve was the same one Renaissance artists were preoccupied with, namely, what are the principles of projection of threedimensional space on to a twodimensional surface.

The twodimensional static picture was thus of double importance to traditional psychology. First, its perception was regarded to be the simplest case of vision, and second, pictures contained information about the principles of projection which rule the formation of retinal image. Thanks to these affordances the twodimensional static image functioned as the model of natural perception, theory of artificial perspective gaining followers not only among the artists, but also among the students of natural perception.

This happy marriage between the artificial and the natural finally broke, both parties asking for their own rights. Modern painters, theoreticians of art and aestheticians claim painting should not be understood as a substitute for natural perception, but in its own right, as a specific symbolic system with its own specific codes, norms and conventions. The experience of natural perception turned out to be insufficient for the understanding of pictures, and in fact misquiding, reducing the semantical and syntactical complexity of pictorial codes to the straightforward simplicity of natural vision.

The same reaction came from the other side. Striving to discover the principles of natural perception psychologists, primarily J. J. Gibson, refused to treat the picture as a perceptual model, showing unreconcilable differences between our perception of a natural and our reception of an artificial optic array. The perception of painting was recognized as a wholly artificial af-

fair from which we may draw no inferences regarding the principles of natural vision. Although Gibson admits painters were the first researchers in the field of visual perception¹, their investigations turned out to be misleading, or in the best case, irrelevant for the understanding of natural perception.

As Gibson's Primary intention was to divorce the natural from the artificial, stressing the autonomy of the first, his account of the art of painting turned out to be onesided and unjust. It is against this unjust treatment that Gombrich reacted, defending the significance of artistic conventions and the plausibility of an autonomous artistic standard of truth. Although our final goal is the same one as Gombrich's, we have chosen different strategies to reach it.

We are going to accept the following points by Gibson:

1) the formation of the retinal image is not the central phenomenon the analysis of which leads to the explanation of visual perception.

2) It is inadequate and misleading to treat the perception of the picture as the model of natural vision.

3) The perception of an arrested image is a more complex achievement than the perception of an ambient optic array.

4) The picture is neither an illusion of reality, nor an imitation of past seeing it is not a substitute but an artificial display of information.

Accepting these points we are going to argue against Gibson's central characterization of pictures.

5) Invariants picked up in an arrested image are weak, ambiguous and formless.

Departing from Gibson at this point we aim at rejecting his consequence, naemly.

6) Research on perception may not profit from the study of paintings.

1)

Quite surprisingly, contrary to the traditional approach, Gibson proclaimed the retinal image to be unnecessary for vi-

¹ »But actually the artist as much as the psychologist, was experimenting with perception all along, even if not formally.« — Gibson, J a m e s J . : *The Ecological Approach to Visual Perception*, Houghton Mifflin Company, Boston, 1979. P. 268.

sion². Redefining perception as »an achievement of the individual«³, a continuous pickup of information from the changeable ambient optic array, Gibson did not focus his investigation on a single, static retinal image, but on a dynamic flow of visual experience. The theory of perception was no more understood as the theory of image formation, but as the theory of the information pickup, retinal image optics was replaced by the ecological one.

According to Gibson, perceptual information is grasped neither by representation, nor by point-to-point projection or reflection of the visible world on the retina of the eye, but by the extraction of invariants of structure from the flux of information. This extraction presupposes »registering of both persistence and change in the flow of structured information«⁴ i. e. invariants in the flux are recognized at the same time as the flux itself. This cooccurrence of the variant and invariant aspects that generate perceptual information corresponds to the balance between the redundant and the novel elements that enables the transmittance of information according to semiotic principles. No information is transmitted by the message which contains only redundant or only novel elements, correspondingly — no perceptual information would be available if the flux of stimulation contained no invariant elements or in the case of the constant presence of a single, unchangeable stimulus.

From this point of view, the emergence of a single and invariant retinal image is not the most elementary, but rather a limiting case of vision. The problem the psychologist has to answer isn't how do we read spatial relations from a flat surface, but rather how is it possible that we perceive anything in a static, unchangeable scene. An account of vision, namely, could never be inferred from an account of a single retinal image, on the contrary, the account of a single retinal image must be inferred from the account of vision as a dynamic experience.

2)

According to Gibson, static, unchangeable stimulus may in no case be regarded as typical of our perceptual experience, on the contrary, only changes of a static scene induce perceptual information. Thus, perceptual information depends on the change

² »The registering of differences of intensity in different directions is necessary for visual perception; the formation of a retinal image is not.« Gibson (1979), P.62

³ *ibid.*, p. 239

of the relative position of our eye and of the things observed and is in fact twofold: it is information about our surroundings and information about ourselves.

The typical perceptual situation is when we move through our environment exploring it. Information pickup results from an activity of exploring,⁵ and not from the passive absorption of stimuli. It is not only the retina of our eye which is engaged in perception. Ocular movements, binocular disparity, head movements and body movements are not less important for the vision than the retinal image itself. Perception is not an achievement of a single organ, but of the whole perceptual system⁶.

The perception of a picture does not correspond to the typical perceptual situation as described by Gibson. A picture is an unchangeable visual pattern which fixes the relative position of the observer and the observed not only thanks to the static character of the picture itself but also because it usually dictates a single unmoving point of observation. As observation, according to Gibson, implies movement, »a point of observation at rest is only the limiting case of a point of observation in motion, the null case«⁷. Leaving the relative position of the observer and the observed unchanged, the perception of a picture does not manifest the twofold character of visual information it engages only our eye leaving the rest of our perceptual system out of function.

Another reason which makes the picture an inadequate model of a natural optic array is the fact that the picture is a limited, whereas the natural optic array is and unbounded, spheric visual field. We do not see the world through a peep-hole, an ambient optic array must surround the point of observation completely⁸.

Stressing all the differences between the perception of the natural and of the artificial optic array, Gibson proclaimed the picture to be an inadequate model of vision. Being the limiting, null case of perception, the perception of pictures may be explained after the account of natural vision has already been given.

⁴ *ibid*, p. 239

⁵ »... looking is always exploring...«, *ibid*, p. 212

⁶ »One sees the environment not with the eyes but with the eyes-on-the-head-on-the-body-resting-on-the-ground.«, *ibid*. p. 205

⁷ *ibid*, p. 72

⁸ *ibid*, p. 65

3)

Up to this point the perception of pictures was identified with a view through the peephole at a static scene. We have recognized it as different from the typical case of natural vision, namely as the perception of a static and limited visual field, prescribing a static point of observation, engaging only the observer's eye and not the entire perceptual system. This description, however, is only partial.

Different from the aperture vision, the perception of pictures, in this case — of paintings, engages us in a twofold activity: we may either perceive the picture as an object in our surrounding, a part of ambient optic array, or we may perceive it as an artificial optic array, a presented scene. »The picture is both a scene and a surface, and the scene is paradoxically behind the surface«⁹.

Gibson claims this dual kind of apprehension goes on at the same time, one of them being direct and the other indirect.¹⁰ Directly we perceive the picture as a surface among other surfaces in our ambient, indirectly we perceive surfaces in the picture. At this point we must disagree with Gibson. He neither gives us an account of the notion of indirect perception which is contrary to his own theory of vision, nor does he explain how is it possible for the recipient to perform two discrepant activities at the same time. To avoid this confusion let us claim that the two kinds of apprehensions are both perceptions which do not occur at the same time. As they are discrepant ways of perceiving, we may either see picture as an object or see the presented scene. As a matter of fact if we are to see picture as a scene we must abstain from seeing it as a surface, otherwise the objects presented dissolve into the patches of paint and strokes of the brush.

Whatever the case may be it is obvious that the perception of a picture is a more complex activity than natural vision. It either involves both the direct perception of its surface and the indirect perception of the scene or is an alternating perception of either the surface, or the scene. In fact it is only the perception of the scene which declines from the case of natural perception; the perception of pictorial surface is just another case of perceiving the ambient optic array.

⁹ *ibid.*, p. 281

¹⁰ *ibid.*, p. 283

4)

Having accepted the view that the perception of pictures involves two kinds of perception going on at the same time, Gibson found the idea, that the picture is an illusion of reality implausible. If we see the surface of the picture at the same time as the scene, how could we ever believe in the existence of virtual objects? Interpreting the notion of »illusion« ad »delusion«, Gibson proclaimed the illusion of reality a myth supported by the prevalent view on perception — retinal image optics.¹¹

For the same reason Gibson rejected the idea that the picture was a »literalre-presentation of an earlier optic array«, »an imitation of past seeing«. He claimed pictures were neither substitutes for absent objects nor for a past experiences, but displays which »record, register, or consolidate information«.¹²

Although Gibson's arguing against the plausibility of the concepts of illusion and representation reveals no more than a simplified and superficial understanding of aesthetic disputes, we do not doubt his conclusion — pictures are indeed displays of visual information.

5)

Although Gibson argued against identifying pictures with copies, projections, illusions, representations or substitutes of any kind, he preserved the criterion of their characterization based on the comparison between pictures and the natural optic array. Considering the perception of pictures as a limiting case, parasitic upon normal vision, he transferred the principle of natural vision, the pickup of the invariants of structure, to the perception of paintings.

If, according to Gibson, the perception of an object implies abstracting its invariant structure from changing perspectives of its appearance, to perceive an object in a painting would be possible only if we were able to abstract its invariant structure from a single, static perspective. The fact that we can understand pictures forced Gibson to acknowledge such a possibility, although it contradicts his main point about vision being a dynamic experience. Nevertheless, to separate persistent properties from the changeable ones in an unchanging scene seems a complicated enough procedure. Therefore, Gibson proclaimed pictorial invariants to be weaker and more ambiguous than invariants picked up in a natural optic array.

¹¹ *ibid.*, p. 281

¹² *ibid.*, pp. 279, 280

An arrested image, a single from, Gibson argues, contains some of the invariants belonging to the family of forms i.e. to the changing appearances of the same object. If the perception of an object depends on the detection of invariant features which underlie transformation, invariants themselves must be understood as formless. Hence, to perceive an object in a picture means to separate its appearance, its form from its underlying, formless, invariant structure. Thus, Gibson argues, although the picture consists of forms, what we perceive, the underlying invariants, are formless.¹³

Because of the limitations of an artificial optic array, the perception of virtual objects, the pickup of pictorial invariants is more complex and less efficient than the perception of objects in the natural optic array. Information that we pick up in the course of natural vision is, according to Gibson, not only more easily available, but also is unlimited, whereas only a limited number of invariants may be preserved by a picture. Our ambient optic array, Gibson argues, is an inexhaustible source of information, whereas a picture is an exhaustible one.¹⁴

Gibson's account of pictures makes the production of paintings hardly reasonable. Why on earth should we bother to produce pictures of objects which can more easily and fully be seen directly? As photography functions as a more successive means for the purposes of registration and instruction, paintings seem to be deprived of their informative value.

The problem with Gibson's account of paintings lies in his overlooking the difference between the kind of information contained in the ambient optic array and the kind of information displayed by the picture. Defining perception as information pickup Gibson uses the term »information« in a sense inappropriate for the theory of communication.¹⁵ There is no transmitter and no coded message; information in the »sea of energy« surrounding us is not conveyed, but simply is there. The amount of information contained in an ambient optic array is in principle inexhaustible; exploring, we can always reveal new facts about the world.

According to the realist theory of perception, each perception is a pick up of certain information; a choice of a certain invariant among the possible ones. Which of the invariants will be extracted, as well as their number in a certain period of time, de-

¹³ Gibson defines picture as »an array of persisting invariants of structure that are nameless and formless.«, *ibid.* p. 271

¹⁴ *ibid.*, p. 279

¹⁵ *ibid.*, p. 242,

depends on a great number of factors, such as the illumination, the functioning of our perceptual system, our interests, beliefs, attention, intentions etc. Thus, the pickup of an invariant is typically a function of a great number of variables. Although the number of invariants is potentially unlimited, actually we always perceive a limited amount of information.

Unlike the ambient optic array, the picture is an intentionally produced visual pattern, a message containing actual, and not only potential information. The picture is a display of information that is not simply there, but is already apprehended by the painter, encoded in a specific visual pattern and addressed to the potential recipient. As a persistent actual message the picture is invariant not only in the trivial sense of being frozen in time, being unchangeable, but also because it is an already extracted and encoded information. Proclaiming pictorial invariants to be weaker and more ambiguous than those picked up in the natural optic array, Gibson forgets that his notion of information was derived from symbolic ways of communication, such as pictures, he forgets that it is reception, and not perception that is a genuine pickup of invariants.

As distinguished from the case of natural perception where the choice of invariants depends on the percipient, pictorial invariants have already been picked up, registered and encoded by the painter. There is nothing variant in a picture. In a successful painting information is encoded in each stroke of the brush, no element of a successful painting may be regarded as irrelevant, as a form of appearance from which we have to extract what is relevant, invariant, i.e. informative. The picture is a record of visual information that has already been extracted by the painter and made constantly available to the recipient. The picture is an informational constant, an extract of visual information.

In typical perceptual situations visual information is only one part of the amount of processed information, whereas in the case of pictures it is only visual information that is extracted and presented of the observer. Thus, pictures enable us to concentrate on the visual aspect of our experience. They present nothing but visual information and engage us only as observers. Unlike the cases of natural perception where visual information usually serves some other purposes, in an artificially produced optic array visual information is presented for its own sake.

By extraction and an exclusive concentration on the visual information as well as by storing it and making it available, pictures make us aware of the visual complexity of our world. Transient and fluid aspects and appearances of objects that are re-

garded as irrelevant in the course of natural perception, once extracted and arrested in an image prove to be informative as well. A single member of the family of forms belonging to one invariant underlying structure contains not only information about the family to which it belongs, but becomes important for its own sake. Form extracted and represented by the painter is not an incidental snapshot from a series, but is noticed and intentionally registered by the painter and hence invariant. As forms themselves are pictorial invariants it is absurd to regard pictorial invariants to be formless. The information of an artistic painting is not reached by abstraction from its form because it is identical with it.

A recipient who transfers the principle of natural perception — the pickup of underlying formless invariants, to the perception of an artificial optic array does not understand the specific pictorial information which is not hidden behind the form, but lies in the form itself. Such a recipient simply recognizes virtual objects, the »what« of the picture, paying no attention to its »how«. A recipient who understands pictorial information, on the contrary, recognizes the ways of presentation as being significant, informative, he recognizes the painter's choice of invariants as justifiable.

Such a recipient is not only an ordinary percipient, but a person who has mastered specific pictorial codes and thus has learnt to recognize the reasons of a certain artistic choice. The knowledge he has gained governs his perception of pictures, becomes one of the variables which determine his choice of invariants.

The reception of pictures requires some extra knowledge that an ordinary perceiver lacks and which determines what will be perceived. Gibson himself proved the gap between perception and knowledge to be an arbitrary one.¹⁶ If perceiving is but a pickup of information, the kind of information that stands at our disposal determines our perception, determines what will be the next information that we are going to pick up. Thus the reception of pictures is not a mysterious act of quasi-perception. Projection of mental images or images or imagining, but simply perception that is based on a certain amount of knowledge already attained, either by perception, or by verbal descriptions. Although the reception of pictures is more complicated because of the restrictions described in points 1-3, although it requires an awareness of pictures as displays of information, and although

¹⁶ *ibid*, p. 258,

it requires some knowledge of specific pictorial codes, it still is no more than an affair of perception.

6)

Thus, although pictures are not adequate models with which the study of natural perception should begin, although their reception requires some extra restrictions and some extra knowledge, they still require and develop nothing else but our perceptual skills. Gibson himself recognized pictures as ways to »facilitate knowing, to aid perceiving, or to extend the limits of comprehension«.¹⁷ If pictures perform these functions it is difficult to understand how they could be considered to be irrelevant for the study of perception. Of course, they are not the first step, but surely one of the important stages in the explanation of the potentials of our perceptual skills. Namely, pictures teach us to observe more attentively, they facilitate perceptual informational pickup and make us aware of it. If our perceptual skills profit from the reception of paintings, the study of perception should profit from it as well.

¹⁷ *ibid*, p. 258

REFERENCES:

1. Gibson, James J.: *The Ecological Approach to Visual Perception*, Houghton Mifflin Company, Boston, 1979
2. Gombrich, E. G.: »The 'What' and the 'How' — Perspective Representation and the Phenomenal World«, *Logic and Art*, The Bobbs Merrill Comp., 1972, pp. 129—149
3. Gombrich, Ernst G.: »Standards of Truth: The Arrested Image and the Moving Eye«, *Critical Inquiry*, Winter, 1980. Vol. 7. No 2, pp. 237—275

Vanda Božičević: OPTIČKI RASPORED: PRIRODNI I ARTIFICIJELNI

Sažetak

Članak je posvećen stavovima o slikarstvu psihologa percepcije J.J. Gibsona. Prihvatajući većinu Gibsonovih postavki autorica otkriva neke proturječnosti Gibsonovog objašnjenja koje rezultiraju njegovim stavom da su slike manje informativne od našeg vidljivog okoliša, te da su neadekvatne za proučavanje principa prirodne percepcije. Naglasivši činjenicu da je kirografska slika namjerno proizveden vizualni uzorak, ekstrakt vizualne informacije, informacijska konstanta, invarijantna u svakom pogledu, autorica zaključuje da složenost likovnih kodova ne dokazuje da su slikovne invarijante slabe i bezoblične, niti da je proučavanje slikarstva irelevantno za razumijevanje percepcije.