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VECTOR FIELD IN FIGURAL COMPOSITION

Key words: concept and mesh of vector field, Köhler's figural after-effects, Köhler-Wallach's explanation of satiation, triangular gamma movement, triangular composition in Kandinsky.

ABSTRACT

The paper discusses the vector field as a tool for understanding figural composition in painting and sculpture. In the same way as format, artistic space and spatial cross, the concept of a pictorial field is classified among the nonmimetic elements of the image-sign. The standpoint is taken that the origin of a field is psychological. The contents of the field speak of oriented tensions, psychological forces and the visual field of forces, which man observes simultaneously with the distribution of objects. On the basis of the previously mentioned principles, a triangular and vector coordinated mesh is created as the material base of the field. With the mesh, the vector field acquires operational value in the formal analysis of artistic works.

I. CONCEPT OF FIELD

Origin of field: The word field first appeared as a scientific term in physics. Field is the basic term for defining the physical phenomena used to describe the forces between bodies in space. It was first introduced in the 19th century by physicist Faraday to explain the remote generation of electromagnetic forces. This represented a decisive step in understanding the generation of forces in space. Later on, the field concept led to the formation of Maxwell's equations, which present the structure of an electromagnetic field. This concept then moved from physics to the field of psychology (Gestalt psychology), and later to painting (colour field, pictorial field).

Assumptions on the origin of the psychological field. In psychology, the field is perceived multilaterally: from the phenomenal aspect, as something visible (e.g. a homogeneous,

differentiated, complex sensory field), coloured, audible and touchable; from the aspect of personality (Lewin), it is viewed as a field of interhuman relations. Gestalt psychology substantiated its interpretation of a phenomenal field analogically with a magnetic field, which is comprised of forces distributed around a magnet. It was focused on searching for the physiological bases of phenomenological gestalts. Thus, the configuration of physiological or nerve processes corresponded isomorphically to each phenomenological organization. "Isomorphism means that all empirical distributions in time and space are" a true representation of the corresponding arrangement in the pertaining dynamic context of physiological processes."[1] "Köhler assumed that phenomenal fields relate to electrochemical fields in the sensorial parts of the brain. In his opinion, a stimulus (e.g. perceived figure) is produced by a different concentration of ions in the visible part of the cortex (retina). Because the ions begin to spread from those parts with a higher concentration to those with a smaller concentration, one part becomes electropositive with respect to the other part. Owing to the difference in electric potentials, a current is formed, circulating from the cortical part of the figure into the base or background. The current is denser inside a part of the figure, whereas outside the figure it spreads outwards on all sides. Due to the varying distribution of potentials in the field, the figure separates from the base and becomes phenomenally more homogeneous, unified, and the base less clear."[2] Köhler : "…a theory of perception must be a field theory. By this we mean that the neutral functions and processes with the perceptual facts are associated in each case are located in a continuous medium; and that the events in one part of this medium influence the events in other regions in a way that depends directly upon the properties of both in their relation to each other. This is the conception with which all physicist work. The field theory of perception applies this simple scheme to the brain correlates of perceptual facts."[3] The origin of the field thus connects to two factors. The first is physiological (originating from the eye structure: demands of the retina, materials for satiation), and the second is psychological (colour

[1] Vid, Pečjak, *Nastajanje psihologije,* Univerzum, Ljubljana, 1983. *cit., p*. 205.

[2] Ibidem /1/, *op. cit*., p. 205.

[3] Wolfgang, Kohler, *Gestalt Psyhology*, Liveright Publishing company, New York, 1929, in: Sherman, Hoyt L., Cezanne and Visual Form,Likovne besede, 39-40, Original text: Duke-Elder, Sir Wiliam Stewart: *Textbook of Opthamology*, Vol 1, St. Louis, Missouri, 1944. *cit., p*. 59.

phenomena, light-dark, illusions, psychological depth signs, switches, gamma movements, etc.). This is also why the action radius and the direction of the field's activity differ.

Consequently, there are various forms of expression for a field in painting. The term field has been arrogated by colours, light-dark, and format as a form of the pictorial field. Within the context of gradients and convergent lines, the line activates the effect of a depth field in linear perspective. Sherman explains Cézanne's method of work with the concentric field, substantiating it with a group of Gestalt principles.[4] In his cycle of paintings entitled Structural Constellations, the artwork of Joseph Albers is based exclusively on the method of switches. According to the minimalist sculptor Morris, „the characteristics of gestalt is, that once it is established, all information about it as a gestalt have been absorbed. For example, noone will look for the gestalt of the gestalt."[5]

Given the above-mentioned, it would seem reasonable to ask whether there is only a single psychological field, or if there are, in fact, many of them. The heterogeneity of extensive gestalt psychological materials enables a variety of field concepts. According to this idea, every phenomenon can induce its own field form. In this case, the phenomenon is a prototype carrier of a specific type of field. On the other hand, some perceptive phenomena mutually support, condition and even overlap one another (e.g. interaction of colour, light-dark and perspective). This leads one to think that perhaps there is only one psychological field and that an individual phenomenon or group of interacting phenomena are merely a special form of activity of this unified field. In this case, the question is how to present such a field.

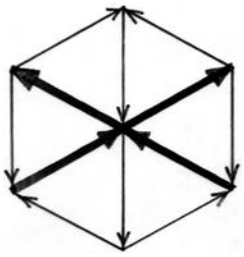
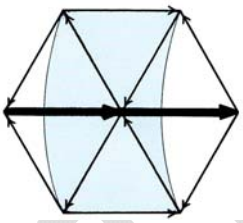
[4] Hoyt L., Sherman, *Cezanne in vizualna forma*. Likovne besede, 38/39, 40/41, 42/43; Original text: Duke-Elder, Sir Wiliam Stewart: *Textbook of Opthamology*, Vol 1, St. Louis, Missouri, 1944.
[5] Daniel, Marzona, Minimal Art, Taschen, Köln, 2004, *cit.,* p. 76

II. REASONS FOR THE INTRODUCTION OF THE VECTOR FIELD IN FIGURAL ART

Presented here are some key texts by Kandinsky, Schapiro and Kalin which, from the standpoint of personal perspective, describe how the authors experience the basic plane in painting, the function of centre in the format, and the role of sculpting volumes in determining a field. It is assumed that a uniform metric base can be arranged in the vector field mesh in two steps.

Kandinski and triangular composition. Kandinskog observations on Cézanne's painting *Large Bathers* (Fig. 1) can be commented as an effect of field. Kandinsky refers to the triangular composition as a "mystic triangle".[6] "This type of construction in a geometrical shape is an old principle, but one which has in recent times been abandoned for having reduced itself to a rigid academic formula incapable of any internal meaning whatsoever, lacking soul. Cézanne, on the other hand, instilled a new soul in this same principle, simultaneously laying particularly strong emphasis on the pure painting/ compositional element. In this significant case, the triangle is not an aid for harmonizing the group, but a loudly proclaimed artistic goal. Here, art form also functions as an aid for composition in painting: the emphasis is on striving for pure painting in strong unison with the abstract. For this reason, Cézanne rightfully changes the proportions of the human body: not only is the whole figure propelling itself towards the tip of the triangle, but also individual parts of the body are pushing upwards from below with increasing intensity, as if caught in an internal storm, and becoming increasingly lighter and visibly more elongated."[7] It is proposed that the field acts as a current directing individual shapes in the pictorial field (the directions in the vector field mesh are shown in Figure 2. To avoid any repetition of pictorial materials, the mesh is shown in each case, but is discussed only in Chapter IV.

[6] Vassilij, Kandinsky, *Über das Geistige in der Kunst* (1912) © Nina Kandinsky 1955; in: Kandinsky, Vassilij, Od točke do slike, Zbrani likovno teoretski spisi (collected, translated and arranged by Marijan Tršar), CZ, Ljubljana, 1985, *cit.,* p. 70
[7] Ibidem, p. 70.

1  2  3 

The method of sculptor Zdenko Kalin has come to be used as a permanent guideline for students of sculpture in modelling of the face or the human figure, as practised by Kalin during his engagement as professor of modelling at the Academy of Fine Arts in Ljubljana. "The sculptural form must satisfy the tendency of the perceptive apparatus to deform the concave form in order to make it level, and to sharpen the convex form into several level segments with the same tendency towards levelling. This will allow the sculptural form to acquire vitality."[8] Our thesis is as follows: It is evident from the foregoing that the binary oppositions of the concave and the convex are directed towards levelling into a straight form (Fig. 3).

Asymmetry of pictorial field in Kandinsky and Shapiro

Kandinsky concludes his observations on format in a text entitled Basic Plane.[9] In his opinion, the division of the basic plane is an example of a general scientific method that is believed to have contributed to the construction of young art science. This is explained in five examples: "the forces of resistance of four sides of a square, internal expression of a square, distribution of weight inside a square, the determination of two diagonals with different meanings (harmonic and disharmonic), and the differences in tensions from the center. Kandinsky finds the reason for the above-mentioned experiences in the fact that "every living being is and must remain in continuous proportion to the positions above, below, left and right, which is why these qualities are also transferred to the Basic Plane, which for this reason represents a living being to the

[8] Marjan, Drev, *Zapiski ob modeliranju*, 1977. (unpublished)
[9] Vassilij, Kandinsky, *Punkt und Linie zu Fläche, (1925), © Nina Kandinsky 1955*, *Od točke do slike,* Zbrani likovno teoretski spisi (collected, translated and arranged by Marijan Tršar), CZ, Ljubljana, 1985, *op. cit*., p. 188- 212.

artist.[10] "The only point that expresses the most complete tranquillity is the center of the square and the circle."[11]

Schapiro gives some examples confirming Kandinsky's assumptions on the asymmetry of the pictorial field. He proves the expressive qualities of the field through the different ways of experiencing broad and narrow, up and down, left and right, central and marginal, the corners and the rest of the space. On two examples he shows that field symmetry is not applicable in the direction left-right (lateral symmetry) and in the direction of the positions up-down (vertical symmetry), and their compositions are noncommutative (they cannot be copied into mirror images without changing their expressive value)."[12] Our thesis is that, except for the center, the pictorial field is a dynamic and asymmetrical artistic formation.

III. **PSYCHOLOGICAL REASONS FOR AND JUSTIFICATION OF VECTOR FIELD**

This chapter examines three Gestalt principles. These have a double function: first – to justify the above-mentioned materials, and second – to show the characteristics of the field: perceptive displacements of pictorial materials, deformation of pictorial materials (expansion and shrinking) and exposition of left twist as a positive direction within the pictorial field. It is expected that the principles have a topos, which is necessary for the formation of a mesh.

1. Köhler's figural after-effects

"Köhler's figural after-effects should be understood to mean the perceptive shifts occurring in models if, immediately beforehand, the testee fixes his view on another model in the same area

[10] Ibidem /7/, *op. cit*., p. 188-189.
[11] Ibidem /7/, *op. cit*., p. 194.
[12] Mayer, Shapiro, *On some Problems in the Semiotics of Visual Art: Field and Vehicle in Image-signs, 1969*; v George Brazziler, Inc. (Meyer Shapiro, Theory and Philosophy of Art: Style, Artist and Society, 1994, p. 1-32); Shapiro, Mayer, *O nekaterih problemih iz semiotike likovne umetnosti: Polje in medij pri podobotvornih znakih*, Likovne besede št. 38, Ljubljana, 1996, *op. cit.,* p. 96-98.

of the visual field. For example, if we always fixate the same point midway between the upper and lower black rectangles, the upper rectangle will shift to the right and the lower one will shift to the left, appearing g as if they are no longer standing vertically one above the other."[13] Under this principle, the left twist in the field of the Gestalt mesh (twist in clockwise direction) is meaningfully defined as positive, and the right twist as negative (Fig. 4). The principle exposes two qualities of a field: the role of the center, and rotation. The center is the referential point for determining the perceptive shifts and twists of a field. A similar statement was made above by Kandinsky: The only point expressing the most complete tranquillity is the center of the square and the circle. By means of rotation, the field accepts the quality of left and right twist, as well as the meaningful advantage of left shift before right shift. This reveals that asymmetry becomes a fundamental quality of the field (Fig. 5).

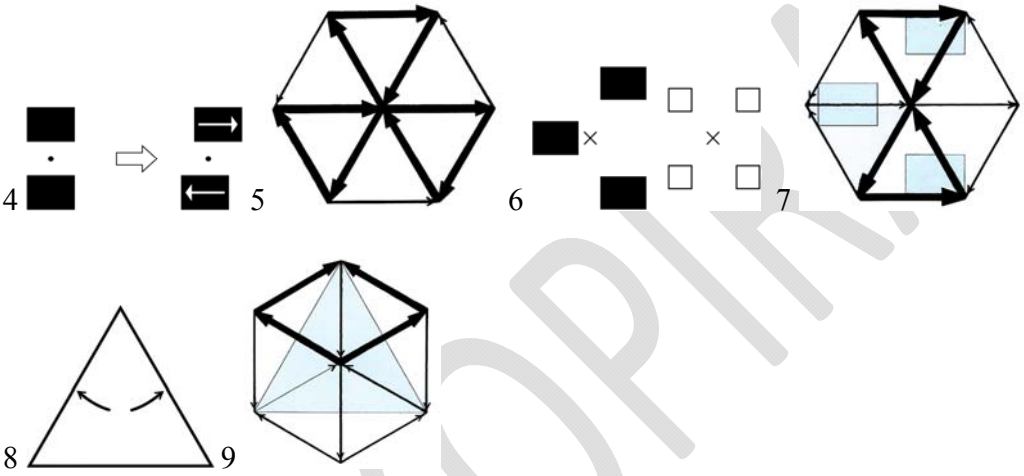
2 Köhler-Wallach's interpretation of satiation (Fig. 6) is one of the most famous Gestalt principles. The materials needed for the experiment are as follows: "Stare at point X between the black shapes for a longer time, e.g. 35 to 40 seconds, then quickly stare at point X between the white rectangles. The distance between the left squares will expand and the distance between the right squares will narrow. If there is no effect, repeat the test and extend the viewing time."[14] This principle proves the following quality of the field: the forces of the field or the directional tensions deform the perceptive materials by expansion and shrinking. Also of relevance here is Kalin's intuitive assumption: the forces of a field expand a concave form and contract a convex form (Fig. 7).

3. Triangular gamma movement

"Gamma movement occurs when objects suddenly appear and disappear. These include, for example, flashing traffic signs, which at the time of turning on appear to be spreading outwards

[13] Anton, Trstenjak, *Oris sodobne psihologije* 2, Obzorja, Maribor, 1971.
[14] Ibidem /1/, p. 206.

from the center in all directions. The turning off of lights, on the other hand, is seen as the contraction of a sheaf of light rays. In the specific case of triangular gamma movement when the triangle is lying on the baseline, the base remains calm, while the other two sides stretch sideways and upwards as if joined by a hinge on the top of the triangle."[15] (Fig. 8) The exposed quality of the field is that the forces bend the sides of the triangle. By its directional tensions, triangular gamma movement is similar to Kandinsky's assumptions on triangular composition, where the field bends the bodies (Fig. 9).



IV. DETERMINATION OF MESH

The task of this chapter is to translate word messages into geometric messages, content into form – topos, and the effects of directional tensions into vectors. The functioning of the above-mentioned principles provide for the creation of metric principles for determination of a mesh.

The word mesh brings to mind a homogeneous knit comprised of similar units which it is practically impossible to separate and display, but the basic elements and principles uniting them can be determined. These elements are mesh lines, vertices of intersection, and cells as the space in-between. Meshes differ according to function (e.g. compositional, structural, cartographic, mesh of interhuman relations), structure (planar, spatial, regular or irregular), and shape (e.g.

[15] Ibidem /11/, *cit.,* p. 32.

geometric, organic). Geometric shapes such as the triangle, parallelogram and hexagon make the most stable planar meshes. Meshes made of symmetrical geometric shapes cover or pave the surface uniformly. Owing to their strict structure and simplicity, they seem suitable for describing such an indefinite phenomenon as the field.

Formal execution, determination of appropriate mesh and mesh parameters.

The visual experience also contains a dynamical component. The object of human or animal perception is not simply an arrangement of things, shapes, colors, movements and dimensions. It is perhaps a matter of an interaction of channeled tensions. These tensions are not something a spectator would add to fixed forms for specific reasons. On the contrary, these tensions are fundamental components of any observation, such as dimension, shape, location and colour. Since they are defined by dimension and direction, these tensions can be considered psychological forces. "[16]

The task of a mesh is to provide a topographic presentation of the directional tensions or psychic forces that are manifested in the principles. For this purpose, the mesh lines need to be furnished with arrows, which will become directional vectors. Each directional vector in the mesh becomes the carrier of one directional tension from the principle.

According to Köhler-Wallach's interpretation of satiation, it is evident that the directional tensions deform the perceptive materials through expansion and shrinking. The shrinking of materials in the mesh will be assumed by two vectors facing one another and focused on a common point, whereas expansion will be assumed by two vectors moving away from a common point and from each other (Fig. 7). By means of Köhler's figural after-effects, the field accepts the quality of left- and right twist. This condition is met by a mesh of at least two

[16] Rudolf, Arnheim, *Art and Visual Perception, A Psychology of the Creative Eye* (the New Version), Univ. of California Press, Berkeley and Los Angeles, 1954 (1974); *Umetnost in vizualno opažanje, Psihologija stvaralačkog gledanja*, Academy of the Arts in Belgrade, 1988, p.17

modules with opposite rotations and a common vector. Gamma movement is demonstrated by four factors: two moving away from the common point and two moving towards the common point (Fig. 9).

Testing of various modular meshes has shown that the required conditions are not fulfilled by meshes comprised of four- and six-sided modules, but only by a mesh of triangular modules, provided that the triangles are grouped in a neighbourhood in six units per common point (Fig. 10). A mesh created in this way out of equilateral triangles has an additional quality – it preserves similarity by measure of size, which means that left twist or right twist will be preserved by a denser or sparser mesh, with smaller triangles functioning as micro modules or larger triangles functioning as macro modules. This quality has proved to be effective in creative practice because, from the perspective of the field, it creates transparency in the artefact between segments and the whole.

We have found that each principle has its own specific manner of functioning and differs from the others by its corresponding topographic description. To them the mesh represents a common metric formal level within the scope of which the otherwise apparent differences between them are no longer distinct. The vector field possesses the conditions for the modelling of visible matter in the style of perceptive shifts of the pictorial base; by expansion and shrinking it deforms the pictorial material and becomes the carrier of left- and right twist.

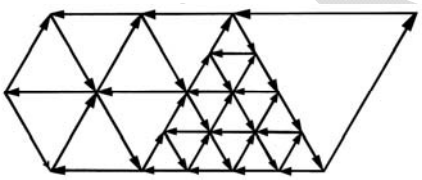
Owing to its geometric topological approach, the vector field model is most similar to the approaches introduced in Gestalt psychology by psychologist Kurt Lewin. This is an original form of psychology known as topological or vector psychology, and as psychology of the field. Its concept is based on the hypothesis that the physical field of lines of force distributed in the stimulated areas of the cortex correspond to the perceptive field."[17] "It has introduced mathematics in psychology, a concrete method of topology. It has developed an understanding of space that is not a Euclidian space of three dimensions. Topology takes into account all factors functioning simultaneously in space. Of sole importance are the relations between parts that are

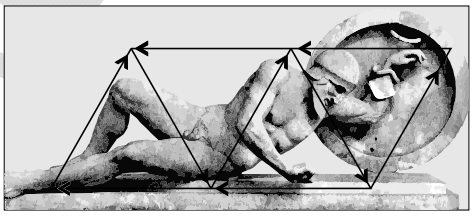
[17] Ibidem /11/, *cit.,* p. 32.

simultaneously present and comprise the whole of the field and mutually influence one another. ,,[18]

V. APPLICATION OF VECTOR FIELD IN VISUAL ART

Every Gestalt principle is comprised of selected pictorial materials with a topographic message inciting the intensified activity of the field. The materials of Gestalt principles differ in this respect from the message values of daily pictorial materials. Visible reality (the world) is too heterogeneous to be able to maximally activate, through each apparent form, the field's activity in the manner activated in individual gestalts. In complex visual materials comprising, for example, a group of persons, individual gestalts are not directly visible. It is here that the artist assumes the role of a sensitive observer who is not only capable of recognizing the activity of a field, but also of maximizing in composition. The mesh of a vector field is an aid in the attainment of this goal. The painting *Wounded Soldier* is an example of the activity of a vector field in four modular units (Fig. 11).

10 

11 

[18] Ibidem /1/, *cit.,* p. 211

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Fig. 7, Drev Marjan, Activation of fector field in Köhler-Wallach's interpretation of satiation

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