

Meaningful Forms and Fuzzy Geometry II: Meaningful Surface & "Meaningfully Flat" Criterion

Mehdi Asasian^{1,2*}

¹Department of Applied Mathematics, Sharif University of Technology, Tehran, Iran.

²Department of Painting, University of Culture and Art, Sari, Iran.

Author's contribution

The sole author designed, analyzed and interpreted and prepared the manuscript.

Article Information

DOI: 10.9734/ARJOM/2018/41165

Editor(s):

(1) Nikolaos Dimitriou Bagis, Department of Informatics and Mathematics, Aristotelian University of Thessaloniki, Greece.

Reviewers:

(1) Choonkil Park, Hanyang University, Republic of Korea.

(2) Luis Angel Gutierrez-Mendez, Autonomous University of Puebla, Mexico.

(3) Bamadio Boureima, University of Social Scientists and Management of Bamako, Mali.

Complete Peer review History: <http://www.sciedomains.org/review-history/24378>

Received: 15th February 2018

Accepted: 22nd April 2018

Published: 30th April 2018

Original Research Article

Abstract

In this paper, after providing definition for the Meaningful Surface, we attempt to present a criterion called "Meaningfully Flat". In these definitions we try to define the meaningful forms that protect the Kantian individuality feature in modern and postmodern artworks. In addition, our extended definitions of meaningful visual elements are also useful for criticizing and reviewing artworks in fields like new media and Installation art. Because of the type of human approach to the verbal phrase of "surface" and the property of being "flat" or "almost flat" is fuzzy and in practice, it is more consistent than the definitions based on binary logic. It can help to fields like fuzzy geometric aesthetic and art educational methods.

Keywords: Fuzzy thinking; fuzzy geometry; formalism; Kant; Tatarkiewicz.

1 Introduction

Formalism is a conventional, sometimes deceptive name of a critical trend that has lasted more than eighty years, even though it was misunderstood and even annoyed during this period. This title, which was originally proposed by the opponents, was subsequently accepted reluctantly by Russian commentators of

*Corresponding author: E-mail: asasianart96@gmail.com;

"formal style". Of course, they protested that this is not just a single way limited to what is usually considered a form, but regardless of these internal debates, the formalism tradition can be regarded as a distinct achievement of the twentieth century in the field of aesthetics. Because this aspect was historically created by the interest in finding a scientific basis for critique, and to some extent, it was a response to the freshness of modern art, while also improving the understanding of classical works. In summary, formalism was a critical perspective that uniquely responded to the challenge of the West in modern times. The tendency that was later reflected in the 1930s by American "new critics", along with Structuralists and semiotics. From the perspective of the history of the philosophy, since the late nineteenth century with the development of modernist approaches to art, an unprecedented transformation was created in the approach to art. Theorists such as Clive Bell and Roger Fry considered form and formalism as the fundamental features of contemporary art [1,2]. They believed that the value of artistic works is related to their formal qualities, regardless of the socio-historical conditions of art. In this way, this theory stood against the theory of representation. It has led to the emergence of artists such as Jackson Pollock and Willem de Kooning by abstracting the artworks, especially in the fields of painting and sculpturing. Throughout the history of art, the relationship between form and content has always been of interest to the artists. But it found a systematic form and helped shaping a kind of formalism, especially in the fields of beauty and art with Kant's ideas.

Using the ideas of Baumgarten, Kant, Schelling and Schiller; Tatarkiewicz has studied the genealogy of the form and has introduced various definitions of the form and its relevance to the content in his research. Clive Bell also posed a Significant form theory in the twentieth century [1]. Roger Fry emphasized the importance of the form. A new division was presented in the field of the explicit and hidden formalisms by Richard Wolheim [3]. On the other hand, Clement Greenberg tried to reorganize the art critique in the light of a form and revising Kant's third critique on this subject, stating that the origins of artistic formalism should be sought in the thoughts of Kant [4]. In the history of aesthetics, according to Tatarkiewicz, there are five meanings for a form [5], that the fifth meaning of the it was used by Kant. According to Kant and his followers, form is the share of mind in the subject and perception. In this sense, form is what the mind shapes by observation and experience of a phenomenon. So form is one of the characteristics of the mind, so it allows us to get things and phenomena in a specific form. This Kantian form is a priori concept. In fact, our mind imposes the form on phenomena. In the book of *Critique of Pure Reason*, he discovers the prior forms of science within our minds. Forms such as time and space and categories such as essence and causality are in this category [6].

In the meantime, in the book *Art & Illusion* [7], as the study of psychology of visual representation, Ernst Hans Gombrich investigated the roots of ambiguity and illusion in the artworks created in the history of art which is important in analyzing the form of artworks. With the formalist perspective emerged in the twentieth century, it is necessary to address the issue of "illusion" and the roots of ambiguity resulting from the efforts of the mind to receive and represent a phenomenon along with factors such as the meaning and content of the artworks. Eventually, these factors impose content on the visual works that affects the form. Ignoring this important factor, poses a problems to form critique. Because in analyze the artwork, we always expect those implied factors in the form to be decrypted by the audience. But the important point is that using the current Aristotelian geometric instrument that analyzes classical artworks ignoring the factors influencing the form and the modern and postmodern artworks cannot be analyzed properly. So we need a logic and geometry that put meaning and content on the form without harming the Kantian individuality contained in visual works. It should also provide tools and standards for the geometric aesthetic in art.

Here, based on the fuzzy logic proposed by Professor Zade (1965) [8], we attempted to deal with the visual elements forming visual forms in a different way. In the field of fuzzy thinking, researchers such as Bart Kosko (1993) investigated in their studies on the fuzzy logic and deals with different human thought categories, such as aesthetic foundations. They believe that fuzzy thinking is much more consistent with the human thinking compared to binary thinking. We believe that fuzzy thinking can cover a wide range of mental, visual and verbal ambiguities and processes nature. In this way, using the fuzzy geometry derived from this new logic, we try to define Meaningful geometric form. In this paper, we first try to define the

meaningful point and line in order to obtain "Meaningfully Flat" criterion after providing a practical definition for "Meaningful Surface". In the meantime, it is important to us that the defined meaningful forms can protect the Kantian individuality feature in the modern and postmodern artworks, and also cover the classical artworks in the deterministic mode. In addition, our development is also effective in analyzing the visual artworks in fields like new media and Installation art. Definitions presented in fields such as painting are a way to go out of the challenge of the flatness of the paintings created in non-classical artistic styles, which provide a suitable tool for critique and aesthetics based on fuzzy geometry. So we try to put the concept on the geometric form using a mathematical model and try to obtain tools to critique and create a modern and postmodern artwork. It is obvious our definitions of Meaningful visual elements, in deterministic form, become classical definitions. Therefore it covers not only modern works but also classical artworks.

It is clear that discovery of the logical and mathematical mentally-behavioral models of the artists have advantages including the production of aesthetic criteria, better critique of artworks, helping the art economics, the production of software to process and analyze the artworks, and finally helping to improve the methods of teaching modern and contemporary arts. In the following, we will present our definitions of visual elements.

2 Meaningful Surface

Here, according to the works done by Eslami and Buckley [9,10], Debdas Ghosh, Debjani Chakraborty [11,12,13] in fuzzy geometry, we define the Meaningful visual point and line as follows (see [14]).

Definition 2.1. A Meaningful point (MP) at (a, b) in R^2 (or painting box), written $\tilde{P}(a, b)$, is defined its Meaningful function (MF):

1. $\mu((x, y)|\tilde{P}(a, b))$ is upper semi-continuous;
2. $\mu((x, y)|\tilde{P}(a, b)) = 1$ if and only if $(x, y) = (a, b)$;
3. $\tilde{P}(\alpha)$ is a compact, convex subset of R^2 for all $\alpha, 0 \leq \alpha \leq 1$.

Definition 2.2. Let \tilde{P}_1 and \tilde{P}_2 be two Meaningful points in the plane. Define (for $0 \leq \alpha \leq 1$)

$$\Omega(\alpha) = \left\{ (x, y) : \frac{y - v_1}{x - u_1} = \frac{v_2 - v_1}{u_2 - u_1}, (u_1, v_1) \in \tilde{P}_1(\alpha), (u_2, v_2) \in \tilde{P}_2(\alpha) \right\}$$

Meaningful line (ML); \tilde{L} is

$$\mu((x, y)|\tilde{L}(a, b)) = \sup \{ \alpha : (x, y) \in \Omega(\alpha) \}$$

According to these definitions we present our definitions for "Meaningful Surface" and "Meaningfully Flat" Criterion.

Definition 2.3. A Meaningful Surface is the moving meaningful line or the history of ML.

In discrete mode, we have lots of surfaces around a main surface like Fig. 1.

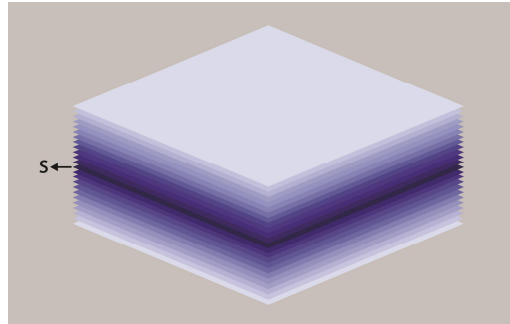


Fig. 1. Schematic form of the meaningful surface in a discrete mode

In fact, artist's meaningful function shows the significance and meaning of each surface around the "S" surface. For example $\mu(S) = 1$. Obviously, defining a Meaningful Surface in the deterministic mode is the same as the classical definition of a surface. In this case, the deterministic surface is a surface that the value of its MF is one.

3 "Meaningfully Flat" Criterion

In twentieth century, with the emergence of numerous artistic styles in the form of modern and postmodern art and the emergence of various techniques such as Mass coloring, collages (with various materials) and etc., flatness as one of the most important features of classical painting has been faced a challenge. Here, we try to use a fuzzy thinking to provide a fuzzy definition based on meaningfulness for a flat surface in a way that can be highly effective in the critique of modern and postmodern art. So that again, we can return the property of flatness with a new logic which is more consistent with the natural thinking of humans.

Definition 3.1. An artwork is Meaningfully Flat if it consists of a Meaningful Surface.

It is understood that this definition is more in line with the way of human thinking about the verbal concept of a flat surface, because in our everyday life, generally, we consider a flat surface to the extent that our minds accept it as flat. It depends on the interpretation and mental characteristics of each individual. Therefore, this definition has been completely changed from person to person and is completely dependent on the artist and his personal meaning of the flatness. This artist's personal interpretation of the flatness emerges in his behavioral actions during the use of painting techniques and can be defined by his personal meaningful function. For example, if our meaningful function is an asymmetric triangular function as Fig. 2.

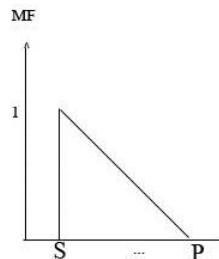


Fig. 2. Asymmetric triangular meaningful function

Then we have a surface which is meaningfully flat as the Fig. 3. Of course, for better detection, we have shown the figure as discrete surfaces. But in fact we have an integrated surface whose degree of significance is changed from the surface "S" to the surface "P" (depending on the meaningful function value shown in Fig. 2).

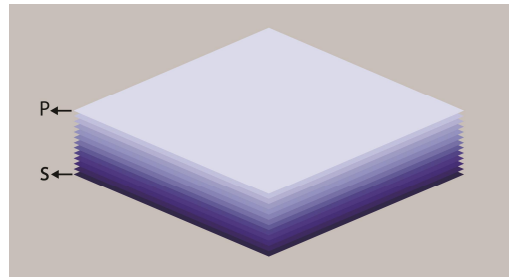


Fig. 3. A meaningfully flat surface

Here, surface "S" is the surface of painting canvas, which in flatness has the highest value of meaning, that is, one. And "P" is the last surface that can be considered flat by the painter. The meaning value of the surface "P" is zero in terms of flatness. And since then, our surface is not considered to be flat in terms of the mental contract of the given painter. In the artwork, the distance between "S" and "P" is filled, depending on the technique and material used. For example, the distance can be filled with collage or mass coloring material, or even in new media artistic branches with light beam, etc. It is important to note that, with regard to the definition of the Meaningfully Flat criterion, we can consider the visual element of the texture as a part of the Meaningful Surface and suppose the surface of the texture to be Meaningfully Flat.

It is observed that on the one hand, the above definitions and criterion protect the Kantian individuality feature which is one of the basic features of modern and postmodern artworks. On the other hand, they cover the works of classical painting in their deterministic mode.

4 Samples and Modeling

According to history of art, in drawing, black lines usually appear in our mind impairing the white background of the paper and visualizing a picture. Drawing is supposed as a preliminary exercise to provide a colorful and complete picture, while the drawing and operation of the drawing are independent phenomena through which the artist transmits his observations and ideas directly to others.

In fact, drawing is an action that results from movement. In this action, nervous and emotional actions of the artist has a great effect, and its weaknesses and strengths guarantee the state of the drawing.

The first examples of the drawing left in the caves show the type of "line" and the way of application of the material used to carve "line" on the surfaces. To create an image on the cave stone, the primitive man mixed the colorful lines (usually red or brown lines) with water or sticky materials drew the image of wild animals and hunters by his hand. In examining these drawings, we find that the lines have been created by continuation of hand slow function, and the nature of the "soil" and the underlying property or the surface on which the drawing has been put (rough rocks of the cave wall) made the conditions on line and drawing; these conditions have changed the strength and thickness of the "line" in different places. This action, in addition to contributing to the consolidation of the form and the intensification of darkness, is in full harmony with the violence of the subject (wild cow). This drawing, in its most basic form, poses an issue that is called line psychology in our era.

In different eras, we are confronted with the thinking of the human sometimes in the form of words, sometimes in the form of pictures that are considered as the taste of the people of that era. For example, drawings that have been placed on ancient pots in Iran (which can be seen in the studies of Iranian researchers such as Mohsen Vaziri Moghaddam), or the drawing carved on the bronze dishes of Etruscan civilization, are delicately and visually opposed to the drawings in the caves.

In Susa pottery, the smooth circular "line" become thin and wide. In the Etruscan bronze, the drawing is a fluid and continuous line carved on metal. But in the drawing present in the caves, the line is often a violent and shaky element with different thicknesses.

Comparing the Etruscan drawing with the primitive man drawing (cave drawing) we deal with two types of lines, the "positive line" and "negative line", and two types of implementation (placing the material or removing the material). In the cave drawings, the lines has been added to the surface, but in the bronze, the line has been separated from the material in the "bronze". In both these positive and negative lines, neural action, type of material, work tools, and way of implementation have visual effects on the drawing.

These are the first examples in which the man produced a meaningful surface by combining the materials with the surface and adding his mental states through physical actions. He made a surface that is meaningfully flat with its bumps or dents (not in terms of binary logic but fuzzy). This kind of fuzzy look has always existed in mankind. A man who has recorded his fears, joys and passions in these forms. Fig. 4 is an example of human encounter with the surface.



Fig. 4. Carving on the prehistoric rock of southern Algeria

Here, with respect to the artists of the middle eras (before the twentieth century), we ignore these eras, particularly the outstanding works of carving of Russian and German artists (in movements such as German Expressionism). They are good examples for dealing with surfaces and producing meaningfully flat surfaces, carrying the concepts and mental states of the artists to the audience. Here are some of the most important and recent works of the 20th century artists as examples for our work.

In history of art we see that Jackson Pollack is the artist who took the temptations of abstract Expressionism to its peak. He appeared to be a very American figure against European trends of promoters of this method. In the 1930s, like many other American artists of his time, Pollack was influenced by Mexican painters and then Surrealist painters like Gorky. And his particular method in art history is a turning point in the creation of an artwork. His view of creating a work is reflected in his sentences. It shows us his way of encounter with the concept of the surface during the creation of an artwork. He says that *my painting is never created on an easel! I rarely put the canvas on the easel before working, I prefer to install it on the wall or the floor. I need a hard surface resistance.*

And that's why I feel more comfortable on the floor. In this case, I feel far closer to drawing, because I can rotate it around and work on all four sides. This sense for me is the concept of being inside in drawing instead of being in front of it. This type of work reminds me of the work of the American Indian artists working on the sand.

I'm constantly moving away from the usual tools of painting, such as easel, pallets, brushes, and so on. On the contrary, I prefer to use a glue, a knuckle, a knife and color, or a thick color mixed with sand, rubbing glass, or any other extraneous matter.



Fig. 5. Jackson Pollock's Art Studio and his method in creating the artwork

Pictures such as Fig. 5, which have been published about Jackson Pollock's behavior during painting are a good illustration of how he interacts with surface material. He definitely does not seek to transform a surface into volume and does not want to turn the work into a sculpture in the painting process by adding material to its surface. In fact, he is building a surface that is meaningfully flat in terms of his mental perspective. In the meantime, he has added or removed the material from the pure surface of the canvas, and added some degrees of the material to it, or removed from it so that the result is acceptable as a relatively flat surface for him, and this is well understandable in artworks such as Fig. 6. **Note:** In this paper, we consider the surfaces in which the artist physically adds or diminishes the material, and we never consider the artworks that produce a sense of embossed surface through visual errors, because they are in the form of flat surfaces that are subset of meaningfully flat surfaces and are not discussable.



Fig. 6. Jackson Pollock's painting,1950, 183*243CM, Tehran Museum of Contemporary Art

In the twentieth century, Robert Rauschenberg (1925) and Jasper Johns (1930) are two important and controversial faces in the neo-dada movement in the United States. After significant experiences with minimalism, Rauschenberg gradually began to move toward a composite painting. The first example entitled "Bed" was a combination of a painted surface and various objects stuck together Fig. 7. Let's change our classical geometric look to the form here and look at this work in a fuzzy point of view. From this angle, as stated above, this work can represent a surface meaningfully flat. In this way, the maintenance of the feature

of the flatness of an artwork is more consistent with the minds and purpose of the creator, and make us free from the challenge of dealing with a work of art that is not definitely flat, nor voluminous in the classical view.



Fig. 7. Bed, Robert Rauschenberg, 1955, Mixed Material, New York

One of the tendencies of the Pope movement was a rather strange tendency, sometimes referred to as "Horror" in art or "Art of Horror," as an example of this tendency, we pay attention to the work of Paul Teck (1933), entitled "The Death of a Hippie", Fig. 8. This work that shows the pestilent and indignant body of the dead is visually describing a meaningfully flat surface; this flatness transmits the mental meaning of death from the creator to the audience. And the audience knows his conditions in the formic-geometric analysis of this artwork.

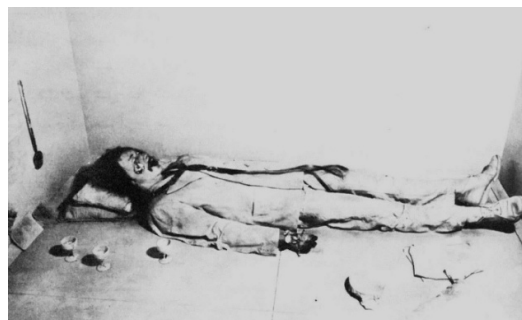


Fig. 8. The Death of a Hippie, Paul Teck, 1967, New York

He faces a mental surface that starts from the floor and continues to the highest point of the person's body (for example, the tip of the person's nose). This integrated level of mind is the one that visually gives the feeling of dying and annihilation to the audience.

Lucio Fontana, Fig. 9, is other artists that have been influential in the twentieth-century art movements. In the artwork created in 1960, we see a different and widespread approach from the classical level in it. But it represents a surface that carries the mental and behavioral meanings of the creator of the artwork that are not consistent with the definitions of the classical geometry of the flat surface.



Fig. 9. Lucio Fontana Concetto spaziale, 1960, Oil on Canvas, 100*80 CM

In the history of art, the reclamation of artistic objects is largely due to the experiences of Latin American artists, including the Argentinean artists of the Madi group, as well as Venezuelan artists such as Carlos Cruz Diez and Jesus Rafael Soto. In 1960, Carlos Cruz Diez created embossed moving-colored artworks, such as the *Physichromies*, Fig. 10. Here the main point is, in Fig. 10, the type of framing and how to place the wood and plastic on a surface created a mental-flat surface or meaningfully flat surface that carries the mental goals of artist to the audiences.

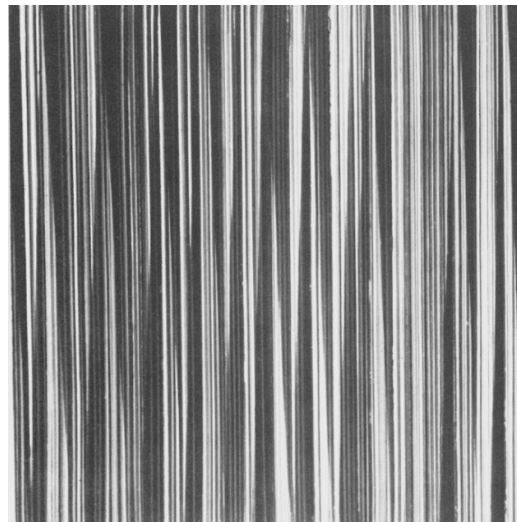


Fig. 10. Carlos Cruz Diez, Physichromies No. 1, 1959, Plastic and Wood, 50*50CM, Artist's Personal Collection

From a human's point of view, determining whether a surface is a volume or a surface is always a relative matter, which is reflected in the frame according to our worldview. In view of a work of art, the simplest criterion that our minds use to separate the surface from the volume is the rate of bump or dent compared to the extent of the surface in which the bump or dent has been created. We again emphasize that the boundary of collections in fuzzy logic is relative, and the difference between volume and surface (as the normal function of the mind) is dependent on the artist's mental arrangement. Hence, in analyzing an artwork, it is expected that the artist will adhere to his mental contracts. In all the artistic works mentioned above, if we consider the base "S" as the base surface, in the process of adding or reducing the material from - to it, we have produced mentally two meaningful surfaces Fig. 11 and Fig. 12. If we consider the simplest way that is the depth or height for modeling the function of meaning, we will have diagrams like Fig. 13 and Fig. 14, respectively.

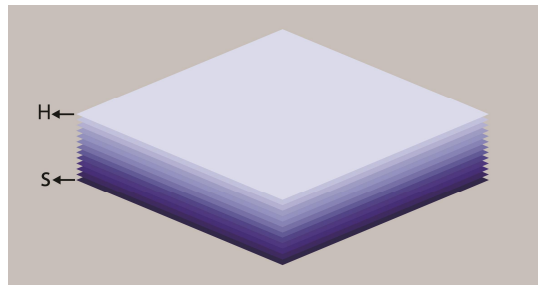


Fig. 11. A Meaningful Surface resulting from the process of addition

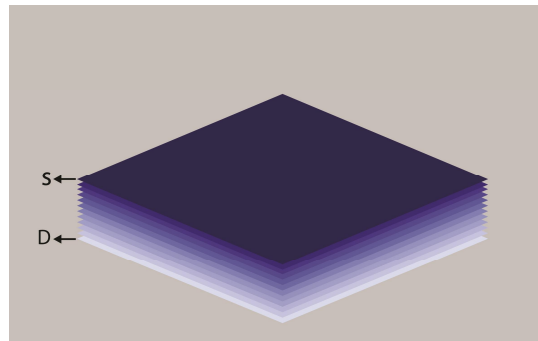


Fig. 12. A Meaningful Surface resulting from the process of reduction

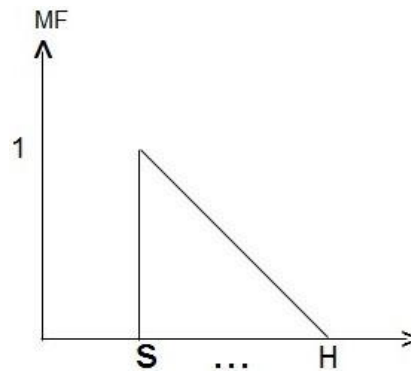


Fig. 13. A Meaningful Function resulting from the process of addition

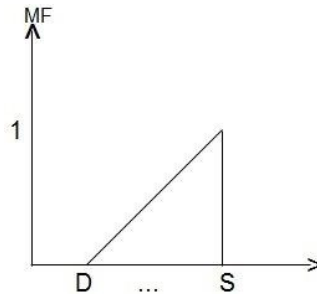


Fig. 14. A Meaningful Function resulting from the process of reduction

Now, consider the Fig. 15 as a practical example by the author. This painting was created by applying the technique of massive coloring with oil on canvas.



Fig. 15. Untitled.Mehdi Asasian, 2017. Oil on Canvas.20*20CM

If we cut this painting, Fig. 16, which is part of the sectional area of the cut, is obtained. This figure derives from the artist's mental-behavioral action in the face of the subject. Surface "1" is the first layer of paint on the canvas, and the layer "3" is the last one. The line "L" shows the last artist's mental layer. Layers of "1" to "L" are collectively creating a single surface that, from the painter's point of view, is considered to be an approximately flat. Here, we called it a Meaningfully Flat Surface.

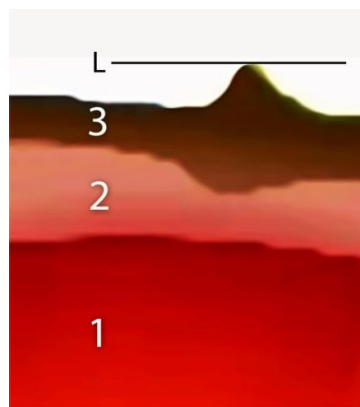


Fig. 16. Part of the sectional area of cutting the painting surface

The significance and meaning of each layer of the Fig. 15 is determined by the actions of the painter in dealing with the mass of the paint and occasions of creation time which can be described with the asymmetric triangular meaningful function of Fig. 17. This function absolutely determine by painter to describe his mental meaning of flatness (with respect to the features of the fuzzy membership function and the definition of the meaningful surface).

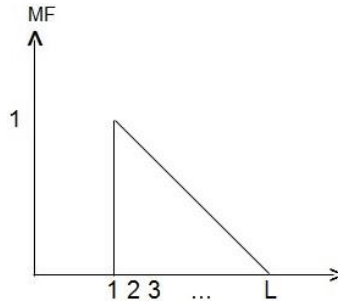


Fig. 17. Painter's asymmetric triangular meaningful function

5 Conclusion

Obviously, finding mental-behavioral models of artists can help in the analysis and critique of the artworks, educational goals and etc. In this paper, according to definitions of "Meaningful Surface" and "Meaningfully Flat", the mathematical properties of the Meaningful function can be used as aesthetic criteria for an artwork, and assess its degree of beauty and harmony. Using this definition, we can create a path for the formal-semantic teaching of modern and post-modern artworks. Extracting the Meaningful functions for each artists, geometric criteria used to critique and compare the works of an artist with himself and others. It can be provided according to harmony and the form of Meaningful functions used in their artworks. This definition is effective for the evaluation of stochastic-based artworks. The Meaningful function in such stochastic works includes the artist's thoughts, and the stochastic process of creating the artworks. Due to the properties of fuzzy logic, the definition can cover all verbal ambiguities in describing the form and color. Considering that at the time of artwork creation, the Meaningful functions are defined by the artist himself (according to the conditions of artwork creation and his purposes). So this definition protects the feature of Kantian individuality in modern and postmodern art. It is so important for us in future works. It is very important that the presented definitions can cover the classical artworks and be consistent with its formal critique.

Competing Interests

Author has declared that no competing interests exist.

References

- [1] Bell C. Art as significant form. *Aesthetics: A critical anthology*. Dickie, G. & Sclafani, R. J. (Eds), New York, St. Martin's Press; 1977.
- [2] Fry R. *Transformation: Critical and speculative essays on art*, Chatto & Windus, London Press; 1926.
- [3] Wolheim R. *On formalism and its kinds*, Barcelona, Fundació Antoni Tàpies; 1994.
- [4] Greenberg C. *Feeling is all*. *Partisan Review*; 1952.

- [5] Tatkiewicz W. Form in the history of aesthetics. Dictionary of History of Ideas, P. (Ed). New York, Charles Scriber's Sons; 1968.
- [6] Kant I. Critique of pure reason. Bernarrd, J. H. (Ed), New York, Hafner Press; 1951.
- [7] Gombrich EH. Art and illusion: A study in the psychology of pictorial representation, 6th Ed.; 2002.
- [8] Belohlavek R, Dauben JW, Klir GJ. Fuzzy logic and mathematics: A historical perspective; 2017.
- [9] Buckley JJ, Eslami E. Fuzzy plane geometry I: Points and lines. Fuzzy Sets Syst. 1997;86:179-187.
- [10] Buckley JJ, Eslami E. Fuzzy plane geometry II: Circles and polygons. Fuzzy Sets Syst. 1997;87:79-85.
- [11] Ghosh D, Chakraborty D. Analytical fuzzy plane geometry I. Fuzzy Sets Syst. 2012;209:66-83.
- [12] Ghosh D, Chakraborty D. Analytical fuzzy plane geometry II. Fuzzy Sets Syst; 2013.
- [13] Ghosh D, Chakraborty D. A study on parametric form of fuzzy line. Uncertainty in Mathematics. 2013;1-11.
- [14] Asasian M. Meaningful forms and fuzzy geometry I: MPB&MGP. ARJOM.In Press; 2018.

© 2018 Asasian; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:

The peer review history for this paper can be accessed here (Please copy paste the total link in your browser address bar)

<http://www.sciencedomain.org/review-history/24378>