몬드리안의 회화 양식에 대한 신경미학적 연구

Neuroaesthetic Study on Mondrian's Painting Style

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Abstract

Peter Mondrian (1872-1944) is a representative of abstract expressionism, whose paintings and thoughts still play an important role in art. Through the study of Mondrian's life and painting style changes, it can be seen that his visual language has changed from the realistic representation of visual objects to the use of pure colors and absolute lines, which can be distinguished by the level of visual nerve activity. According to the performance characteristics of Mondrian's painting, this study first divides the artistic change process into three stages: learning period, exploration period and mature period. Then, based on the research of cognitive neuroscience, the symmetrical neural structure of Mondrian's three-stage painting style is explored in the painter's neural activities. The learning period adopts the neural learning mechanism of imitating the expression of painting, and the exploration period uses the neural mechanism of creating painting style. While, the mature period carries out the neural mechanism of forming pictures through cognitive structure. Finally, this paper analyzes the different visual processing mechanisms and aesthetic preference structures used by viewers to appreciate Mondrian figurative paintings and abstract paintings based on the research in the field of neuroaesthetics.

From the perspective of natural science, this study explains the style changes of Mondrian's paintings, establishing a neuroaesthetic interpretation method, so as to deeply understand the charm of his works, further understand the beauty. Therefore, it can provide reference materials for the later art education of his works.

Keyword

Mondrian(몬드리안); Neuroesthetics(신경미학); Artistic creation(예술 창작); Visual Processing(시각 처리); Aesthetic preference(심미적 선호)

요약

피터 몬드리안 (1872-1944) 은 추상주의 회화를 대표하는 인물로, 그의 작품과 사상은 미술에서 오늘날까지 중요한 위치를 차지하고 있다. 몬드리안의 생애와 회화 양식의 변화를 연구해보면, 시각 대상의 실제적 재현에서 시작해 순수한 색채와 절대적인 선으로 시각 언어가 바뀌어 갔음을 알 수 있다. 이런 몬드리안의 양식 변화는 신경 과학의 연구를 통해 시각적 신경 활동 층위에 따라 구분 지을 수 있다. 본 연구는 먼저 몬드리안의 회화가 가진 표현의 특징을 신경학적으로 분석해, 그의 예술적 변화를 학예기, 탐구기, 성형기의 세 단계로 나누었다. 다음으로 인지신경 미학의 연구를 바탕으로, 창작자의 신경 활동 층위에서 몬드리안의 세 단계 회화 양식의 대칭적인 구조를 탐구했다. 즉, 학예기의 몬드리안은 기존 회화의 표현 양식을 모방하는 신경의 학습 메커니즘을 사용하였음을 알 수 있다. 탐구기에는 회화 양식을 창조하는 신경 메커니즘을 사용하였으며, 성형기에는 인식 지능을 통해 회화를 구조적으로 구성하는 신경 메커니즘이 사용된 것이다. 마지막으로 신경 미학 영역에서의 연구를 통해, 감상자가 몬드리안의 구상화와 추상화를 감상하는 데 사용하는 서로 다른 시각 처리 메커니즘과 미의식의 호감 구조를 분석했다.

본 연구는 자연 과학의 시각에서 몬드리안 회화의 양식 변화를 해석하고, 그의 작품에서 나타나는 매력을 더 깊게 이해할 수 있게 신경 미학적 독해 구조를 세워 아름다움을 이해하고 이를 교육의 참고 자료가 될 수 있게 한다.

목차

1. Introduction

Peter Mondrian (1872-1944) is a representative of abstract expressionism, whose paintings and thoughts still play an important role in art. Through the study of Mondrian's life and painting style changes, it can be seen that his visual language has changed from the realistic representation of visual objects to the use of pure colors and absolute lines, which can be distinguished by the level of visual nerve activity. According to the performance characteristics of Mondrian's painting, this study first divides the artistic change process into three stages: learning period, exploration period and mature period. Then, based on the research of cognitive neuroscience, the symmetrical neural structure of Mondrian's three-stage painting style is explored in the painter's neural activities. The learning period adopts the neural learning mechanism of imitating the expression of painting, and the exploration period uses the neural mechanism of creating painting style. While, the mature period carries out the neural mechanism of forming pictures through cognitive structure. Finally, this paper analyzes the different visual processing mechanisms and aesthetic preference structures used by viewers to appreciate Mondrian figurative paintings and abstract paintings based on the research in the field of neuroaesthetics.

From the perspective of natural science, this study explains the style changes of Mondrian's paintings, establishing a neuroaesthetic interpretation method, so as to deeply understand the charm of his works, further understand the beauty. Therefore, it can provide reference materials for the later art education of his works.

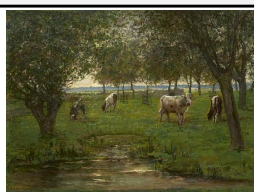
2. Three Stages of Mondrian's Painting

2-1. Mondrian in Learning Period (Before 1908)

Mondrian was born in Amersfoort, the Netherlands on March 7, 1872. His father was the principal and painting teacher of the local primary school, who was also the first painting teacher of Mondrian. So, he had been learned art since childhood. While, his uncle Fritz

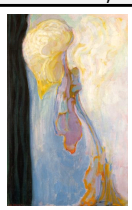
Mondrian played an important role in Mondrian's artistic life, who was a professional painter, as well as a loyal follower of "Hague School". Fritz loved landscape paintings. Mondrian began to paint from life due to the influence of his uncle, and his landscape paintings also had obvious style characteristics of "Hague School" (Table. 1) . In 1892, 20-year-old Mondrian

Table 1. Hague School Style vs mondrian in Learning Period

Frits Mondriaan,Farmhouse along astream,1983-1932	Peter Piet Mondrian,Herding calves,1901
	

was admitted to Amsterdam University of the Arts, starting his 16-year study. At this time, the National Academy of Art still continued its traditional academic style. In the past ten years after graduation, Mondrian mainly created

Table 2. Norway expressionism style vs mondrian in Learning Period

Edvard Munch(Expressionism) Landscape, 1905	Peter Piet Mondrian,Flower Dying Chrysanthemum ,1908
	

paintings in naturalistic style (lifelike, detailed, realistic), often depicting mills, forests, canals, etc. Paintings in this period were also influenced by Dutch Impressionism, Norwegian Expressionism, and Symbolism (Table 2) . divorced from the realism of Hague School. Although the theme of the painting had not changed, the meticulous strokes were gradually replaced by strong contrasting colors and rough lines, such as The Red Cloud and Woods near Oele. The Red Cloud depicted the natural beauty of a red cloud floating across the sky above the green fields in a simple way. However, the depiction of natural scenery in the picture no longer played a dominant role, but gave way to the balance between composition and color. Now, a new modern style had begun to rise. In 1908,Mondrian came to the coastal area of the Netherlands, where there were different landscapes on the inner road, simpler and

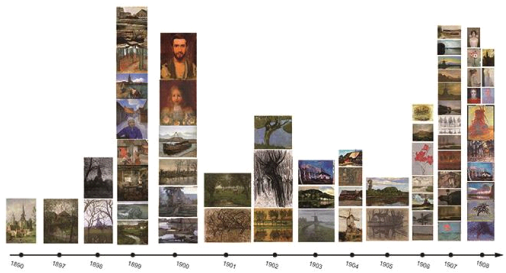


Fig 1. An overview of Mondrian's paintings during the learning period

more "modern". At this time, Mondrian gradually gave up the realistic way of depiction and began to pursue spirituality. One of the most important reasons was to join Dutch Theosophical Society. In general, Mondrian's painting style in this period changed with the changes of popular trends, and he did not carry out his own artistic style and thought (Fig 1) .

2-2. Mondrian in Exploration Period (1909-1919)

In May 1909, Mondrian joined Dutch Theosophical Society, which emphasized the pursuit of the inner beauty of objects, or in other words, the inner essence of things. In terms of artistic creation, Theosophists believed that artists in the past pursued too much

"superficial truth" to describe transient phenomena, which was undoubtedly a kind of blasphemy. These concepts became the theoretical basis of his "pure abstract" in artistic creation. In 1911, Mondrian was greatly shocked by seeing the

Table 3. Cubism vs Mondrian in Exploration Period

Pablo Picasso(cubism) , Girl with mandolin.1910	Peter Piet Mondrian,Blossoming Apple Tree 1912
	

original Cubist painting for the first time, who believed that Cubism was the way to "New Plastic". After that, he also quietly added cubism into his works. The Grey Tree in 1912 was one of Mondrian's first attempts to transition from realism to abstractionism through cubism(Table 3). In this work, the branches were abstracted into a "plane", which changed fromthree-dimensional to two-dimensional.

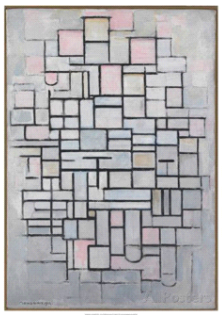


Fig 2. Composition No.VI
Source : www.google.com (20220701)

Contrary to the early realism, this work paid less attention to details, and the colors were only black, white and gray, which increased the simplicity of the overall form and simplifies it into the "essence" of the tree. (Fractal Form) But he still believed that Cubism was not pure enough. In the spring of 1914, Mondrian completed Composition No. VI., which completely rejected curves, and vertically and horizontally arranged straight lines into small areas with low-purity pink yellow, pink green and other colors filled(Fig 2). Such attempt went beyond cubism, indicating the main direction of his future artistic creation. World War I forced Mondrian to return to Holland, where he stayed until the end of the war. During this period, he met Bart van der Leck and Theo van Doesburg, wo also sought an abstract method that could

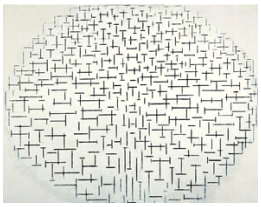


Fig 3. Composition No. 10
h Pier and Ocean, 1915
Source : www.google.com
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accurately describe their philosophy and spiritual ideas. With such influence, Mondrian began to use primary colors. In terms of lines, Pier and Ocean, created in 1915, marked a clear transformation of Mondrian from realism to pure abstraction, where there was only the most basic visual expression in the picture - lines (Fig 3) . In Color Planes Composition, 1917, Mondrian's use of abstraction became more and more mature. Finally, Mondrian and Theo van Doesburg jointly founded the magazine De Stijl, marking the debut of Neo-plasticism, a new artistic style. Mondrian published his articles and theories in the magazine, proposing that the combination of vertical and horizontal lines on a two-dimensional surface was the most intuitive way to convey beauty. He believed that this was the harmony of the world and the most basic truth. Therefore, Mondrian transited from concrete description to

plastic simplification at this stage, gradually forming his own style. (Fig 4)

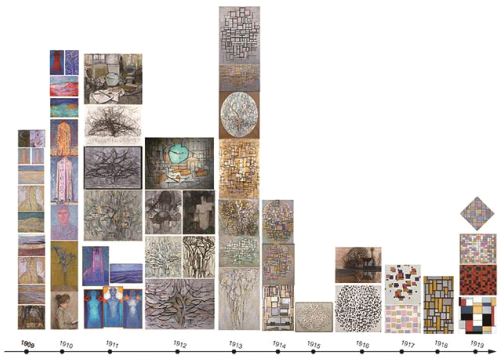

Fig. 4 Mondrian in Exploration Period

2-3. Mondrian in Mature Period (1920-1944)

Mondrian returned to Paris in 1918 at the end of World War I, where he stayed until 1938. The post-war atmosphere was very suitable for Mondrian's new theory of art and philosophy experiments to flourish. Freedom of

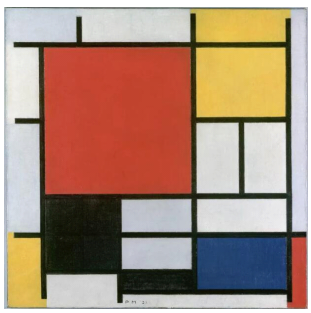

Fig 5 .Composition with Large Red Plane, yellow, black, grey and blue, 1921.

Source : www.google.com (20220701)

knowledge abounds, which can provide a perfect foundation for the creation and development of Mondrian's most famous work: grille painting, and it was not until around 1920 that Mondrian's grille painting reached a mature state. The lines in a mature style cannot slowly disappear near the edge of the canvas, but end suddenly. Mondrian's works, such as bright red, yellow, black, gray and blue, created in 1921, were examples of his early artistic style works (Fig 5) , which helped him win the reputation and lasting attention in the art world. Compared with his early style attempts, the lines used in this work were relatively thick, creating a peaceful feeling. Mondrian generally improved his artistic methods to better convey his spiritual theory. In 1924, Mondrian began to concentrate on the creation and theoretical research of New Plastic, and it was during this period that Mondrian's painting and theory became mature. Mondrian wrote many articles from 1924 to 1929 (Table 4) . The article published by

Table 4. Mondrian's theoretical achievements

Time	Paper
1924	The Evolution of Humanity Is the Evolution of Art
1925	The Neo-Plastic Architecture of the Future
1926	Purely Abstract Art
1927	Jazz and Neo-Plasticism
1929	Pure Abstract Art.

Mondrian in 1926 put forward six principles of Neo-Plasticism , explaining the aesthetic thought of New Plastic painting in detail from the aspects of plastic, color, balance, duality, and social psychology, which can be said to predict the formation of cognitive structure of Mondrian's painting style. According to his own theoretical basis, Mondrian created a lot in the form of "composition reduction" in the second half of the 1920s, and the picture became extremely concise and simple. The three primary colors of red, yellow and blue, as well as white and gray, were evenly distributed in the picture, which were separated by vertical or horizontal black lines. In the composition of rectangle or diamond, the painter conveyed a kind of solidified sense of movement through the wonderful combination of basic elements of painting, such as straight lines, primary colors, right angles, etc. During this period, Mondrian

completely formed his own artistic style (Fig .6) .

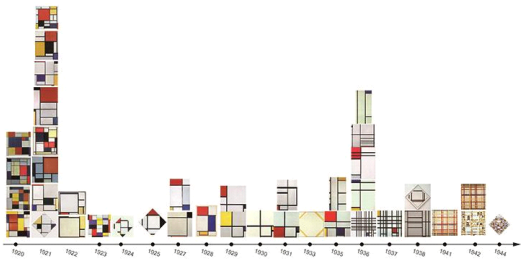

Fig . 6 An overview of Mondrian's paintings during the Mature Period

3. Three Neural Mechanisms Used by the Creator Mondrian in the Process of Painting

3-1. Copying Brain Used during Learning Period

Mondrian's paintings in the enlightenment stage can not only show the real local customs, but also show the obvious Hague style. Therefore, at that time, Mondrian just imitated the techniques of his instructors to describe the real scene in front of him, which mainly used the copying brain. Copying is mainly to use the brush to reproduce the characteristics of the original by waking up the previously over learned mobile mode. This process uses the fronto-parietal network, mainly including Superior parietal lobule(SPL)、ventral premotor cortex(vPMC), and Inferior frontal gyrus(BA 44、BA 45) on the right side, which are important for imitation learning[1]. Among them, vPMC contains neurons that process motor imprints of highly over learning actions[2]. Its activation may reflect the access to the mobile mode of highly over learning in the process of using the brush. 44 and 45 occupy the opercular and triangular parts of the Inferior frontal gyrus, forming the Broca region of the language processing center (Broca, 1864, Amunts et, al., 1999).

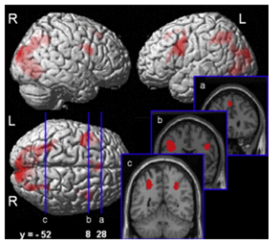

Fig. 7 Brain areas for copying paintings

Right frontal opercular cortex has also been shown to be closely related to the learning of explicit and implicit motor sequences. In other words, copying is to first move the eyes to observe the object to activate the cerebral motor cortex, and then reflect the painting steps on the paper through body movements in the order taught by the instructor. (Fig 7) Besides, in terms of the brain activity during portrait painting carried out by the professional portrait artists and non-artists, FMRI research shows that the right-posterior parietal region of both artists and novices is activated during the task, while novices are more activated. The activity of this area confirms that the brain region often related to face recognition is specifically activated, while novices need more participation in this region. It indicates that novices process faces at a "lower" level, which means that they use the brain's sensory cortex to process object features, such as "copying faces" (Solso R L.2001), just like Mondrian in his learning period. Besides, in terms of the brain activity during portrait painting carried out by the professional portrait artists and non-artists, FMRI research shows that the right-posterior parietal region of both artists and novices is activated during the task, while novices are more activated. The activity of this

1) Bruno Laeng, et al., "Pupillometry: A Window to the Preconscious?". Perspectives on Psychological Science, 2012, Vol.7. No.1 pp. 18-27.

2) F. Binkofski, G. Buccino, "The role of ventral premotor cortex in action execution and action understanding. Journal of Physiology and Pharmacology, 2006, Vol.99, pp. 396-405,

area confirms that the brain region often related to face recognition is specifically activated, while novices need more participation in this region. It indicates that novices process faces at a "lower" level, which means that they use the brain's sensory cortex to process object features, such as "copying faces" , just like Mondrian in his learning period.

3-2. Creative Brain Used during Exploration Period

Mondrian in his exploration period gradually began to get rid of his familiar painting style. Affected by Dutch Theosophical Society, he tried to think and explore the inner essence of things. When creating on the basis of Cubism, the brain will focus more on creation. Painting creativity, namely visual art creativity, refers to the creation of novel and beautiful visual forms (such as sketch, painting and graphic design) based on visual psychological images (Aziz-Zadeh, Liew, & Dandekar, 2013). Recent research also finds that the creative painting involves Dorsolateral prefrontal cortex (DLPFC). In this case, DLPFC is considered to exert top-down control over parietal-temporal-occipital region, suppressing interfering stimuli and supporting internal attention needs[3)4)]. Besides, studies have also found that in the process of creative thinking, people who produce more creative ideas show a faster increase in the functional connectivity between the frontal and parietal-occipital lobes, suggesting that the execution process is more effective (Lachaux et al., 1999). In addition, creation also requires the participation of memory.Without memory, our brain will be blank, which is not conducive to create, while creativity requires experience and professional knowledge. Researcher Solso (2001) conducts an experiment in which professional artists and non-professionals are asked to draw facial sketches, and FMRI is used to observe their brain activities during this period. Compared with a single control object of non-artist, the middle area of the artist's right frontal lobe shows higher activation. Solso believes that professional artists can use more brain resources in the advanced cognitive processing of "thinking about portraits" rather than "looking at faces"(Fig 8).In general, Mondrian at this time has a deep foundation of painting, who starts to carry out creative exploration according to what he has learned rather than physical sketch, using the frontal lobe of the brain to think and plan on the basis of the memory of the original professional knowledge. Thus, he has made a breakthrough in his style of painting.

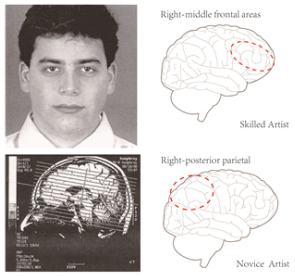

Fig 8. Different brain regions used by skilled artists and novice artists to draw portraits.
Source : Robert L. Solso. 2001

3-3. Brain with Planning and Execution Used uring Mature Period

With the maturity and perfection of Mondrian's theory, it is no longer necessary to imitate anyone's painting. Mondrian's painting at this time can be said to be "have a well-thought-out plan". He makes the corresponding planning before painting according to the six principles(Table 5). Planning is a complex process necessary for normal daily

3) M. Rijntjes, et al., "A blueprint for movement: functional and anatomical representations in the human motor system." Journal of Neuroscience, 1999, Vol.19 , pp.8043-8048.

4) Kowatari, Yasuyuki, et al. "Neural networks involved in artistic creativity." Human brain mapping 2009.Vol.30.No. 5, pp.1678-1690,

Table 5. The Cognitive Structure of mondriaan's Painting

The six principles of Neo-Plasticism
1. The plastic means must be the rectangular plane or prism in primary colors (red, blue, and yellow) and in noncolor (white, black, and gray). In architecture, empty space can be counted as noncolor, denaturalized material as color.
2. Equivalence in the dimension and color of the plastic means is necessary. Although varying in dimension and color, the plastic means will nevertheless have an equal value. Generally, equilibrium implies a large area of noncolor or empty space opposed to a comparatively small area of color or material.
3. Just as dual opposition is required in the plastic means, it is also required in the composition.
4. Constant equilibrium is achieved by the relationship of position and is expressed by the straight line (boundary of the pure plasticmeans) in its principal, perpendicular opposition.
5. Equilibrium that neutralizes and annihilates the plastic means is achieved through the relationships of proportion in which they are placed and which create vital rhythm.
6. Naturalistic repetition, symmetry, must be excluded.

activities, which describes the ability to think ahead and evaluate the consequences of possible actions. Besides, planning is "modeling a series of actions to prepare for a specific task"[5]. Clinical neuropsychology has linked the "highest cognitive function" (such as planning, organization, decision-making, problem solving and logical analysis) with the largest and most mysterious brain region - frontal lobe in a long term. A metaphor that helps to understand the role of frontal lobe related to executive function is driving a car[6]. The driver can control all, using all parts of the car to drive. mature painters often have a plan in their mind before they implement when drawing artistic creation. In terms of the specific brain areas of planning, studies have shown that when subjects carry out tasks in the expected order, the medial prefrontal cortex (BA 32/10) related to ventral striatum participates first. For example, (count to five, then act, and then count to five, then act, etc.) there is obvious activation[7]. At the same time, patients with impaired frontal lobe on the right side have defects in the design fluency task, which means that they can neither complete free painting well nor complete painting under fixed conditions (Jones- Gotman and Milner, 1977).

4. Audience Interprets the Neural Activities Used in Mondrian's Painting

4-1. High-Level Vision Participates in figurative Painting Interpretation

It can be seen from the above that Mondrian's painting style has changed from concrete to abstract, which will also be accompanied by the change of brain processing. The so-called figurative painting is a painting that truly represents the actual existence or imaginable things.[8] The appreciation of figurative painting seems to be our additional ability to interpret real objects in our evolution. In primates, the process of parsing the world into meaningful objects is mediated by the activation of ventral occipito-temporal cortex, which is the so-called "what" pathway.

5) Groenewegen H J, Yasuyuki, et al. "The anatomical relationships of the prefrontal cortex with limbic structures and the basal ganglia". Journal of Psychopharmacology, 1997.Vol.11.No.2, pp.99-106.

6) A. Alvarez & Eugene Emory ,"Executive Function and the Frontal Lobes: A Meta-Analytic Review",Neuropsychology, Vol 16, pp,17-42, 2006.

7) Etienne Koechlin,et, al. "Dissociating the role of the medial and lateral anterior prefrontal cortex in human planning." 2000. Vol.97 No.13 , pp.7651-7656,

8) https://wordrow.kr/basicn/ko/meaning

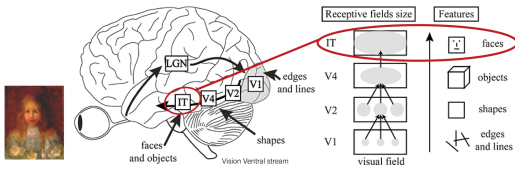

Fig 9. Cognition of figurative painting in high-level brain regions
Source : www.google.com(20220701)

This pathway starts from occipital lobe and end at the frontal lobe (Fig 9) , which is specially used for object recognition (Haxby et al., 1994, Ungerleider and Mishkin, 1982). In addition, it is a very rapid process. Behavioral and electrophysiological studies of humans and monkeys have shown that object recognition can be achieved in hundreds of milliseconds[9)10)11)]. Moreover, functional brain imaging studies in humans have shown that object and face perception trigger activation in a distributed cortical network that includes a wide range of vision ventral stream [12)13)14)15)]. It is also concluded that compared with abstract painting, meaningful figurative painting is activated in the selective visual area of objects at a higher level (Yago & Ishai, 2006). A set of analyses reveals bilateral activation clusters of uperior temporal sulcus, angular gyrus and the supramarignal gyrus and these areas constitute temporoparietal junction (TPJ)(Fig 10) It is worth mentioning that the TPJ on the left is also activated by "beautiful" rather than "neutral" art paintings (Kawabata & Zeki, 2004). Therefore, for the brain regions activated by meaningful figurative painting, the audience needs to mobilize higher-level regions to interpret it[16)].

4-2. Low-Level Vision Participates in Abstract Painting Perception

In the works created by Mondrian in the middle and late period, it shows the "essence" of things pursued by Mondrian with no concrete traces, which becomes absolutely abstract. Abstract art does not reflect the objects or entities familiar to our visual system in our daily life experience. Nevertheless, as all visual information, abstract art is perceived through the same visual system originally developed, which is mainly to functionally represent objects in the real world. (Aviv V. 2014) Different from concrete art, studies have shown that watching abstract painting can evoke the activation of inferior occipital gyrus (IOG) and dorsal occipital cortex (DOC) in early vision (Neural correlates of object indeterminacy in art compositions). In the early stage of visual processing, the visual scene is deconstructed into light spots, lines, edges, simple forms, colors, motion and other basic components[17)18)]. Obviously, Mondrian uses elements that could activate early vision. Why

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does Mondrian insist on using absolute vertical and horizontal lines? Latto (1995) proposes the concept of "aesthetic primitiveness", which means that the use of the most primitive basic elements can be defined as interesting visual stimulation, even with no narrative significance, because it is consistent with the mechanism of visual system processing (Richard Latto ,2001). Neurons in the primary visual cortex

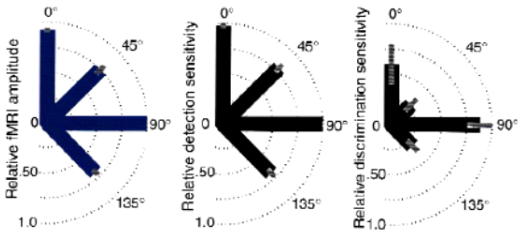
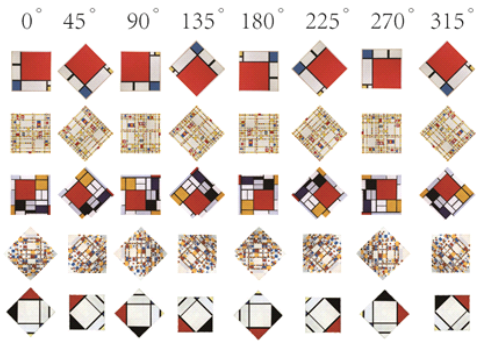
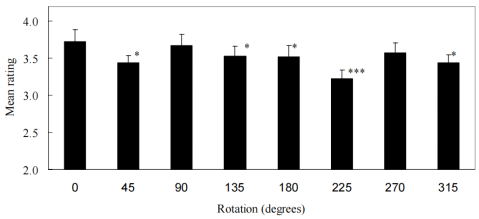


Fig 11. The primary visual cortex is better at perceiving horizontal and vertical lines.
Source : From Furmanski & Engel, 2000

selectively respond to line segments corresponding to the specific orientation of their receptive fields (Zeki, 1999). Jastrow (1892) finds that observers with normal optics are better at perceiving, distinguishing and manipulating horizontal and vertical lines than diagonal lines(Fig 11) [19]. In addition, there is an experiment that takes a few works of Mondrian to rotate to test people's preference for line direction. It turns out that the observer prefers Mondrian's paintings in the original direction to those in rotation, (Table. 6) which is also known as the "tilt effect" (Latto et al, 2000 Perception 29981-987)[20] . To sum up, people use primary vision more in their appreciation of Mondrian's later works, besides, a large number of vertical and horizontal lines will cause our visual pleasure, which is also the charm of Mondrian's abstract paintings.

Table 6. Rotation Angle and Preference of mondriaan's Painting

Rotating mondriaan painting

Rotation angle and preference degree


V. Conclusion

Mondrian is a representative of the Dutch De Stijl, who is also an important pioneer of geometric abstract painting. He has had a great impact on the architecture and design of future generations. With the cognitive neuroscience knowledge, this study analyzes Mondrian's painting life from the perspective of creators and audiences. First of all, according to Mondrian's painting style, it is divided into three different periods, which are the learning period, exploration period and mature period. Then, it

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20) Latto R, Brain D, Kelly B. "An oblique effect in aesthetics: Homage to Mondrian (1872-1944)". Perception, 2000,Vol.29No.8, pp.981-987.

discusses the different brain mechanisms used by creators in these three periods. In the learning period, Mondrian mainly used his imitative brain to paint, so he could not develop his own style, in the exploratory period, Mondrian began to use his thinking brain to create his works, but he was still attached to the paintings of his predecessors, but in the mature period, Mondrian began to use his thinking brain to paint, and he could no longer see the shadow of others' painting style. Finally, with the relevant research on neuroaesthetics, Mondrian's paintings are divided into early figurative paintings and late abstract paintings from the perspective of the audience, analyzing the neural activities and aesthetic preferences caused by these two types. In more detail, for Mondrian's early figurative paintings audience uses mainly high-level visual areas dealing with figurative objects, while for the later abstract paintings audience uses mainly low-level visual treatments.

Therefore, through the cognitive science interpretation of mondriaan's painting life, in the future aesthetic education, in terms of art or creation, teachers should teach students the cognitive structure, and create through cognition instead of mere imitation. In terms of aesthetic appreciation, the educated should scientifically classify visual materials according to different visual processing methods of the brain.

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