COLOURS IN WITTGENSTEIN'S PHILOSOPHY

A THESIS SUBMITTED TO
THE GRADUATE SCHOOL OF SOCIAL SCIENCES
OF
MIDDLE EAST TECHNICAL UNIVERSITY

BY

KEREM KURU

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR
THE DEGREE OF MASTER OF ARTS
IN
THE DEPARTMENT OF PHILOSOPHY

FEBRUARY 2022

Approval of the thesis:

COLOURS IN WITTGESNTEIN'S PHILOSOPHY

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ABSTRACT

COLOURS IN WITTGENSTEIN'S PHILOSOPHY

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M.A., The Department of Philosophy
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February 2022, 126 pages

This thesis aims to investigate Ludwig Wittgenstein's philosophy of colour in detail. His main claim is that it is necessary to grasp the logical grammar of colour concepts called the geometry of colour or the mathematic of colour by Wittgenstein in order to understand colours. In this thesis, the complex usages of colour concepts, which he does not adequately describe in *the Remarks on Colour*, are explained by considering his debates on colour blindness. This thesis discusses some samples that demonstrated how achromatopsia patients use colour concepts in daily languages in order to understand Wittgenstein's argument of the language–games about colours. In this way, this thesis suggests different points of view about the state of colour concepts in our lives by examining the relationship between Wittgenstein's ideas and the effects of perceptual and visual diseases on language ability.

Keywords: Colour, Colour Language, Logical Grammar of Colour, Colour Blindness

ÖZ

WITTGENSTEIN'IN FELSEFESİNDE RENKLER

KURU, Kerem
Yüksek Lisans, Felsefe Bölümü
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Şubat 2022, 126 sayfa

Bu tez, Ludwig Wittgenstein'ın renk felsefesini detaylı bir şekilde incelemeyi amaçlamaktadır. Wittgenstein'ın temel iddiası, renkleri anlamak için renk geometrisi veya renk matematiği olarak adlandırdığı renk kavramlarının mantıksal gramerini kavramak gerektiğidir. Bu tezde, Wittgenstein'ın *Renk Üzerine Notlar* çalışmasında yeterince açıklamadığı renk kavramlarının kompleks kullanımlarını, onun renk körlüğü konusundaki tartışmaları dikkate alınarak açıklanmıştır. Bu tez, Wittgenstein'ın renklerle ilgili dil oyunlarına dair argümanını anlamak için akromatopsi hastalarının günlük dillerde renk kavramlarını nasıl kullandığını gösteren bazı örnekleri tartışıyor. Böylelikle, Wittgenstein'ın fikirleri ile algısal ve görsel hastalıkların dil becerisi üzerindeki etkileri arasındaki ilişkiyi inceleyerek renk kavramlarının hayatımızdaki durumu hakkında farklı bakış açıları önermektedir.

Anahtar Kelimeler: Renk, Renk Dili, Renklerin Mantıksal Dilbilgisi, Renk Körlüğü

ACKNOWLEDGEMENTS

I would like to express my speacial gratitude and thanks to my supervisor, Assoc. Prof. Aziz Fevzi Zambak, for his endless support, kind and contributions. The completion of this study could not have been possible without his guidance.
I am extremely grateful to my committe members, Prof. Dr. Şeref Halil Turan and Assist. Prof. Dr. Ahmet Cüneyt Gültekin, for their helpful feedbacks and contributions.

Lastly, my sincere thanks goes to Assist. Prof. Dr. Ümit Kartal and Dr. Hasan Münüsoğlu for their encouragements and friendships. In addition, I could not have completed this dissertation without the support of my friends, Emre, Şeyma, Caner, Büşra, Fırat, Tevfik and Celil who provided happy distractions to rest my mind outside of my research.

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CHAPTER 1

INTRODUCTION

Colours constitute a large part of our visual perception, and they play a significant role in cognitive representation of objects in the human mind. Colours always help us to experience the world because perceptions are crucial for the knowledge of the world and colours are essential in human perception. Although perception is one of the central notions in certain philosophical issues, studies about colours in this field are scarce. Colours are studied in many scientific domains, but there are few studies whose main subject is colour in philosophy. Colour theories often appear as either part of theories of light in science or painters' colour theories based on chemical classifications of colours. Therefore, it is not easy to give a general analysis of colour theories in the history of philosophy. Nevertheless, this does not mean that colours are an insignificant subject for philosophers. Although colours are not one of the main topics of philosophy, they have always been used as a tool in philosophical debates since ancient times.

There are different approaches to the theory of colours. These approaches diversify in terms of ontological and epistemological perspectives. There are certain questions that philosophers deal with regarding the nature of colour, and these questions have raised some ontological debates in philosophy. The most fundamental contradiction among philosophers is whether the colours of objects are a property of subjective experiences in the human mind or they have a reality of their own independent from the human mind. In this respect, it can be broadly classified that there are two main perspectives through which philosophers fundamentally approach the nature of colours. The first approach is objectivism, in which philosophers assume that physical objects have colours as an intrinsic

property. The second one is subjectivism, in which it is claimed that colours are subjective properties of human minds.

In ancient philosophy, philosophical problems about colours were considered from an ontological point of view. Philosophers such as Democritus and Aristotle tried to explain the nature of colour and colour perception. For example, Democritus explains that the relative features of colours change according to conventions, but colours are essentially made up of atoms and void. Furthermore, Aristotle claims that objects are coloured, and colours of objects are the essential properties, so colours themselves are not relative properties that change according to perceivers. Similarly, with the same objectivist approach, he also describes colour perception as an effect of lights in a transparent medium on the eyes.

Although these early approaches are not significant in terms of current studies about colour, the questions in which ancient philosophers were interested affected empiricist philosophers in the early modern periods. In this period, philosophers such as John Locke, George Berkeley and David Hume used colours as a tool in order to discuss epistemological problems. From the ontological discussions inherited from early philosophers, they continued to investigate whether colours are primary or secondary qualities of objects because the ontological status of colours was an important topic of discussion for empiricist philosophers' epistemological debates in determining the reliability of knowledge based on our senses. The incompatibility of the illusions of the colour experience with the physiological definitions of colours started to conduct philosophical debates on a subjectivist approach, namely the idea that colours can be secondary qualities of objects and phenomena of minds. Then, what was the reason for philosophical discussions about colours to start adopting such an approach after Aristotle's objectivist approach? Undoubtedly, it was Newton's *Opticks*, which is one of the most important and influential physiological colour theories, that started those philosophical discussions because philosophers in this

period noticed that subjective colour experience could not be entirely explained by applying Newton's theory. Newton's theory of light can be thought of as the first theoretical study on colours, and it can be said that this work prepared the ground for the theoretical debates on colours in modern philosophy. Therefore, Newton's empirical outputs on colour pushed philosophers to think about colours.

Isaac Newton's *Opticks*, published in 1704, is a fundamental study for the science of light and colour. According to Newton, light consists of small particles. Light sources, especially the Sun, emit these small particles around them. Then, these particles that fall to the bottom of the eye create vibrations on the retina membrane. Therefore, the visual experience is actualized when retinal vibrations are transmitted to the brain by the eye nerves. Newton separated white light by using a glass prism to examine the nature of light. In this way, he found spectral lights refracted from different angles. Newton also recovered non–decomposed white light by passing the light he had separated from the glass prism through another glass prism. As a result of all these experiments, Newton showed that coloured rays are separate from each other, while white light is a mixture of all of them. According to him, the perception of colour is formed by reflecting coloured rays from the object to our eyes after the objects absorb spectral rays. Newton's theory of light laid the groundwork for many problems of general relativity and quantum mechanics. It also affected modern colour theories. For instance, it influenced Johann Wolfgang von Goethe's *Theory of Colours*, which can be considered the first philosophical colour theory due to his phenomenological debates on colours.

Goethe's colour theory can be thought of as a synthesis of objectivist and subjectivist colour discussions because his ideas are based on Newton's physiology and he also has phenomenological investigations. That is, it is a theory that we can see the effects of philosophy of colour debates of the period on colour science because he tries to analyse some phenomenological cases

related to colour perception that was also the problems of philosophy. Newton's *Opticks* influenced not only Goethe but also many subsequent colour theorists, including Philipp Otte Runge (1777–1810), Johannes Itten (1888–1967), Michel–Eugene Chevrul (1786–1889),Thomas Young (1773–1829) and Hermann von Helmholtz (1821–1894). Young and Helmholtz proposed the trichromatic theory, which claims that light can be described as a wave motion rather than particles. Also, they showed that varying degrees of wavelengths of all colours could be detected by three different sensors in our eyes. (Kernell, 2016: 45–52) Later, this theory, which these two physicists put forward separately, was called 'the Young–Helmholtz Theory'. Although Newton's particle theory lost its popularity, later studies have observed that light acts in some cases like both a wave movement and a particle. Goethe can be considered a primary figure who approaches colour from a phenomenological perspective. He describes colour in *Theory of Colours* as follows:

> Colour is an elementary phenomenon in nature adapted to the sense of vision; a phenomenon which, like all others, exhibits itself by separation and contrast, by commixture and union, by augmentation and neutralization, by communication and dissolution: under these general terms its nature may be best comprehended. (Goethe, 2015: 21)

Goethe defends the idea that the colour phenomenon is the most complementing thing for our visual experience and it is the most crucial element that is active in sensory perception. Therefore, colours are the most active aspect of gaining perceptual information on objects. Goethe's *Theory of Colours* has an important place in history as it pioneered the colour theories that would emerge later. One of the important characters influenced by Goethe's *Theory of Colour* was Ludwig Wittgenstein. Although Wittgenstein acknowledged Goethe's idea of inadequacies in the physical definitions of colours, he did not accept Goethe's method of phenomenological reduction. Zeno Vendler (1995: 302) describes the influence of Goethe on Wittgenstein as follows:

> As we can expect, here is where Wittgenstein parts company with the poet. He goes along with Goethe in insisting on the deficiencies of a purely physical account, and he acknowledges the inherent properties of colours, and their various relations, spelt out by Goethe, but he cannot countenance a phenomenological analysis.

Wittgenstein's most comprehensive work on colour is *Remarks on Colour* (*Bemerkurgen über die Farben*). Wittgenstein's understanding of colour has two significant aspects. First, it can be the ground for building a contemporary philosophical theory on colour. Second, it can be helpful for understanding his ideas on mind, language and mathematics in a detailed manner. Wittgenstein's ideas on colours are far from classic colour theories and are significant for philosophy of mind, language and colour because he treats colour phenomenon as linguistic and philosophical problems. Rather than discussing colours as physiological or psychological entities, he treats colour phenomena through his argument of the language–games. In general, he was mainly interested in how we use colour concepts in everyday life from a semantic point of view. Wittgenstein's main focus on colours is to illustrate the logical grammar of colours because he thinks that the logic of colours is similar to the logic of numbers in mathematics. For this reason, Wittgenstein calls his approach mathematics or geometry of colour. Nonetheless, it is not easy to clearly understand his discussion in *Remarks on Colour* because this work is a fragmented and disorganized study. That is why interpreters of Wittgenstein's philosophy of colour, such as Jonathan Westphal, Alan Lee, Zeno Vendler and Andrew Lugg, usually analyse his discussion by considering his previous discussions about colours in his other works.

The most confusing argument in the logical grammar of colour is the colour octahedron, which is a polyhedron with eight faces, twelve edges, and six vertices, because he does not sufficiently explain this argument in *Remarks on Colour*. Wittgenstein adapted Alois Höfler's octahedron called 'opponent classification' to his studies in order to describe the rough logical grammar of

colours. According to him, the colour octahedron gives us fundamental grammatical rules of colour space. However, he does not sufficiently explain the complex grammatical rules of colour words. This gap in his discussions can cause general misunderstanding about the role of the colour octahedron. For instance, it can be understood by readers as a geometric shape that gives a physiological map of colours, but the colour octahedron gives us the rough logical grammar of colour words. He discusses the complex grammatical rules of colour words by applying his language–games argument. Unfortunately, since Wittgenstein does not adequately explain his claims, it is not possible to say that he presents us a systematic and complete philosophy of colour. Therefore, this situation has caused Wittgenstein's colour philosophy to be ignored in current colour debates. In fact, it is not much known that Wittgenstein has a philosophy of colour.

However, the importance of Wittgenstein's philosophy of colour is that it offers a different perspective to subjectivist and objectivist colour philosophy through his language–games arguments. Objectivist and subjectivist approaches define colours as either a reality in the world or a subjective phenomenon of our minds. However, Wittgenstein fills the gap between the world and thought with language. Therefore, he offers a solution through language to the problems of the subjectivist and objectivist approaches.

It is a fact that the philosophy of colour has not been a popular field. It may even be difficult to say that there was a philosopher who was only interested in colours in the history of philosophy. For this reason, it would be difficult to draw an exact scheme of the philosophy of colour and to say where Wittgenstein's approaches about colour are in this scheme today. However, philosophers from ancient times to the present have always used colours as a tool. It can be said that Wittgenstein's purpose is also to use colours as a tool in his discussions rather than to create a colour theory. Wittgenstein's discussions on colours are valuable, especially in the current debates about colour conducted by the

philosophy of mind and linguistics. For example, his discussion about colour blindness can give us a different perspective on the qualia problem. In particular, his discussion about colour blindness shows us the role of subjective colour perception in colour experience. Also, his ideas can be a source for the famous universalist and relativist linguistic debates about how colour concepts are learned and used in different languages because his philosophy, which brings the thought and the world together through language, can offer a solution to both universalist/relativist and objectivist/subjectivist debates.

This thesis analyses Wittgenstein's journey into the philosophy of colour, and the aim of this thesis is to fill some gaps that he does not explain in detail. In the second chapter, general information about questions of the philosophy of colour is provided. Also, scientific studies about colour perception, such as physiological and cognitive colour perception, are explained. In this part, this thesis explains the main discussions about colour from different fields and philosophical problems that are subject of the philosophy of colour, rather than telling what philosophers say about colour. In the third chapter, Wittgenstein's debates on colour in his works are described in detail. This part shows how his approaches to colours developed from his early philosophy to *Remarks on Colour*. In the final chapter, this thesis holds a detailed discussion between colour blindness and Wittgenstein's philosophy of colour. With this discussion, this thesis aims to resolve problems due to a misunderstanding of the colour octahedron and explain complex usages of colour concepts in the frame of Wittgenstein's philosophy.

CHAPTER 2

PHILOSOPHY OF COLOUR

What is a colour? Is it possible to give a universal definition of colour? It is always challenging to give an exact definition of colour because the definitions of colours in different fields are based on different ontological presuppositions. Colours can be defined in terms of visual experience, perception, or sight; colours are the perception that occurs when different types of light arriving from object to eye's retina. Those lights generally come from the surface of objects and change according to many variables such as angles, medium, occasion, and intensity. It seems that this technical and straightforward definition is not enough to satisfy even ordinary people who have never been deeply interested in colours. However, many questions about colours can be raised even from this basic description: Are the objects coloured or not? Is colour a physical reality or just a disposition towards the observers? Are colours an essential property of objects or qualia in minds? Is there any role of neural function to see colours? (How) Do we know colours? How can we learn colour concepts?

Many philosophers and scientists have struggled with the problems of the philosophy of colour in order to answer these kinds of questions. They have tried to answer such problems by studying colours and their related philosophical problems, either directly or indirectly. Visual experience roughly consists of shapes and colours. However, there are structural differences between shapes and colours. Although shapes can be represented with mathematical description, there are some obstacles to define colours with mathematical representation. One of the reasons is that the shapes are quantitative, but colours are qualitative. Also, shapes can be experienced with more than one sense of data, which gives us a better understanding of them compared to colours

experienced with a single sense of data. The fact that the essence of colours has a qualitative character has led them to be seen as models that cannot be analysed. The problem is that when the physiological and phenomenological features of colours are tried to explain on a single theoretical ground, these kinds of descriptions cause inconsistencies in describing subjective aspects of colour perception. In other words, physiological descriptions of colour perception can be seen as unsatisfactory to describe subjective colour experiences. For example, colours can be explained consistently regarding their physiological features if colours are only described in terms of measurable wavelengths of light. Such a description is explanatory of all physiological processes, including vision. However, it cannot be adequately proved with such a physiological theory whether different observers have the same mental states when they see the same red apple simultaneously. Undoubtedly, this situation is related to the contradiction of whether colours should be defined according to their physical features or their phenomenological features. If the definition of colours is based on observers, colours may be considered the result of a relative and subjective experience regardless of physical laws. If the definition of colours is based on objective experiments, even if the description is correct, it can be asked whether these data describe the same colours that observers experience in their minds. For instance, when we see a red pillow under the green light, this pillow is perceived as dark brown or black because green light absorbs the reflectance of the redness of the pillow. The physiological explanation for this example is that red and green wavelengths oppose each other in spectral range, just like blue and yellow. Therefore, red objects under green light will be perceived as black and dark brown, and vice versa. However, even if the physiological explanation is consistent with the laws of physic, this statement would go against our subjective colour experience because our visual experience tells us that this pillow is not red. At this point, the most crucial question is whether colours are objective properties or subjective properties. As a philosophical problem, we can ask whether we should consider colours as primary qualities of objects or secondary qualities of objects.

From the objectivist point of view, there is no doubt that colours are considered objective realities independent of the subjects who perceive colours. Objectivist perspective usually examines colours through their relationship to each other according to physiological laws. Although our epistemic access to colours is limited, colours can be measured and observed with physiological tests. Therefore, according to the objectivist approach, colours can be objectively represented and described.

However, some philosophers– like Frank Jackson and C.L. Hardin claim that studying the colours of objects will not be sufficient to understand colours. According to them, we must examine colour perception experienced from objects. Philosophers of this view are more concerned with the phenomenological and epiphenomenological properties of colours. This view can be considered a subjectivist approach to colours.

However, instead of categorizing philosophers and scientists as objectivist or subjectivist, this thesis tries to show the different perspectives from colour debates and investigate the problems of the philosophy of colour arising from the inconsistency of these two different points. It is not reasonable to consider the philosophy of colour independently of scientific studies on colours because current debates of philosophy related to colours interrelate scientific colour theories. Therefore, general scientific information about colours and visual perception is given in section 2.1.

This part provides physiological and biological background information about colours and our colour perception. In this way, the journey of light coming from the surface of the objects to our brain is explained considering current scientific debates. In section 2.2, colours are examined in terms of their ontological aspects. The approaches of objectivism and subjectivism are also discussed in detail, and the philosophical issue of the primary and secondary qualities is explained to show modern philosophers' debates on colours. Section 2.3 is about

the colour experience from the philosophical and anthropological points of view. The aspects of the human colour experience are discussed both as a part of a culture and as an individual. Finally, in section 2.3, the debates of the philosophy of mind on colour are explained. The problems of qualia and other minds are discussed in terms of the philosophy of colour. This thesis aims to give a general understanding of fundamental debates on colour by examining these topics on the frame of philosophy of colour.

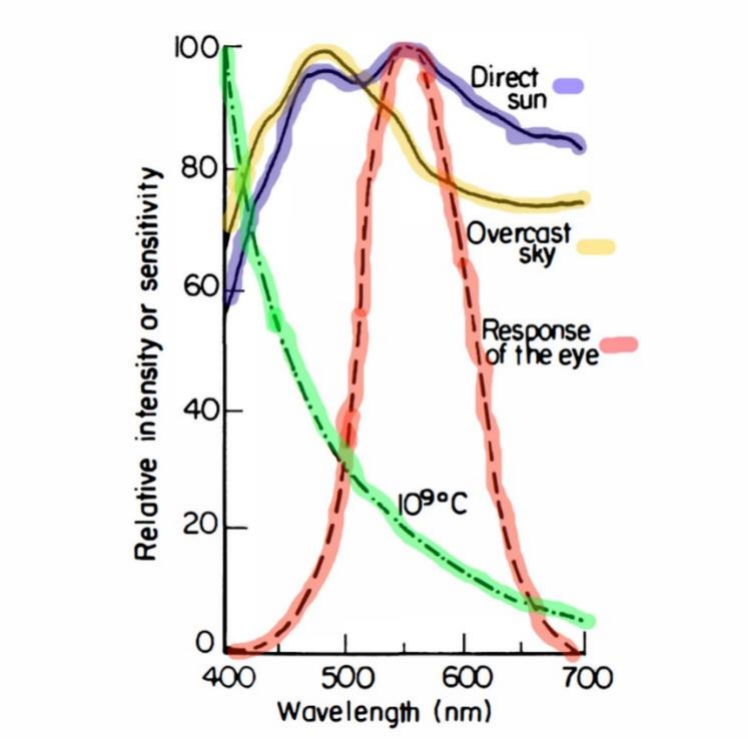
2.1. Scientific information about colour perception

2.1.1. Physiological colour perception

Colours emerge as a result of different intensities of sunlight reaching objects. These different intensities of lights do not always lead to the appearance of colours. While high energies of sunlight rays cause destructions on the objects, low energies of sunlight rays only cause vibrations at the level of molecules and atoms. So, which energy intensity of sunlight do colours emerge? It would not be correct to give a definite answer to this question, but colours usually appear with reflection, refraction, and transmission of moderate sunlight rays on the surface of the objects. There is no doubt that all living things on the earth have different sensitivities to different intensities of sunlight and, consequently, depending on this situation, it can be said that they have different ranges of eyesight abilities. In other words, living things have evolved according to different intensities of sunlight in order to be able to see better in the environmental conditions in which they live.

What is the range of sunlight that humans can perceive colours? The intensity of light is measured by wavelengths that are electromagnetic energy. Researchers usually use a nanometer(nm) as a measuring unit of wavelengths. Human colour vision is placed in a medium range of wavelengths between 700 and 400 nm. In other words, people can only see colours at wavelengths in the range of 700nm

and 400nm. 700 nm is considered the beginning of the infrared spectrum, and 400 nm is considered the beginning of the ultraviolet wave. (Hardin, 1988: 2)



[1]

Figure 1. Blackbody radiation curve[2]

Of course, there are exceptional individuals with colour perception outside this range, but the range in which the human eye can perceive colours on average is as above. There is no doubt that there are many different creatures on earth, and most of them have an advanced or more primitive colour perception than human

[1] In this curve, Hardin show us a blackbody radiation degree with green line. Electromagnetic radiation within the black body radiation is the uniform heat that maintains thermodynamic equilibrium around it or is emitted and held constant by the black body. This blackbody is considered as idealized and opaque matter.

[2] Hardin, C. L. (1988). *Color for Philosophers : Unweaving the Rainbow*. Indianapolis, Ind: Hackett. (pp. 3)

vision. Therefore, it should be forgotten that this thesis refers to human colour perception when discussing colour perception.

Colours usually appear with reflection, refraction, and transmission of moderate sunlight rays on the surface of the objects. Even if the radiation curve gives us the overall range of human vision, the same object can appear as a different colour simultaneously or in a different situation. When we see a red ball in daylight, its redness may seem saturated red. However, when we see it under the moonlight, its redness may seem less reddish. The redness of the red ball is based on the transmission of light in different intensities from the surface of the red ball to the retina. The variability in the transmission of light is not just related to the angle of the sunlight. According to many factors, such as the gas pressure in the atmosphere, the environment in which the object is located, the movements of the sunlight can vary.

Suppose that there is a ruby ball and an opaque plastic red ball under daylight. Even if these two balls have the same hue of redness, their visual experience cannot be identical. They will have different refraction and reflection properties due to their different molecular structure, even if the light intensity falling on their surface is the same. Also, the light intensities they transmit to the retina will be various.

Although it seems very easy to represent the colours of the objects according to their physiology of light, the proliferation of different inputs complicates this situation. One of the most significant problems is whether the colours we attribute based on intensities of light from objects are the same as those we perceive. Two objects under the same spectral intensity can be perceived in different colours. In some cases, even two objects under different spectral intensities can be perceived as having the same colour. Therefore, it seems unlikely that the colours of objects can be categorized in certain classes based solely on the spectral intensities they reflect. Explanations based on the

physiological properties of objects and light are not enough to understand colour perception. In addition, even if the spectral range that an object reflects according to its physiological properties is determined, the perception of the colour of that object does not depend only on its spectral variables. Then, how can we distinguish the class of the green objects from the class of the red objects? It is obvious that more input is needed to make this classification. Besides physiological properties, the most critical determinant of colour perception is biological factors. In other words, it should be understood how the human eye works.

The human eye is an organ specialized in receiving visual images and transmitting them to the brain. It is one of the essential parts of the sensory neural system. A similar relationship is often established between the human eye and the camera. Nevertheless, the human eye is more than just a camera that passively receives visual images. The retina is a membrane situated inside the back of the eye that is sensitive to light stimuli. It works more like a miniature brain rather than a passive conduction tool. Unlike the optical axis of camera lenses, visual images fall into the fovea region on the retina with certain refraction by the visual axis. The fovea is a thin and sunk central part of the retina that contains almost exclusively conical cells and forms the most prominent field of vision. (E–ILV: 17–22–006)

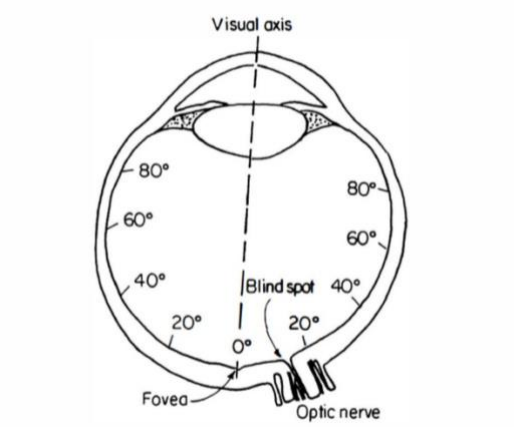


Figure 2. Visual axis and fovea[3]

The network of receptors on the retina must be examined to understand the functions of visual perception. There are several conical cells in the fovea region of the retina. These conical cells are of two types as cones and rods. The human retina contains 7,000,000 cones and 75,000,000 to 150,000,000 rod cells. Rods are more dominant in nocturnal animals than humans and are sensitive to low–intensity lights. Therefore, rods allow people to see better at night. On the other hand, cones are cells that provide precise and detailed vision in daylight and provide us with colour perception. When the rods are stimulated, they cause achromatic visual perception. However, when cone cells are stimulated, they provide achromatic and chromatic perception. (Roger, 2011: 33) Rods enable us to see objects better in the dark. So, just like cone cells provide us with sharp and clear visual images in daylight, rods give us this clarity at night. So, how are the outputs from these conical cells transmitted to the brain? At the end of the information processing chain of the retina, there are ganglion cells that send the outputs from the optic nerves to the brain. Information transmission occurs when the adjacent receptor modifies the effects of the outputs reaching them and transmits them to the neighbouring receptors. During the transmission, ganglion cells provide the connection between all receptors. What is happening in the

[3] Ibid., p. 9

enlarged region of the retinal image is also happening in the ganglion cells. (Hardin, 1988: 12)

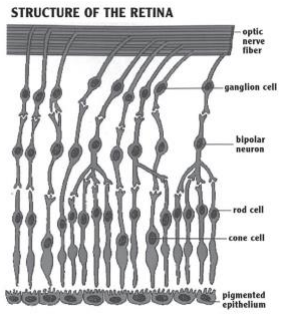


Figure 3. Structure of the retina[4]

The main role of cones cells is providing chromatic vision. The normal human eye can distinguish the average wavelength band of light intensity received by cones, which allow us to perceive chromatic lights. There are three types of cone cells: the first cones absorb longer wavelengths, allowing us to perceive red light. The second cones absorb medium wavelengths, allowing us to perceive green light, and the third cones absorb shorter wavelengths, allowing us to perceive blue–violet light. (Rogers, 2011: 100)

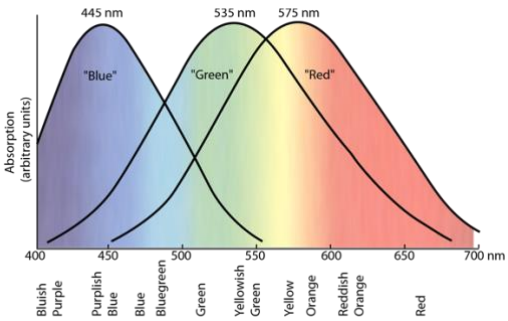


Figure 4. Chromatic vision[5]

[4] Rogers, K. (2011). *The Eye : The Physiology of Human Perception*. New York Britannica Rosen Education Service Cop. (p. 100

[5] HyperPhysics. (2020). *The Color-Sensitive Cones*. http://hyperphysics.phy-astr.gsu.edu/hbase/vision/colcon.html

The presence of three types of cones with different spectral absorbances receives the three properly selected spectral lights. In other words, these three cones are responsible for detecting the green, red and blue wavelengths separately. Each of the three spectral lights cannot match the mixture of the other two lights. An unlimited number of spectral hues can be thought, but these three spectral lights must remain primary hues as green, red, and blue in order to maximize the range of hues that can be produced. Hermann Grassmann put forward this theory in 1853 as the tri–variable nature of the laws of colour mixing. Many scientists and philosophers interested in colours in the 19th century accepted this theory. At first glance, the idea of having three different receptors corresponding to the three main spectral lights seems accurate to common sense, but this approach brings many problems with it. (Hardin, 1988: 28–29)

According to Grassmann's theory, when we define purple, everyone defines it as a mixture of red and blue. In other words, the perception of purple can be occurred due to the simultaneous stimulation of blue and red receptors. So, we can then define purple as reddish–blue or bluish–red. Nevertheless, can yellow be defined as reddish–green or greenish–red formed by mixing "red" light with "green" light? This definition seems unlikely because there is no such colour as reddish–green or greenish–red. Greenish–red or reddish–green is a spectrally impossible colour like bluish–yellow or yellowish–blue.

In order to understand what 'impossible colours' is, we should investigate the system of the colour opponent theory which Ewald Hering invented. According to him, there are some hues of colours nobody can perceive simultaneously at the same place. For example, although bluish–red or yellowish–red can be perceived, greenish–red and bluish–yellow cannot be perceived. He argues that colour appearances emerge from not three but four basic chromatic processes, and these appearances are determined by three opponent pairs, black–white, red–green and blue–yellow. He determines that four primary signals transmitted by cone cells following the neural cells are processed according to the principle of

binary opponent–spectral processes. For instance, red light is the opposite of green, and they cancel each other. The same process applies to pairs of black–white and blue–yellow. C. L. Hardin (Hardin, 1988: 28–29) explains Hering's argument of opponent pairs that claims 'yellow is the primary colour' and 'a combination of red and green is impossible colour' as follows:

> The phenomenal characters of purple and yellow thus reflect their neural representations. The phenomenally complex color purple is represented by the joint occurrence of red and blue processes, and the phenomenally simple color yellow is represented by a noncomposite yellow process, the – red and green processes in this case being in neutral balance (Notice that none of this has anything to do with whether the wavelength composition of the stimulus is monochromatic or complex; a phenomenally simple yellow hue can be produced by either sort of stimulus composition.) The red and green processes are not constituents of the yellow process, any more than perceived red and green are constituents of pure yellow. There may of course be reddish yellows or greenish yellows, but no yellows that are reddish and greenish. There cannot be a reddish greenish appearance, because the occurrence of either the red or the green process involves the inhibition of the other. It is as if there were a two–person tug of war; a net pull to the right is red, a net pull to the left is green, and a neutral balance is achromatic.

After Hearing's theory, Leo Hurvich and Dorothea Jameson developed the *hue cancellation* method to reinforce the psychophysical side of Hering's opponent pairs in colour perception. According to Hurvich and Jameson, if green and red are combined, yellow emerges rather than reddish–green. Similarly, if blue and yellow are combined, white is produced rather than bluish–yellow. The method of hue cancellation claims that when we add green to a reddish–yellow, we cancel the redness of reddish–yellow. Likewise, when we add yellow to a greenish-blue, a yellow cancels the blueness from greenish-blue. This is the logic of the hue cancellation thesis. Therefore, according to their opponent process theory, there are two opponent pairs: green–red and blue–yellow. Hurvich and Jamesson conduct an experiment in order to test the method of hue cancellation.
Hurvich and Jameson experiment with two individuals (J and H) who are shown four wavelengths of monochromatic light in Hering's unique hue. Their first aim was to determine the unique hues of green, red, blue, and yellow in the

wavelengths curve. (This determination can be changed according to individuals J and H's relative chromatic response to monochromatic lights, but Hurvich and Jameson give us overall range points.) First of all, each monochromatic light was shown to both individuals. What is required of the participants here is that if the monochromatic light shown is not one of the unique hues, they cancel out this hue. First, the observers add a unique yellow and green to cancel out the blue(violet) and redness in the shortest wavelengths. Then they add a unique red and blue respectively to cancel out the green and yellow in the middle wavelengths. Finally, unique green is added to cancel the red in the longest wavelengths. (Hurvich and Jamesson, 1957: 389)

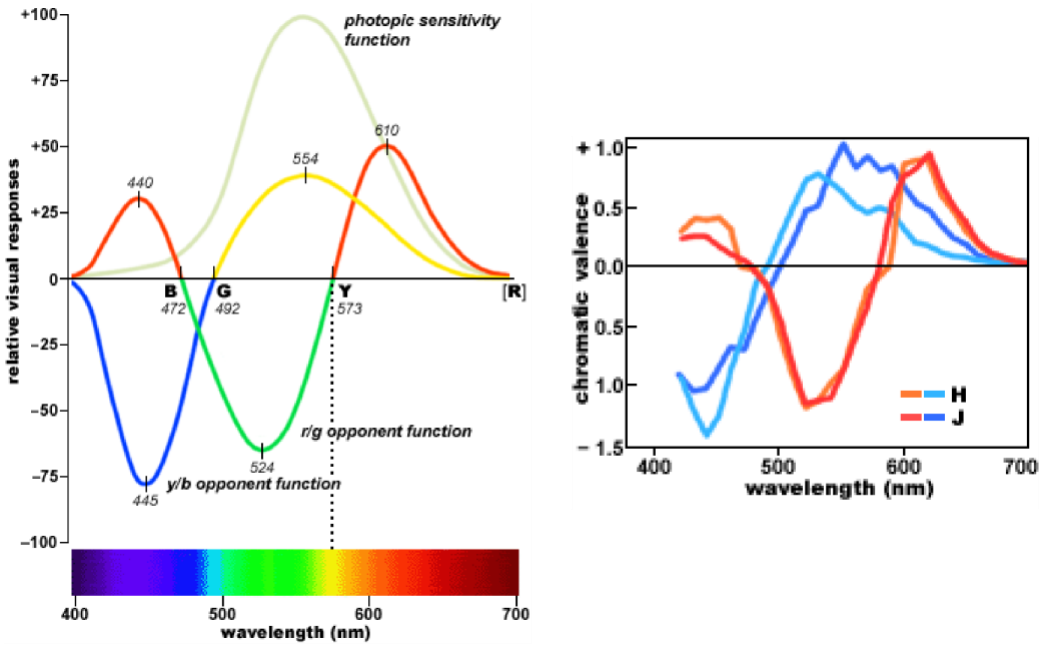


Figure 5. Hurvich and James's Opponent Processing and J and H individuals[6]

This experiment shows that unique hues appear at any point where a function of an opponent is at the zero line. For example, unique blue appears when green and red curves are at the zero line 472 nm that is also the point of the r/g

[6] MacEvoy, B. (2015). *the geometry of color perception*. https://www.handprint.com/HP/WCL/color2.html

opponent function. When green and red curves are at zero line 573 nm that is also the point of r/g opponent function, unique yellow appears. When blue and yellow curves are at zero line 492 nm that is also the point of the y/b opponent function, unique green appear. The situation is different for unique red because the y/b opponent curves do not meet at the zero line the second time. Even there is found a bit of yellowness at the 700 nm. If this is the case, it is necessary to add some violet at 700 nm to get a unique red. In this way, yellow lights are cancelled by violet light.[7]

Through the efforts of Hurvich and Jamesson, the opponent process theory became famous between colour theories. In the 1950s, Gunnar Svaetich and Macnichol found that different cones gave electrophysiological responses to emulate the opponent process.[8] As a result, the psychophysiological efforts of Hurvich and Jamesson. Then the subsequent neurophysiological findings are evidenced by electrophysiology, which strengthened the opponent processing theory of colour vision. Of course, there have been studies that claim the contrary theses of this theory, but the opponent process theory is still a powerful description of the physiological and biological explanation of colours.

2.1.2. Cognitive colour perception

Cognitive processes of colour perception are more complex compared to physiological processes, as there are just inputs and outputs in physiological definitions, like the opponent process theory. However, it is not easy to give an obvious definition in terms of the cognitive and psychophysical process of colour

[7] Unique red is not got by a single wavelength because cones stimulated by shorter wavelengths perceive both blue and violet. Thus this situation occurs because of the biological structure of types of the shortest wavelengths cones. Further information about this, see Hardin, p. 31–35

[8] For further information about their finding see ; Svaetichin, G., & MacNichol, E. F. (1958). Retinal mechanisms for chromatic and achromatic division. *Annals of the New York Academy of Sciences*, *74*(2), 385–404.

perception because there are ordered stages and multiprocessing in the different parts of the brain while working on colours. That is why CIE (International Commission on Illumination) says that cognitive aspects of colours are new phenomena that do not fit in definitions of psychophysical and perceived colours. (CIE 166:2005). The fundamental differentiation between processes of perception and cognition is that even though perception means direct mapping of colours of the environment to the brain, cognition means semantic and verbal processing of perceptions as ordered stages. Also, it covers mental imaginations of the colour of objects and events of the outside world. (Derefeldt, Swartling, Berggrund, Bodrogi, 2003: 7) Fortunately, findings by now in physiology and neurophysiology illustrate 'the abundance of projections of visual pathways in the cortex from the primary visual cortex to other parts of the brain including the temporal, the parietal, and the frontal areas.' (Derefeldt, Swartling, Berggrund, Bodrogi, 2003: 14). Those findings tell us the need to describe colours from the cognitive point of view.

The visual data that has already been processed by optic nerve cells is transmitted from the eye to the brain through nerve fibres. There are different types of neurons on the retina, which are bipolar cells, ganglion cells, horizontal cells and amacrine cells. Bipolar cells provide the main pathway between receptor cells and ganglion cells, either directly or through amacrine cells. Ganglion cells collect visual data from receptor cells via bipolar and amacrine cells and transmit them to the brain. Horizontal cells provide synaptic contacts between bipolar neurons and receptor cells. Amacrine cells regulate the connection between the ganglion and bipolar cells at the level of synaptic contact. (Kernell, 2016: 122–3) Ganglion cells have a significant role in conveying visual information to the brain. The next step is that ganglion cells transmit signals from optic nerves to LGN (lateral geniculate nucleus), which is the part of the thalamus. Then, the visual cortex takes signals from LGN. (Hardin, 1988: 210) The task of LGN is combining two separate data coming

from two eyes. (Hardin, 1988: 54) In other words, LGN can be considered a station or a convertor between the visual cortex and optic nerves.

Sensory inputs, such as smell, vision, touch, so on from sense organs, are associated with separate brain regions. Those inputs are transmitted to the primary sensory cortex; then, the information is transmitted to a series of secondary regions. The primary visual cortex is named V1, so other secondary regions are named with an increasing number in sequence, such as V2, V3, V4 so on. V1 transmits visual information to other parts of the brain through other layers of the visual cortex. Ventral stream from the visual cortex relays data to the temporal lobe, which provides consciousness of visual experience. Dorsal stream relays data to the parietal lobe, which provide automatic visual–motor skills. The main part of the visual cortex for colour processing is the region of V4, whose cells respond to colours signals. For example, any damage in this region causes cerebral colour blindness. Also, people who have a damage in this area lose acuity in their vision. There is another important region which is called V5 or MT. People notice movements of objects via V5 (Kernell, 2016: 132– 3). Therefore, colour processing in the brain occurs with parallel pathways, and there are other parts of the brain where visual data is processed. When the brain receives visual data, all features about visual information turn into the imaginations of observers. Unfortunately, there are unrevealed truths about visual processing. That is why the cognitive side of colour perception has still some mystery.

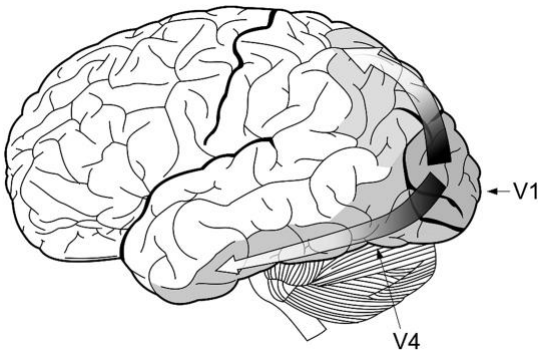


Figure 6. The visual pathways of the brain[9]

Colour perception and colour cognition need two different capacities, so it can be said that the colour spaces of these two different processing cannot be the same. There are countless hues in the outside world in the perceptual colour space, although these hues are known explicitly as colour concepts. However, cognitive colour space is fewer than perceptual colour space. If the languages of all cultures are examined, colour concepts that people use and know refer to a tiny part of perceptual colour space. In the article of *Cognitive Color*, Derefeldt, Swartling, Berggrund, and Bodrogi (2003: 8) describe the relation between perceptual and cognitive colour spaces as follows.

> If a perceived color is in a specific region of perceptual color space then that perceived color will be associated with a certain color category, i.e., an element of cognitive color space. Each region corresponding to a color category is a continuous subset of perceptual color space and the term space in the expression cognitive color space may refer to the set of these regions. This set does not necessarily cover the whole perceptual color space.

Gestalt psychologists found that patients who had damaged their occipital and parietal cortex suffered from a lack of cognitive colour capacities. For example, these patients do not have colour categorization abilities. Also, they cannot perceive the colours of objects and synthesize perceptual colour space. Therefore, Gestalt psychologists claim that categorical colour perception is

[9] Kernell, D. (2016). *Colours and Colour Vision : An Introductory Survey*. Cambridge: Cambridge University Press.

closely related to the synthesis of visual data and the comprehension of spatial organizations (Derefeldt, Swartling, Berggrund, Bodrogi, 2003: 9). However, it would not be correct to say that categorical colour perception is just a product of the brain's visual data processing because there have been many external factors that form colour categories. Colour categorizations have always been used as code, symbols and representation of events and objects in the outside world. For instance, blue is usually considered a code of coldness, or red is generally a code of danger.

These social codes of colours can be relative to various cultures and languages. That is why colour perception should not be only considered as a result of stimulations of the visual cortex. For example, capacities of memory, learning colour concepts, temporal and spatial consciousness etc., are needed for the acquisition of colour categorization.

Studies and debates on cognitive colour perception still continue in different research fields. Therefore, because the fact that colour data is proceeded by the brain in a very complex way from the visual cortex to the prefrontal cortex, it is not easy to show any specific point or theory about this issue.

2.2 . Ontology of Colour

Colours always have a fundamental role for human beings in order to understand and participate in the outside world. Although the opponent process theory gives us physiological and biological information, it cannot explain all issues about colours for philosophers or psychologists. Philosophers generally ask questions about colours' nature, appearances, classification, and they investigate their ontological aspects to describe their nature and relation with humans. Moreover, the opponent process theory may not be satisfied for colour theorists interested in subjective colour experiences regarding the phenomenological side of colours.

Therefore, there are different approaches to explain ontological aspects of colours, such as materialism, subjectivism and dispositionalism.

There is a question to scrutinize the role of the opponent process theory in terms of classification of colour appearances. Here, the classification of colour appearances is based on the differences between ‘looking’ and ‘perception’. It is not possible to perceive or distinguish colours without having any category and classification about them in our minds. Therefore, the sensation of any coloured thing ‘like such as camera obscure’ should not be considered as colour perception. Perceiving colours requires understanding the features of colours. For instance, all languages in the world categorize colours as cold and hot regarding their features, even if these classifications can vary according to different cultures. Therefore, the question is how people made their own colour order system.

In 1921, W.E. Johnson, a logician, asserted that our understanding of adjectives of numbers, colours, shapes are determined by characteristic structures. According to him, having common characters is not the only factor that unites class members. He claims no common adjective character that red and blue or red things and blue things share. Therefore, neither the red and blue itself nor the red and blue things are colour or coloured by favour of these adjectives. On the contrary, colours can be a class member due to their particular differences distinguishing them from each other. Johnson called this argument by the special kind of differences. People understand related ordering relations of colours by noticing special kinds of differences, and then they can create certain subclasses. (Cohen and Matthen, 2010: IX)

At first glance, the opponent process theory can be considered to be related to Johnson’s approach because Hurvich and Jamesson, with the opponent process theory, try to determine such a colour order system that is built on opponent pairs of colour. Although these two similar approaches have been used as a traditional

criterion in philosophical and scientific debates about colour for many years, it is not reasonable to say that the opponent processing theory satisfies all colour theorists, especially philosophers and psychologists.

For example, Hardin, who was one of the most significant contributors to the popularity of the opponent process theory with his discussions, argues that this system does not fully describe colours in terms of their physical features. Hardin means that the opponent process theory has no objective value in terms of colour science because he says that its ordering system is based on a sensory system that is not a representation of physical colours in the outside world. (Cohen and Matthen, 2010: xii) Likewise, Donald Macleod is one of the leading psychologists who have several studies on the process of human's vision from retina to the brain. In his article *Into the Neural Maze*, he argues that our knowledge of the neural processes of colour vision underlying physiological definitions of trichromatic colour vision are more complex than one might think. In other words, he says that current information on colour cognition based on outputs of three retinal cone cells is not enough to explain everything about colour perception because neural findings of the neural representations of colour have given us irregular and non–explanatory information about the cognitive process. Therefore, inconsistency between neurological and physiological findings prevents us from ensuring uniformity between colour phenomenon and the neural representation of colour perception. (Macleod, 2010: 170–2) Despite those criticisms, the opponent–process theory is still a current and noteworthy theory for discussions about colour. Also, it is not reasonable to expect it to fill all gaps about colours because it describes colour in terms of physiology. Thus it cannot describe all ontological questions of colour.

These different ontological approaches to colour are not unique for current debates. There have been colour theories created according to different ontological approaches. For example, Newton ordered colours regarding the laws of nature, especially principles of gravity of light. The common point of most

colour theories has been classifying and ordering colours from a particular ontological perspective. Classification is necessary to understand things because humans cannot understand anything without classification. In other words, we must first divide it into meaningful parts in order to understand or perceive the whole of parts. Therefore, ontological classification is necessary to determine the differences between looking at colours and perceiving colours.

In terms of philosophy, colours are always a matter of debate whether they belong to objects or subjects. This interest has brought along different approaches to the philosophy of colour. Some materialist philosophers, such as Aristotle, try to answer these controvertible discussions of colours and investigate objects as the bearer of colours. They say that colours exist independently of humans or any living creature with senses. Colours are one of the components of the physical world for them. So, for these philosophers, colours are real entities and objective properties of objects. The colours have the same properties as the shape and mass of objects. The group of philosophers who have such an approach to colours is called objectivists. For other philosophers such as Berkeley, Descartes, colours are more of a subjective experience rather than the objective properties of the objects. The objects do not have colours because they think that colour is like pain or other subjective experiences. These philosophers are in a group that is named subjectivism. (Hardin, 1988: 59). Lastly, philosophers such as Locke and Hume claim that colours have properties of objects but argue that colours are the disposition of objects that affect the senses of living beings.

Objectivist colour philosophy is examined under three subtitles. These are reductionist realism, non–reductive realism, and physicalism. According to non–reductive realism, colours are the only fundamental property of objects, and common–sense and scientific knowledge are coherent with each other. On the other hand, reductionist realism claims that although our common sense tells us objects have colour, the objects do not have colours concerning their

microscopic particles. These microscopic particles cause some wavelengths that the objects reflect colours. In this way, colours are reduced to basic properties that do not have colour properties in objects. Physicalism explains colours with properties of the light of objects, that is, physical properties. Thus, they reduce the colours to the primary properties in the object. (Aboties, 2009: 217)

Subjectivist colour philosophy claims that objects do not have colours because their colours are the properties of our visual system based on mental and internal states. Thus, according to this approach, the world is substantially colourless. (Maund, 2019: 18–19)

Another approach to the philosophy of colour is dispositionalism. This approach does not deny that objects have colours but claims that these colours can be relative according to observers. (Maund, 2019: 20) Dispositionalism can be considered as a moderate approach between objectivism and subjectivism.

In this part, the general factions in the discussions on the philosophy of colour were shown. In the next section, the debate of the primary and secondary qualities is significant in terms of the philosophy of colour are examined.

2.2.1. Primary and secondary qualities

The debate of primary and secondary qualities has been the most controversial problem in terms of the epistemology of colours. The first traces of the idea that colours are secondary qualities of objects can be found in the works of Galileo and Descartes. According to Galileo, the phenomenon we call colours of objects is mere colour names, and if the creatures that named these objects disappeared, the qualities, such as colours attributed to the objects, will also remove. (Drake, 2001: 84–5) Likewise, Descartes claims that the qualities of objects such as colour, smell, temperature, and sound are produced in our minds. (Descartes, 2002: 37) Although Galileo and Descartes can be considered pioneers of this

debate in modern philosophy, the most prominent formulation of the debate of the primary and secondary qualities was firstly given by John Locke. Therefore, his ideas about these debates affected other modern philosophers like George Berkeley and David Hume. Initially, in order to understand Locke's analysis on the primary and secondary qualities, his notion of the idea by which he explains capacities of mind such as perception, thought and understanding, should be understood. Locke (2011: II. Ch. VII) describes the notion of the idea as follows:

> Whatsoever the mind perceives in itself, or is the immediate object of perception, thought, or understanding, that I call idea; and the power to produce any idea in our mind, I call quality of the subject wherein that power is.

According to Locke, primary qualities are the properties of the object itself, independent of any observer, such as solidity, space, movement, number, and shape. Since the primary qualities exist in the object itself, they can be known precisely, independent of the subjects. On the other hand, secondary qualities are the properties that produce sensations in the human mind, such as colour, taste, smell, and sound. The secondary qualities can be defined as the effect of things on the subjects. Our mind perceives secondary qualities through reflection. These qualities usually are only a power rather than fundamental properties of the object. These powers are logical qualities in the human mind that generate ideas different from the real object. According to Locke, since the primary qualities are immutable, they are measurable and are known precisely. On the other hand, secondary qualities cannot be fully measurable as they can be varied according to different observers. Also, Locke defines secondary qualities as the power that help us to classify objects in our minds. However, the important point here is that Locke claims that the secondary qualities are not in our minds but belong to the object. This part is the darkest point in this division for Locke's successors.

The most substantial criticism of Locke's distinction came from George Berkeley. He sees this distinction as a refuge for philosophers who want not to lose their materialist view. The primary qualities that Locke sees as the reality of objects, according to Berkeley, are also the ideas in our minds; they do not exist in the object. Berkeley assumes that both primary and secondary qualities are contingent upon how they are perceived or viewed. For example, Berkeley claims that the texture and space claimed to be the primary qualities of an object can also be relative according to the observer's position and sensations. Likewise, the secondary qualities such as colour and temperature can be varied regarding the observer's sensations and position. Therefore, Berkeley rejects this Locke's distinction. For him, all the properties of the object are a production of our mind. (Berkeley, 2002:14–15)

One of the philosophers who criticized this distinction is David Hume. He neither carries the outside world in a purely idealistic ground like Berkeley nor makes a sharp distinction into the qualities of objects like Locke. According to Hume, human perception is two types as impressions and ideas. Although impressions are our lively and vivid perceptions such as sound, colour, smell, which enter our minds with power and force, ideas are faint images of impressions in our thinking and reasoning. Impressions are vivid perceptions that we gain while eating chocolate, seeing and tasting it. Its colour, smell, taste, shape, texture are all impressions. However, the thought of buying and eating chocolate on your way to home is an idea. In other words, it is an idea created with faint images of the impressions we have gained while eating chocolate before. (Wright, 2009: 61)

Furthermore, Hume divides all perceptions, including impressions and ideas, into simple and complex. For example, while the whole perception of an apple is complex, perceptions such as the smell, colour, taste, and shape of an apple are simple. If these simple perceptions are thought of as parts of the apple, it can be said that these simple perceptions are the elements that form the complex

perception of the apple as a whole. Although the smell and taste of the apple do not cause problems considering a simple perception, the situation is different in terms of colours since the redness of the apple can be perceived as brighter or dimmer. At this point, he claims, while debating on the abstraction of the apple, that the shape and colour of an object such as an apple cannot be a simple perception. In other words, shapes and colours cannot be perceived separately from each other. According to him, we create a distinct perception of colours and shapes in our minds by comparing them with other objects, such as yellow lemon or green plum. (Wright, 2009: 68) In short, the incompatibilities that may arise between the physical representations of colours and common sense knowledge of colours have been attributed to the mind's tendency to produce the different shades of colours.[10]

When considering colours as a philosophical problem by modern philosophers, the most crucial problem is the inconsistency between the representation of the colour of objects and the feeling of colour experience. There is no doubt that colour was not the main focus for philosophers until Hurvich and Jamesson developed their profound work on colour. It was seen as a problem to be solved around epistemological and metaphysical problems. Therefore, philosophers used colours as a tool to analyse our subjective experiences and our knowledge of the physical world.

2.3. Colour Experience

People experience data coming from the outside world, both as individuals and as part of a community, to discover their environments. Visual data, especially colours, constitutes a large part of that experience many people have in everyday life. Because of this reason, the colour experience should be examined under two headings: cultural colour experience and subjective colour experience.

[10] For more detailed information on this subject, see David Hume's *Missing Shade of Blue*.

People interact with objects in their everyday life. In order to distinguish and identify those objects from each other, colours are always used as a tool. For instance, fresh vegetables are generally expected to seem green. Potable water was supposed to have a blue colour. Hot objects were associated with red colour and so on. However, perception of the primary colours, such as red, green, blue, yellow, is independent of cultural learning because perceptual and psychophysical studies show that ability to distinguish primary hues is even found in infants, primates who do not know colour names. Therefore, instead of perceptual categorizations of colours, anthropological debates on colours generally concerns colour naming diversities according to different cultures. (Bornstein, 2007: 4) Of course, anthropological sides of colour experiences cannot be limited to colour naming debates. Many anthropological and cultural studies shed light on people' relationship with colour experiences by now since colours have always been a part of societies' traditions, customs and languages. For example, in the paintings found in the cave ruins, the use of umbers –colour pigments– differed according to geography and environment. Also, colours always turn into holistic symbols as representations of societies on their clothes, arts, etc. Although those kinds of cultural studies are not directly related to the aim of this thesis, the colour naming studies of linguistics and anthropology provide significant debates for the philosophy of colour.

Considering that cultural variety results in relativism in some respects between different societies, the first thing that comes to mind about the colour naming process in different cultures is relativism in their colour languages. That is why debates on the colour naming process are held on concepts of universalism and relativism. The famous study of *Basic Color Terms* written by Brent Berlin and Paul Kay is considered a pioneer of the universalist colour naming theory. They reveal the existence of certain universal colour hues in various natural languages in this study.

Berlin and Kay found that colour categories in 20 different languages are shaped around universal focal colours in their study of *Basic Colour Terms*. These universal focal colours are black, white, red, yellow, green, and blue. (Kay, 2006: 52). Although they claim that primary colours vary according to languages and cultures, they assume that there are some universal rules in different languages. For example, black and white exist for all cultures and languages, and if there are only three basic colour terms in a language used by a culture, one of them will necessarily be red. Similarly, if the basic colour terms are four, at least one of them will be either green or yellow. Berlin and Kay say that these differences between cultures and languages can be organized in a coherent hierarchy. They exhibited these different colour terms used by cultures in seven stages adjusted according to the evolution of languages. (Kay, 1979: 613)

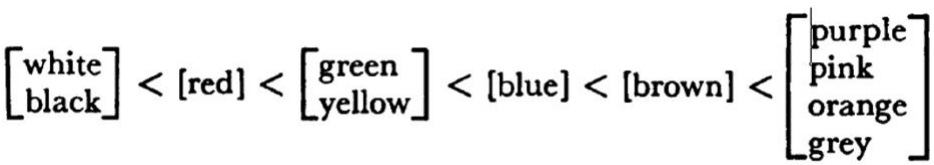


Figure 7. The hierarchy of colour words[11]

In terms of the colour experience, Berlin and Kay want to make a universal and objective assessment of the usage of colours. In the following years, this theory is supported by experiments on focal colour categories conducted by Eleanor Rosch is a cognitive psychologist. According to the results of her experiments, people in different cultures have a tendency to remember focal colours more easily than other colours. In other words, focal colours create a universal cognitive basis in terms of both colour language and colour memory. (Kay, 2006: 52) As a result, these researches show us that colours are objective based on biological and cognitive organizations rather than subjective. It can be reached a conclusion that no matter how different our subjective experience is,

[11] Kay, P., & McDaniel, C. K. (1978). The linguistic significance of the meanings of basic color terms. *Language*, *54*(3), 610–646.

we can represent our subjective colour experiences with colour concepts as objective experiences due to our evolved cognitive and biological structure. In addition, cultures determine how we experience the colour of objects. The influence of our language on our knowledge of colours is incontestable, but this reductionist approach disregards our subjective colour experiences.

The tension between subjectivism and objectivism maintains to answer the problem of colour representation. In this sense, much of this criticism is directed at Berlin–Kay's reduction of our subjective colour experience to universal principles of colour naming. These critics often claim that linguistic relativity does not allow such a universal commonality about colours. The Berlin–Kay theory roughly claims that biology determines phenomenology, and as a result, it determines meaning. However, Barbara Saunders, who is an anthropologist, says that 'there is no convincing neurophysiological evidence for an autonomous colour pathway.' (Saunders, 1997: 178) The similarity between our neurons, genes, cognitive networks cannot guarantee that human colour naming processes are based on universal principles. Saunders (1995: 33) explains that they followed the wrong method to eliminate the distinctions between different languages in their experiments as follows:

> However, once Berlin and Kay's picture is in place it is always more or less confirmed by their methods of inquiry. For their procedures require that any distinction between the observers' language and the actors' language is denied, privileging the observers' own explicit leading concepts or categories, styles of interpersonal exchange and reasoning. Quite apart from the moral problems of ranking languages on an evolutionary scale relative to the observer's own language, the destructiveness of privileging that language, and the pretentiousness of the claims to special knowledge, the recurrent failure of the experiments to match the promise of theory should raise serious enough queries.

Current discussions of colour theories are conducted by the fields of anthropological linguistics and cognitive science. While making colours the product of the evolutionary development of languages may still be effective for this field, some questions need to be answered about the colour experience and

knowledge of colours in terms of the philosophy of colour. For example, objectivist philosophers consider language as a reflection of the objective world. The reference of colour concepts is the colours that objects have. On the other hand, philosophers, who can be considered subjectivists, say that our colour concepts are based on our arbitrary and subjective experiences. It should not be assumed that discussions on colours on both sides were fruitless. On the contrary, this is not seen as an impasse for the philosophy of colour but proof that the discussions are still sustainable. In this context, Wittgenstein's philosophy of colour in *Remarks on Colour* may also be considered in the practical approach to colours because he makes a conceptual analysis of colours and emphasizes the usages of colour concepts in language. However, he does not reduce colour experience to conceptual analysis, but he reveals an approach that excludes experience and experimentation. He thinks that the problems are occurred by our colour experiences can only be solved by conceptual analysis. In this context, the traces of linguistic analysis of colours can be seen in Wittgenstein's *Remarks on Colour* before Berlin–Kay. On the axis of those discussions about colours, Wittgenstein's approach should be worth examining in terms of the philosophy of colour.

When we perceive the colour of the objects, we often tend to say that the colour must be a property of the object itself. However, sometimes we doubt whether colours belong to objects or not because of our visual perception's illusions. At this point, the question arises, whether we can know colours by their representation gained from their measurable objective properties of objects or sensations obtained from our subjective experiences of the colour phenomena. Therefore, the problem here is how we match our subjective colour experiences with what science gives us about objective properties of colour. Do we know colours as representations or as sensations? (Byrne and Hilbert, 1997: xiii)

When we look at a ripe tomato under normal conditions, we tend to think that the redness of the tomato and its spherical shape represents the ripe tomato in our

perception. Our visual experience represents objects according to their content. In other words, the experience of the ripe tomato includes the proposition that the ripe tomato standing in front of us must be sphere and red. Nevertheless, in some cases, our visual experience can mislead us. For instance, a ripe tomato may not appear red under a green light. Although the experience of the ripe tomato may seem green to us, we generally have representative knowledge that ripe tomatoes must be red and sphere. The problem here is that while our experience represents that the ripe tomato is green and sphere, our representation does not. At this point, a question arises whether representations and our feeling are identical. According to John Locke, there may be a contingent connection between our sensory experiences and the representation of experienced objects. Locke (2011: II. Ch viii. 25) explains this connection as follows:

> But our senses, not being able to discover any unlikeness between the idea produced in us, and the quality of the object producing it, we are apt to imagine that our ideas are resemblances of something in the objects, and not the effects of certain powers placed in the modification of their primary qualities, with which primary qualities the ideas produced in us have no resemblance.

According to Locke, our subjective experiences can form without colour representation and vice versa. Due to the organizational nature of our organs, the same object can lead to different experiences for different people at the same time. In other words, an object that looks blue to one person may appear yellow to another. However, according to him, sense ideas in different minds produced by objects often remarkably resemble and are close to each other. (Locke, 2011,:II. xxxii, 15) In this discussion, traces of the inverted spectrum argument, which is the current topic of philosophy of mind and language, can be found.

The inverted spectrum argument is also commonly used in debates of the philosophy of colour and mind. The inverted spectrum argument claims that individuals with an inverted spectrum have subjective visual experiences that systematically differ from the normal visual experience. However, these

differences are incapable of being manifested in their behaviour, including their verbal behaviour. (Johnsen, 1986: 1). People who have an inverted spectrum perceive colours in opposite wavelengths. That is, they see red as green and blue as yellow. Supposing a person whose name is Mary, her cones are spectrally inverted innately. So, when she sees a red ball, she perceives it as green. Supposing a person whose name is Jane perceives ripe McIntosh apples as red and ripe cucumbers as green. Mary, on the other hand, perceives ripe McIntosh as green and ripe cucumbers as green. Then, Mary's hue perception is innate spectrally inverted compared to Jane's. Whenever Jane sees red, Mary sees green, or whenever Jane sees blue, Mary sees yellow. In other words, Mary perceives complementary colours of what Jane perceives. However, we do not have any information about why Mary is like this. (Hardin, 1988:137) Mary and Jane are not different in terms of physical condition, internal functions, and behaviours. When Jane perceives a yellow ball, she has a feeling that this ball is yellow, and his visual experience can be a yellow representation of the ball. However, when Mary perceives a yellow ball, she has a feeling that this ball is blue, and her representation of yellow ball refers to blue. Can it be argued that Mary's perception is a yellow representation of the yellow ball?

The representation of a yellow ball and the feeling of having a perception of yellow can be often considered consistent in terms of a normal observer's visual ability. Therefore, Jane's colour experience seems consistent, and Mary's situation is considered abnormal. However, supposing that Mary says that 'I have the feeling of perception of a yellow ball', although she perceives the yellow ball as a blue. Can it be claimed that she has a yellow representation of yellow objects due to her feeling? It is not plausible to claim that phenomenal and qualitative characters of colour are based on only representational contents of colour. Also, it seems inevitable that there is no unshakeable foothold between representational contents of colour and our colour experience depending on commonsense beliefs and feelings. Materialist philosophers and few empiricists tend to establish this kind of connection because they believe that the colour

experience must be gained from objects. Even if we represent the physical and biological organizations of the color experience, such an approach is not enough to eliminate the intersubjective relativity of colour perception. In order to understand the intersubjective relativity problems of colour perception, the issue of qualia and other–minds, which is one of the important debates in the philosophy of mind, must be examined.

2.3.1. Qualia and Other–Minds

It is challenging to define qualia since it is defined many times differently by philosophers and psychologists. However, for philosophy and psychology, in general, it can be defined as subjective instances based on conscious experience. Also, Qualia can be defined as the characteristics of how mental states are. Daniel Dennett (1988: 1) illustrates what qualia is with an example as follows:

> Qualia" is an unfamiliar term for something that could not be more familiar to each of us: the *ways things seem to us*. As is so often the case with philosophical jargon, it is easier to give examples than to give a definition of the term. Look at a glass of milk at sunset; *the way it looks to you*—the particular, personal, subjective visual quality of the glass of milk is the *quale* of your visual experience at the moment. The *way the milk tastes to you then* is another, gustatory *quale*, and *how it sounds to you* as you swallow is an auditory *quale*; These various "properties of conscious experience" are prime examples of *qualia*.

The most popular argument on the issue of qualia is ‘what is like to a bat’, which Thomas Nagel developed in 1974. With this argument, Nagel is fundamentally opposed to reductionist materialism. According to reductionist materialism, all gaps about consciousness in mind–body problems can be filled with data obtained from scientific information of the physical process of the brain–body. According to Nagel, conscious experience is a common phenomenon for all living things, although the state of basic organisms is not yet known. An organism in whatever form it takes to have a conscious experience means it is like to be that organism. So, it does not matter what kind of organism it is; he

says it has conscious experience if it is like to be human, frog, eagle, and bat, so on. According to him, this subjective experience of each creature has not been addressed by any reductionist analysis because these subjective experiences are outside their logical framework. If reductionist materialists try to explain mental states without directly addressing these subjective experiences of, this explanation is insufficient to explain the mental state of subjective experiences. (Nagel, 1974: 436–437) Therefore, he claims that reductionist theories cannot explain subjective experiences since they leave out of account the subjective experience. Because of this reason, Nagel investigates the idea of 'what is like to a bat' to explain individual instances of subjective experience. Frank Jackson (1982: 131–132) known his famous 'knowledge argument' explains Nagel's 'what is like to a bat' argument as follow:

> In "What is it like to be a bat?" Thomas Nagel argues that no amount of physical information can tell us what it is like to be a bat, and indeed that we, human beings, cannot imagine what it is like to be a bat. His reason is that what this is like can only be understood from a bat's point of view, which is not our point of view and is not something capturable in physical terms which are essentially terms understandable equally from many points of view.

With the metaphor of the bat, Nagel wants to show us the differences between subjective experience and objective experience. He deliberately chooses bats rather than any animal because their biological sensory organs are better than any other organism, and he also says that they are closer to humans than other creatures. (Nagel, 1974: 438) He says that when we try to imagine *what it is like for a bat to be a bat*, our own minds restrict us from doing this. We cannot understand the subjective experiences of bats even if our point of view metaphorically replaces their point of view since our mindset has been determined concerning a human's brain from birth. Therefore, he claims that individuals only know own mental state.

On the axis of the problem of other minds, it can be asked how we know Mary's mental state when she perceives blue as yellow or red as green. We may ask her

to describe her own situation in order to understand her mental state. However, we know that she is not aware of his own situation because she categorizes own subjective experience as a normal observer. Maybe we can conduct an experiment on Mary like what Hurvich and Jameson did. In this way, we can observe with fMRI how her brain reacts at different wavelengths while perceiving the opponent colours. We can learn physiological and biological organization about Mary's situation with this experiment. Nevertheless, this again seems to not go beyond physical reduction since it cannot seem possible to know how he actually experiences the colour phenomenon from his point of view. We may even ask the question, is it possible to know the subjective colour phenomenon of someone with normal vision? To answer this question, Frank Jackson develops the knowledge argument with the thought experiment of Mary's room in order to reinforce Nagel's qualia problem. Jackson (1982: 130) explain this thought experiment as follows:

> Mary is a brilliant scientist who is, for whatever reason, forced to investigate the world from a black and white room via a black and white television monitor. She specialises in the neurophysiology of vision and acquires, let us suppose, all the physical information there is to obtain about what goes on when we see ripe tomatoes, or the sky, and use terms like 'red', 'blue', and so on. She discovers, for example, just which wavelength combinations from the sky stimulate the retina, and exactly how this produces via the central nervous system the contraction of the vocal chords and expulsion of air from the lungs that results in the uttering of the sentence 'The sky is blue'.

Jackson asks what will happen when Mary is given a colour TV or taken out of her black and white room. Will Marry learn something new about colours? Jackson argues that although Marry has a high level of knowledge about colours, it is inevitable that she will know something more than she knew before when she encounters colours as a raw feel, phenomenological features or qualia. Also, he thinks that her previous knowledge is incomplete due to a lack of experience. So, if she knows something about colour based on experiences, this guarantees that qualia exist. For him, the existence of qualia is in opposition to physicalist reduction.

Unlike Jackson, Daniel Dennet argues that Mary cannot learn anything new about colour when she leaves her room because if she knows everything about colour, she will also know why and how subjective experience happened as her qualia. (Dennet. 2007: 400) Therefore, if Mary knows everything physical about colour, she will know how to react when she encounters red. To support this argument, Dennet developed the RoboMary thought experiment. Robomary has a black and white camera whose software is adjusted to see different shades between black and white. Dennett claims that if we compare the yellow colour of a ripe banana with its black and white cameras to a computer with a colour camera, we can observe the effect of qualia of yellowness of a ripe banana. Then, he says that if we unlock RoboMary's colour–lock, we can measure what happens in her mental state when she first sees the yellowness of a ripe banana compared to other computers. RoboMary can bring her colour codes after seeing a yellow ripe banana (B states) into what it means to see a yellow ripe banana in her previous colour codes(A state). Then she builds up a new and reasonable version of a previous colour–coding system based on knowledge (B state). Thus, she can know what it means to see a yellow–ripe banana without perceiving it. According to Dennet, because of these reasons, RoboMary will not know something new after unlocking her colour–lock. (Dennet,2008: 24 –28)

> The big day arrives. When she finally gets her color cameras installed, and disables her colorizing software, and opens her eyes, she notices … nothing. In fact, she has to check to make sure she has the color cameras installed. She has learned nothing. She already knew exactly what it would be like for her to see colors just the way other Mark 19s do. (Dennet. 2008: 28)

According to Dennett, B state is not a situation where a new colour experience is experienced, but when original Mary sees the colours for the first time, she pretends to be got colour experiences rather she genuinely experience.

The dominant examples discussed above on qualia problems related to the colour phenomenon were given in order to show the philosophical problems in terms of

philosophy of mind. As can be seen, the debate is again based on the tension between subjectivism and objectivism. There are undoubtedly more profound theories that have been developed on this issue by both sides, but this debate is current and significant in terms of philosophy of colour and mind. Therefore, this thesis tried to show why the qualia problem is a matter of debate on colour experience.

To sum up, until Hurvich and Jamesson's opponent processing theory, colours were not seen as the main topic, philosophically and scientifically. Of course, many philosophers and scientists have been interested in colours until this theory, but Hurvich and Jamesson showed that our colour experiences could be only explained by physics, biology, and physiology.

However, the problems have studied in philosophy of mind, especially after the mid–twentieth century, rekindled an old debate for the philosophy of colour. This debate is whether colours can be explained objectively or subjectively. This tension continues the ongoing debate over the connection between the physical world and the intellectual world in the history of philosophy.

It does not seem too difficult for objectivist philosophers to represent colours objectively within any system. However, for subjectivist philosophers who consider our subjective colour experiences to be entirely unrepresentable, these objective colour representations seem difficult to accept by the subjective philosophers. Therefore, it does not seem easy to give an inclusive answer to the questions asked that satisfy both fields. Perhaps we should take a more middle–ground approach to explain our subjective colour experiences. Wittgenstein's ideas on colour can give us this middle–ground approach.

CHAPTER 3

WITTGENSTEIN'S PHILOSOPHY OF COLOUR

Wittgenstein's ideas on colour chiefly were written in his work *Remarks on Colours* (Bemerkurgen über die Farben) which can be considered his last study. This work was turned into a book from his last writings he had written a year before his death. In this work, Wittgenstein's most significant difference from other colour theories is that he does not try to give physiological and scientific accounts on colours. In *Remarks on Colours*, his interest in colour is the logical grammar of colour words in the language–games. Unfortunately, Wittgenstein's ideas on colours in this work are genuinely disorganized and fragmented. Therefore, it is difficult to argue that *Remarks on Colour* provides a systematic and complete colour theory. Nevertheless, it does not matter whether Wittgenstein's approaches to colours can be considered a colour theory or not because he only aims to analyse colour propositions in terms of his philosophical debates rather than developing a colour theory. The momentous point is that Wittgenstein's interest in colours is also noticeable in his other works before the *Remarks on Colours*. Therefore, Wittgenstein's philosophy of colour should not be limited to *Remarks on Colours*.

In his writings from *Notebooks in Logic 1914–1916* to *Remarks on Colour*, there is a transformation from an ideal language philosophy based on logic to a practical language philosophy. In this respect, his consideration of colour evolved during that period. Wittgenstein's early debates on colour in his earliest writing of *Notebooks on Logic 1914–1916* has metaphysical and empirical aspects rather than linguistic. However, after *Notebooks on Logic 1914–1916*, he usually examines colours on the axis of logic and language in his works. His main argument of *Remarks on Colour* is that colours have geometry or

mathematics; he argues that the logic of colours is similar logic of numbers. He tries to describe the logical grammar of colour words in the language–games by using the argument of colour geometry or colour mathematics. However, since *Remarks on Colour* is a disorganized work, it can be challenging to understand his philosophy of colour. Therefore, this thesis suggests that before examining *Remarks on Colour*, his early and later philosophy should be analysed because the *Remarks on Colour* can be seen as confusing without this kind of investigation. Also, just examining *Remarks on Colour* will not be adequate to understand the reasons for his interest in colours and arguments about colours he was trying to develop in his other works.

Because of these reasons, it is necessary to examine his works chronologically in order to find the answer to why Wittgenstein is particularly interested in colours. In this way, the development and change process of his philosophy of colour can be understood. Then from this kind of investigation, an inference can be made about his philosophy of colour.

3.1. Early–Wittgenstein's Color Philosophy

3.1.1. Pre–Tractatus Period

In 1911, Wittgenstein travelled to Jena because he wanted to visit Frege in order to discuss whether the philosophical issues he was working on had any value. However, Frege suggested to Wittgenstein that he should work under Bertnard Russell at Cambridge. On 18 October 1911, Wittgenstein met with Russell at his room in Trinity Colleague. Then he followed Russell's lectures on mathematical logic. In those lectures, Wittgenstein took part in Russell's debates. After those lectures, they continued those debates in Russell's room. (Monk, 1990: 36) However, Wittgenstein's main aim was not to follow Russell's lectures. He wanted to impress Russell, and in this way, he might learn whether he had any extraordinary skill for philosophy.

There are letters between Russell and Wittgenstein in 1911–1913. We understand from those letters that Wittgenstein was particularly interested in metaphysics and logic during that period. Moreover, when we look at the letters between Russell and Ottoline Morrell, Russell gave us clues about Wittgenstein's philosophical approaches in the Pre–Tractatus period. According to Russell, Wittgenstein was suspicious about empirical knowledge in those times. Also, he only admitted the existence of asserted propositions. (Monk, 1990:36) In a letter to Ottoline, Russell talked about Wittgenstein's philosophical approaches as follow: "My lecture went off all right. My German ex–engineer, as usual, maintained his thesis that there is nothing in the world except asserted propositions, but at last I told him it was too large a theme". (Monk, 1990: 37)

In October 1913, Wittgenstein wrote his first noteworthy philosophical work is *Notes on Logic*. (Pottter, 2009: 13) Although Wittgenstein focuses on logic in this work, his assertions also point out different philosophical subjects, such as epistemology, solipsism, god, and metaphysical issues. (Westphal, 2016: 533) In *Notes on Logic*, Wittgenstein generally examines the structures of logical propositions. This work is a kind of collection of debates and criticism towards Russell's ideas about propositions, especially his *Theory of Types*. As a result of that criticism, Wittgenstein constructed his own philosophical view that formed the basis of *Tractatus Logico–Philosophicus*. In *Notes on Logic*, Wittgenstein describes his philosophical approach with own words as follows:

> In philosophy there are no deductions: it is purely descriptive. Philosophy gives no pictures of reality. Philosophy can neither confirm nor confute scientific investigation. Philosophy consists of logic and metaphysics: logic is its basis. Epistemology is the philosophy of psychology. Distrust of grammar is the first requisite for philosophizing. (NB: 93)

In this work, although Wittgenstein does not directly concentrate on colours when he discusses whether 'Are there any simple things?' can be expressed in symbolic notation, he tries to solve this problem by analysing '*points of visual*

fields'. Firstly, Wittgenstein asserts that the uniformly coloured part of our visual field is composed of invisible sensible points –*minima sensibilia*. However, later, he says that simple things are nonsense because we have no any contact with simple things. For him, when we see uniformly coloured parts of visual space, we always perceive whole rather than simple parts. He questions '*points of visual fields'* as follows: "It is imaginable that –e.g.– we should see that all the points of surface are yellow, without seeing any single point of this surface? It is almost seems to be so." (NB. 24.5.15) In this point, Wittgenstein asks some questions about extensional parts of our visual field as follows:

> How we should describe, e.g. uniformly covered with blue? Does the visual image of a minimum visible actually appear to us as indivisible? What has extension divisible. Are there a parts in our visual image that have no extension? E.g., the images of fixed stars? (NB. 24.5.15)

According to him, thinking and claiming those kinds of questions result from non–satisfaction of our wishes by science. Also, he says that this ambiguity about divisible and indivisible parts leads us mystical fields to find answers. With this fixed star example, Wittgenstein criticizes Gustav Fechner's argument of just–noticeable difference[12]because Fechner asserts that there is "*an absolute extensive threshold above which differences in spatial extension of sensations are just noticeable*". (Soutif, 2017: 12) This absolute extensive threshold for visual sensation is called minima sensibilia. However, Wittgenstein alludes that the locations in the visual field of Fencher's minima sensibilia as a determinant of visual sensations is determined arbitrarily. Thus, Wittgenstein's example on the fixed stars without extension is indicative of his thinking about the inadequacy of scientific knowledge. From this discussion, Wittgenstein carries

[12] Gustav Fechner was one of the pioneer of experimental psychology and psychophysics. According to him, sensations can be analyzed by considering 'just–noticeable–differences' as the basic unit of measurement. 'just–noticeable–differences' is the minimum reportable differences in sensations caused by the minimum change in the intensity of the physical stimulus. According to him, sensations can be measured if absolute threshold which is the lowest detectable intensity of stimulus is determined. At stimulus intensities below the absolute threshold, observers may not notice the presence of a sensation, while they may perceive stimulus intensities above this threshold.

on the theme of the discussion to simple and complex propositions. Therefore, the rest of the discussion is not about colours. However, the *Notes on Logic* shows us that Wittgenstein considered colours as a subject of philosophical debate even in his early writings. This study discusses colours through logical propositions rather than empirically or scientifically. This theme is the heart of Wittgenstein's philosophy of colour.

At the end of *Notes on Logic*, Wittgenstein discusses the elementary proposition. According to Jonathan Westphal, this argument dominated Wittgenstein's ideas on colour until 1926, but its effect on his colour thoughts can be seen in his works after that date. Wittgenstein explains his ideas about elementary propositions as follows:

> It is clear that the logical product of two elementary propositions can never be tautology. If the logical product of two propositions is a contradiction, and the propositions appear to be elementary propositions, we can say that in this case the appearance is deceptive. (E.g.: A is red and A is green.) (NB 8.1.17)

It is noticeable that there are terminological confusions between the notions of simple, complex, elementary propositions. This problem is also seen throughout this work and letters between Wittgenstein and Russell. In some works, Wittgenstein calls simple proposition by referring to the elementary propositions, and he sometimes calls complex proposition by referring to the molecular proposition. (Potter, 2009: 171). For Wittgenstein, the elementary proposition asserts the existence of a state of affairs. No elementary proposition contradicts a proposition that is the elementary proposition. Therefore, if two elementary propositions like A is red and A is green, are seen in contradiction, there is an empirical error rather than a tautology. In *Notes on Logic*, Wittgenstein argues that if discordant colour elementary propositions are referred to a single visual point, we are in contradiction.

3.1.2. Tractatus Period

The *Tractatus Logico–Philosophicus* was published in 1921 and is considered the twentieth century's one of the most significant philosophical work. In this work, Wittgenstein deals with the philosophical problems about the subject of world, thought, and language. According to him, the problem of philosophy is caused by a misunderstanding of the logic of language. He tries to resolve these problems by conducting a logical analysis of language because he believes that if we understand the proper logical principles of language, we can solve the problems of philosophy. Therefore, this work aims to limit the expression of thoughts rather than limiting the thoughts. (TLP; 3–4) The philosophical problems that Wittgenstein deals with in *Tractatus* are logical and conceptual. That is why he examines the logical structure of our language. (Grayling, 1988: 17)

The discussions in *Tractatus* is based on seven main propositions. The fifth one, which is significant in terms of the colour proposition, is also about the elementary proposition. Wittgenstein's fifth proposition is: "A proposition is a truth–function of elementary propositions. (An elementary proposition is a truth–function of itself.)." (TLP, § 5.) It can be seen that Wittgenstein continues the same argument from the *Notes on Logic*. Of course, in *Tractatus*, the argument of the elementary proposition is more developed and precise than in *Notes on Logic*.

Another fundamental problem that Wittgenstein harps on in both *Notes on Logic* and *Tractatus* is the problem of colour incompatibilities. According to Wittgenstein, some propositions seem necessarily true, although they are not logically valid. In this situation, it can be seen contradictions in propositions. Wittgenstein gives us an example of this problem related to colour propositions as follows:

> For example, the simultaneous presence of two colours at the same place in the visual field is impossible, in fact logically impossible, since it is ruled out by the logical structure of colour.
>
> Let us think how this contradiction appears in physics: more or less as follows—a particle cannot have two velocities at the same time; that is to say, it cannot be in two places at the same time; that is to say, particles that are in different places at the same time cannot be identical.
>
> (It is clear that the logical product of two elementary propositions can neither be a tautology nor a contradiction. The statement that a point in the visual field has two different colours at the same time is a contradiction.) (TLP. § 6.3751)

The answer of what the logical structure of colour is hidden in the logical feature of elementary propositions. According to Wittgenstein, propositions like 'A is red' or 'A is green' are elementary propositions that cannot be analysed with truth–function because "an elementary proposition is a truth–function of itself." (TLP, § 5.) Wittgenstein asserts that the only necessity that exists is a logical necessity. Therefore, we cannot attain both red and green to place like 'A' at the same time. Wittgenstein's analysis is just a reinforcement of logical necessity. He does not answer the particle light theory. He just wants to point out that a contradiction similar to the one about the co–occurrence of two velocities emerges in physics. (Lugg, 2017: 35) Even if Wittgenstein defines colour proposition as simple or elementary, he also wants to show that their descriptions should be based on an analysis because it is evident that there is difficulty to describe elementary colour proposition. That is why he uses the example of 'a particle velocity' to analyse this fact.

However, the paragraph of 6. 3751 has been a controversial part of *Tractatus*. The most famous criticism comes from Frank Ramsey. In *Critical Notice of the Tractatus Logico–Philosophicus* 1923, he says that Wittgenstein reduces the colour incompatibilities problem to space, time, matter, and ether in order to solve it. However, according to Ramsey, this kind of reduction cause many contradictions in term of physics. (Ramsey, 1923: 473) Ramsey (1923: 473) criticizes Wittgenstein's example of 'a particle velocity' as follows:

> These necessary properties of space and time are hardly capable of a further reduction of this kind. For example, considering between in point of time as regards my experiences; if B is between A and D and C between B and D, then C must be between A and D; but it is hard to see how this can be a formal tautology.

Wittgenstein asserts that a particle cannot have two velocities simultaneously, so the particle cannot be in the same place simultaneously. He wants to make an analogy between elementary colour proposition and the movement of particle velocities rather than reduction. It seems like Wittgenstein takes this criticism and thinks that his analysis was not enough to describe colour incompatibilities because he makes further analysis in *Some Remarks on Logical Form* (1929). This work can be confusing because Wittgenstein uses different terminology. To refer to simple propositions, he uses 'atomic propositions', which "is kernels of every proposition, they contain the material, and all the rest is only a development of this material". (RLP: 163) Wittgenstein in *Some Remarks on Logical Form* discusses on colour incompatibilities as follows:

> One might think—and I thought so not long ago –that a statement expressing the degree of a quality could be analyzed into a logical product of single statements of quantity and a completing supplementary statement. As I could describe the contents of my pocket by saying "It contains a penny, a shilling two keys, and nothing else ". This "and nothing less "is the supplementary statement which completes the description. But this will not do as an analysis of a statement of degree. For let us call the unit of, say, brightness b and let E(b) be the statement that the entity E possesses this brightness, then the proposition E(2b), which says that E has two degrees of brightness, should be analyzable into the logical product E(b) & E(b), but this is equal to E(b); if, on the other hand, we try to distinguish between the units and consequently write E(2b) = E(b') & E(b"), we assume two different units of brightness; and then, if an entity possesses one unit, the question could arise, which of the two– b' or b"– it is; which is obviously absurd. (RLF. p. 167–8)

According to Wittgenstein, if we want to talk about the degree of colour brightness of the entities in our visual field – two degrees of brightness, we will have to state this as E(b)&E(b). However, he concludes that E(b)&E(b) means expressing the same thing twice. In this sense, this expression is a tautology.

Also, E(b)&E(b) corresponds to E(b) rather than E(2b). (Westphal, 2016: 535) In the next paragraph of this analysis, Wittgenstein says that the statements attributed to the degrees cannot be further analyzed. He also asserts that there is internal relation in the relation of difference of degree. This relation is represented by an internal relationship between statements that describe different degrees. Therefore, he adds that this kind of relationship must enter the class of atomic propositions because atomic statements can represent the same multiplicity as the degree to what it is attributed. (RLF: 168)

However, there is a significant problem with the logical structure of colour propositions. From this analysis and the following paragraph, it can be understood that the colour propositions are atomic because Wittgenstein says they cannot be further analysed. If this is the case, there is no logical relationship between them that can be analysed. In the RLF, Wittgenstein shows this case on a truth table. Supposing that a proposition claims the existence of colour ‘R’ in the certain time ‘T’ and in the certain place of our visual field. He calls this proposition ‘RTP’. Then, supposing that there is colour proposition ‘B’ in the certain time ‘T’ and in the certain place ‘P’. He calls this proposition ‘BTP’:

RPT	BPT	RPT&BPT
T	T	T
T	F	F
F	T	F
F	F	F

According to Wittgenstein, there is a contradiction in the first line, so he asserts that RPT&BPT is a contradiction. He says that the output column should be ‘FFFF’ instead of ‘TFFF’ because he thinks that in the first line, there is a mutual exclusion that is the kind of contradiction. (RLF: 168) He explains the reason of the mutual exclusion as follows:

> How, then, does the mutual exclusion of R P T and B P T operate? I believe it consists in the fact that R P T as well as B P T are in a certain sense complete. That which corresponds in reality to the function" ( ) P T "leaves room only for one entity–in the same sense, in fact, in which we say that there is room for one person only in a chair. Our symbolism, which allows us to form the sign of the logical product of "R P T" and "B P T "gives here no correct picture of reality.(RLF: 169)

It might be thought that Wittgenstein drops the idea of truth–functional logic as the basis of a general account of propositions. (Westphal, 2016: 536) However, this does not mean that what Wittgenstein argues in the *Tractatus* is completely useless. Although *Some Remarks on Logical Form* is generally considered problematic in some respect because he cannot adequately support his assumptions, it shows us the beginning of some changes in Wittgenstein's philosophy. It is clear that the problem of colour incompatibilities contributes to Wittgenstein's philosophy of colour. After this period, he notices that some colour phenomena cannot be defined with a logical proposition. At this point, he needs a new approach to construct the background mechanism of colour expressions. After this investigation, he analyses colour as grammar, and he tries to form the arguments of the logical grammar of colour. Wittgenstein uses the colour octahedron that is the geometrical shape to organize the rough logical grammar of colours.

3.1.3. The Octahedron: Logical Grammar of Colours

After *Some Remarks on Logical Forms*, Wittgenstein's thought of the colour incompatibilities changed. This change can be noticed in *Philosophical Remarks* was written in 1929–30. (Westphal, 2016: 539) This works can also be considered a bridge between *Tractatus* and the *Philosophical Investigations.* As can be seen in the last part of *Some Remarks on Logical Forms*, Wittgenstein realizes that colour incompatibilities cannot be solved by analysing logical propositions. However, he still believes that the co–occurrence of two colours in the same place excludes each other. That is why in the *Philosophical Remarks*,

he claims that the colour exclusion should be based on analysis of logical grammar rather than truth–functional logic of colour propositions.

The logical structure of grammar has a mathematical background. Wittgenstein constructs this mathematical substructure by using a geometric shape, an octahedron. According to Wittgenstein, "an octahedron with the pure colours at the corner–points, e.g. provides a *rough* representation of colour–space, and this is a grammatical representation, not a psychological one". (PR: 52) He also argues that the octahedron gives us a *bird's–eye view* of the grammatical rules of colour words. (PR: 52)

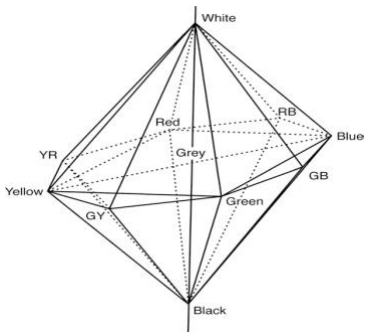


Figure 8. The colour octahedron[13]

For him, grammar gives our language freedom, but this freedom is not limitless. He claims that it gives only necessary degrees of freedom. (PR: 74) This argument is significant to understand how Wittgenstein changed his ideas from the *Tractatus* to the *Philosophical Remarks*. He still wants to establish limits on colour expressions and colour perception. Another point here is that he tries to find different methods for propositions about colour as statements of degree.

According to him, the colour octahedron represents the rough logical grammar of colour words, and it gives us rules of grammar. For example, according to the colour octahedron, we can speak of a reddish–blue but not of a reddish–green,

[13] Silva, M. (2017). *Colours in the Development of Wittgenstein's Philosophy*. Palgrave Macmillan p. 235.

etc. (PR: 75). He also says that different shades of colour can be represented due to the geometrical shape of the octahedron. Each point on the octahedron give us rules on how we can exclude different colours at the same time at the same place. Also, it establishes limits for impossible colours such as reddish–green and bluish–yellow. Wittgenstein gives us detailed information on what the colour octahedron's topological structure provides for our colour expressions as follows:

> Of course you can also arrange all the shades in a straight line, say with black and white a endpoints, as has been done, but then you have to introduce rules to exclude certain transitions, and in the end the representation on the line must be given the same kind of topological structure as the octahedron has. In this, it's completely analogous to the relation of ordinary language to a 'logically purified' mode of expression. (PR. 277)

Instead of a mixture of the primary colour (red, blue, green, yellow, and black–white), this octahedron is based on an opposition of colour. Therefore, Wittgenstein builds a system based on the logical contrasts and similarities of colours with this shape. In this system, black and white have a critical role in systemizing positions of saturated colours. There is a grayscale between black and white, but grayscale should not be understood as a classical mixture of saturated colours. All saturated colours between black and white are opponent pairs of each other. For instance, the white–blue–black group has the same structure as the group of red–yellow–green. However, at the same time, these two groups express opposition to each other.

Colour words are subjected to rules in the language–games, and the colour octahedron gives us the logical limits behind the grammar of colours. Transparent white has no reference, either logically or as a phenomenon. However, some colour expressions refer to some phenomena used in the language–games, such as the colours of gold and silver. Wittgenstein emphasizes that adjectives used for colours are not a property of the colours themselves. We use these adjectives in special language–games. Therefore, the colour of gold is

not the same as yellow in the octahedron. We cannot replace yellow with the colour of gold when we are in a language–games because the word "gold" does not refer to a quality that belongs only to yellow. Those kinds of usage pertain to the logical grammar of the colours in the languages–games, rather than physiological colour space.

In the *Philosophical Remarks*, he still tries to analyze the problem of colour incompatibilities. Westphal claims that "Color incompatibility had shown Wittgenstein the force of a relation that is not logical in the truth–functional sense, yet has all the symbolic power of logic, in that it tells us what is and what is not possible; he called it "grammar.""(Westphal, 2016: 536) The arguments in the *Philosophical Remarks* are the basis of the *Remarks on Colour*. For example, he discusses the colour octahedron in both works. Also, in the *Philosophical Remark*, he says that "What I need is psychological or rather phenomenological colour theory, not a physical and equally not a physiological one" (PR: 273). This argument is also the basis of the *Remarks on Colour*. To sum up, he modifies from the idea of elementary colour propositions to the logical grammar of colour words. Then he evolved from this approach to the language–games.

3.2. Later–Wittgenstein's Philosophy of Colour

3.2.1. Philosophical Investigations

Philosophical Investigations was published posthumously in 1953 is the most famous work after *Tractatus*. This work is considered the main work of his later–philosophy. The *Philosophical Investigations* consists of two parts. In Part I, Wittgenstein criticizes his early thoughts to explain better his new thoughts. In Part II, he asserts his new philosophical arguments such as the language–game, family resembles, rule–following, and form of life. Colour is not the main subject in this work, but Wittgenstein gives some examples and analyses related

to colours while discussing the main topics of philosophy of language, metaphysics, and epistemology.

One of the main subjects that Wittgenstein's concern is the meanings of words. Wittgenstein investigates the meaning of 'usage' in ordinary language. He argues that the meanings of words are determined by their usage in the language. (PI § 43). Also, In the *Philosophical Investigations*, Wittgenstein develops the argument of the language–games to emphasize that language is part of an activity or a form of life. (PI § 23) According to him, the forms of life can be defined as shared human behaviour that is the system of reference through which we interpret an unknown language. (PI § 206) Wittgenstein also points out that the language–games are subjected to rules. The words in the language–games are used according to rules. For example, using a sentence is like making a move on a chessboard. The following–rules give us meaning because when a standard of correct use fulfils its role, the meaning is revealed. (Baker and Hacker, 2009: 136) Wittgenstein also investigates the argument of 'private language'. For him, a language that refers to what the speakers can know their immediate private sensations, and another person cannot understand is 'private language'. (PI § 243) While he admits that we can assume such a private language, he says it contains inconsistencies. Baker and Hacker (2009: 168) sum up Wittgenstein's views on this issue as follows:

> What are 'grammatical truths' are that following a rule is (in general) a practice; that there is no such thing as following a rule for which there are no public criteria; that all languages must in principle be capable of being understood by others who possess the appropriate abilities. A language need not be shared, but it must be shareable. It may be private, but it must be possible for it to be public.

Wittgenstein conducts some debates on colours in *Philosophical Investigations*, even though the main topic of this works is not colours. For example, Wittgenstein gives a colour naming example to explain the relativity of simplicity. According to Westphal, this argument claims that "what makes an

element simple is its role – as the recipient of a name – in the language-game". (Westphal, 2016: 537) Wittgenstein argues that colour concepts are the names of simple parts in a pattern of coloured parts. (see Figure 9) Therefore, the sentence "RRBGGGRWW" can be arranged from left to right and top to bottom as square patches according to the 3x3 coloured pattern. In this analysis, he criticizes the picture of language that sentences have meaning on if they define or picture the real world. (PI § 1) Wittgenstein explains the relation between the sentence "RRBGGGRWW" and the 3x3 coloured pattern as follow: "Here the sentence is a complex of names, to which a complex of elements corresponds. The primary elements are the coloured squares". (PI § 48)

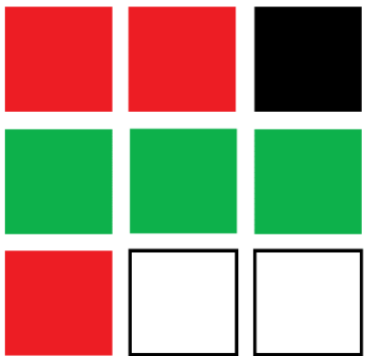


Figure 9. Wittgenstein's the 3x3 coloured pattern (PI § 48)

Wittgenstein asks whether the sentence "RRBGGGRWW" consists of 4 or 9 letters. His aim for this question is to see a distinction between the process of naming a word and describing a sentence. According to him, the signs 'R', 'B', 'G' or 'W' can sometimes be a word or a sentence because this is based on "the situation in which they are written or uttered." (PI § 48) Wittgenstein explains this distinction as follows:

> For instance, if A has to describe complexes of coloured squares to B, and he uses the word "R" *by itself*, we'll be able to say that the word is a description as – a sentence. But if he is memorizing the words and their meanings, or if he is teaching someone else the use of the words and uttering them in the course of ostensive teaching, we'll not say that they are sentences. In this situation the

> word “R”, for instance, is not a description; one *names* an element with it. (PI § 48)

It can be understood that the simplicity of word does not mean the simplicity of element. However, it does not mean that someone cannot describe the element with the sign ‘R’. He means whether the element is simple or complex, depending on which the language–games it is part of. The role of a word in the language–games can make the element either simple or complex. Therefore, Wittgenstein argues that the simplicity or complexity of the squares of each patch colour depends on their uses in the language–games. For instance, when the language–games give a universal description of ‘G’, there is only one green element in the 3x3 coloured pattern. However, when the language–games give us a description about particulars of ‘G’, there are three green elements in the 3x3 coloured pattern. (Westphal, 2016: 538) It can be inferred that Wittgenstein still struggles with the problem of colour incompatibilities even though this analysis is not directly related to colours. If remembering the discussion in *Tractatus* about the colour incompatibilities, there was ambiguity between simple and complex propositions. Similarly, In *Philosophical Investigations*, while he analyses the complexity and simplicity of meaning in language–game, he also tries to answer his old colour debate.

In paragraph 33, Wittgenstein examines the objection that one does not have to be a master of language games about the object to which they are pointing in order to know the definition of an object. He asks a question through the example of ‘pointing a vase’: how do we know whether we are pointing to its shape or colour? Suppose we pointed to its colour as independent of its shape. At this point, Wittgenstein asks that “how is that done?” (PI § 33) Wittgenstein lists a series of language–game examples of ‘pointing to the blueness’ in order to investigate this issue as follows:

> Is this blue the same as the blue over there? Do you see any difference? You are mixing paints and you say, "It's hard to get the blue of this sky". "It's turning fine, you can already see blue sky again." "Note how different these two blues look." "Do you see the blue book over there? Bring it here." "This blue light means . . ." "What's this blue called? a Is it 'indigo'?' (PI § 33)

According to Wittgenstein, a person's attention to colour is sometimes achieved by covering the contours of the form with his hand, or by looking away from the contours of that object, or by staring at the object and trying to remember where he/she has seen that colour before. However, he adds that these alone do not allow us to claim that a person's attention is directed to the object's colour. All the sentences he mentioned above refer to blueness as it is part of a language–game. He explains this with a chess example. Just as making a move in chess is not just about moving a piece – this includes the thoughts and feelings of the gamers – we need to analyse a set of rules, problems while pointing out a colour or attaining a colour, just like in playing chess.

To sum up, it can be seen that the problem of colour incompatibilities is still the main concern from *Tractatus* to *Philosophical Investigations*. With the argument of the language–game, he tries to solve this problem. However, it would be hasty to say that in *Philosophical Investigations*, Wittgenstein's interest in colours and his problems about colour were solved in the frame of his practical philosophy because there are a few debates on colours in this work. For this reason, the *Remarks on the Philosophy of Psychology*, which is the predecessor of *Remarks on Colour*, need to be investigated in terms of his debates on colours.

3.2.2. Remarks on the Philosophy of Psychology

Remarks on the Philosophy of Psychology was posthumously published from Wittgenstein's notes. The aim of this work is nearly the same as *Philosophical Investigations* and *Zettel*. It is difficult to say specifically what issues Wittgenstein deals with in this work, but it can be said that he generally

examined the relationship between the language–games and human's inner experiences. In the first part, he analyzes the language–games from a phenomenological perspective. In this section, it can be seen that his sketches of many of the issues are similar in *the Remarks on Colour*.[14]

The most important argument is in the second part of this work in terms of his philosophy of colour. In paragraph 421, Wittgenstein argues that there is a geometrical structure based on the propositions about colours. This structure provides a necessity for colour propositions. He argues that ""There is no such thing as a bluish yellow." This is like "There is no such thing as a regular biangle""; this could be called a proposition of colour–geometry, i.e., it is a proposition determining a concept." (RPP II § 421)

This passage directly refers to the colour octahedron. When we read *Philosophical Investigations*, it is difficult to find detailed analysis about colours. Moreover, when he gives an example about colours, they are only considered within the framework of the language–games. After completing the first part of the *Philosophical Investigations* in 1945, Wittgenstein kept nine notebooks between 1946 and 1949. Editors published these notebooks posthumously as the second part of Philosophical Investigations, Zettel and Remarks on the Philosophy of Psychology. (Diamond, 1984: 459) Therefore, it would not be correct to say that when Wittgenstein was writing *Philosophical Investigations*, the idea of colour geometry or colour mathematics about colours was replaced entirely by the language–games. Moreover, since Wittgenstein also defended the colour geometry in *Remarks on Colour*, the language–games about colours should be considered together with the colour geometry.

[14] I think it would be hypothetical and confusing to give general information on the subjects in the first part of this study, since they are not systematic for general information of Wittgenstein's philosophy of colour. But of course I will touch on the following parts of the thesis in necessary discussion. But if you want to see in more detail on which topics Wittgenstein studied colours in the first chapter of the RPP, see Westphal's Wittgenstein on Color p. 539.

3.3. Remarks on Colour

Why are colours so important for Wittgenstein? What prompted him to study on colours at the end of his life? Of course, while he was writing the notes of *Remarks on Colour*, colours were not a new interest for him. For example, the problem of colour incompatibility is an impasse from *Tractatus* to *Philosophical Investigation*. The inconsistency caused by the problem of colour incompatibility perhaps leads to questions on Wittgenstein's early philosophy. However, it would not be right to limit Wittgenstein's interest in colours to this argument. He had held debates on colours in his works until *Remarks on Colour*. Wittgenstein describes the importance of colours for philosophy as follows: "Colours are a stimulus to philosophizing. Perhaps that explains Goethe's passion for the theory of colours. Colours seem to present us with a riddle, a riddle that stimulates us,—not one that exasperates us." (CV: 76)

When Wittgenstein had visited his family in Vienna in January 1950, Wittgenstein was investigating Goethe's *Farbenlehre* (Theory of Colour). In the letters he wrote to G. H. von Wright, he said this book 'stimulate me to think'. According to Wittgenstein, although *Farbenlehre* was boring and repetitive work, it was philosophically exciting and instructive. *Remarks on Colour* was edited into three parts by the editors. Part II was composed of the notes he took during his readings of *Farbenlehre* in Vienna. The Part III of the work is thought to be written in Oxford in April 1950 and Part I in March 1951. (Monk, 1990: 561)

The common opinion on *Remarks on Colour* is that it has unsatisfactory structure, disconnections between fragments and theme, and is not a systematic study. (Lee, 1999: 1) For example, Marie McGinn (1991: 435) says that because of the disorganized structure of *Remarks on Colour*, it is a difficult task to evaluate this work concerning traditional debates of the philosophy of colour. However, instead of evaluating the text as a whole, it would be more beneficial

to examine it through the problems Wittgenstein was trying to solve. In *Colour: Some Philosophical Problems from Wittgenstein,* Jonathan Westphal said that Wittgenstein analysed colours through some puzzle propositions rather than forming a general theory of colour. For example, "Something can be transparent green or any other colour, but not transparent white." and "There can be a bluish–green but not a reddish green". (Westphal, 1987: 1)

To say something general about *Remarks on Colour*, Wittgenstein examines the problems of using colour concepts in ordinary language. Also, it seems logical to read this work in co–occurrence with Wittgenstein's other works, especially what he wrote between 1941 and 1949. Therefore, some of his ideas on colours in his other works in previous chapters were explained. Before examining *Remarks on Colour*, it would be beneficial to present a brief overview of Goethe's *Farbenlehre*, which encouraged Wittgenstein to write this work. Goethe (2015: 3) defines colour in *Farbenlehre* as follows:

> Colour is an elementary phenomenon in nature adapted to the sense of vision; a phenomenon which, like all others, exhibits itself by separation and contrast, by commixture and union, by augmentation and neutralization, by communication and dissolution: under these general terms its nature may be best comprehended.

Goethe's colour theory is generally based on phenomenological analysis. These analyses can be noticed throughout his entire work. Sometimes he also sets up experiments simulating some phenomenological situations. Goethe argues that light is essentially invisible and cannot have colour. According to him, colours emerge with the perception of the human eye. (Vendler, 1995: 391) Also, Goethe bases his theory on the principle of contrasts and inherent relations. Goethe defines contrasts in nature as yellow–blue, effect–deprivation, light–shadow, light–darkness, strength–weak, hot–cold, near–far, repulsive–attractive, affinity with acids–affinity with alkaline. According to him, colours are formed in nature through the movement of these contrasts and inherent relations. Also, the primary and the intermediate colours are placed regarding contrasts and

similarities in a colour wheel he calls the chromatic circle. Since he considers green–red and blue–yellow as opposite pairs, he positions them at opposite points on the circle. Neighbouring colours can mix with each other, while opposite pairs evoke each other. (Vendler, 1995: 392)

Although Goethe's colour theories influenced Wittgenstein, there are many objections to Goethe's arguments in *Remarks on Colour*. It is not essential to explain these criticisms one by one in terms of the aim of this thesis. The general brief on which subject Wittgenstein was influenced by Goethe and on which subjects he opposed can be shown.[15]

Wittgenstein rejects colour analysis based on any physiological and psychological explanation of colours. This approach can be also observed in his other works. In this context, it can be said that he adopts Goethe's critique of explaining colours only by reducing them to physiological processes. Nevertheless, he is critical of Goethe's reduction of colours to phenomenological analysis because he believes that 'there is no such thing as phenomenology, but there are indeed phenomenological problems'. (RC I: § 53) According to Wittgenstein, phenomenological analysis requires analysing concepts. (RC I § 16) He says that it is necessary to examine the roles of colour concepts in the language–games.

Wittgenstein's one of the puzzles in *Remarks on Colour* is about the notions of pure white and transparent white. He analyses these two notions in order to criticize Goethe's reductionist approach and show the logical impossibility of transparency of white. In the next section, the two notions will be examined in terms of his debates in *Remarks on Colour*.

[15] For detailed comparison of the color theories of Goethe and Wittgenstein, see: Vendler, Z. (1995). Goethe, Wittgenstein, and the Essence of Color. *Monist*, *78*(4), 391–410.

3.3.1. The Concept of Pure White and Impossibility of Transparent White

> A language–game: Report whether a certain body is lighter or darker than another.—But now there's a related one: State the relationship between the lightness of certain shades of colour. (Compare with this: Determining the relationship between the lengths of two sticks—and the relationship between two numbers.)—The form of the propositions in both language–games is the same: "X is lighter than Y". But in the first it is an external relation and the proposition is temporal, in the second it is an internal relation and the proposition is timeless. (RC I § 1)[16]

Wittgenstein begins *Remarks on Colour* with such a comparison. For him, statements about lengths and lightness or darkness of colours are timeless and internal. However, statements about whether the colour of something is darker or lighter or whether a stick is longer or shorter are temporal and external. (Westphal 2016: 541) According to Alan Lee, this idea comes from *Remarks on the Foundations of Mathematics*. For Wittgenstein, timeless and internal statements refer to propositions that are independent of the outcome of experiments. (Lee, 1999: 218)

The aim of this comparison is that Wittgenstein wants to discuss the notions of purity and abstractness of colours. According to him, a white paper getting its light from the blue sky may be brighter than the blue sky because blue can be darker than white. (RC I § 2) He tries to answer the question of 'What does 'white' mean?'. To find answers to this question, he suggests Lichtenberg's argument of 'pure white' as follows:

[16] In this quote, Wittgenstein gives us a clue about his understanding of phenomenology. He rejects the traditional Husserl's phenomenology based on subjective states of consciousness. By saying that colours, like numbers, are subject to internal relations, he implies that the meaning of colour concepts is not determined according to consciousness of colour of objects. Subjective colour experience is dependent on temporal and external factors, but Wittgenstein's phenomenology explains colours with a logic away from temporality and external variables. Therefore, for Wittgenstein, phenomenology is grammar, and he tries to determine the logical grammar of colour concepts to solve the problems of phenomenological and psychological description of colour experience. In other words, colours depend on the rules of logical grammar rather than consiousness.

> Lichtenberg says that very few people have ever seen pure white. So do most people use the word wrong, then? And how did *he* learn the correct use?—He constructed an ideal use from the ordinary one. And that is not to say a better one, but one that has been refined along certain lines and in the process something has been carried to extremes. (RC I § 3)

Lichtenberg emphasizes the necessity of conceptual analysis as against Goethe's phenomenological reduction of colours. Therefore, Wittgenstein mentions this argument, as conceptual analysis is the point that he wants to revive. (Lee, 1999: 224) Wittgenstein wants to tell here is that meaning cannot be identified with the reference. The meanings of colour concepts have nothing to do with looking at the colour of something. (Carvalho, 2017: 324) In other words, perceiving a colour does not mean that we know the meaning of that colour. Wittgenstein argues that "It would, however, also be wrong to say, "Just look at the colours in nature and you will see that it is so". For looking does not teach us anything about the concepts of colours."(RC I § 72)

Wittgenstein distinguishes between logical propositions and experiential propositions. In order to understand this distinction, his argument of the impossibility of transparent white will show us what he means by this distinction. He begins by asking, "Why is it that something can be transparent green but not transparent white?". (RC I § 19) Wittgenstein argues that, unlike other colours, we cannot have a concept of transparent white. For example, although we can see the object through a transparent red, green, black, blue, yellow medium, but not with a white medium, a white object and white surface cannot be transparent because of the opaque nature of whiteness. However, he argues that the impossibility of using the word 'transparent white' in language–games is based on the logical grammar of white. Therefore, he emphasizes that the concept of white cannot be associated with the concept of transparency because white cannot be transparent due to grammatical illogicality rather than a phenomenological character of white. The critical point is that the rules of the impossibility of the transparency of white do not come from a posteriori. These

are logical necessities that are gained as a priori. (Westphal, 2016: 542) According to Wittgenstein, what distinguishes the logical proposition from the empirical proposition is undoubtedly not an accompanying mental phenomenon but its usage in the language–games. (RC I § 32)

This argument is criticized because it cannot be explained through the octahedron, which he claims is the basis for logical grammar. However, Wittgenstein does not make such a claim in *Remarks on Colours*. The position of white in the octahedron does not warrant its impossibility of transparency. The octahedron gives us a basic skeleton of logical grammar. It just gives us the 'and' and 'not' commands to use colour concepts. (Lugg, 2014: 3)

Another problem regarding the impossibility of transparent white is to try to justify this argument with physical data because such a justification contradicts Wittgenstein's theme of the philosophy of colour. Westphal (1987: 27) says that "white surfaces present barrier to the light means that they block the dimension of depth required for transparency of the image". Wittgenstein would undoubtedly object to such an explanation as a ground of impossibility of transparent white because he argues that transparent white cannot be imaginable and impossible colours are unimaginable phenomena, so we do not need to think of them as if they exist. (RC I § 27) Therefore, the concept of transparent white cannot be used in the language–games as a logical necessity. According to him, any physiological colour theory cannot solve phenomenological problems. He argues that there are rules for solving these problems, which are related to the usage of words in the language–games. Unfortunately, Wittgenstein's arguments on this issue are not clear enough, and his claims are open to criticism. Andrew Lugg (2014: 16) explains why he would oppose a physical explanation as follows:

> Since he regards transparency as necessarily involving the dimension of depth and transparent white as logically – not physically – impossible, he can justifiably view the propositions about transparent he is concerned with as having to do with how phenomena are conceptualised, not how they are, how things are in the world (compare Brenner 1999: 126–127). Had he been pressed and thought the point worth discussing, I imagine, he would have attempted to convince the reader that how we normally think and speak about colour precludes the possibility of transparent white surfaces no less than how we normally think and speak about motion precludes the possibility of particles with two velocities.

Wittgenstein repeatedly discusses the impossibility of transparent white in several places in *Remarks on Colour*. Although his debates on these issues are not clear enough, this argument is not so important as to overshadow the argument of the logical grammar of colour in terms of the language–games about colours since the argument of transparent white is used only to criticize the physiological reductionist approaches. Wittgenstein discusses another essential issue about impossible colours: the impossibility of reddish–green and yellowish–green. In the next section, this argument is examined in detail.

3.3.2. Reddish–Green and Bluish–Yellow

The colour octahedron is based on four primary colours – red, blue, yellow, green. Black and white can be also considered primary, but their role and positions in the octahedron are different from the four primary colours. Wittgenstein mainly focuses on why green is a primary colour instead of the mixture of a bluish–yellow. Wittgenstein (RC III § 27) describes why green cannot be a combination of bluish yellow as follows:

> So if someone described the colour of a wall to me by saying: "It was a somewhat reddish yellow," I could understand him in such a way that I could choose approximately the right colour from among a number of samples.
>
> But if someone described the colour in this way: "It was a somewhat bluish yellow," I could not show him such a sample.—Here we usually say that in the one case we can imagine the colour, and in the other we can't—but this way of speaking is misleading, for there is no need whatsoever to think of an image that appears before the inner eye.

Wittgenstein wants to emphasize is not ‘looking at colour’ but the usage of the concept of that colour. (RC III § 158) The expression green is primary in our colour vocabulary because it has a particular syntactic and semantic pattern in our language–games, as so red, blue, and yellow. For example, green serves as a basis for intermediate colour expressions such as yellowish–green. It also functions as an adjective to denote other intermediate colours, such as greenish–blue. (Barceló and Saab, 2017: 227) What Wittgenstein argues in the quote above is that when we see a green wall, we do not see yellow and blue, and those colours cannot be imagined. He argues that just as a transparent white cannot be imagined, a bluish–yellow cannot be imagined in this context.

Blue and yellow as primary colours can be changed by using with green, but the same does not work for red. Red cannot be changed by using green and vice versa. (Barceló and Saab, 2017: 227) To illustrate the nonsense of these impossible colours, Wittgenstein quotes a letter from Runge to Goethe in *Remarks on Colour* as follows: “Runge: “If we were to think of a bluish–orange, a reddish–green, or a yellowish–violet, we would have the same feeling as in the case of a southwesterly northwind....” (RC I § 21)

Wittgenstein gives an example of what it would be like to look for reddish–green in ‘holly leaves’ that turn from green to red. He says that when these leaves turn into an iridescent blackish colour during the transition, where one point is red and the other point is green, we can call it reddish–green. (LFM: 244) Here, Wittgenstein wants to show that this blackish colour will not remind us of either red or green, just as he says that yellowish–blue cannot be imagined when we see green.

According to him, “an octahedron with the pure colours at the corner–points, e.g. provides a rough representation of colour–space, and this is a grammatical representation, not a psychological one” (PR § 51). He claims the octahedron says that green and red cannot be taken together. This is logically impossible

since they place at the opposite position, like blue and yellow. (PR § 75–76) One of the reasons in *Remarks on Colour* is why he does not mention much about the octahedron is that while he still sees it as a basic explanation of grammar rules, he does not see it as the basis of every usage of colour words in language–game. In addition, he still argues that "the geometry of colours shows us what we are talking about, i.e. that we are talking about colours". (RC III § 86) He never hesitates about the mathematical distinctiveness of every point in the colour space and the mathematical representation of colours. (Lugg, 2017: 11)

Wittgenstein's debates on colours in his works can be considered a criticism of phenomenological description of colour perception. He argues that there are phenomenological problems to be solved, and the impossibility of reddish–green, bluish–yellow and transparent white are among these phenomenological problems. According to him, these phenomenological problems cannot be solved with physiological and psychological descriptions. Therefore, he develops a conceptual method to analyse these phenomenological problems. As a result of his analysis, he claims that reddish–yellow and bluish–yellow are impossible in terms of logical necessities.

To sum up, the problem of colour incompatibilities forces him to investigate colour propositions in his works. Therefore, he develops the argument of colour geometry or colour mathematics in order to solve the problem of colour incompatibilities. Then, he tries to solve the logical difficulties posed by phenomenological propositions about colours in *Remarks on Colour*. Wittgenstein focused on puzzle problems in language games because he believes there is a logical structure behind these the language–games.

However, the argument of colour geometry needs further examination through more concrete examples because the complex usages of colour concepts cannot be represented by the colour octahedron. Moreover, the role of the colour

octahedron is not sufficiently explained in *Remarks on Colour*. Therefore, in the last chapter, this thesis discusses Wittgenstein's debates on colour blindness in order to describe the argument of colour geometry or mathematics in detail.

CHAPTER 4

COLOUR BLINDNESS IN WITTGENSTEIN'S PHILOSOPHY OF COLOUR

Wittgenstein does not give a fundamental role to the colour octahedron to describe all usages of colour concepts. In other words, he does not claim that the colour octahedron can explain complex usages of colour concepts. He uses the language–games to describe this issue. Although he does not sufficiently explain these issues in his works, Wittgenstein debates on colour blind people in *Remarks on Colour* are a critical point in order to understand the complex usages of colour concepts.

Colour blindness is a comprehensive concept; for example, it can be described with different types of symptoms that vary from daltonism to achromatopsia. Therefore, it is significant to determine which type of colour blindness Wittgenstein considers in *Remarks on Colour*. In the passages about colour blind people in *Remarks on Colour*, Wittgenstein starts to inquire whether normal observers and colour blind people have the same concepts of colour blindness or not. He continues the same neutral attitude towards colour perception in this discussion because he wants to develop a methodical approach to colours through the language–games.

Before examining Wittgenstein's approaches to colour blindness, terminological information about types of colour blindness will be given because this thesis also discusses different types of colour blindness, such as achromatopsia, to analyse Wittgenstein's debates in detail.

4.1. Types of Colour Blindness

First of all, it is beneficial to remember how human colour vision works. Standard human colour–space is between 700 nm and 400 nm, which are categorized according to L, M, and S cones. Respectively, L cones can perceive red–yellow light about 575 nm monochromatic wavelength, M cones can perceive green–yellow light about 535 nm, and S–cones can perceive blue–violet about 445 nm. Normal vision can only occur if cone cells match all hues of the mixture of LMS primary monochromatic lights. Normal human vision is also called normal trichromacy. In this concept, 'tri' refers to three monochromatic lights (LMS). However, different hues can be perceived by the combination of stimulated cones. So, our brain cannot compute by the stimulation that only comes from one cone type. For the proper hue perception, at least two mixtures of LMS are needed. According to the different intensities of these three combinations, different hues can be separated easily by observers. (Hsia and Graham, 1997: 201)

Colour blindness generally is categorized into dichromacy, monochromacy, and anomalous trichromacy. Dichromats are individuals who can match any colour of the spectrum with a suitable combination of two primary monochromatic lights. (Hsia and Graham, 1997: 201) Unlike trichromats, these individuals only need two primary monochromatic lights, so the colours are perceived with no more than two primary monochromatic lights. Dichromats are generally divided into two groups. These are known as protanopia called red colour blindness and deuteranopia called green colour blindness. Protanopia individuals cannot perceive the L–monochromatic lights, e.g., red light, because no L–cones exist on their retina. For example, they perceive red light as grey, black, or beige. This kind of colour blindness is commonly known as red–green colour blindness. Deuteranopia, which is also red–green colour blindness, is caused due to the lack of M–cones on the retina. This kind of colour–blind individual cannot see green lights. Lastly, there is an uncommon type of dichromacy that is tritanopia. It is

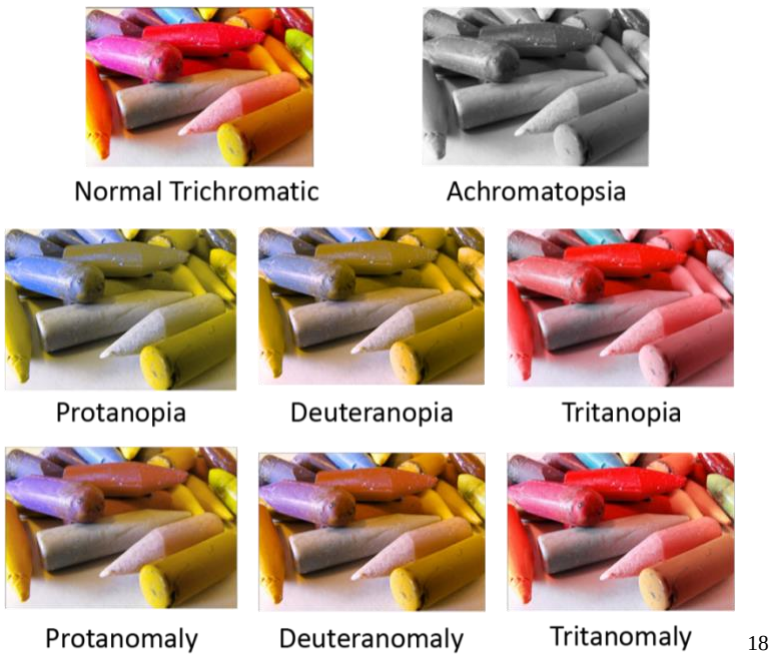
occurred because of the loss of S–cones. Because of these defects, observers cannot see monochromatic blue lights and see blue lights as green or black. Since they often have trouble distinguishing between yellow and blue, this kind of colour blindness is called yellow–blue colour blindness. (Hsia and Graham, 1997: 201–15)

The second type of colour blindness is monochromacy, known as total colour blindness. Monochromats cannot distinguish hues due to lack of cones or impairment of cone and rod cells. However, they can match the spectrum to any selected wavelength if luminance is appropriate for them. (Hsia and Graham, 1997: 216) There are two types of monochromacy: rod–monochromacy and cone–monochromacy. Rod–monochromats do not have regular cones; they only have rod cells on the retina. This kind of colour blindness is also called achromatopsia. People who suffer from this disease cannot perceive any colours, and their colour vision is a kind of white–black TV vision. Having only rod cells results in photophobia, which means the sensitivity to high luminance. For example, when they face high luminance, they continuously blink their eyes to decrease their intensity. Because of that hypersensitivity, their visual experience is not acute. (Nordby, 1990: 305)[17] Another type of monochromatic colour blindness is cone–monochromatism. Although cone–monochromats have rods and cones cells, their cones are only stimulated by one monochromatic light. That is why, unlike rod–monochromats, cone– monochromats can only see in a single hue, not black and white. Also, they cannot discriminate different hues as rods– monochromats do. However, their vision is acute, and they do not have hypersensitivity to luminance. (Hsia and Graham, 1997: 217)

Anomalous trichromacy is usually confused with dichromacy and normal trichromacy because even if they have LMS cones like normal trichromats, one of their cones is different and has a low sensitivity. The individuals whose L–cones have lower sensitivity than normal observers are called the protanomalous

[17] In the following sections, I will examine the topic of achromatopsia in more detail as a topic.

colour blindness because their L–cones are impaired**.** The cause of deuteranomalous colour blindness is the defection of M–cones. So, they have low sensitivity to M–cone monochromatic lights. Both protanomalous and deuteranomalous observers find it challenging to distinguish red–green hues. The last type of anomalous is trichromalous, which is caused by the impairment of S–cones. Because of this reason, the separation of blue with green and yellow with red is difficult for tritanomalous observers. (Hsia and Graham, 1997: 217–9) It seems easier to distinguish monochromatic colour blindness from other types of colour blindness, but it is difficult to say the same for dichromacy and anomalous trichromacy. There are many similarities between types of dichromacy and anomalous trichromacy. The most crucial difference between these two types is that dichromacy reduces the missing colour to another colour, while anomalous colour blindness is based on alternating spectral matches of normal colour vision.



[18]

Figure 10. The vision of different types of colour blindness

[18] Colblindor. (2016). *Color Blindness Simulator* . https://www.color–blindness.com/coblis–color–blindness–simulator/.

Most colour blindness is hereditary and is commonly inherited from parents' genes, especially protanopia and deuteranopia. For this reason, the majority of colour blind people are congenitally colour blind. In addition to this, colour blindness is also a disease that can be acquired. External factors can impair the visual system (e.g., injures, poisoning, physiological defects). It is always thought that whatever form or type of colour blindness causes aberrations in vision and is deficient compared to our normal trichromatic vision. However, we can often find many examples that colour blind people try to use colour concepts when they talk about colours with normal trichromats, despite their different subjective colour experiences. Of course, this is a normal situation in terms of the necessity of communication. At this point, considering Wittgenstein's approach to colours, a noteworthy question must be asked; can colour blind people play the same language game as normal observers do with colours?

4.2. Colour Blindness in Wittgenstein's Philosophy of Colour

The reason why Wittgenstein talks about colour blindness can be understood with his crucial questions: "Do the normally sighted and the colour–blind have the same concept of colour blindness?". (RC III § 120) Wittgenstein claims that all types of colour blind people cannot use the colour concepts and play the language–games about colours like as normal observers can do. At first glance, this approach can be seen as a natural inference reached by Wittgenstein due to the different or incomplete visual experiences of colour blind individuals. However, he explains the reason of this inference with his knowledge argument.

Wittgenstein argues that the psychological explanation of the phenomenon of seeing and colour blindness or blindness is meaningless, and this kind of explanation cannot give us a new information. Wittgenstein claims that while explaining the phenomenon of blindness, psychology gives an explanation is based on observations of the behaviour of blind people. For example, when blind people walk in the street, they cannot cross the ways as normal observers do. The

same goes for the description of colour blindness. For example, psychologists explain red-green colour blind people through their behaviours, showing their disability to distinguish between red and green. According to Wittgenstein, psychology only teaches us descriptions of what seeing and blindness are. However, he also adds that this explanation neither teaches to normal observers what blindness is nor to blind people what seeing means. Wittgenstein (RC III § 283) explains why psychological description is useless as follows:

> Does everything that I want to say here come down to the fact that the utterance "I see a red circle" and "I see, I'm not blind" are logically different? How do we test a person to find out if the first statement is true? And to find out if the second is true? Psychology teaches us how to determine colour–blindness, and thereby normal vision too. But who can learn this?

Wittgenstein criticizes phenomenological explanations because he treats knowledge of something in two different ways. For him, these are 'knowledge by description' and 'knowledge by acquaintance'. In *Remarks on Colour*, Wittgenstein classifies psychological descriptions as 'knowledge by description'. Wittgenstein supposes a tribe of colour blind people using only three primary colour concepts: blue, yellow, and any colour instead of red and green. According to him, the language games these people play with their colour concepts are different from ours. It also seems very difficult for them to play in our language–games with our colour concepts (RC II § 128) because Wittgenstein claims that this colour blind tribe, even if they have all the colour concepts in English, cannot be played with them in the language–games like us. (RC I § 13) It may be in a situation that the opposite is the same case. That is, the usages of colour concepts that colour blind people have, but we do not. For example, they may have reddish–green and bluish–yellow concepts that are impossible colours for us. He explains this situation as follows:

> But even if there were also people for whom it was natural to use the expressions "reddish–green" or "yellowish–blue" in a consistent manner and who perhaps also exhibit abilities which we lack, we would still not be forced to recognize that they see colours which we do not see. There is, after all, no

> *commonly* accepted criterion for what is a colour, unless it is one of our colours." (RC I § 14)

When psychology defines colour blindness, it gives us descriptions of what phenomenon colour blind people can see or not. Nevertheless, it is precisely at this point that Wittgenstein criticizes this descriptive knowledge of psychology. According to him, psychology only emphasizes colour blind or blind people's deviations from the normal observers. That is why he asks: What does this kind of descriptive knowledge teach to whom? Can the phenomenon of blindness or colour blindness be explained to a normal observer with a description? What do normal observers understand from such a description of blindness or colour blindness? He argues that the meaning of 'there is a human who sees' is unclear, or there are no sensible uses of these sentences in the language–games because neither blind nor normal observers can understand this expression without using it in a language game. Therefore, he assumes that as a result of psychologists' observations, we are informed by this kind of description to distinguish what seeing and blindness mean. However, Wittgenstein claims that we learn uses of this kind of phenomenological description through the language–games. (RC III § 338–340) Wittgenstein (RC III § 282) points out that it is not sensible to describe what seeing colours are to someone who cannot see colours and what it is not to see colours to someone who can see as follows:

> I say to B, who cannot play chess: "A can't learn chess". B can understand that.––But now I say to someone who is absolutely unable to learn any game, so and–so can't learn a game. What does he know of the nature of a game? Mightn't he have, e.g. a completely wrong concept of a game? Well, he may understand that we can't invite either him or the other one to a party, because they can't play any games.

One of the most important reasons underlying Wittgenstein's distrust of phenomenological description is that he thinks subjective experience cannot be expressed just by describing. In terms of philosophical terminology of colour, it can be said from his discussions in *Remarks on Colour* that the expression of subjective colour experiences is related to the problem of qualia and other minds.

Because of this reason, the psychological descriptions cannot inform us what seeing and blindness mean. (RC III § 337). For a colour blind person who tries to use the same colour concepts as normal observers, the state of her knowledge cannot go beyond imitations even if she has good skill about imitating normal observers' attitudes. In the last sentences of *Remarks on Colour III*, Wittgenstein says that 'knowing' is not related to our psychological states; instead, there is a particular logic of the concept of 'knowing'. He means with the particular logic of the concept 'knowing' is 'knowledge by acquaintance'. The notion of 'knowledge by acquaintance' is one of the fundamental methods in the *Remark on Colour* to answer what 'knowing colours' means in terms of his philosophy of colour.

The notion of 'knowledge by acquaintance' can be seen from the language–games thesis Wittgenstein puts forward since *Philosophical Investigation*. It can be said that 'knowledge by acquaintance' is essentially a method that provides us with gaining information or being competent about knowing something. According to Wittgenstein, having sense data of any colour does not prove knowing all information about the concepts of those colours. Wittgenstein always emphasizes the usage of colour concepts in the language–games to know the meaning of colour, and the way to possess all usages of colour concepts depends on how observers perform in the language games. With this performance, knowledge about colours can be acquired if the observers are masters of the language–games about colours. Therefore, in *Remarks on Colour*, Wittgenstein distinguishes knowledge of something as descriptive and acquired. He does not deny the existence of the physical world of colours, but he does not reduce the meaning of colours to physiological experience. Here, a question should be asked; if it is not so essential to experience colours physiologically, why can colour blind people not know the concepts of colours that normal observers have? What is the reason colour blind people cannot have colour concepts with the knowledge by an acquaintance? Wittgenstein (RC III § 291–2) answers these questions as follows:

> Can one describe higher mathematics to someone without thereby teaching it to him? Or again: Is this instruction a description of the kind of calculation? To describe the game of tennis to someone is not to teach it to him (and vice versa). On the other hand, someone who didn't know what tennis is, and now learns to play, then knows what it is. ("Knowledge by description and knowledge by acquaintance".) Someone who has perfect pitch can learn a language–game that I cannot learn.

To summarize, observers need to perform with colour concepts in the language–games to understand the meaning of colour concepts. Considering the situation of blindness and colour blindness, Wittgenstein does not interpret these people's colour experiences in terms of the deficiencies in their visual abilities. He just claims that since these people have different practices and forms of life, neither they can fully have the meanings of our colour concepts nor our experiences. Similarly, normal observers cannot understand the meaning of colour blind people's colour concepts. According to him, colours perceptions and experiences are not an indication of understanding their meaning because he claims that the meaning of subjective colour experiences cannot be taught by descriptions to anyone.

The performance and practices in the language–games are the keys to understand Wittgenstein's main concern about the meaning of colour concepts. According to Wittgenstein, to understand the meaning of colour concepts, it is necessary to understand the logic of the language–games involving the colour concepts. Jonathan Westphal (2016: 543) says that "The logic of language- games played with colour words turns out to be complicated, more complicated than the empiricist could have expected, and the puzzle problems find their resolution in tracing out the structure of these games." In this regard, it can be asked how the logic of these language games can be understood, that is, how the meaning of a colour concept can be learned.

Wittgenstein says that the language games about colours should not be tied to a single cause, such as memory, visual phenomena, mental process. That is why

the meaning of colour concepts are more complex than empiricists and scientists think. Wittgenstein (BB. § 14c) makes the following inference from a thought experiment on colours in *Brown Book*: "What ties the ship to the wharf is a rope, and the rope consists of fibres, but it does not get its strength from any fibre which runs through it from one end to the other, but from the fact that there is a vast number of fibres overlapping."

What Wittgenstein means is that in order to understand the meaning of the colour concepts in the language–games, it should not be focused only on one reason as a source of the meaning of any colour concepts. For example, suppose John says to Mary: 'Can you pluck red apples from the garden!', then suppose she brings the red apples. In this situation, Mary may look at the red apples to understand what John means. Also, she may evoke her memories about red coloured objects to understand the meaning of 'red'. Maybe, Mary has a colour palette in her mind. When John calls her 'red apples', her mind starts the process to match 'apples' to 'red'. These and many other cases can be listed that Marry may be done to understand 'red apples'. Wittgenstein does not deny all these possible cases, but he says that these cannot be reasons in themselves to understand the meaning of red. Her memories, perceptions, and all subjective experiences about colours should be considered as overlapping fibres of the language–game of 'red apples'. All these conditions ensure her performance in the language–games. Byong–Chul Park (1998: 146) explains the relation between meaning and the language–games as follows:

> Rules cannot serve as the ultimate source of meaning. Rather, what we have to see more importantly is the fact that there is the language–game of color which is being played. There can be no specific reason that one sees a red thing and calls it red. One only plays the language–game of color in the way in which one has been taught to. Therefore, the way we use certain color–words, or the way we play the language–game of color needs no justification. It is our activity of playing the language–game of color that justifies the meaning of this or that color–word.

Both John's ability to use the concept of red and Mary's participation indicate that they understand the logic of the language–games. However, it can be asked how they learn to do this. According to Wittgenstein, the meaning of the words is determined by their usages in the language–games. (PI. § 43) According to him, practising in the language–games is crucial to learn the usages of concepts. This term refers to the effectiveness of people in forms of life. The language–game played with different concepts refers to different forms of life. For example, the concept of 'red' can be used with different meanings. However, this situation causes difficulty in giving a general description of the language–games. (PI § 65–66) For instance, if Mary and John want to be masters of the language–games of 'red', they have to practice the concept of red countless times in the language–games by pointing out different meanings in different situations. However, it is impossible to define the rules, and logical structure of all language–games played with 'red' because all language–games played with the concept of 'red' is a unique practical activity.

Wittgenstein argues the notion of 'family resembles' to explain the similarities between concepts. He explains 'family resembles' as "a complicated network of similarities overlapping and crisscrossing: similarities in the large and in the small." (PI § 66) The octahedron provides us with a system for the concepts of primary colours. Although the mixtures and contrasts of primary colours in the octahedron give the basic rules for our language–games, the octahedron is not enough to explain all usages of colour concepts, such as transparency, glitter, opacity and colour adjectives. However, although the ambiguous colour concepts that the octahedron cannot define seem complex, all colour concepts are part of a system, like overlapping fibres that constitute a rope.

Wittgenstein always emphasizes logical grammar representing colour concepts. In the first sense, the octahedron provides the logical grammar of colour concepts that is generally considered as geometry or mathematic of colour concepts. Such an interpretation can be an adequate description as the basis for

the usages of primary colour concepts, but it cannot be sufficient to explain the complex usages of colour concepts. At this point, the logical grammar of colours concepts can be explained through his methodological discrimination between ‘surface grammar’ and ‘depth grammar’. In *Wittgenstein In The Chinese Room*, Aziz Fevzi Zambak (2010: 39) explains this distinction as follows:

> According to Wittgenstein, surface grammar includes syntactic features or morphemes (meaningful units) of the sentence which is written or pronounced in a certain order. On the other hand, although Wittgenstein does not explicitly specify the term “depth grammar”, depth grammar is about the various circumstances and sentential contexts of *linguistic practices*. It is the appropriate way for us “to find our way about”.

Colour octahedron should be considered a bird–eye view of colour–space that arranges the rough usages of basic colour concepts. Wittgenstein does not deny the existence of colour–space, but he thinks that the physiological reduction of colours may produce inconsistent colour concepts. That is why colour octahedron should be considered a basic logical arrangement of colour grammar rather than a physiological representation of colours. It can be said that Wittgenstein wanted to prevent the fallacious effects of physiological colour experiences on the colour concepts by using the colour octahedron. Anyone who knows how to use the colour octahedron is even colour blind or blind may play the language–games about colours formulated by ‘surface grammar', because in *Remarks on Colour*, he does not mention that colour blind or blind people cannot use colour concepts at all. However, he emphasizes that they cannot master of the language–games about colours. He means that they cannot play ‘to mean’ themed the language–games, that is, games that require skills of advanced linguistic practices. Therefore, it is difficult for colour blind and blind people to understand what colour concepts mean in the language–games formed with ‘depth grammar’. The language–games established with ‘surface grammar’ can be compared to entering a corridor through a single door and leaving from the same door. However, the language games played with a ‘depth grammar’ can be likened to a maze. Even if the colour blind and the blind have the opportunity

to view the maze from the bird–eye view, Wittgenstein thinks that when they walk in this maze, these people will be lost.

According to Baker, using ‘surface grammar’ about colour concepts is formed either in sentences with colour concepts established with crude grammatical classifications. For example, ‘Pink is lighter than red’ can be an example of crude grammatical classifications. In this respect, colour concepts in the octahedron can be considered crude grammatical classifications. In other word, they can be considered the rough logical arrangements of the colour octahedron. On the other hand, Hacker explains ‘depth grammar’ as showing us different possibilities or impossibilities in the expressions. Thanks to ‘depth grammar’, it can be set clear boundaries around a concept for specific purposes or avoid misapprehensions. It provides the connection between the possibility of making sense of something and the capacity to express what someone means decisively. It allows the discourses to be considered a criterion of what they meant before, and it establishes the boundaries for those criteria. (Baker, 2001: 304)

In the next section, some colour blind cases, especially achromatopsia, are examined to show some situations where people with achromatic vision have some problems naming colours. Also, Wittgenstein’s debates on inverted spectrum cases are explained related to subjective colour perception. The division of ‘surface grammar’ and ‘depth grammar’ can be clear with those investigations in terms of Wittgenstein’s philosophy of colour.

4.3. Achromatopsia

Achromatic or monochromic vision is consists of black, white, and grey. People who suffer from achromatopsia caused by a lack of cone cells are totally colour blind. Also, there is another type of achromatopsia, which is central achromatopsia caused by damage in the visual cortex. People who suffer from central achromatopsia have a dull, faded, and grey colour perception, like black–

and–white television. (Rizzo, Smith, Pokorny, Damasio, 1997: 278) This thesis uses the concept of ‘rod–monochromacy’ and ‘central achromatopsia’ to avoid confusion between two types of achromatopsia’. Firstly, some cases of rod–monochromacy will be investigated, then showing an experiment conducted to determine the colour naming process of central achromatopsia patients. In the rod–monochromacy review, this thesis will begin to discuss Knut Nordby’s life experiences and researches because he is the most famous rod–monochromat globally, and Nordby’s experiences are unique in terms of the aim of this thesis. Also, he is a scientist with research in rod–monochromacy. Therefore, he gives us a broad perspective to understand the differences that people with this disease encounter in practical life.

Despite Nordby’s parents having normal vision, Nordby, his sibling, and brother were born with rod–monochromacy due to genetic factors. The childhood of each of them was not easy as normal children due to this disease. In the past, rod–monochromats were generally considered totally blind since the diagnosis of rod–monochromacy was not easy. Therefore, children with rod–monochromacy often had to attend schools for the blind. However, Nordby’s situation was a little different because his family sent him to an ordinary school because there was no school for the blind near his home. Although he had to study at a school for the blind for a while, Nordby, with his great effort, later completed his education in ordinary schools. Nordby (1990: 290–315) describes his relationship with colours and colour concepts during his school years as follows:

> An important discovery that I made during my first school–years worth noting. As an aid for teaching the letters of the alphabet, the teacher placed large cards, each holding a printed letter, in a row over the blackboard as the letters were introduced. To differentiale between the two categories of letters they had different colours; the vowels were red, while the consonants were black. I could not see any difference between them and could not understand what the teacher meant, until early one morning late in the autumn when the room lights had been turned on, and, unexpectedly, I saw that some of the letters, .e. the A E I O U Y Å Ä Ö, were now suddenly a darkish grey, while the others were still sold black. This experence taught me that colours may look different under different

> light sources, and that the same colour can be matched to different grey–tones in different kinds of illumination. I have since often used ths phenomenon of spectral differentation as an aid to separate colours by their different grey tones under varous light–sources…. I always memorized the colours of my own clothes and of other things around me, and eventually I learned some of the "rules" for "correct' use of colours and the most probable colours of various things: As an example, I learned that glass that was very dark to me usually was a dark cobalt–blue, glass that looked a bit lighter was usually bottlegreen, and so on. In this way, I could fool some people into believing that I had colour vision and stop them from pestering me.

From this passage, two issues can be concluded in terms of Wittgenstein's philosophy of colour. The first one is whether colour blind people have their special colour geometry to name colours. If this is possible, the contents and structure of the colour octahedron can be modified according to different types of colour experiences. The superficial connection that colour blind people establish between objects and colour names in the colour naming process supports the analogy between Wittgenstein's 'surface' and 'depth' grammar and 'colour octahedron' and 'depth colour grammar'. If colour blind people have their own colour geometry, this supports Wittgenstein's claim that people with normal vision cannot play the language–games played by colourblind people.

Oliver Sacks, a neuroscientist and author, wrote a notable book about rod–monochromacy. Its name is *The Island of Colorblind*, which is about Sack and Norby's travel to the atoll of Pingeland in Micronesia. In Pingeland, ten percentages of the population suffer from rod–monochromacy because of genetic factors. (Sacks, 1997: 5) It can be said that there is a community in this island that Wittgenstein mentioned in *Remarks on Colour* as a tribe of colour blind. When Nordby and Sacks arrived at the Pingeland, Sacks noticed that the island had rich vegetation that almost consisted of green vegetation. For Nordby and another rod–monochromats, the leaves of the vegetations could be distinguished in different shades of grey, although to someone with normal vision, it was like an indistinguishable green cover. Sacks (1997: 23) explains different visual perceptions of those people as follows:

> For us, as color–normals, it was at first just a confusion of greens, whereas to Knut it was a polyphony of brightnesses, tonalities, shapes, and textures, easily identified and distinguished from each other. He mentioned this to James, who said it was the same for him, for all the achro–matopes on the island – none of them had any difficulty distinguishing the plants on the island. He thought they were helped in this, perhaps, by the basically monochrome nature of the landscape: there were a few red flowers and fruits on the island, and these, it was true, they might miss in certain lighting situations – but virtually all else was green.

Nordby tests natives who suffered from rod–monochromacy by using the sloan achromatopsia test cards. There were grey squares in different tones from black to white on each of these cards in a deck. Each card had a hole in the middle, and Nordby showed different colours behind those holes. Sacks recognizes that although the rod–monochromats were able to distinguish all hues of grey in different level brightness and match colours with grey squares of different hues, this kind of matching is not possible for normal observers. (Sacks, 1997: 32) On the island, for example, Sacks mentions the rugs that are traditionally woven by rod–monochromats women, whose patterns can only be distinguished in detail by rod–monochromats. He mentions that it is very difficult for normal observers to understand these patterns because the patterns are created according to colours and their brightness and reflection. (Sacks, 1997: 31) However, do these differences prove that they can have a colour geometry based on their unique perceptual experiences? That is, do they have any structure that determines their rules of usages of (grey)concepts in the language–games based on an octahedron or any geometric shapes representation of shades of grey?

Frankly, it does not seem possible to prove such a claim directly, but as an assumption, it can be asserted that the colour geometry can be developed relatively according to different perceptual colour experiences. Although the rod–monochromats in Pingeland were a small community, they were not completely isolated from normal observers. That is why those people knew that there are different colours, excluding grey. Because of this reason, they did not just play the language– games about grey and its hues.

However, it can be hypothetically supposed that if the entire population of the Pingeland were isolated from normal observers, rod–monochromats would have a unique colour geometry according to their vision. Nevertheless, Sack's explanations can be understood that these rod-monochromats in Pingeland used colour concepts that they could not perceive. According to him, the rod–monochromats knew colour concepts by referring to objects. They support their visual deficiencies with auditory and cognitive aids. For example, when they first heard the name of the colours of objects from normal observers, they generally imitated them. The next time they reencounter the same objects, they could easily refer to their memories and use correct colour words. Of course, they also generally coded colours according to hues of grey, but still, the references between objects and their colour concepts which, stored in their memories, allowed them to participate in some language–games. (Sacks, 1997: 35– 49)

To explain the relation between colour names and objects, some data from an experiment about central achromatopsia that was done by Mathew Rizzo, Vivianne Smith, Joel Pokorny, and Antonio R. Damasio will be illustrated. [19] Although the cause of central achromatopsia is different from rod–monochromacy (the first is damage to the visual cortex, the second is the result of a congenital retinal disorder), both are total colour blindness.

In the test, firstly, the experimenters show Munsell tokens, which are coloured and rectangular cards, to ask the name of colours. In this way, the experimenters

[19] The general purpose of the experiment is that 'By testing the patients residual vision along S–cone, R–G, and achromatic axes, we were able to chracterize the psychophysical correlates of their abnormal experience and compare how color processing fails after cortical as opposed to retinal lessions. Our secondary goals were to evaluate a role of target size in central achromatopsia, and to ask whether the defect in central achromatopsia precludes the appreciation of tranparancy, specularity, and other surface reflectance and light–source effects that differ froom color.' (Rizzo, Smith, Pokorny, Damasio, 1997: 278)

In my thesis, I thought that it would be unnecessary to describe the whole experiment, in which I only used the data in the parts where the color naming process of central achromatopsia patients was tested. For more detailed information about this experiment; Color Perception Profiles in Central Achromatopsia.

aimed to test how they named colours without referring to the colour of any object. Secondly, the experimenters asked the patients to name the colours of the objects in short sentences connected with ten separate objects. The colours of some objects in the sentences are commonly known, such as milk and blood, even though some of them are rarely known. (Rizzo, Smith, Pokorny, Damasio, 1997: 283). According to the result of that experience, in the first task, the patients were generally able to give proper achromatic names of colours for hueless Munsell tokens, such as white and black. However, when the experimenters showed Munsell tokens with different hues, such as orange, blue, purple, they gave wrong answers. For example, when the blue token was shown, patients said that it was grey and white–green. In the second task, Patients mostly gave correct answers to the names of the objects' colours in the sentences. These are mostly common verbal pairs such as grass–green, blood–red, spoon–silver. However, they gave incorrect responses to uncommon verbal pairs. For instance, both patients answered 'maybe green' for eggplant. This response probably was based on their foreknowledge: 'all plants should be green'. Again, one of the patients answered 'maybe green' for plum by using the same preliminary information about plum. (Rizzo, Smith, Pokorny, Damasio, 1997: 283–4)

From that experiment, it can be said that memories about the colour of objects are the most essential cognitive 'assistance' in the colour naming process for total colour blind people. Also, Sacks and Nordby emphasize the role of memories for total colour blind people. For example, in *the Island of the Colorblinds*, Sacks (1997: 49) tells about his observation of rod–monochromats children as follows:

> The achromatopic children were oddly knowledgeable too about the colors of people's clothing, and various objects around them and often seemed to know what colors 'went' with what. Thus we could already observe in these achromatopic children in Mand how a sort of theoretical knowledge and know–how, a compensatory hypertrophy of curiosity and memory, were rapidly developing in reaction to their perceptual problems. They were learning to

> compensate cognitively for what they could not directly perceive or comprehend.

However, it is not easy to prove that total colour blind people have their unique colour geometry considering this example because the rod–monochromats on the island of Pingelap lived with normal observers. Therefore, even if they did not have perceptual colour experiences, they tried to use colour concepts in their linguistic practices. At this point, considering the universalist and relativist debates in linguistics, how should Wittgenstein's philosophy of colour not be categorized into these debates? Westphal (2016: 543) discusses this issue as follows:

> …the existence of a "tribe of colour-blind people," who had different concepts from the ones "we" have, and who used the expression "reddish-green," would not force us to recognize that there are colors that we do not see. "There is, after all, no *commonly* accepted criterion for what is a colour, unless it is one of our colours." (§14) ("Commonly accepted" does not, I think, mean "practiced by most or even ordinary people," but "possessed in common," in the same usage as "*The Book of Common Prayer*.") If some concept (*reddish-green*) is not one that is common to us and to the other tribe, there is a clear difficulty in calling it a color concept at all; certainly *our* concepts are *color* concepts, in *our* sense of "color."

Wittgenstein does not accept that the grammar of colours is based on different subjective experiences because subjective experience is just one reason for the 'meaning' of colour concepts. Also, the memories about the colour of objects are in the same situation for him. Therefore, colour blind people cannot attend the language–games about colours formed by depth grammar because they do have our colour geometry like normal observers. A conversation between Sacks and Nordby to reinforce that approach. Sacks noticed that he was having visual migraine attacks due to a traditional drink of the island and asked if the same result was happening for Norby. Norby said that he sometimes suffers from migraine attacks, and someone had once asked him if he saw migraine phosphenes in colour – but he had answered, 'I would not know how to answer'. (Sacks, 1997: 175) In this example, Sacks's question about the colour of

migraine phosphenes is not directly referred to any object. Phosphenes are amorphous beams that occur due to pressure applied to the eyeball independently of any light or as a result of stimulation of the brain's visual cortex. Therefore, because Sacks's questions have 'to mean' structure, Nordby cannot attend this language–game constructed with depth grammar.

Moreover, the logical grammar of colours should not be considered that Wittgenstein gives us universal rules of colour concepts because his approach should be just understood as a method that determines the meaning of colour concepts. This method can be relatively used for a different form of life, communities. However, the essence of the meaning of colour concepts should not be reduced in subjective experience. Therefore, it can be said that Wittgenstein approach on colours that can be called colour geometry or logical grammar of colour, is a methodical approach rather than presenting the universalist colour theory. In this methodical approach, depth grammar has a significant role in order to understand the meaning of colour concepts. In order to understand this methodological approach, the language–games based on depth grammar should be taken into account rather than colour octahedron. It should also be noted that Wittgenstein focused on grasping the meanings of colour concepts rather than explaining the subjective colour experience or physical existence of colours.

Unfortunately, Wittgenstein does not sufficiently discuss the subjective colour experience of both colourblind people and normal observers, as he criticizes colour theories based on subjective colour perception. Therefore, his superficial discussions on colour blindness lead to be overlooked the 'depth grammar' detail implied in his colour blindness debates. His discussions in *Remarks on Colour* would be unsatisfactory to understand why Wittgenstein ignores subjective colour experiences. That is why, in the next part, Wittgenstein's ideas on subjective colour experience in terms of the cases of the inverted spectrum will be investigated in order to explain his colour blindness debates. Also, in the next

part, this thesis will suggest the case of unilateral inverted spectrum supposing one eye inverted spectrum vision in order to explain in detail Wittgenstein's ideas on subjective colour experience.

4.4. Unilateral Inverted Spectrum

Philosophers commonly use the thought experiences about the inverted spectrum to discuss subjective colour experience in terms of the philosophy of colour. It is the fact that subjective colour experience is not the main reason to understand the meaning of colours for Wittgenstein, but he does not adequately discuss this issue in Remarks on Colour. However, in *Notes for Lectures on Private Experience and Sense Data*, he enters into some discussions related to the inverted spectrum.

Ned Block, in his article of *Wittgenstein and Qualia*, approaches Wittgenstein's thoughts about the inverted spectrum as innocuous[20] and dangerous[21] scenarios

[20] Ned Block quotes the following text from Wittgenstein's Notes for Lectures on Private Experience and Sense Data to refer innocuos version of inverted spectrum;

"The normal use of the expression "he sees red where . . ." is this: We take it as the criterion for meaning the same by 'red' as we do, that as a rule he agrees with us in giving the same names to the colors of objects as we do. If then in a particular instance he says something is red where we should say it's green, we say he sees it different from us.
Notice how in such cases we would behave. We should look for a cause of his different judgment, and if we had found one we should certainly be inclined to say that he saw red where we saw green. It is further clear that even before ever finding such a cause we might under circumstances be inclined to say this. But also that we can't give a strict rule for....
Consider this case: someone says "I can't understand it, I see everything red blue today and vice versa." We answer "it must look queer!" He says it does and, e.g., goes on to say how cold the glowing coal looks and how warm the clear (blue) sky. I think we should under these or similar circumstances be inclined to say that he saw red what we saw blue. And again we should say that we know that he means by the words 'blue' and 'red' what we do as he has always used them as we do." (NFL. II. 283–4)

[21] Ned Block quotes the following text from Wittgenstein's Notes for Lectures on Private Experience and Sense Data to refer dangerous version of inverted spectrum;

"…We said that there were cases in which we should say that the person sees green what I see red. Now the question suggests itself: if this can be so at all, why should it not be always the case ? It seems, if once we have ad–mitted that it can happen under peculiar circumstances, that it may always happen. But then it is clear that the very idea of seeing red loses its use if we can never know if the other does not see something utterly different. So what are we to do: Are we to say

of the inverted spectrum. According to Block, if inverted colour experiences are instantaneous, and the subject is aware of this different situation, this is an innocuous version of the inverted spectrum for Wittgenstein. On the other hand, in a dangerous scenario, subjects with inverted spectrum colour vision are not aware of their peculiarity. Also, their situations can always occur rather than being exceptional. Block also mentions another difference between innocuous and dangerous scenarios. According to him, Wittgenstein thinks that although the innocuous version may be behaviourally detected from subjects' speeches, behaviour, and mentions, this can be difficult for the dangerous version. Also, Wittgenstein thinks that if many people have a belief that there are so many people who are inverted spectrum, this is dangerous in terms of qualia. (Block, 2007: 81–2)

According to Block's inferences, the innocuous version of the inverted spectrum is just seen as abnormal rather than qualia. In this scenario, it is unnecessary to ask 'what it is like' question because we have information that "there are color experiences that cannot be expressed in terms of properties of things"(Block, 2007: 83). However, in terms of the dangerous version of the inverted spectrum, it can be faced qualia problems. Block (2007: 83) explains this difficulty as follow:

> …However, if we allow the existence of a dangerous scenario, in which normal perceivers are inverted with respect to one another, we cannot say of either of

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that this can only happen in a limited number of cases? This is a very serious situation.–We introduced the expression that A sees something else than B and we mustn't forget that this had use only under the circumstances under which we introduced it. Consider the proposition: "Of course we never know whether new circumstances wouldn't show that after all he saw what we see." Remember that this whole notion need not have been introduced. "But can't I imagine all blind men to see as well as I do and only behaving differently; and on the other hand imagine them really blind? For if I can imagine these possibilities, then the question, even if never answerable makes sense." Imagine a man, say W., now blind, now seeing, and observe what you do? How do these images give sense to the question? They don't, and you see that the expression stands and falls with its usefulness.

The idea that the other person sees something else than I, is only introduced to account for certain expressions: whereas it seems that this idea can exist without any reference to expressions. "Surely what I have he too can have."" (NFL. II. 316–7)

> them that green is what it is like to see red. If we acknowledge the existence of an inverted spectrum in this sense, we have to agree that no color name expresses what it is like for either one of the inverted people to see red… For example, we can refer to it by saying "What it is like for that person to see red". What we cannot find is a color name 'F', such that what it is like for one of these people to see red can be expressed in the form "looking F", and in that sense we can say that the experiential property is an ineffable quale… If there could be an inverted but behaviorally indistinguishable pair of people, then it is hard to see how the difference between them could be relevant to any everyday uses of terms. My point is rather that an inverted pair both members of which are normal is problematic for Wittgenstein even if they are not behaviorally indistinguishable.

The subjective experiences of colour blind people can be interpreted in two ways in terms of Wittgenstein's approaches to the inverted spectrum. If the subjective experiences of colour blind people were thought of as abnormal, Wittgenstein might probably categorize their subjective experience in the innocuous version. However, if we had the belief that subjective colour experiences of colour blind people were an alternative to colour experiences of normal observers, Wittgenstein could have described this as a dangerous scenario. Therefore, it can be claimed that in *Remarks on Colour*, Wittgenstein classifies the subjective experience of colour blind people as abnormal. His ideas about the inverted spectrum can be understood that the main criterion that prevents differences in subjective colour experiences from being a qualia problem is that those kinds of abnormal situations can be determined from behaviours. However, these behaviours should not be understood as psychological descriptions. He means that those kinds of abnormal subjective experiences can be detected in the language–games, especially those constructed with depth grammar.

In discussions about the inverted spectrum and qualia, subjective experiences are generally discussed by comparing intersubjective experiences. The case of intersubjective experience in which people have inverted spectrum experience according to the normal observer. However, discussion of qualia through this case cannot usually advance at one point in the comparison because of the difficulty of describing the subjective experiences of other minds. That is why

philosophers interested in a qualia problem mostly discuss the cases of inverted spectrum through intrasubjective experiences. According to Block, intrasubjective experience in which people have one–time inverted spectrum experiences, but at another time, those people have normal spectrum experiences. In this way, the case of the inverted spectrum can be adequately evaluated because those people have different subjective experiences in the same mind. In terms of Wittgenstein's innocuous version of the inverted spectrum, Block argues that Wittgenstein accepts both types of comparison. (Block, 2007: 110) In order to further discuss Wittgenstein's thoughts about the inverted spectrum from a different perspective, it can be asked a question: What if a person gets a different subjective experience from the same object at the same time?

There is a sort of colour blindness that patients have a normal colour vision in one eye, although they suffer from colour blindness in another eye. This kind of colour blindness which is called unilateral colour blindness or unilateral dichromacy, is generally acquired defection. The types of colour blindness that patients' defective eyes may be different types of colour blindness, such as deuteranopia, protanopia, and tritanopia. It is a rare situation to have this disease as a congenital, and people generally acquire this disease due to damage to one of their eyes due to chemical poising, physiological imbalances, and injuries. (Hsia and Graham, 1997: 223–4)

Unilateral colour blind people have a binocular colour vision in their everyday life. Because of this reason, two different visual data are reached to their brains. If these two different data from the objects when they perceive the colours of objects in coincide, they mostly suppress one of them or need to adapt both of them. However, because the latter method generally causes confusion, they usually eliminate one of the data. Therefore, although they have two different subjective experiences, they suppress a visual data that they perceive as abnormal according to normal observers. (Alpern, Kithara, Grantz, 1997: 240–2)

Therefore, the subjective experience of unilateral colourblind people can be categorized in the innocuous scenario in terms of Wittgenstein's approaches because the subjects can notice their abnormality in their dual subjective experiences and adjust their colour experiences according to normal observers' colour concepts.

Suppose a person whose name is Mary is a congenital unilateral inverted spectrum. So even though her right eye has a normal spectral vision, her left eye has an inverted spectrum. In the first scenario, Mary is someone who has spent her life with people who have a normal spectrum. Therefore, even if her left eye perceives colours in an inversion, she suppresses this abnormal perception to attend normal observers' language–games. Of course, her situation can be defined in the innocuous version for Wittgenstein because when she attends the language–games about colours, most people can notice her differences, even herself. In the second scenario, supposing that Mary moves to another planet where all aliens have inverted spectrum colour visions as a normal observation. Even if Marry has inverted colour vision in her left eye, she may be confused the first time when she communicates with aliens. The reason why Marry may be confused is that she would realize that all the colour concepts that used by aliens are different. Mary's adaptation process for this case may be easy compared to a non–unilateral observer because she has a chance to perceive these different colour concepts as sense data. Also, in this scenario, Mary's condition may still be considered abnormal by aliens. Therefore, in terms of Wittgenstein's perspective, Mary's condition can be categorized as innocuous for aliens.

The crucial point in these two scenarios is the term 'adaptation'. Considering Wittgenstein's dangerous scenario, the subject who has inverted colour experiences cannot adapt the form of life, culture, the context of colour concepts, and the practice in their culture. In this manner, Wittgenstein does not accept the case of qualia which amounts to an idealization or holism in the dangerous scenario. For him, the meaning of colours cannot be gained from sense data but

the practical use of colour concepts in the language–games. Also, for Wittgenstein, what determines the meaning of colour concepts is the prevalence of uses in the living environment, culture, and publicity, and subjective colour experiences are not one reason for the meaning of colour concepts. However, it can be said that subjective colour perception has an active role in practising the language–games about colour, especially depth grammar language–game although Wittgenstein criticizes the approaches that describe the meaning of colour concepts by referring only to subjective colour experience. Therefore, it can be claimed that Wittgenstein implies that colour blind or blind people cannot attend the language–games about colours that are constructed with 'depth grammar'. Moreover, inverted colour vision or colour blindness cannot cause any qualia problems for him. Even if some people have abnormal subjective colour experiences, they can attend some language–game and know the meaning of colour concepts after adapting their forms of life.

Since Wittgenstein claims that essence is expressed by grammar, the essence of colour concepts should not be researched in subjective experiences. The thought of qualia causes the idea that the essence is a hidden or mysterious entity. To avoid this, Wittgenstein suggests us a method that reveals the essences by linguistic practices. Regardless of whether our subjective experiences are normal or abnormal, we must have a process of adaptation to these practices. However, if we have an abnormal subjective experience, we can participate in these linguistic activities in a limited way. That is why, although Wittgenstein does not directly explain the reason why colour blind and blind people do not attend all language–games about colours, this gap can be filled through the distinction of 'surface grammar' and 'depth grammar'. Nevertheless, in terms of Wittgenstein's method, it should be noted that abnormal subjective experiences are not negotiable; being a normal observer is a prerequisite for his methodological approach on colours.

CHAPTER 5

CONCLUSION

In this thesis, Wittgenstein's philosophy of colour was investigated for two purposes. Firstly, this study aims to show the role of colour in Wittgenstein's philosophy. The second purpose is to explain Wittgenstein's uncertain debates on colour blindness in *Remarks on Colour*.

Firstly, this thesis aims to show the progress of Wittgenstein's philosophy to understand his philosophy of colour, which is analysed in Chapter 3. Because his philosophy is kind of a journey, it is necessary to establish connections between his works in order to follow his paths in terms of his philosophy of colour. When his works are examined chronologically, it can be seen that each work makes the next one essential.

Wittgenstein thought that the limits of the expression of thinking must be determined in order to solve philosophical problems. That is why simplicity in philosophy is the main idea in his philosophy. Thus, it can be said that the principle of simplicity is the aim of his methodological approach to philosophy. In this manner, logic is used as a tool by him both in the early–Wittgenstein and in the later–Wittgenstein in order to apply the simplicity in philosophy.

According to him, in the early–Wittgenstein, if the logical structure of language is understood, the philosophical problems can be solved. The logical structure of language– proposition– determines the limit of the meaning. Thus, this determines the limit of philosophy. Similarly, in the early–Wittgenstein's colour debates, he tries to limit the meaning of the colour language based on colour

perception. In *Tractatus*, he considers that the logical structure of colors is hidden in the feature of elementary propositions, which are truth–function of themselves because Wittgenstein's approaches to colour in his early philosophy depend on the logical necessity. However, the colours are not his main concern in this early period because it is clear that he just uses the colours as a tool in order to analyze the structure of elementary propositions. This situation can be noticed in his discussions on the colour incompatibilities of elementary colour propositions in *Some Remarks on Logical Form*. He finds a contradiction between two colour propositions in the truth table. Therefore, the problem of colour incompatibilities in terms of elementary colour propositions forced him different philosophical approach. In this point, we can also see how his philosophical ideas' development changes his approach to colours.

In the middle period of his philosophy, the changes in his philosophical perspective can be easily noticed, especially in *Philosophical Remarks*. This study's concern is mainly the grammar and arithmetic of the language. He aims to construct a phenomenological language which separates "what is essential from what is inessential in our language". (PR: 9) In other words, he tries to analyze the grammar of the phenomenological language in which the theories of physics are expressed. In this middle period, he tried to solve the problems of the logical structure of propositions coming from the early–Wittgenstein with an investigation of the grammar of our language. This shows us that *Philosophical Remarks* can be considered a transitional period from *Tractatus* to the *Philosophical Investigations*.

The middle period of his philosophy is significant in terms of his colour debates since the argument of the colour octahedron is developed in *Philosophical Remarks*. Despite the changes in his philosophy, Wittgenstein is still interested in the logic of colours. Because of this reason, he analyses the logical grammar of colour propositions. According to him, the logical structure of colour grammar has a mathematical background provided by the colour octahedron. The colour

octahedron is a rough representation of colour–space, and this is a grammatical representation. In this point, two issues need to be talked about the place of the color octahedron in Wittgenstein's philosophy of color.

Firstly, it can be seen that the argument of the colour octahedron is a result of the changes in his philosophy after the discussion on colour incompatibilities in the early–Wittgenstein. This shows that he again uses the colours as a tool in order to the problems of the elementary/atomic propositions. His main aim still limits the expression of thinking about the world. Also, the logical structure of propositions is still his main concern, but it can be noticed that he focuses on the logical structure of the grammar in this period to solve the same philosophical problems. In this manner, the argument of colour octahedron can be considered as a representation of the changes in his philosophy. At this point, there is a point that should not be overlooked in terms of his colour philosophy. The argument of the colour octahedron illustrates that Wittgenstein still tries to explain colour proposition as the arithmetical and logical structure of grammar, but the argument of the colour octahedron should not be considered as a method for the complex usages of colour concepts. The second issue about the colour octahedron is that the colour octahedron is not the only reference point of his arguments in *Remarks on Colour*. This kind of interpretation of *Remark on Colour* can cause a criticism on his philosophy of colour that the argument of the colour octahedron is not enough to explain all language–games about colours. The language–games about colours should be considered according to his argument of 'surface grammar' and 'depth grammar'. Although the colour octahedron should be understood as a representation of the language–games established with 'surface grammar', complex usages of colour concepts should be described with 'depth grammar'.

The later Wittgenstein's philosophy can be directly referred to *Philosophical Investigations*. In this work, he constructs his new philosophical arguments such as language–game, family resembles, rule–following, and form of life. One of his main concerns in *Philosophical Investigations* is the meaning of words in our

language. According to him, the usages of the words in the language–games determine their meanings. (PI. § 43) Although there is no direct discussion about colours in this study, he again uses colours as a tool in order to criticize some arguments from the early–Wittgenstein's philosophy. For instance, he criticizes the picture theory of language with his discussion of the 3 x 3 coloured pattern. (PI. § 48) This discussion shows that he still deals with the problems of the colour incompatibilities as he analyses whether elements of colour propositions are complex or simple. Also, from this discussion, it can be recognized that, in contrast to his early philosophical approach, he takes the approach that the meanings of colour concepts and colour propositions depend on their practical uses in different language games.

However, this new approach does not mean that Wittgenstein does not leave the idea of the mathematics or geometry of colours because the idea of the colour geometry can be found in *Remarks on Colour*. Moreover, as shown in the part of *Remarks on the Philosophy of Psychology*, the notion of colour geometry can be found in Wittgenstein's notes between 1946 and 1949. Therefore, Wittgenstein's solution of the problem of the colour incompatibilities with the language–games does not mean that he abandoned the idea of colour geometry. However, it can be said that he quits his earlier idea that it is logically impossible attributing two colours to one point. Andrew Lugg (2015: 12) explains this situation in *the Wittgenstein on Colour Exclusion: Not fatally mistaken* as follows:

> During the first months of 1929 Wittgenstein retains his earlier conception of an elementary proposition but sees that the geometry of visual space does not coincide in any straightforward way with the geometry of physical space, the only sort of geometry he had considered in the Tractatus (2000, MS 105, 1ff)….. At this juncture he could retain his conception of colour as mathematically representable but not his conception of elementary propositions as number–free. He found he had to retract his earlier explanation of the attribution of more than one colour to a point as logically impossible (or, what amounts to the same thing, to accept that such attributions are logically impossible in a broader sense of logic).

The question that should be discussed is how Wittgenstein applies both the colour geometry and the language–games about colours in *the Remarks on Colour*. This work is considered disorganized and fragmented, so it can be difficult to understand his general ideas about colours. It is surely beyond doubt that *Remark on Colour* is a disorganized and fragmented study, so there are some unexplained points in his arguments. Wittgenstein analyses some puzzle propositions, which are mainly phenomenological problems. Also, he enters into further discussions on his argument of the language–games by using colour blindness. In other words, it can be said that he again uses the colours as a tool in order to analyse philosophical problems, so it cannot be exactly said that his main aim was not constructing a colour theory in *Remarks on Colour*.

In *Remarks on Colour*, Wittgenstein still defends the idea of the colour geometry; thus, he still uses the colour octahedron to determine the logical grammar of colours in *Remarks on Colour*. However, this situation may cause a common misinterpretation of his ideas in the *Remarks on Colour* as follows: although *Remarks on Colour* is built the colour octahedron around, but the colour octahedron cannot explain all language–games about colors. One of the aims of this thesis is to correct this common misreading of *Remarks on Colour*. First of all, Wittgenstein constructed this argument earlier from *Remarks on Colour*. Also, he does not have an approach that all colour propositions can be explained with the colour octahedron neither in his earlier writing nor *Remarks on Colour*.

The colour octahedron in *Remarks on Colour* is the footprints of the problem of the colour incompatibilities. In *Some Remarks on Logical Forms*, Wittgenstein notices that elementary/atomic propositions must also include numbers and degrees. He aims to show that the mathematical impossibility of the two colours at the same point together is sufficient to show that it is logically impossible. (Silva, 2017: 49) This discussion about the colour incompatibilities leads him to claim that colour space can be mathematically representable with the colour

octahedron. However, according to him, phenomenology is the grammar that describes physiological phenomena, so the octahedron is the grammatical representation of colour space, not the psychological representation of colour space. When Wittgenstein asserts the mathematic or geometry of colours, he does not directly argue that numbers and colours are similar in every sense; instead, his implication is that colours have a systematic relationship with numbers. With the colour geometry, he implies that the logical relations of numbers to each other can be seen in the logic relation of the colours. According to him, colours are ordered like integers, and this mathematical and topological relationship with each other allows us to compare them. In other words, the colour can be ordered from the brightest to the darkest, just like the rational numbers between two natural numbers that can be ordered from smallest to largest. In this manner, the colour octahedron just gives us the rough logical grammar of the colours, rather than giving all rules of every language–games about colours. (Lugg, 2017: 39)

The question which Wittgenstein addresses in *Remarks on Colour* is whether the normal observers and colour blind people have the same concept of colour blindness. According to him, colour blind people cannot play the language–games like normal observers even if they have knowledge about the colours. Because Wittgenstein argues that the knowledge of something should be considered ‘knowledge by description’ and ‘knowledge by acquaintance’, he says that colour blind people’s knowledge is based on psychological descriptions rather than acquaintance from the linguistic practices. It can be said that his aim for discussion on colour blindness is to emphasize that mental states, perception, or memory cannot describe the meaning of the colour concepts in the language–games, because the meaning of the colour concepts is gained by performing the language–games.

Colourblind people have some colour concepts and use them in their languages, although Wittgenstein claims that they cannot master of the language–games

about colour like a normal observer. So what does he allude by saying that they cannot master? Unfortunately, Wittgenstein does not give enough explanations why colour blind people cannot master of the language–games. Therefore, this part of *Remarks on Colour* is generally ignored, but his discussion on colour blindness also fills the gaps in the argument of the colour octahedron. When reading the discussions about colour blindness, contrary to Wittgenstein's approach, it can be thought at first glance that colour blind people can play the language–games about colours by learning the rules of the colour octahedron. However, it is not reasonable to think that Wittgenstein overlooked such a possibility, because he mentions that colour blind people can learn our colour concepts through descriptions. Therefore, in this thesis, in order to solve this uncertainty in his debates on colour blindness, his distinction between 'surface grammar' and 'depth grammar' in the language–games is used to explain what he implies in *Remarks on Colour*. This thesis suggests that what Wittgenstein implies by "they can't use these sentences in as many different ways" (RC. III. § 278) are the language–games which the colour blind cannot master, especially the language–games constructed with the depth grammar. According to him, the sentences constructed with the surface grammar has a rough and determined grammatical structure, such as 'Yellow is lighter than red' and '5 is bigger than 4'; on the other hand, the sentences constructed with the depth grammar requires more complex logical syntax and more linguistic practices to provide meaningful and logical expression with different combinations of the words.

In the examples where examined the linguistic practices of the colour blind people, it can be seen that these people can generally understand and use the colour sentences constructed with a crude grammar. Therefore, it can be said that these people grasp the logic of the usage of the colour words in their own language, such as the basic opposition and similarities between the colour words even if they do not have visual information about them. Hence, it can be interpreted that they can also learn the rough logical grammar of the colours presented by the colour octahedron in Wittgenstein's words; in other words, they

can use the colour sentences formed with the surface grammar. However, they cannot understand the complex sentences requiring different grammar combinations; that is why they cannot master of the language–games constructed with the depth grammar. Ignoring Wittgenstein's these two distinctions on grammar, the arguments of *Remarks on Colour* seem weak at first glance, but this thesis illustrated that both the mechanism of the colour octahedron and his discussion on the colour blindness can be understood better if *Remarks on Colour* are read with considering this distinction.

Another issue that needs to be discussed is whether Wittgenstein's ideas about colours can be considered as a colour theory. When we examine his works, it is noticed that Wittgenstein actually uses the discussions about colours as a tool to analyse his main philosophical issues, such as colour incompatibilities, the logical structure of the propositions, the language–games so on. Wittgenstein's distrust and disinterest in epistemological and psychological explanations of perceptions are obvious. That is why he tries to find the most appropriate language based on logic between the thought and the world at every stage of his philosophy. Because colours are one of the main parts of perception, he uses colours as a tool in his discussions to achieve his aims. Therefore, it cannot be claimed that developing a colour theory was his main aim in *Remarks on Colour*, even though he had a great interest in colour and colour debates. Also, the disorganized and unsystematic structure of *Remarks on Colour* does not allow itself considering as a colour theory.

It is a fact that *Remarks on Colour* cannot provide a colour theory does not make it a trivial study. Although Wittgenstein's ideas about colours are not well known and popular compared to his other ideas, his ideas about colour and colour experiences should be taken into account as sources in terms of problems of philosophy of colour, mind and language. For example, in his discussion on colour blindness, Wittgenstein addresses important contents and questions about the problems of other minds, especially for qualia problems. Also, this

discussion can be given another perspective to the issues of colour experience in terms of linguistic and anthropological studies. For example, his approach to the logical grammar of the colours can be used to solve how people learn the primary colour concepts. In fact, a colour theory can be developed based on Wittgenstein's ideas. However, for this, it is necessary to investigate the psychological and cognitive process of the colour experience, which he criticized much but did not explain sufficiently. With such research, it can be revealed more precisely whether people use any logical and grammatical model in the process of learning colour words. Lastly, whether or not Wittgenstein presents us with a colour theory, it is obvious that his approach to colour is worth further investigation in terms of philosophical debate on colours.

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APPENDICES

A. TURKISH SUMMARY/ TÜRKÇE ÖZET

Renkler, görsel algımızın büyük bir bölümünü oluşturur ve insan zihnindeki nesnelerin bilişsel temsilinde önemli bir rol oynarlar. Aynı zamanda renkler her zaman dünyayı deneyimlememize yardımcı olur çünkü görsel algılarımız dünyanın bilgisinin ediniminde önemli rol oynar. İnsan algıları, belirli felsefi tartışmaların merkezi konularından biri olmasına rağmen, bu alanlarda özel olarak renklerle ilgili çalışmalar azdır. Renkler özel olarak birçok bilimsel alanda incelenir, ancak felsefede ana konusu renk olan çok az çalışma vardır. Renk teorileri genellikle ya bilimdeki ışık teorilerinin bir parçası olarak ya da ressamların renklerin kimyasal sınıflandırmalarına dayanan renk teorileri olarak ortaya çıkar. Bu nedenle felsefe tarihindeki renk teorilerinin genel bir analizini yapmak kolay değildir. Yine de bu durum, renklerin filozoflar için önemsiz bir konu olduğu anlamına gelmez. Renkler, felsefenin ana konularından biri olmasa da eski çağlardan beri felsefi tartışmalarda bir araç olarak kullanılmıştır.

Isaac Newton'un 1704' de yayınlanan *Optiks* adlı yapıtı ışığa ve renklere dair önemli açıklamalar getirmiştir. Bu nedenle, Newton'un bu çalışmaları, ondan sonra gelen renk teorilerine de kaynaklık etmiştir. Newton, Descartes'in uzamın içerisindeki basınca dayalı teorisini reddetmektedir. Ona göre ışık yalnızca gözümüze etki eden basınca indirgenemez. Newton ışığın küçük parçacıklardan oluştuğunu ve bu parçacıkların yer çekimi yasasına göre hareket ettiğini söyler. Başta güneş olmak üzere diğer yapay ışık kaynakları da çevrelerine bu küçük parçacıkları yaymaktadırlar. Ona göre gözün dibine düşen bu parçacıklar ağtabaka zarında titreşimler yaratmaktadır. Göz sinirleri tarafından beyne iletilen bu titreşimler sayesinde görme duyusu ortaya çıkmaktadır.

Newton'un ışık teorisi, renkleri fizyolojik süreçlere göre tanımladığını söylenebilir ve genel görelilik ve kuantum mekaniğinin birçok probleminin temelini attığını söylenebilir. Aynı zamanda sonraki renk teorilerinin üzerinde etkisi büyüktür. Örneğin Johann Wolfgang von Goethe'nin renkler üzerine fenomenolojik tartışmaları nedeniyle ilk felsefi renk teorisi sayılabilecek *Renk Teorisi'* ni derinden etkilemiştir. Goethe'nin *Renk Teorisi*, Newton'un fizyolojisine dayanmakla beraber renklerin fenomenolojik incelemelerini de yapar. Yani felsefenin de sorunu olan renk algısı ile ilgili bazı fenomenolojik olguları incelemeye çalıştığı için dönemin felsefi problemlerini de görmemizi sağlar.

Bu problem aslında Newton'dan miras kalan ve günümüzde halen tartışılan bir sorunun etkisidir. Newton'un fizyolojisinin sonrasında gelen renk teorilerini etkilediğini söylemiştik. Aynı etkiyi felsefe tarihinde de görmekteyiz, çünkü bu fizyolojik renk tanımlaması antik felsefenin renklerin doğasına ilişkin temel bir sorusunu yeniden gündeme getirmiştir: Renkler nesnelerin mi yoksa zihnimizin özellikleri midir? İlk bakışta karmaşık bir soru gibi görünmese de, bu soru halen hem felsefede hem de diğer bütün alanlarda yapılan renk çalışmalarının temel tartışma konularından biridir.

Bu soru doğrudan felsefe tarihindeki nesnenin doğasına ilişkin birincil ve ikincil nitelikler tartışmasıyla ilgilidir. Antik yunan felsefesinden modern felsefe değin, bu problem hem epistemolojik hem de ontolojik açısından nesnenin bilgisine ve doğasına ilişkin araştırmaların temel tartışmalarından biri olmuştur. Bu bağlamda, nesnelerin renklerinin doğası ve onlara ilişkin bilgimiz, renklerin nesnelerin birincil mi yoksa ikincil nitelikleri mi olduğunu sorunun cevabıyla doğrundan ilgilidir. Kabaca tanımlamak gerekirse, nesnelerin birincil nitelikleri nesnelerin kendisine ait ve özneye göre değişmeyen nitelikleridir. İkincil nitelikler ise duyularımız ile algılayabildiğimiz ve özneye göre değişkenlik gösterebilen niteliklerdir.

İşte Newton'un fizyolojik renk tanımlaması erken modern dönem ampirist filozofları bu noktada etkilemiştir. Bu dönemde John Locke, George Berkeley ve David Hume gibi filozoflar epistemolojik sorunları tartışmak için renkleri bir araç olarak kullanmışlardır. İlk filozoflardan miras kalan ontolojik tartışmalardan, renklerin nesnelerin birincil veya ikincil nitelikleri olup olmadığını araştırmaya devam ettiler çünkü renklerin ontolojik durumu, deneyci filozofların duyularımıza dayalı bilginin güvenilirliğini belirlemede epistemolojik tartışmalarında önemli bir tartışma konusuydu. Renk deneyimlerimizin yanılsamalarının renklerin fizyolojik tanımlarıyla uyuşmaması, renklerin nesnelerin ikincil nitelikleri ve zihin fenomenleri olabileceği fikri üzerinde felsefi tartışmalar yapılmaya başlandı. Bu nedenle, Newton'un renk üzerine deneye dayalı çıktıları, filozofları renkler hakkında düşünmeye ittiğini söylenebilir.

Birincil ve ikincil nitelikler tartışması, renklerin epistemolojisi açısından en tartışmalı sorun olmuştur. Renklerin nesnelerin ikincil nitelikleri olduğu fikrinin ilk izleri Galileo ve Descartes'in eserlerinde bulunabilir. Galileo'ya göre nesnelerin renkleri dediğimiz olgu sadece renk isimleridir ve bu nesnelere isim veren yaratıklar ortadan kalktığında nesnelere atfedilen renkler gibi nitelikler de ortadan kalkacaktır. (Drake, 2001: 84–5) Aynı şekilde Descartes da nesnelerin renk, koku, sıcaklık, ses gibi niteliklerinin zihnimizde üretildiğini iddia eder. (Descartes, 2002: 37) Modern felsefede Galileo ve Descartes bu tartışmanın öncüleri olarak kabul edilebilirse de, birincil ve ikincil nitelikler tartışmasının en belirgin formülasyonu ilk olarak John Locke tarafından verilmiştir. Dolayısıyla onun bu tartışmalara ilişkin fikirleri George Berkeley ve David Hume gibi diğer modern filozofları da etkilemiştir.

Locke'a göre birincil nitelikler, nesnenin kendisinin katılık, uzay, hareket, sayı ve şekil gibi herhangi bir gözlemciden bağımsız özellikleridir. Birincil nitelikler nesnenin kendisinde bulunduğundan, öznelerden bağımsız olarak kesin olarak bilinebilirler. İkincil nitelikler ise renk, tat, koku ve ses gibi insan zihninde

duyumlar oluşturan özelliklerdir. İkincil nitelikler, nesnelerin özneler üzerindeki etkisi olarak tanımlanabilir. Zihnimiz ikincil nitelikleri yansıma yoluyla algılar. Bu nitelikler genellikle nesnenin temel özelliklerinden ziyade yalnızca nesnelere ait bir güçtür. Bu güçler, gerçek nesneden farklı fikirler üreten insan zihnindeki mantıksal niteliklerdir. Locke'a göre birincil nitelikler değişmez oldukları için ölçülebilir ve kesin olarak bilinirler. Öte yandan ikincil nitelikler, farklı gözlemcilere göre değişebildiğinden tam olarak ölçülemez. Ayrıca Locke, ikincil nitelikleri zihnimizdeki nesneleri sınıflandırmamıza yardımcı olan güç olarak da tanımlar. Ancak burada önemli olan nokta, Locke'un ikincil niteliklerin zihnimizde değil, nesneye ait olduğunu iddia etmesidir. Bu kısım, Locke'un halefleri için bu bölümdeki en karanlık noktadır. Bu sebeple, Locke'un açtığı bu tartışma kendinsen sonra gelen filozofların ikincil niteliklerinin doğasına ilişkin farklı tartışmalar yürütmesine yol açmıştır.

Newton'un fizyolojik renk tanımlamasının ortaya çıkarttığı soru sadece modern felsefede değil, günümüz renk çalışmalarında da etkisi gözlemlenebilir. Bu tezin ikinci bölümünde sadece bu modern tartışmayı değil, renk felsefesinin konusu olabilecek ana soruları anlatılmıştır. Bu araştırma, geçmişten günümüze renklerle ilgili çalışmaların çözmeye çalıştıkları ana sorunun renklerin fizyolojik mi yoksa fenomenolojik durumlara göre mi tanımlanması gerektiği üzerinedir. Yani, konu renkler ve renk deneyimi olduğundan karışımızda ontolojik olarak birbirinden farklı iki ayrı dünya bulanmaktadır ve renk tartışmalarında bütün mesele bu iki dünyanın nasıl bir araya getirileceği üzerinedir.

Renklerin fizyolojik olarak tanımlamak nesnelci bir bakış açısıyla dış dünyanın bir gerçekliği olduğunu kabul eden ontolojik ön kabulün sonucudur. Bu ön kabule göre, renkler, güneş ışınlarının cisimlere farklı yoğunluklarda ulaşması sonucu ortaya çıkar. Işıkların bu farklı yoğunlukları her zaman renklerin ortaya çıkmasına neden olmaz. Güneş ışınlarının yüksek enerjileri nesneler üzerinde tahribatlara neden olurken, güneş ışınlarının düşük enerjileri sadece moleküller ve atomlar düzeyinde titreşimlere neden olur. Peki, güneş ışığının hangi enerji

yoğunluğunda renkler ortaya çıkıyor? Bu soruya kesin bir cevap vermek doğru olmaz ama renkler genellikle yansıma, kırılma ve orta dereceli güneş ışınlarının cisimlerin yüzeyinden iletilmesi ile ortaya çıkar. Kuşkusuz yeryüzündeki tüm canlıların farklı yoğunluktaki güneş ışınlarına karşı farklı duyarlılıkları vardır ve dolayısıyla bu duruma göre farklı görme yeteneklerine sahip oldukları söylenebilir. Yani canlılar, yaşadıkları çevre koşullarını daha iyi görebilmek için farklı güneş ışığı yoğunluklarına göre evrimleşmişlerdir. Peki insanların renkleri algılayabileceği güneş ışığı aralığı nedir? Işığın yoğunluğu elektromanyetik enerji olan dalga boyları ile ölçülür. Araştırmacılar, dalga boylarının ölçüm birimi olarak genellikle bir nanometre (nm) kullanır. İnsan renk görüşü, 700 ile 400 nm arasındaki orta dalga boylarında yer alır. Başka bir deyişle, insanlar sadece 700 nm ve 400 nm aralığındaki dalga boylarındaki renkleri görebilirler. 700 nm, kızılötesi spektrumun başlangıcı olarak kabul edilir ve 400 nm, ultraviyole dalgasının başlangıcı olarak kabul edilir. (Hardin, 1988: 2)

Fizyolojik renk teorileri, görmenin meydana gelmesini yine fizyolojik bir mekanizm ile açıklar. Görsel algının işlevlerini anlamak için retinadaki reseptör ağı incelenmelidir. Retinanın fovea bölgesinde konik hücreler vardır. Bu konik hücreler, koniler ve çubuklar olarak iki tiptedir. İnsan retinası 7.000.000 koni ve 75.000.000 ila 150.000.000 çubuk hücre içerir. Çubuklar, gece hayvanlarında insanlardan daha baskındır ve düşük yoğunluklu ışıklara duyarlıdır. Bu nedenle çubuklar insanların geceleri daha iyi görmelerini sağlar. Koniler ise gün ışığında kesin ve detaylı görüş sağlayan ve bize renk algısı sağlayan hücrelerdir. Çubuklar uyarıldığında akromatik görsel algıya neden olurlar. Ancak koni hücreleri uyarıldığında akromatik ve kromatik algı sağlarlar. (Roger, 2011: 33) Çubuklar karanlıkta nesneleri daha iyi görmemizi sağlar. Yani, koni hücrelerinin gün ışığında bize keskin ve net görsel görüntüler sağlaması gibi, çubuklar da bize bu netliği geceleri verir. Peki, bu konik hücrelerden gelen çıktılar beyne nasıl iletilir? Retinanın bilgi işlem zincirinin sonunda, optik sinirlerden gelen çıktıları beyne gönderen gangliyon hücreleri bulunur. Bilgi aktarımı, bitişik alıcının kendilerine ulaşan çıktıların etkilerini değiştirmesi ve bunları komşu alıcılara

iletmesi durumunda gerçekleşir. İletim sırasında gangliyon hücreleri tüm reseptörler arasındaki bağlantıyı sağlar. Retina görüntüsünün büyütülmüş bölgesinde ne oluyorsa gangliyon hücrelerinde de oluyor. (Hardin, 1988: 12)

Görüldüğü üzere renkleri ve renk algısını fizyolojik olarak tanımlamak deney, gözlem ve ölçmeye dayanmaktadır. Bu durumda renklerin dış dünya nesnel bir gerçeklik olarak tanımlanmasını sağlamaktadır. Bu nedenle fizyolojik renk teorileri özelinde günümüzde tartışmalardan çok yeni araştırmalar olduğu söylenebilir. Ancak renkleri ve renk deneyimlerimizi bilişsel, antropolojik ve dilbilimsel açıdan incelediğimizde, renk felsefesindeki kadim tartışmanın devam ettiği söylenebilir. Bu tartışma, zihnimizdeki renk fenomenlerinin ya da öznel renk deyim ve kullanımlarımızın, renklerin fizyolojik tanımlamalarına uygun olup almadığı üzerinedir. Başka bir deyişle problem yine renklerin fizyolojik olarak mı yoksa fenomenolojik olarak mı tanımlanması gerektiği üzerinedir.

Kuşkusuz bu konu Wittgenstein'nın renk felsefesi içinde önemli bir problemdir. Bu noktada, onun renk felsefesini ve temel problemlerini anlamak için kısaca Goethe'nin renk kuramına değinmek gerekir çünkü Goethe'nin renk kuramı Wittgenstein'ı renkler üzerine daha ayrıntılı bir şekilde düşünmeye sevk etmiştir. Goethe, temelde Newton'un fizyolojisini kabul eder fakat renklerin yalnızca fizyolojik olarak tanımlanamayacağını, özellikle de renk deneyimimizin salt fizyolojik mekanizm indirgenerek tanımlanamayacağını savunur. Bu sebeple, eserin renk fenomenlerimiz üzerine sayısız incelemeler yapmıştır. Goethe, renk fenomenlerinin görsel deneyimimizi en iyi tamamlayan ve duyusal algıda etkin olan en önemli unsur olduğu fikrini savunur. Bu nedenle onun için renkler, nesneler hakkında algısal bilgi edinmenin en aktif yönüdür.

Wittgenstein her ne kadar Goethe'nin bu fenomenolojik yaklaşımdan etkilense de, tamamıyla onun kuramını kabul etmemektedir. Wittgenstein, renklerin ne fizyolojik ne de fenomenolojik olarak tanımlanamayacağını düşünür. Onun için fenomenoloji dilbilgisidir ve onun amacı renklerin dilbilgisinin mantığını

belirleyerek fizyolojik ve fenomenolojik tanımlamalar arasındaki uyumsuzluğu çözmektir. Wittgenstein'nın renk felsefesinin temel amacını kısaca tanımlamak gerekirse, fenomenolojiye için yeni bir dil geliştirmektir. Bu dil bize hem renk kavramlarımızı mantıksal bir zeminde tanımlamamızı sağlayacak hem de fenomenolojik olguların sunduğu farklı ihtimalleri gündelik dilimizde ifade etmemizi sağlayacaktır. Wittgenstein'nın renk felsefesinin bu ana projesini anlamak önce onun renklere olan felsefe yolcuğunu, yani renk tartışmalarının gelişimini incelememiz gerekmektedir.

Wittgentein'nın renk felsefesi, argümanlarının kronolojik gelişimine göre üç aşamada incelenmelidir. Wittgenstein erken dönem felsefesinde ağırlıklı olarak renk uyumsuzlukları problemi ile uğraşmıştır. Erken ve geç dönem felsefesinin geçiş sürecinde renk geometri ve renk oktahedron'u argümanını geliştirmiştir. Geç dönem felsefesinde ise *Renk Üzerine Notlar* eserinde hem renk geometrisi hem de dil oyunları argümanını aynı zeminde kullanmıştır.

Tractatus Logico – Philosophicus eserinde Wittgenstein, renklerle ilgili temel önermelerin gerçekliğin resmini veremediğini, yani gerçekliği tanımlayamadığını fark etmiştir. Wittgenstein'a göre, "A kırmızıdır" veya "A yeşildir" gibi önermeler doğruluk – işlev tablosu ile analiz edilemeyen temel önermelerdir, çünkü ona göre temel bir önermeler kendi kendisinin doğruluk işlevdir. (TLP, § 5.) Wittgenstein, var olan tek zorunluluğun mantıksal bir zorunluluk olduğunu iddia eder. Dolayısıyla kırmızıyı ve yeşili aynı anda 'A' gibi bir noktada var olduğunu iddia edemeyiz. Wittgenstein'nın bu analizi sadece mantıksal zorunluluğun bir sonucudur. Yani 'A' noktasının hem kırmızı hem de yeşil olduğu temel önermeler ifade edildiğinde, mantıksal olarak bir tutarsızlık doğmaktadır.

Wittgenstein *Some Remarks on Logical Form* adlı çalışmasında, bu renk uyumsuzlukları problemini çözümünün Tractatus'un eski sembolizminden kaynaklandığını düşündü. Bu nedenle bu eserinde temel renk önermelerini

mantıksal olarak ifade edebilmek için yeni bir sembolizm geliştirmeye çalıştı. Bu yeni sembolizm ile farklı derecedeki renklerin mantıksal olarak ifade edilebileceğini iddia etti. Fakat temel önermeler yine doğruluk – işlev tablosunda tutarsızlıkları yol açmaktaydı. Bu çalışma aslında Wittgenstein'nın Tractatus'un doğruluk – işlev mantığını terk etmek zorunda kaldığı ilk çalışmadır. Başka bir deyişle renk uyumsuzlukları problemi Wittgenstein'nın erken dönem felsefesinden geç dönem felsefesine geçişine yol açan ana nedenlerden biridir.

Wittgenstein'nın bu geçiş döneminde, fenomenolojik problemlerin çözümüne odaklandığını görmekteyiz. Renk uyumsuzlukları problemi ona gündelik dilimizdeki fenomenolojik ifadelerin, Tractatus'un mantığı ile ifade edilemeyeceğini göstermiştir. Tractatus'un mantığına göre, görme alanımızdaki bir parça tamamen tek bir renkten oluşmak zorundadır. Yani 'A' noktası tamamen kırmızı veya tamamen yeşil olmalıdır. Fakat renk fenomenleri, görsel alanımızda bize farklı ihtimaller sunmaktadır. Örneğin, fenomenoloji açıdan 'A noktası kırmızı ve yeşildir' ifadesi olasıdır. Philosophical Remarks adlı eserinde Wittgenstein bu durumu fark etmiştir ve fenomenolojik ifadeler için yeni bir dil bulma projesine girişmiştir. Ona göre fenomenoloji dilbilgisidir ve eğer renk dilbilgisinin mantığını belirlersek aslında fizyoloji ve fenomenoloji arasındaki uyumsuzluğu çözebiliriz. Wittgenstein bu eserinde renk geometrisi ya da renk matematiği dediği argümanını geliştirir. Ona göre renklerin birbirleriyle olan ilişkileri, sayıların birbirleriyle olan ilişkilerine benzemektedir. Bu sebeple renklerin temel mantıksal dilbilgisinin belirlenmesi renk kavramlarının anlamlarının öğrenilmesini sağlar. Bu noktada Wittgenstein'nın renk oktahedronu argümanı, renklerin geometrisinin en temel parçasıdır çünkü bize renklerin temel mantıksal gramerini verirler.

Dilbilgisinin mantıksal yapısı matematiksel bir arka plana sahiptir. Wittgenstein bu matematiksel alt yapıyı geometrik bir şekil, bir oktahedron kullanarak inşa eder. Wittgenstein'a göre, köşe noktalarında saf renklere sahip bir oktahedron, renk uzayının kaba bir temsilini sağlar ve bu temsil fizyolojik ya da

fenomenolojik değil, dilbilgisel bir temsildir. (PR: 52) Yani renk oktahedronu bize renk kavramlarının dilbilgisi kurallarına kuş bakışı bir bakış açısı verdiğini savunuyor. (PR: 52) Dilbilgisi dilimize özgürlük verir ama bu özgürlük sınırsız değildir. Yani başka bir deyişle Wittgenstein, dilbilgisinin sadece gerekli özgürlük derecelerini verdiğini iddia ediyor. (PR: 74) Renk oktahedronuna göre, kırmızımsı-maviden bahsedebiliriz ama kırmızımsı-yeşilden vb. söz edilemez (PR: 75). Ayrıca Wittgenstein, renk oktahedronun geometrik şekli nedeniyle farklı renk tonlarının temsil edilebileceğini ileri sürer. Renk oktahedronu, kırmızımsı-yeşil ve mavimsi-sarı gibi imkansız renkler için sınırlar belirlerken, hangi rengin hangisi ile karışabileceğinin bilgisini de sunuyor. Wittgenstein, renklerin mantıksal karşıtlıklarına ve benzerliklerine dayalı bir sistem kurar. Bu sistemde siyah ve beyaz, doygun renklerin konumlarının sistemleştirilmesinde kritik bir role sahiptir. Siyah ve beyaz arasında bir gri tonlama vardır, ancak gri tonlama, doygun renklerin klasik bir karışımı olarak anlaşılmamalıdır. Siyah ve beyaz arasındaki tüm doygun renkler birbirinin rakip çiftleridir. Örneğin beyaz – mavi – siyah grubu, kırmızı– sarı– yeşil grubu ile aynı yapıya sahiptir, ancak aynı zamanda bu iki grup birbirine karşıtlık ifade etmektedir.

Renk kavramlarının anlamları sadece renk oktahedronu tarafından belirlenmez. Dil oyunları argümanı renklerin kavramlarının anlamlarının belirlenmesinde önemli bir rolü vardır. Renk oktahedronu bize sadece renklerin dilbilgisinin ardındaki mantıksal sınırları verirken, dil oyunları renk kavramlarının gündelik dildeki çok anlamlılığını sağlar. Bu noktada Wittgenstein'nın Renk Üzerine Notlar'da hem renk geometrisi hem de dil oyunları argümanını aynı zeminde kullandığını söylenebilir. Başka bir deyişle, renk kavramlarının temel anlamlarının sınırları renk oktahedronu tarafından verilirken, Wittgenstein dil oyunları argümanını kullanarak renk fenomenlerinin çok anlamlılığını dil oyunlarında verir. Fakat Renk Üzerine Notlar eserinin çok dağınık olması ve Wittgenstein'nın bazı iddialarını yeterince açıklaması nedeniyle bu iki argümanı nasıl bir arada kullandığını anlamak kolay olmamaktadır. Bu eserin tam anlamıyla tamamlanmış bir eser olduğunu iddia etmek yanlış olur. Bu nedenle

Wittgenstein'nın fenomenolojik dil projesini anlamak için diğer çalışmalarıyla eşgüdümlü bir şekilde ele alınmalıdır. Bu tezde, Wittgenstein açık bıraktığı ve yeterince açıklamadığı bazı noktaları açıklamak ve onun fenomenolojik dil projesini daha net açıklamak için Renk Üzerine Notlar eserindeki renk körlüğü üzerine yaptığı tartışmalara odaklanılmıştır.

Wittgentein'a göre, normal görme yetisine sahip insanlar ve renk körleri aynı renk kavramlarına sahip olamazlar, çünkü renk körleri dil oyunlarında performans gösteremediklerinden, renk körleri renklerle ilgili dil oyunlarında usta olamazlar. (RC III § 120) İlk bakışta Wittgenstein'nın bu argumanı, renk algıları normal gözlemcilerden farklı olduğu için ustalaşamayacaklarından söylediği düşünülebilir. Ancak Wittgenstein, her zaman, öznel deneyimin renk kavramları hakkında bilgi sahibi olmak için temel bir neden olamayacağını savunur. Bu sebeple Wittgenstein'nın renk körlerinin öznel deneyimlerinin farklı olduğunu düşündüğünden böyle bir argüman geliştiği söylenemez. Ayrıca, birçok renk körü insanın gündelik hayatta renk kavramlarını kullandıklarını ve renklerle ilgili cümleleri anlayabildiklerini biliyoruz. Bu noktada sorulması gereken soru Wittgenstein usta olmakla neyi kastetmektedir.

Wittgenstein için bilgi iki şekilde edinildiğini söyler: tanıyarak ve tanımlanarak. Fenomenolojinin ve psikolojinin görmenin ne olduğunu tanımlamasının, tanımlanarak bilgi kategorisine girer. Ona göre renk körü veya normal bir gözlemciye renkleri görmenin ne olduğu tanımlanarak öğretilemez çünkü bir kavramın anlamı onun kullanımıyla ortaya çıkar ve bu kullanım dil oyunu içerisinde gerçekleşir. Bilginin bu türden edinimi tanıyarak bilgi kategorisine girer. Bu sebeple renk körleri dil oyunlarını normal gözlemciler gibi oynayamadıklarından, renk kavramlarının anlamlarında normal gözlemciler gibi usta olamazlar. Fakat bu noktada şöyle bir sorulabilir: Renk körleri renk oktahedronunun mantığını öğrenerek dil oyunlarında ustalaşamazlar mı? Dahası renk körleri gündelik hayatların birçok renk cümlesini anlamakta ve kullanmaktadır. O halde neden dil oyunlarında ustalaşamazlar? Bütün bu sorular

aslında Wittgenstein'nın *Renk Üzerine Notlar'* da yeterince cevap vermediği fakat bu tezin cevaplayamadığı çalıştığı sorulardır. Bu sorular aynı zamanda renk oktahedronun rolünün de daha net bir biçimde cevaplamamızı sağlayacak sorulardır.

Wittgenstein, *Felsefi Soruşturmalar'* da dilbilgisini yüzeysel ve derin dilbilgisi olarak iki şekilde tanımlar. Yüzeysel dilbilgisi, belirli bir formda yazılan veya ifade edilen bir cümlenin içindeki bir kavramın kullanımında ilk anda anladığımız anlamı veren dilbilgisidir. Wittgenstein bunu özel olarak bir kavramın bir cümle içinde kulakla kavranabilen kısmı olarak açıklar. (PI § 66) Her ne kadar Wittgenstein yeterince tanımlamasa da derin dilbilgisi, bir cümlenin içindeki bir kavramın anlamının çeşitli ihtimalleri ve imkansızlıkları işaret ederek ifade edebilme imkanı sunan dilbilgisidir. Baker'a göre, renk kavramlarıyla ilgili yüzeysel dilbilgisi kullanımı, ya kaba dilbilgisi sınıflandırmalarıyla kurulan cümlelerde oluşur. Örneğin, 'Pembe kırmızıdan daha hafiftir' kaba dilbilgisi sınıflandırmalarına bir örnek olabilir. Öte yandan Hacker, 'derinlik dilbilgisini' ifadelerde bize farklı olasılıkları veya imkansızlıkları göstererek açıklar. 'Derinlik dilbilgisi' sayesinde, belirli amaçlar için bir kavram etrafında net sınırlar belirlenebilir veya yanlış anlaşılmaları önleyebiliriz. Bir şeyi anlamlandırma olasılığı ile birinin ne demek istediğini kararlı bir şekilde ifade etme kapasitesi arasındaki bağlantıyı sağlar. Söylemlerin daha önce kastettikleri şeyin bir ölçütü olarak görülmesine olanak tanır ve bu ölçütlerin sınırlarını belirler. (Baker, 2001: 304)

Bu bağlamda bu tezde, renk oktahedronun bize yüzeysel dilbilgisinin kurallarını verdiğini, Wittgenstein'nın dil oyunlarında usta olmakla ile kastettiğinin şeyin ise derin dilbilgisinin kullanımı olduğu sonucuna varılmıştır. Bu argümanı kanıtlamak için akromatopsi hastalarının dilsel yetenekleri ve öznel renk deneyimlerini analiz edilmiştir. Akromatoplar tamamen renk körü olsalar bile renk kavramlarını ve renk cümlelerini anlayabilen bireylerdir. Bu nedenle Wittgenstein'nın bu ayrımını test etmek için ideal bir vakadır. Bu araştırma, bu

kişilerin yalnızca ana renk kavramlarını ve kaba dilbilgisi içeren cümleleri anladığını ve kullandığını göstermiştir. Ancak gündelik dildeki farklı olasılıkları ve imkansızlıkları kasteden cümleleri ve ifadeleri anlayamadıkları görülmüştür. Bu durumda her ne kadar temel renk kavramlarını kullanıp anlasalar da, Wittgenstein'nın iddia ettiği gibi dil oyunlarında ustalaşamamaktadırlar.

Wittgenstein'nın bu yüzeysel ve derin dilbilgisi, ayrımı aynı zamanda onun öznel renk deneyimi hakkındaki fikirlerini anlamak açısından önemlidir. Bu sebeple bu tezde, 'unilateral inverted spectrum' hipotezi geliştirilmiştir. Bu hipotez, bir gözü ters tayf diğer gözü normal tayf olan bir birey varsaymaktadır. Bu inceleme bize eğer bir bireyin özne içi farklı öznel deneyimlerin ne gibi sonuçlar doğuracağını göstermiştir. Bu durumu Wittgenstein açısından değerlendirdiğimizde, renk kavramlarının anlamları dil oyunları tarafından belirlendiğinden, iki farklı görsel veriye sahip olmamız onun açısından *qualia problemi* doğurmamaktadır. Wittgenstein'a göre renk deneyimi, psikologların ve görüngü bilimcilerin düşündüğünden çok daha karmaşıktır. Renk deneyimi, görsel verilere indirgenerek açıklanamaz. Ona göre bir rengin deneyimi, o rengin kavramının kullanımıyla belirlenir. Bu nedenle, renk deneyimi anlama ihtiyaç duyar, özellikle de dil oyunlarında oluşturulmuş renk kavramlarının anlamlarına.

Sonuç olarak, Wittgenstein'nın bir renk teorisi yaratmaktan ziyade fenomenoloji için yeni bir dil oluşturmaya çalıştığını söylenebilir. Bu dilin iki önemli parçası renk geometrisi ve dil oyunlarıdır. Renk geometrisi mantıksal dilbilgisinin kurallarını belirler ve renk oktahedronu, yüzeysel dil bilgisinin temel kurallarının kuş bakışı görünüşünü verir. Derin dilbilgisi ise dil oyunlarındaki renk fenomenlerinin doğurduğu farklı olasılıkları ve imkansızlıkları ifade etmemizi sağlar. Wittgenstein'ın renk felsefesinin, düşüncelerinin dağınık yapısı göz önüne alındığında tamamlanmış bir felsefe olmadığı söylenebilir. Ancak bu durum, bize önemli argümanlar bırakmadığı anlamına gelmez. Günümüzde felsefe ve bilişsel bilimin güncel tartışmaları genellikle renk deneyiminin kavramsal olmayan ve kavramsal yapısı hakkındadır. Renkler hakkında yapılan

çalışmaların çoğu bu iki farklı dünyayı aynı zeminde bir araya getirmeyi amaçlıyor. Wittgenstein'ın renk felsefesi dikkate alındığında onun da aynı amacı taşıdığı söylenebilir. Bu nedenle, onun argümanlarının mevcut tartışmaların sorunlarını çözmek için bize farklı bir açısı sunmaktadır.

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Adı / Name : Kerem
Bölümü / Department : Felsefe / Philosophy

TEZİN ADI / TITLE OF THE THESIS (**İngilizce** / English) : Colours in Wittgenstein's Philosophy

TEZİN TÜRÜ / DEGREE**:** **Yüksek Lisans** / Master ■ **Doktora** / PhD ☐

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