colors move;
harmony and
tension ensues

Color Relativity

Vol. 1

By *Robert Najlis*

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To the Reader

Thank you very much for your interest in my book. Your support means a lot to me and I greatly appreciate it. Any endeavor such as writing a book is a step into the unknown, and it is my sincere hope that it will prove useful to you. In the process of researching this book, I have learned a lot. My understanding of color had grown from a personal one to a more formal one grounded in scientific research and art from around the world and across time. Some of the lessons that I have learned have surprised me, and have changed my understanding of color.

Despite all of this research and analysis, I have never lost sight of the most central principle: learning about color is meant to bolster our intuition and sensitivity towards color. We all have our own ways of relating to color, and my hope is that this book can help foster that potential in each of us.

Thank you for joining me on this journey with color.
I hope you enjoy the process!

Sincerely,

Robert Najlis

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Introduction

Color is exciting. It brings joy and emotion to our lives, and to our artwork. Working with color is attractive and yet challenging. One of the most difficult aspects of working with color is that they are not fixed or static entities. Instead, how colors appear is relative to their relationships with other colors. The goal in this book is to understand color relationships, while at the same time developing a flexible and lively understanding of color on a personal level. This will help us become more aware of and sensitive to colors, and to better understand their interactions and uses. In Volume 1 of this series, we will focus on developing our connection to color, and color movements. Volume 2 will further develop these concepts, delving into more technical areas, as well as expanding on applications of these movements.

The Language of Color

Colors interact to create an expressive language that brings a resonant vibrancy to our world. A language can refer to a system like English, Spanish, or Chinese; it can be body language, it can be the language of music, or even the language of mathematics. We are studying the language of color; how they talk amongst themselves, and express themselves to us. When we learn a language we start with the basics such as pronunciation, grammar, vocabulary. We then start to learn conventions used in the language, sentence patterns

and idioms. Gradually we develop an intuitive feel for the language which allows us to go beyond the rules; to play and break the rules all within the natural feeling of the language. We can make jokes, we can create poetry, we can break the rules in ways that still remain true to the spirit of the language. Part of the reason for this is that the rules are not meant to be an exhaustive list of everything that is possible. Instead, they are meant to describe something as closely as possible, something that is still living and changing. We may speak the same language, but we each speak it in our own particular way, and we say different things with it. In this book we will begin our study of the language of color with the fundamental color relationships and movements.

How This Book is Organized

This book is separated into two parts. The first part of the book will be spent developing our ability to see and understand colors. In particular we are concerned with comparing colors to understand how they relate to each other on the color spectrum, and in relation to each other. Developing a personal connection to color allows us to appreciate and use them in richer ways. Looking at a painting by Vincent van Gogh, appreciating a sunset, designing clothing or a website, all of these activities can be changed with a heightened awareness of color.

In the second part of the book we will apply our knowledge as we build an understanding of color movements. We will see how they can be used to create tension and harmony, and how we can work with them. We will look at examples of these color movements in artwork, including a detailed examination of Claude Monet's painting: Grainstack, Sun in the Mist.

Afterwards, we will discuss how to use these concepts to help develop both our analytical and intuitive abilities. We will also consider how to experiment with colors both for working from what we see, as well as for creating our own color combinations.

Building Blocks

The focus of this book is to develop an understanding of color relationships, and in particular, color movements that will serve as the fundamental building blocks for how we understand and use colors. In Volume 2 of this series we will

build on what we learn here to delve into further facets of color relationships.

Skipping Ahead

If you want to skip ahead and get a sense of where this book is heading, you can take a look at Chapter 7. Color Movements. Although the chapter might not make complete sense without the preceding sections, it does present some of the most important lessons in this book.

Historical Teachers

The color movements described in this book were developed with a great deal of help from many sources. In particular, a number of important theorists have played an important role. Among them are such luminaries as Johanes Itten, Josef Albers, Johann Wolfgang von Goethe, Ogden Rood, Michel Eugène Chevreul, Wassily Kandinsky, Albert Munsell, and Faber Birren. The color movements presented in this book were developed in no small part from what I have learned from those researchers, and in particular from Rudolf Arnheim. Arnheim wrote about concordant and discordant colors based on movements around the three primary colors of red, yellow, and blue. I worked with the ideas of those researchers and examples from artwork throughout history for many years in my own artwork before I felt ready to build upon them and present my ideas in this book, and I owe a great debt of gratitude to all of those researchers. Color movements in artwork have been in use around the world throughout time, and can be seen in work as far back as ancient Chinese silk robes, Roman and Persian mosaics, as well as in paintings by Fra Angelico in the 15th century, Vincent van Gogh, Georgia O'Keefe, Henri Matisse, and many more great artists.

Scientific Research and Personal Experience

In the course of this book we will consider explanations based on scientific research and the fundamentals of the color spectrum. However, this is primarily supporting evidence. The main basis for our own work with color should always be our feeling of color. For this reason, we must always cultivate our sensitivity to color. The process of color vision is incredibly complex and not fully understood. Furthermore, everyone sees and understands color differently. You almost certainly experience color differently than me or anyone else. That

is a good thing, and should not be discarded in the rush to create an overarching theory of color. We learn from each other in order become who we are, not to give that up.

Figure 1. Twelve-Pointed Star-Shaped Tile, 1442–43 northeastern Iran, courtesy of Metropolitan Museum of Art.

PART I. Seeing Color

Listen to those crows. Do listen. If you listen completely, is there a centre from which you are listening? Your ears are listening. There is the noise, there is the vibration and all the rest of it, but there is no centre from which you are listening. There is attention.

Therefore if you listen completely, there is no listener; there is only the fact of that noise. To listen completely you must be silent, and that silence is not something in thought, created by thought.

When you listen to that crow that is making the noise before it goes to sleep, so completely that there is no listener, you will see that there is no entity that says, 'I am listening.'

J. Krishnamurti,
The Collected Works, Vol. XVI", 58, Choiceless Awareness

1. Color Comparison

The first step in understanding colors is being able to see them well. This may sound simple, but it can, in fact, be quite difficult to do, as there are many subtle differences and they change depending on context. Just as musicians spend many years training their hearing, so we visual artists must train our vision.

Even talking about color can be difficult. My idea of yellow might be slightly lemony, while yours might be the reddish yellow of the sun. There is a great deal of variety in colors. Similarly, the green that each one of us imagines are most likely all slightly different colors.[1]

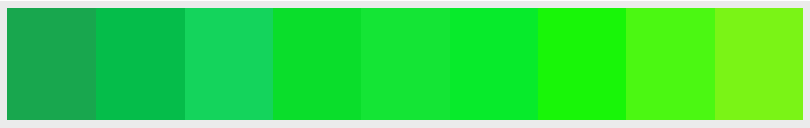

Figure 2. Close your eyes and imagine the color green. Do any of the colors shown here match your image of the color green?

As an example, we can see many greens in the painting Dans Le Parc by Berthe Morisot. Does one of them speak to you as being more of a true green than the others? Even if you don't find the true green that you visualize, perhaps you might see many colors that are almost, but not quite that color of green.

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1. Wool, Lauren E et al. "Salience of unique hues and implications for color theory." Journal of vision vol. 15,2 10. 6 Feb. 2015, doi:10.1167/15.2.10

Cultivating Vision

When we think about color vision, we often think about the sensitivity of the eye to colors; however, it has been discovered that much of the variation color vision seems to occur in the brain, after signals are sent there from the eye.[2] While this shows that vision is a very

Figure 3. Berthe Morisot, Dans le parc, circa 1874.
Courtesy of Musée des Beaux-Arts de la Ville de Paris, Petit Palais.

complicated process, it also helps to reinforce the idea that not only do we affect what we see, but we can also develop our ability to see, by changing how we think about what we see. For example, when mixing paint, and trying to match the color of an object, our preconceptions of how we think that object should look can make it hard to properly see the color we are looking at. Training an ability, such as seeing color, often means, at least in part, pulling away the barriers that we place in our own way, and seeing, or feeling, more clearly, simply, and directly.

Cultivating sensitivity to variations in color is an essential factor in our growth in the use of color, as it allows us to see subtle distinctions clearly, and thus make informed color choices. One way to develop this technique is to look at colors in comparison. In particular looking at neighboring colors helps to clarify a color's characteristics.

Comparing Colors

In the following examples, we will look at color variations in some images. Our focus right now is the ability to see these colors clearly, which will allow us to make informed decisions about how to use them. Let's start with a single color, and see how we can get a clearer vision of it.

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2. Kuehni, R. G. (2005). Color: An introduction to practice and principles (Second ed.). Hoboken, NJ: Wiley. p.22

Red

Let's take a look at the red in Figure 4. Here it looks like a very nice red, a simple clear version of red. Let us call it Red 1.

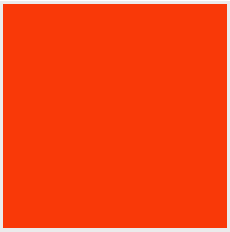

Figure 4. Red 1

In Figure 5 we can see Red 1 on the left compared to Red 2 on the right. Now Red 1 looks much more orange, like a red leaning a little bit more towards yellow. Red 2 on the other hand appears to lean in the other direction.

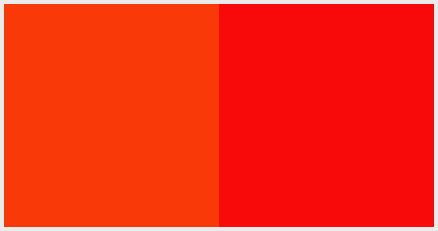

Figure 5. Comparing the two reds directly shows Red 1 to lean towards orange.

Adding a third red and comparing them directly we can see a wide variation.

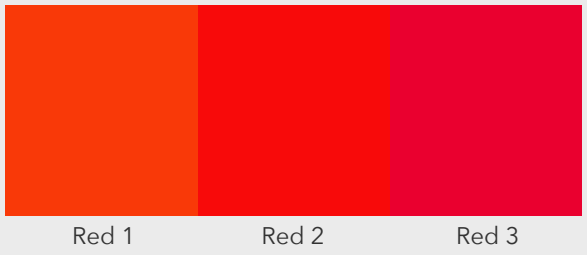

Figure 6. Adding a third red shows a wider variety.

Look at each of the three reds in Figure 7 while covering the other two from view. When looking at each of them individually, any one of the three could easily be called red.

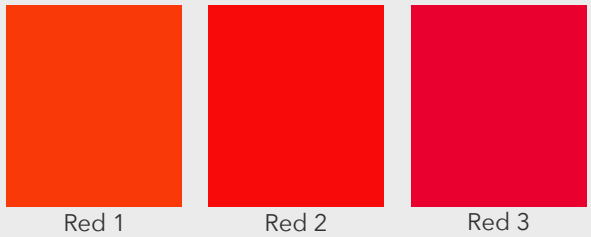

Figure 7. Seen individually any one of these colors could be considered red.

However, in comparing Red 1 and Red 3, we can see a larger difference between the two colors.

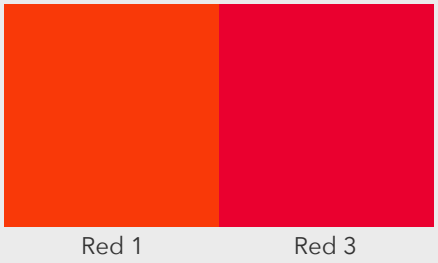

Figure 8. Comparing Red 1 and Red 3 shows a large difference.

In Figure 9 there are a wider range of five reds, ranging from a red leaning more towards orange and yellow to one leaning more towards magenta and blue. Some of the reds separate more from their neighbors than others, making some harder than others to distinguish. As we view larger arrays of colors we can consider when there is a fundamental shift. For example, is there a point at which some of the colors stop being red?

Figure 9. A wider range of reds. At what point do they stop being red?

An Example

Let's take a look at the picture of a barn in Figure 10. Between the barn wall, the door, and the step, there are three different reds being used. These three reds are shown on the right.

Figure 10. Three of the reds in this picture.

1. The red of the door is a bright red, more towards orange in comparison to the other reds.

2. The red of the wall is a much greyer red, and also less orange than the door.

3. The red of the step veers more towards a blueish red.

In an image such as this, each color of red also varies in terms of how dark or light it is, as well as how grey or vivid it is (value and saturation, respectively). This makes it even more difficult to see clearly what is happening.

While this is a pretty simple picture, there is a good amount of variation in each of the three areas described. Within the door, we can see a variety of reds as shown in Figure 11. If we look closely, we will see even more small variations.

Figure 11. Some of the variations within the reds of the door.

In this case, we are looking at colors from a photograph of the barn door shown on a computer screen, or perhaps printed onto paper. Each of these formats limits the number of colors that can be shown as well as their accuracy. When I stood in front of the barn to take this photo I saw even more color variation, and those colors changed during the time I stood there, with the light shining on the barn being altered as the sun passed behind clouds and slowly descended in the sky.

Yellow

Let's continue this practice a little more with the color yellow. We can begin with the yellow in Figure 12 and examine what kind of yellow it is. Perhaps it is more of a blueish yellow, or more of a reddish yellow? On its own it can be a bit hard to tell. It looks like a pretty nice yellow to me, bright and shining.

Figure 12.

In Figure 13, we introduce a second yellow. The original yellow is closer to a lemon yellow, whereas the second yellow is more on the red side, closer to an orange, similar to how we might think of the sun.

Figure 13.

We can make a similar comparison with other colors. Here for example is a series yellows, ranging from a yellow that is almost green to one that leans more towards orange and red. As with the array of reds, we can ask if all of these colors are yellow, or have we reached a point where they become green or orange?

Figure 14.

From the photo of the dandelion in Figure 15, we can see a number of different colors that all combine to give us a feeling of a yellow flower. The center of the flower is a reddish yellow. As we move out from there, this then turns to yellow and then greenish yellow as we reach the tips of the leaves. Below the photos the colors are shown separately, which allows us to see how large a range of a movement there is from reddish yellow, through yellow, to greenish yellow. In all, we move from an orange to a green in quick succession. It is striking to see how different a color can look when taken out from its original context. Seen as a whole, the flower reads as yellow, but taken individually, if I had to break the colors down into simple categories, I would call them orange, yellow, and green.

Figure 15.

Simultaneous Contrast

The context in which a color resides can greatly affect how it appears. For example, in Figure 16, the central yellow box is the same color on both the left and right, however it appears quite differently depending upon the surrounding yellow.

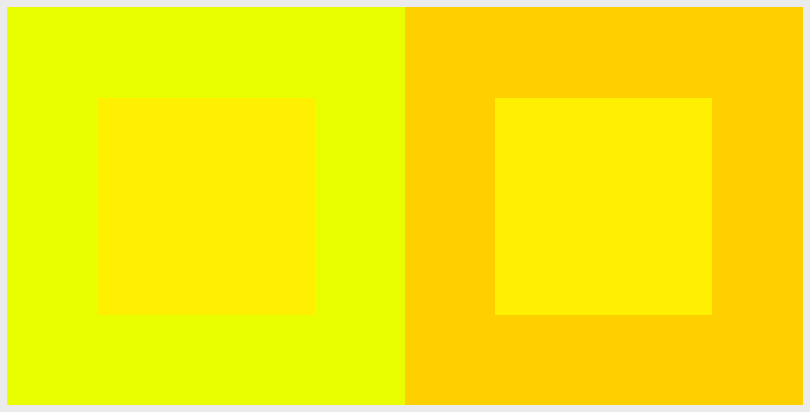

Figure 16. The central yellow is the same on both sides, but appears much different due to the influence of the surrounding color.

The effect seen is an example of simultaneous contrast. The central square on the left moves away from the greenish yellow to look more reddish. On the right we have the opposite effect, with the central yellow square appearing slightly more greenish in comparison to the reddish yellow outer square. People have varying reactions to simultaneous contrast, thus your vision of the effects described in Figure 16 might differ. These individual variations may be part of the reason that it is still an ongoing area of research. Current studies suggest that the inner color moves away from the outer color as described in Figure 17.[3]

Regardless of the exact functioning of simultaneous contrast, the fact that there is a change at all teaches us a lot. It shows us that colors affect each other, and they change in relation to each other. When we add a new color to our work, we have to look again at the other colors and consider how they might have been affected. The process of questioning and comparing goes on throughout the process of our work. Color is a fluid, changing environment, like floating on the water. We have to be sensitive and aware of changes and fluctuations. Colors are not immutable atomic entities, they are permeable presences that affect and are affected by their surroundings.

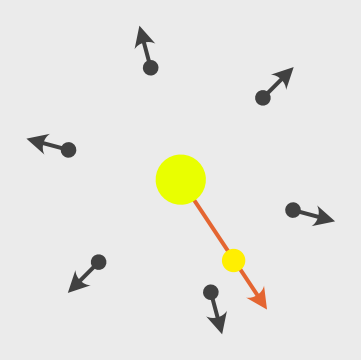

Figure 17. The direction of the simultaneous contrast is away from the outer color. Adapted from Ekroll, Vebjørn and Faul, Franz, Basic Characteristics of Simultaneous Color Contrast Revisited.

As we develop our ability to see these variations clearly, we will better be able to make informed decisions about how to use them. Sometimes the emphasis might be on trying to accurately match the colors we are seeing, such as in realistic painting, or photo correction. Other times we might be working more freely to create the colors we want, such as in abstract painting or clothing design. No matter the situation, developing sensitivity to color variation is paramount to our ability to see and choose the colors we want to work with.

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3. Ekroll, Vebjørn and Faul, Franz, Basic Characteristics of Simultaneous Color Contrast Revisited, Psychological Science, OCTOBER 2012, Vol. 23, No. 10 (OCTOBER 2012), pp. 1246–1255

2. Hue Value Saturation

Comparing colors presented clearly in a row one next to each other was different than in the photographs we were comparing. It is easier to see the colors when each one shown in its full brilliance, not mixed with grey or made very dark or light. When a color is less vibrant, it can be harder to analyze clearly.

Color is often described with three different attributes: hue, value and saturation. Hue is the color, such as red, yellow, blue, etc. Value describes how light or dark the color is. Saturation is how strong and vibrant or grey the color is. These three terms are useful to know in differentiating aspects of color. For the purposes of this book, having a basic understanding of these terms is enough for us to use them in our discussions.

Hue

Hue describes which color we are referring to, such as red, yellow, blue, green, etc. Hues are what we see around the color wheel.

Related Term: Color

Figure 18. Hues around the Color Wheel

Value

Value refers to the brightness, or how light or dark a color is.

Related Terms: Tonal Value, Brightness, Lightness, Luminosity, Luminance

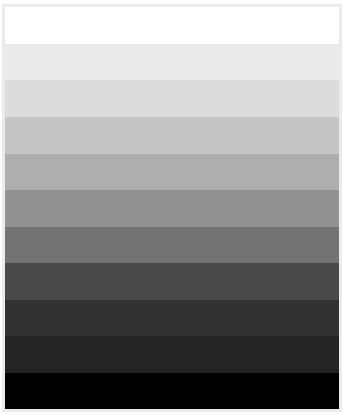

Figure 19. Value scale: how dark or light a color is.

Saturation

Saturation describes how strong or pure the color is compared to the amount of grey mixed into the color. The less grey mixed into the color, the more saturated it is. A fully saturated color has no grey in it.

Related Term: Chroma

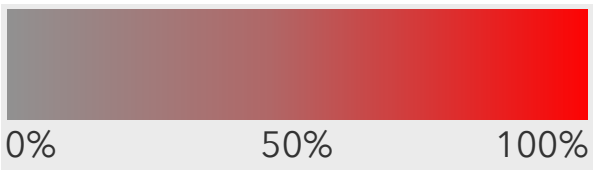

Figure 20. Saturation scale: how pure compared to how much grey in a color.

Comparing Colors with Hue, Value, and Saturation

When comparing colors, it is common to try to determine their relative value, that is to say, how dark or light they are on a scale of grey tones from black to white. This is not an easy task. One of the tricks that can be helpful in this process is to squint our eyes, thus reducing the amount of light coming in. When we are in lower light conditions, we use the rods in our eyes more than the cones. Rods and cones are the two main photoreceptors in the eye. Rods perceive the relative brightness of light, but not color. Rods are also more sensitive to light than cones, so they can function better in low light conditions. Thus, by squinting and reducing the overall amount of light entering our eyes, we can let the rods predominate, helping us to see the value contrasts more easily.

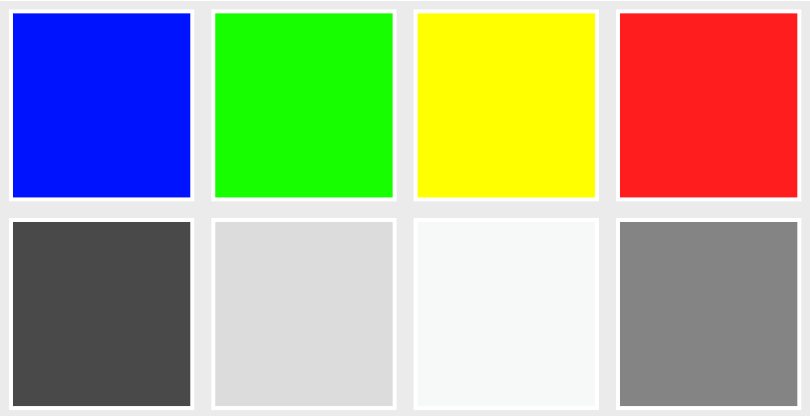

Figure 21. Comparing colors with their greyscale equivalent.

Squinting Does Not Help

Unfortunately, squinting our eyes does not help us to see hues better. In fact, it probably makes it more difficult since the cones responsible for color vision require

higher levels of light. Thus, in order to differentiate hues, we need to take in more light, as we need to depend more on the cones rather than the rods in our eyes.

In Figure 22 we begin with a vivid red square, and then alter the saturation and value. In the second square it is less saturated, with a higher value, and in the third, it is also less saturated, but with a lower value. It is hard to see these three colors as belonging to the same red, as the lighter and the darker versions seem bluer than the original color. These three factors are not fully independent, and a shift in value or saturation will often affect the hue as well. When I am considering colors, if, for example, a red appears to be a bluer as the value shifts, then I consider it to be a bluer color.

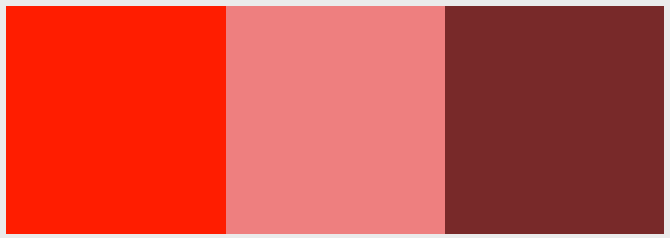

Figure 22. These 3 reds all have the same hue level, but different saturation and value levels.

When we adjust hue, value, and saturation, the small shifts that occur can be hard to perceive. A color contains all three of these elements, but we should not think that we can simply add them up and create the color. For example, if in photography software we create a color by first choosing a hue, as we change the value and the saturation levels the way we see the hue may shift, and we need to be aware of this possibility.

This series of yellows in Figure 23 provides a further example of this. Similar to the previous example, each row starts with a high chroma version of the color, and then the saturation and value levels are altered. The darkest of the three squares on the top row becomes a yellowish green, and on the bottom row the corresponding square becomes brown. Yellow is a fascinating color, it can glow and sing, but only has a narrow amount of space in which to do so. As it becomes darker, it can easily shift towards green, and even brown. It is a strong color, but also delicate in its own way.

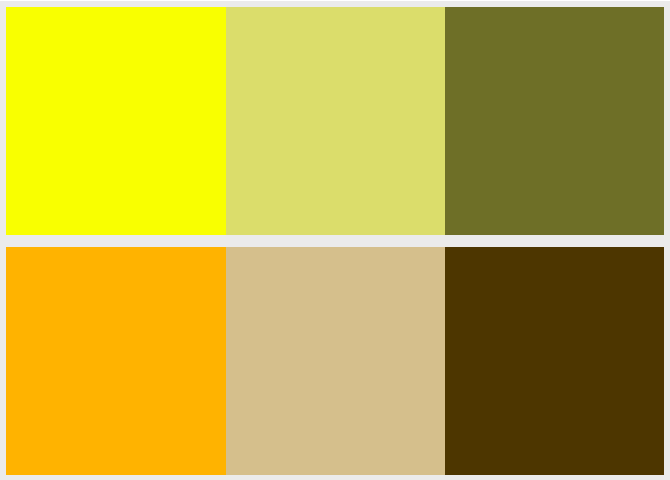

Figure 23. Changing value and saturation alters the way a hue appears.

Highly Saturated Colors

Another factor in the difficulty of seeing colors is that highly saturated colors are very vivid, and can therefore appear to be brighter than their actual value. For example, the vivid red shown below can appear to be quite bright. However, when we look at it in a greyscale, we can see that it is actually about a medium value level between black and white.

Figure 24. Highly saturated colors tend to look brighter than their actual value level.

3. Shifting Colors

When working with and manipulating colors, we are accustomed to making changes to them. Working with paint, we can take a red and add some yellow to move it more towards orange, or perhaps add a bit of blue to push it more towards purple. We can achieve similar results if we work digitally as well, by shifting the colors around the color wheel. Even when we work with colored paper in collage, we usually have a variety of colors that we can choose from; we can place a blue paper on the table, and then place a slightly different blue on top of that. Regardless of medium, we can affect and change the colors we work with in a number of different ways. When we change a color, it changes how it interacts with its surrounding colors; changing one small thing can affect everything.

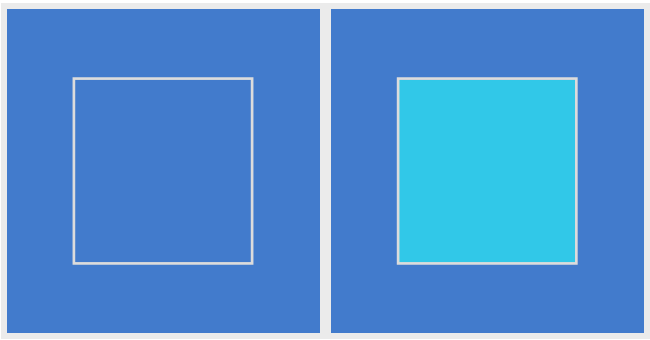

Figure 25. Shifting blues

In Figure 25 we can see two pairs of blue squares. The pair on the left shows two squares of exactly the same blue, while the pair on the right shows a new blue on the inside.

As the new blue is closer to green, if we were mixing paints to create this color, we would to add green or yellow paint to the original color. Looking at a gradient of blue moving towards green as we would see in a section of the color spectrum, our new color lies somewhere along this movement. How far along is very useful information, and often harder to see than we might first imagine.

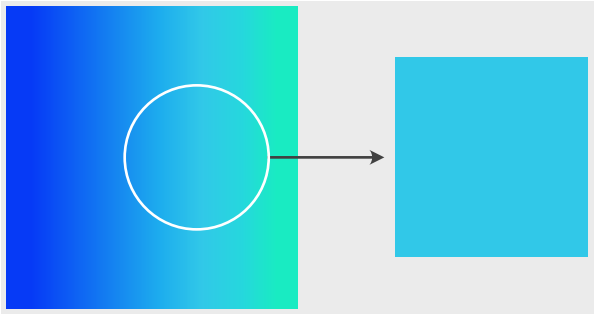

Figure 26. The new blue lies somewhere along this gradient movement.

Similar to what we saw in Chapter 1, it can be helpful to lay out several colors in a row to see more clearly the relationships between them and where on the spectrum the color lies.

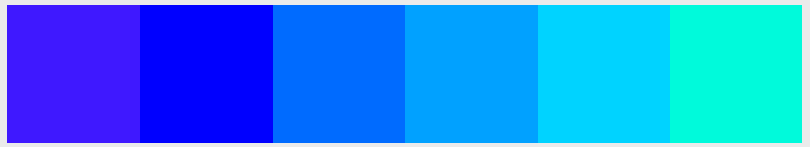

Figure 27. A range of blues, from near purple to aqua.

As things get more complex, we can always return to the idea of simple color comparisons and ask ourselves how we feel about theses colors in relation to each other. This is a common practice in art. We see paintings by Picasso where he included elements such as

newspaper and other external materials. This may well have begun from the practice of placing shapes and colors on the painting in order to make comparisons. Don't be afraid to compare colors and shapes in order to consider how things look, as well as how they might be made to look.

MacAdam Ellipse

There are limits to how accurately we can see colors, and some points in the visible spectrum will appear the same, even though they are technically different. In 1942, David MacAdam studied this effect. He defined an elliptical space to indicate the range in which people are generally unable to differentiate color differences, called the MacAdam ellipse. The MacAdam Ellipse is often used in the lightbulb industry to determine color accuracy and tolerances in their products. Lightbulb color accuracy allows for fault tolerances within the range of the MacAdam Ellipse, as most people will be unable to discern the differences between the colors of any light within that range of the target color.[4] For example, in the spectrum of greens in Figure 28, we might be able to see a difference between the greens on the far left and the far right, but it would be much more difficult to determine a difference between any of the greens in the area encompassed by the ellipse.

4. "Talk Photometry - Colour Difference". Photometric Testing. Retrieved 26 March 2017.

Figure 28. MacAdam Ellipse. Most people cannot discern differences in the greens inside a MacAdam ellipse.

Instead of thinking of colors as being specific, discrete points, we can think of them as fluid gradations. Where yellow changes to greenish yellow is not a specific point, but rather a gradual shift that can be hard to notice at first.

Color Cards

We can place colored pieces on top of each other like cards to see how they move towards one direction or another. For example, in Figure 29, on the left we start with red on the bottom and add cards that gradually move towards blue. We can explore this idea from many directions and many colors, to see the route taken by colors and the directionality of movement.

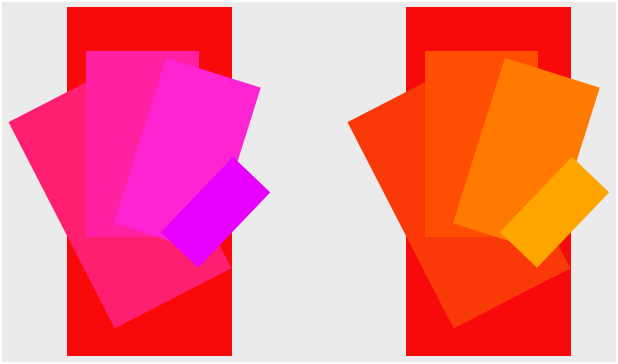

Figure 29. Red moving towards blue and towards yellow.

As we have discussed, comparing colors is very helpful, not only for seeing their current state, but also to see what they might become. Seeing colors clearly often requires looking at them in comparison with similar but

slightly different colors in order to understand them. It is not easy to get an absolute view of a single, isolated color, but by seeing it in relation to other colors, we can begin to get a better understanding of what we are seeing and how it relates to other colors. Seeing colors separately is one thing, but seeing them in the context of a complex work is quite another. We saw this even in the photograph of the dandelion, where the greenish yellow looked much more green in isolation than within the whole picture. Conversely, colors that might appear fairly neutral and unsaturated in isolation can be used in combination to create a luminous effect. When I look at a painting by Van Gogh, Monet, or other great artists, I am often surprised by how colors that look so vibrant within the context of the whole painting, can look so muted when seen separately.

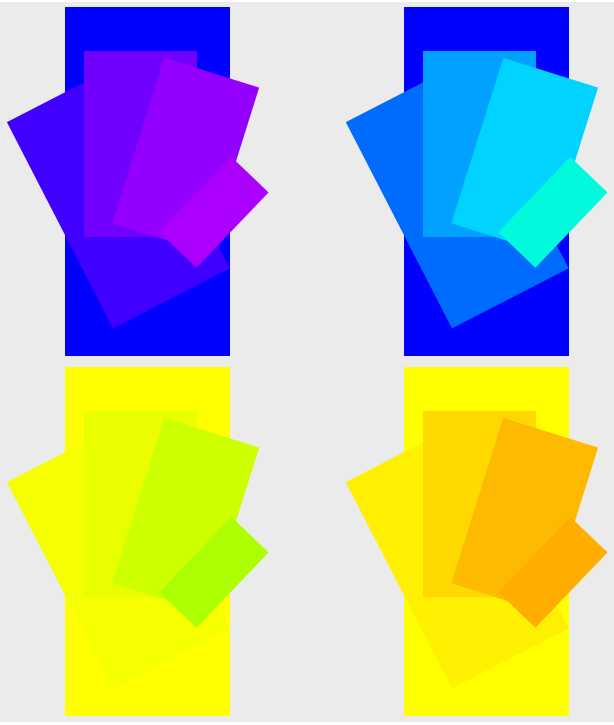

Figure 30.
Blue moving towards red and towards green.

Figure 31.
Yellow moving towards green and towards red.

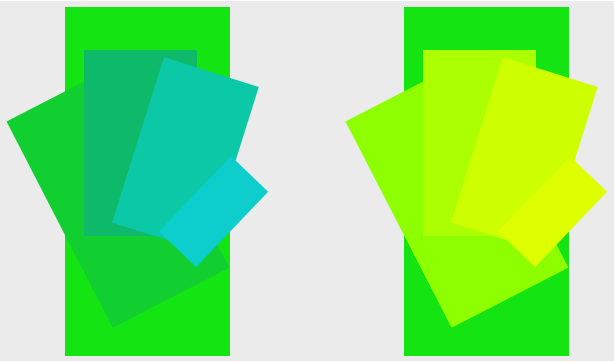

Figure 32.
Green moving towards blue and towards yellow.

Color Arrangement

We have been pretty free with our description of colors up to now, using terms such as red, yellow, green, blue, etc. At the same time we have discussed the fact that everyone sees color differently. When I look at the whole of the color spectrum, I see colors: red, orange, yellow, green, cyan, blue, violet, and so on. However, when I look at a small space of the colors up close, it is hard to say where the borders between colors lie. When trying to create definitions, universal theories and absolutes, the lack of definitive boundaries can prove problematic. At the same time, when creating artwork, it can be a wonderful thing which helps to expand the possibilities of what we might do. For our work, it will behoove us to understand these two paradoxical aspects of color.

Figure 33. Color names on the spectrum.

We can take the color spectrum and bend it into a circular shape to help see relationships between the colors. This is very useful, but it can also be somewhat misleading, as it simplifies what is actually a very complex relationship. There are different color wheels that attempt to explain different aspects of how colors work. Most color wheels are focused on mixing or creating colors, whether with paints, inks, or light, though there are also color wheels that try to represent how people see colors as well as relationships for color schemes. The order of arrangement of the colors around the circle is the same order that we see presented in the linear visible spectrum chart with one difference. In the color wheel we see colors such as magenta that we don't see in the visible spectrum chart. This is because magenta is a combination of red and blue, which are at opposite ends of the spectrum.

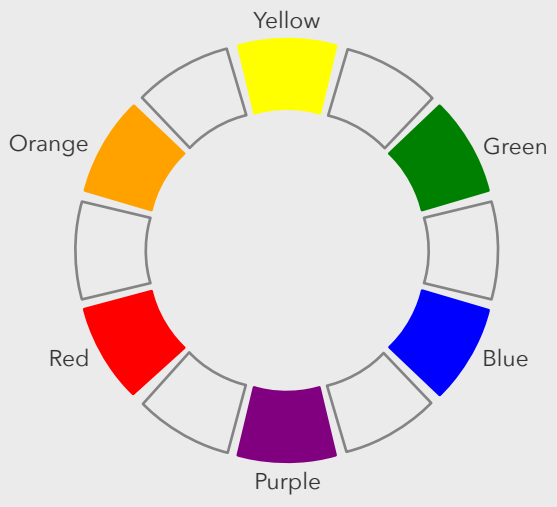

Figure 34. Color names on the color circle.

There Are No Primary Colors

Many color theories are based on some form of primary colors. Primary colors can be useful for mixing colors, but as it turns out there is no dedicated place in the brain that corresponds to seeing primary colors, or any definitive colors at all. The lack of fixed primary colors even extends to the opponent color theory which attempts to explain color vision through 4 primary opponent colors.[5] This means that the process of seeing colors is not fixed by our usual conventions. Removing structures that we have come to rely on presents some difficulties, and requires us to depend more on the sensitivity color changes that we have been cultivating. At the same time, it also frees us up to develop a more flexible and personal way of working with color.

5. Wool, Lauren E et al. "Salience of unique hues and implications for color theory." Journal of vision vol. 15,2 10. 6 Feb. 2015, doi:10.1167/15.2.10

4. Color Constancy and Interpretation

In 1666 Isaac Newton observed that light passing through a prism was refracted into its component colors. This was not the first time that light had been refracted through a prism. What was new in Newton's work was his conclusion that color is an intrinsic property of light, as he deduced that light is a combination of all colors in the spectrum. This was an important discovery, countering previous ideas that color was a property of the thing being viewed. Newton identified seven colors that made up the visible color spectrum: red, orange, yellow, green, blue, indigo, and violet.

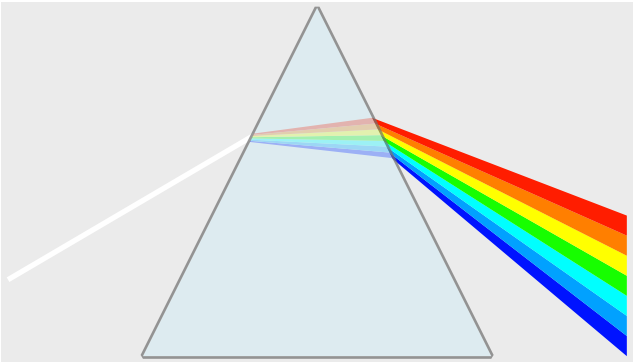

Figure 35. Prism separates light into its component colors.

Figure 36. The color spectrum visible to humans.

Newton argued that light is made of distinct particles called corpuscles. There has long been a debate over whether light is a wave or a particle. It is a debate which continues into the present day.

Rainbows and Halos

In our daily lives, we usually don't see the full spectrum as shown through the use of a prism. However, we do often see aspects of it in other ways.

Rainbows are formed through a similar process of refraction as seen in the prism. As light passes through water particles in the sky, the water particles bend the light by changing their speed, and thus separating it into its component colors.

Figure 37. Rainbow. Photo by Albrecht Fietz, https://pixabay.com/photos/rainbow- cloud-evening-sun-rain-4047523/

The idea of how rainbows as atmospheric refraction work was first proposed by Shen Kuo (沈括, 1031–1095) in Song Dynasty China.

We can also see an effect similar to that of rainbows when the sun is hidden behind the clouds or as the sun rises and sets. We can sometimes see the yellow of the

sun moving out in a halo around it, transforming from yellow to orange and then red. This is akin to a partial view of the spectrum that we might at other times see in a rainbow, as we are seeing a part of the color spectrum spreading out. The colors that spread across the rainbow or halo are doing so in the same order they do in the color spectrum. Thus, a color moving from red to yellow will transition through orange along the way.

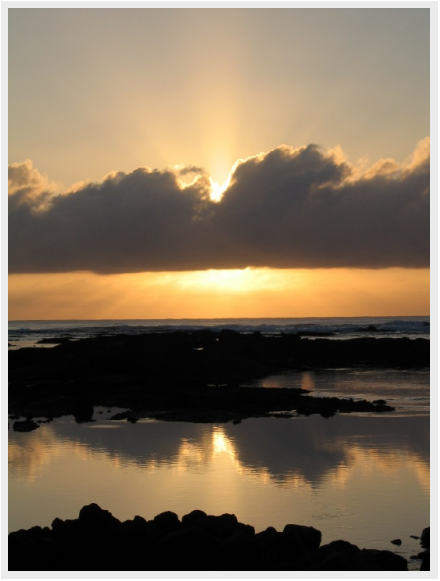

Figure 38. Colors spreading across the sky as would be seen in part of the spectrum. Photo by the author.

Color as Reflected Light

When light strikes an object, some of the light is reflected back, and some of it is absorbed by the object. If an object reflects primarily the blue frequency of light, it will appear blue. If it reflects all colors, it will appear white, and if it reflects no colors, it will appear black. This is why black objects get hotter in the sun, they are absorbing all of the light that hits it.

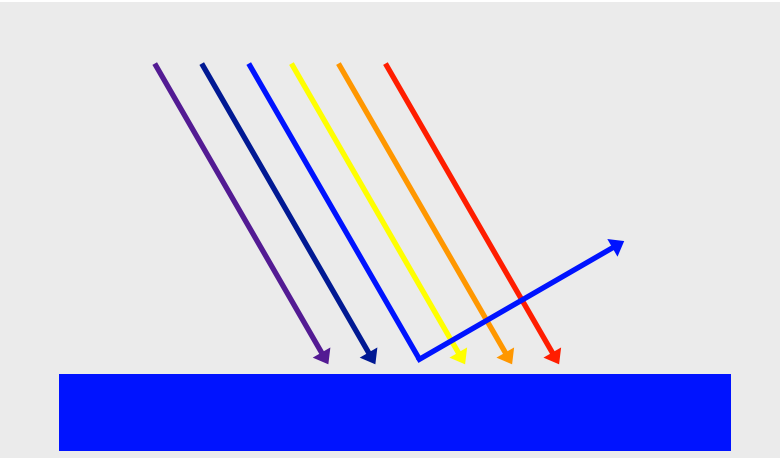

Figure 39. Light striking a blue object. Blue light waves are absorbed, all others are reflected.

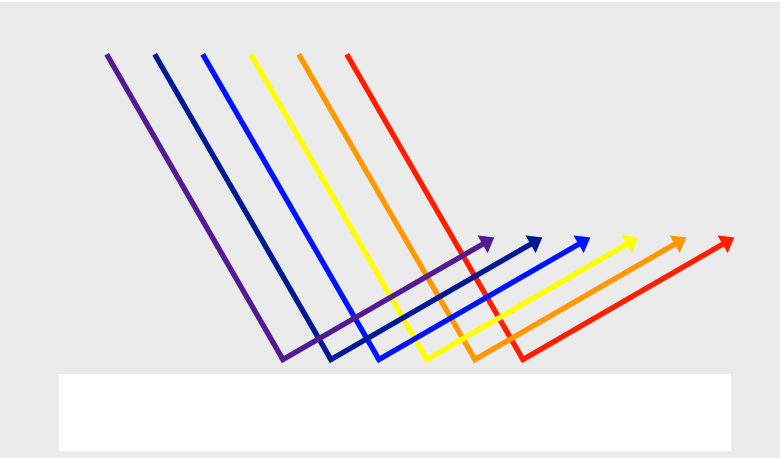

Figure 40. Light striking a white object, all light waves are reflected.

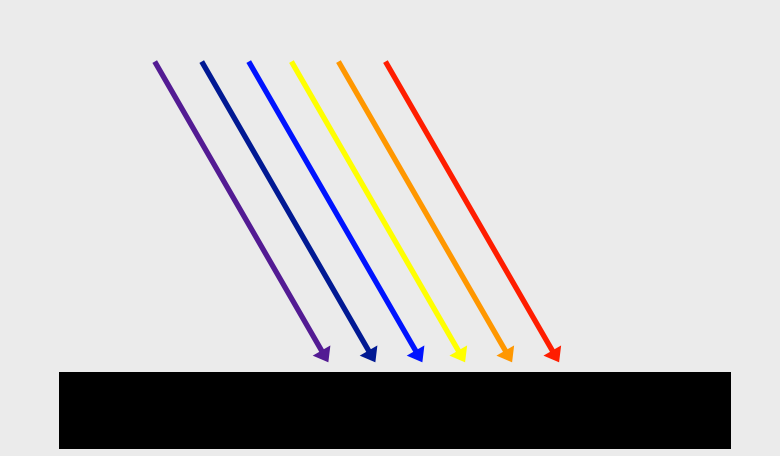

Figure 41. Light striking a black object, all light waves are absorbed.

The previous diagrams describe what happens when full spectrum light shines on to an object. If another type of light shines onto the object, it will react differently. For example, if we are in a photography darkroom using only a red light to see, a blue object might appear black or grey.[6]

Figure 42. A blue object under red light.

This means that in different lighting situations, objects appear differently. Under pure daylight, my coffee cup will look different than it does under fluorescent lighting inside a room, or under a streetlight at night. When we look at an object, especially a familiar object, we can often recognize its color, even when the surrounding light changes. In other words, even though the object might actually appear as a different color, we see it as being the same color. This process, called color con-

6. Kuhn, Karl F., And Frank Noschese. Basic Physics: a Self-Teaching Guide. Jossey-Bass, a Wiley Brand, 2020.

stancy, allows us to see colors as relatively constant under different lighting conditions.[7] This is somewhat counterintuitive, as we tend to think that we see the colors of objects as they are. It turns out to not quite be the case, as it is not a simple task to see colors in terms of the light waves actually being reflected at that moment. Instead, we often see them as we think they should be.

Color Constancy

We spent quite a bit of time earlier in the book comparing and distinguishing colors. Color constancy adds an extra layer of difficulty to our earlier work in color comparison. In addition to seeing color variations clearly, we need to be able to adapt to different lighting conditions. Understanding this helps to augment our sensitivity to colors and how we perceive them.

There are two main aspects to how a color appears:

1. The object's color: the light waves that it reflects

2. The light being shown on the object: sunlight, candlelight, incandescent light bulb, colored light, etc.

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7. Hurlbert, A. Colour vision: Is colour constancy real? Current Biology, 9 (1999), pp. R558-R561, 10.1016/S0960-9822(99)80354-6

In many cases, we seem to be able to mitigate the effect of the second aspect, the light being shown on the object.

As we have seen throughout the first part of this book, how we see is a complicated process. The eye plays an important role, but so does the brain. The mind can make decisions about what it thinks a color should be, and that is how we will see it. We want to open our minds to the possibilities of color, and allow our color understanding to match more closely with the stimulus being perceived.

Waterloo Bridge

Monet painted the Waterloo Bridge over 40 times. Each painting shows the bridge in different lighting conditions. The difficulty of this task might not be immediately obvious. While it might seem like a repetitive task; painting the same scene over and over again, each of the paintings presents a very different visual conception of the bridge. Part of the challenge lies in seeing a scene in a fresh way each time, disassociating the actual condition from how we think it should look. We might say that we want to see it as if for the first time, but that is not entirely true. In addition to seeing it as though for the first time, we also want to bring our experience to bear on the process. Our experience can help guide us to see even better, giving us knowledge of where to look closely and how to perceive the changes in color and atmospheric effects. We want to combine the abilities of seeing freshly, as if for the first

time, with the insight gained from experience of seeing deeply; thus learning to see more clearly and fully.

Regardless of the time of day, or the season of the year, the lighting, and thus the colors of objects, are always shifting in some way or another. Like waves in the water, color is a process. At times the movements are small, and other times they are larger and more noticeable. It is our task to become sensitive to these changes. Some artists, such as Monet, strive to capture the essence of these changes, whereas other artists, such as Seurat may look to represent a timeless, unchanging feel. Regardless of our goal, it is important for us to be aware of the fluctuating nature of light and color so we can choose how to approach it.

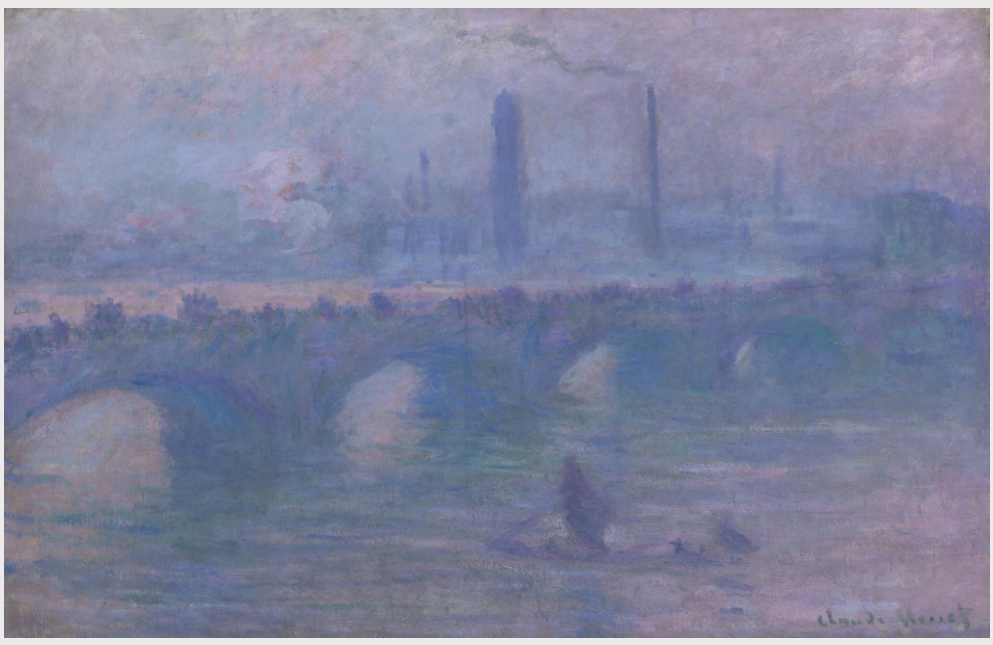

Figure 43. Claude Monet, Waterloo Bridge, Morning Fog, 1901. Courtesy of the Philadelphia Museum of Art.

Figure 44. Claude Monet, Waterloo Bridge, Gray Weather, 1900, Courtesy of the Art Institute of Chicago.

Figure 45. Claude Monet, Waterloo Bridge, London, at Sunset, 1904, Courtesy of the National Gallery of Art.

PART II. Color Movement

Good music theory should describe how the music sounds. And music theory has only two rules: (1) does it sound good? and (2) does it sound good? All else is a discussion of principles: "if I do this, it sounds good; if I do that, it doesn't." I have tried to keep all discussions relative to the aural experience.

Bert Ligon,
Jazz Theory Resources I & II, pg vii

5. Movement Direction

We have been comparing colors, and seeing how colors shift. Now we can observe the direction of color movement that we see in nature, and that we can create in our own work. We do this to help cultivate our feeling for and connection to color changes, which will be essential for the work soon to come in this book.

Observation and Application

Let's look more closely at the dandelion we saw in Chapter 1. Notice how the flower starts out as a reddish yellow in the center, and then moves through yellow to a very greenish yellow at the tips of the petals.

Figure 46.
Colors of the dandelion.

In the seemingly simple dandelion, the colors move through a large range of yellows. Although there is an overall direction of movement, there is also an interspersing of colors. The center, for example, is not only reddish yellow, there are a variety of yellows there, which add contrast and interest to the space.

Flattened Color

If we did not have this variety of colors in the photograph, it would appear much flatter. In Figure 47 I have altered the photo to remove much of the variety of colors from the dandelion. Having one large area of color focuses us on that color. We are inundated with it, we live in that feeling, like being submerged in water. Having a larger variety of colors allows for more variety of interests, more voices speaking to us. Artists such as Henri Matisse would often employ large flat areas of color to beautiful effect. We can employ one or a combination of both of these color strategies in our work.

Figure 47. Comparison of two dandelions.
Left: full colors
Right: flattened color space

Creating Color Direction

Having looked at examples of color movement as it occurs in the natural world, we can consider how we might use this in our own work. In the photograph of the dandelion, we discussed the direction of color movement from the center of the flower towards the petals, moving from reddish yellow to greenish yellow. Shifting a color to move in one direction or another can be an effective way to add interest to our own images.

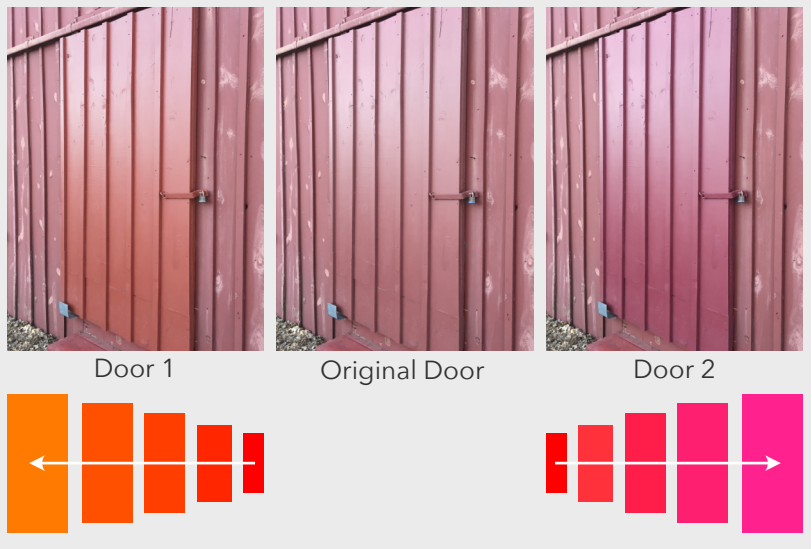

Figure 48. Three versions of the barn door.
Door 1: yellowish red
Original Door: original color
Door 2: blueish red

In Figure 48 there are three different versions of a photograph of a barn and its door. In the original photo in the center, the red of the barn wall and door are the same color, a blueish red. I modified the color of the door to create movement in different directions. In the version on the left, the door has been changed to lean towards orange. In the version on the right, the red of the door was made even bluer than the original.

In either case, the door now stands out from the wall to create an interesting contrast.

The diagrams below the photographs indicate how the altered reds move away from the original color. The original red of the barn is already somewhat blueish in shade and a fairly greyish red as well. We can play with the color of the barn door to create a contrast that fits with the wall and yet brings out the color movement at the same time.

There is an important point to be made here: to say that Door 1 is moving towards yellow or that Door 2 is moving towards blue is not independently true. They are moving in those directions in relation to the wall. The color movement that we are talking about is all relative.

6. How Light Moves

Having observed color movements has given us some insights into how colors manifest themselves and how we can work with them. In this chapter we will delve into some of the science behind light and color, which is an ongoing area of scientific study. As far as this may seem from the artwork that we do, it will help us gain a deeper understanding of the materials called light and color that we work with.

Wave Movement

Newton's theory of light that we discussed in Chapter 4 did not explain all aspects of light, such as when two beams of light interfere with each other, and the bending of light when it goes around corners. Thus, there began a debate between Newton's corpuscles theory, and the theory of light as a wave, which was proposed by Christiaan Huygens in 1678.

In describing light as a wave, Huygen's theory allows us to see the very dynamic nature of light. Examining how waves move as shown in Figures 49 and 50 will help to illustrate the concept. Looking at a wave from above, the crest of the wave appears as a straight line. We often think of that line as being the frontal movement of the wave, called the wavefront. However, there is more movement than that, as Huygen tells us that every point along the wave is moving forward in a semicircle all the time.[8] This constant forward motion explains why

waves such as light and water will bend around surfaces, since there is a connected thrust forward from their original position to the new wavefront being created. As this movement is a connected wave instead of independent particles, it can bend as it moves. Thus, the light that we see, and which allows us to see color, is very dynamic in its movement; it is a process of constant change and emanation.

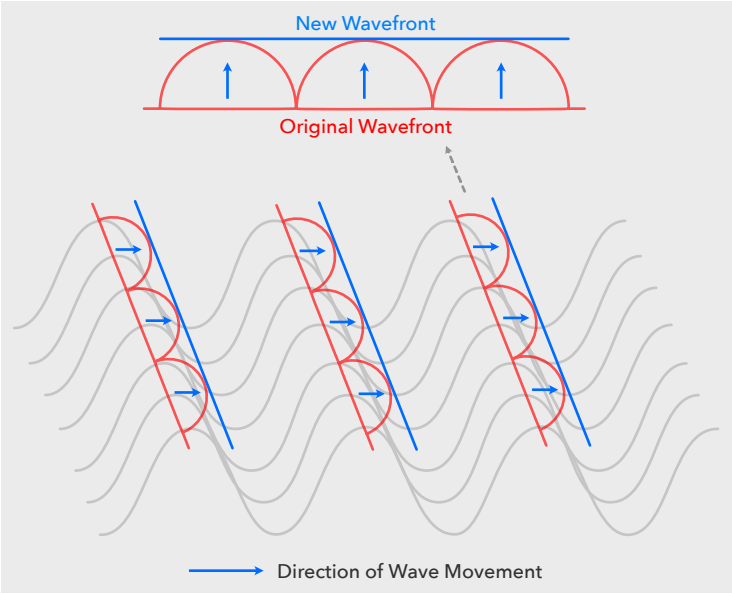

Figure 49.
Wavefront movement.

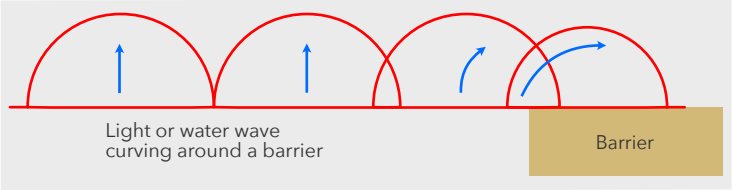

Figure 50. Wave curving around a barrier.

8. Kuhn, Karl F., and Frank Noschese. Basic Physics: a Self-Teaching Guide. Jossey-Bass, a Wiley Brand, 2020.

In a wave, the medium, such as water or air, is not moved from one end to the other, rather, the force of the disturbance is transferred from one particle to the next. The particles are displaced by the energy that is passing through them. This is easiest to see with water. As shown in Figure 51, when a wave passes through water, individual water particles are temporarily displaced slightly, but they do not move end to end. We can imagine a rubber duck floating on the water. It will move up and down with the waves, but it will stay more or less in place unless displaced by other factors such as wind.

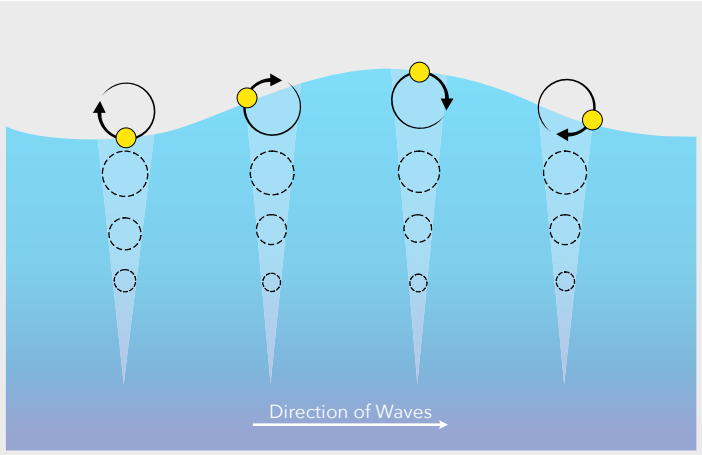

Figure 51. Wave disturbance transferring through water particles.

Light and Energy

Light, viewed as waves, presents the idea of different wavelengths for different colors. The greater the energy, the higher the frequency and the shorter the wavelength. A higher frequency means that it bounces up and down in a shorter distance. This can be seen clearly in Figure 52. Adding energy increases the frequency of the wave and makes the wave shorter, removing energy decreases the frequency of the wave and makes the wave longer. Red has a long wavelength and low frequency, which means that it moves slower, while blue and violet have shorter wavelengths, and higher frequencies which means that they move faster and have more energy. From this information, we can construct a continuous spectrum of colors from red to violet.

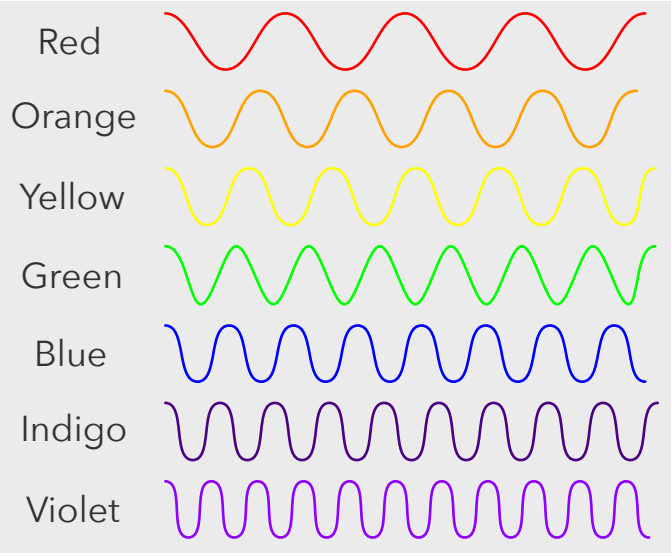

Figure 52.
Light color waves.

At the beach, some waves come in very slowly, at a relaxed pace with time in between each wave. This would be akin to the red and yellow light waves. Other waves might come in to the shore very quickly, and in rapid succession, similar to the blue and violet light waves.

There are light waves longer than red and other waves shorter than violet, all of which we are unable to see.

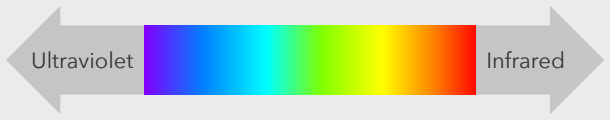

Figure 53. Visible and non-visible color spectrum.

At this point in scientific time, in the era of quantum mechanics, theories seem to point to the idea that light travels as giant collections of photons. While this bears similarity to Newton's corpuscle theory, there is a difference, as each photon is a tiny object that acts as a wave. Thus, while we have distinct particles, we also have wave like properties. Each photon, and the collection as a whole, act like a wave. Importantly, photons carry energy, and different levels of energy relate to different colors that we can see.

To understand the relation of energy to color, let's look at the colors of flames, and the heat that relates to it. Kelvin is the unit used to measure temperature, so we will refer to it here. Red is the coolest temperature of flame that we can see, starting at about 1,000 Kelvin. As the flame gets hotter, it goes to orange, and then

yellow. Eventually, the flame reaches blue and then violet at its hottest degree.

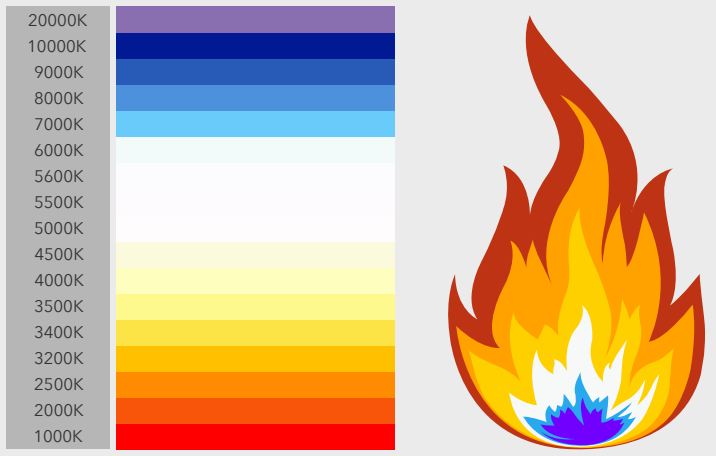

Figure 54. Color temperature levels. Adapted from: http://www.lifud.com/news/101.html

The important lesson to focus on is that the energy level, shown as heat, changes as we go up and down the spectrum. As we move to blue, there is more heat and energy and as we move towards red, there is less.

Figure 55. Energy level rises as we move towards blue and lowers as we approach red.

Movement Along the Spectrum

For a yellow colored light to change to red, it would move along the spectrum in order; starting from yellow, moving through orange, and then arriving at red, similar to what we saw earlier with rainbows and halos. This is because as the yellow light wave begins to lose energy, its frequency will decrease and its wavelength will lengthen. As a lightwave changes its energy to create a longer or shorter wavelength, it will start from its current energy state, and move up or down the spectrum from there. As the frequency of a light wave increases or decreases, the light in the spectrum will move in gradients towards or away from other colors. Yellow moving towards red becomes progressively more orange before gradually moving past orange on the way to becoming fully red. Similarly, yellow moving towards blue becomes progressively more green before gradually moving past green on the way to becoming fully blue.

We can see these two changes in yellow as they occur incrementally through the spectrum in Figure 56.

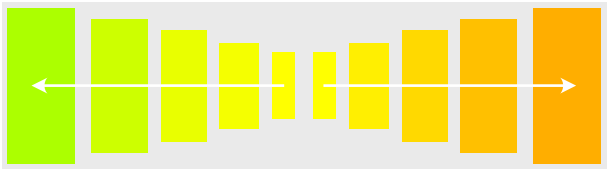

Figure 56.

Temperature and Energy

What is ironic about this understanding of the energy of colors and light waves is that it is more or less the opposite of how we understand temperature in relation

to color. In art, when we talk about temperature and color, we generally think of red, yellow, and orange as warm colors, while we think of blue as cool. There are some exceptions to this, for example, there is great debate about whether reddish blue or greenish blue is warmer. In addition, in Europe during the medieval and Renaissance periods, blue was considered to be a warm color.[9]

Colors and the Eye

Generally, it is considered that warm colors advance towards us and cool recede away from us. While the relationship between temperature and color can be relative and hard to pin down, there is some scientific evidence for the effects of colors on our eyes.

Light waves are bent as they pass through the cornea and lens of the eye, and the way light bends affects how we see it. The location where light focuses in relation to the retina determines how close to us that light wave appears. Light waves that focus near, or even behind the retina appear very close, whereas light waves that focus further in front of the retina will appear further away.[10]

1. Longer wavelength light, such as red light, appears closer, as it focuses behind the retina.

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9. Michel Pastoureau (2001) Blue: the history of a color, Princeton, NJ : Princeton University Press, p.181
10. Mason, Peggy. Medical Neurobiology. Oxford University Press, 2017. p 1081

2. Shorter wavelength light, such as blue light, appears further away, as it focuses in front of the retina.

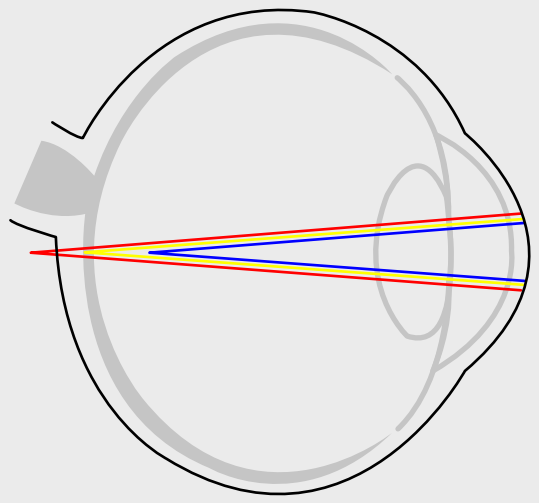

Figure 57. Light waves are bent as the pass through the eye, affecting how we see colors. Adapted from Peggy Mason, PhD (2017) Medical Neurobiology, Oxford University Press, p 1081

There are even more possible reasons for seeing red as closer and blue as further away. For one thing, we have more receptors in our eye for red than we do for green, and the least number of receptors for blue.[11] Therefore, we are very aware and attentive to the presence of red. Additionally, in atmospheric perspective, it is most common for objects to appear more blue as they recede into the distance. Thus, we are perhaps more accustomed to thinking of blue as being in the distance.

11. Valberg, Arne. Light, Vision, Color. Wiley, 2005. p. 104

7. Color Movements

Now that we have seen how colors work, and we understand some of the science behind it, we can delve deeper into color movements and the relationships they create. This is really the crux of what I want to teach in this book. If I only have the opportunity to teach you one thing about colors, it would be the relationships presented in this chapter. The subtitle of this book is: Colors move; harmony and tension ensues. The harmony and tension that arises does so due to the movements that we will study in this chapter. As we have discussed, when we talk about colors, we are focusing on the hues. Although all aspects of color play a role, the movements we define in this chapter are defined in terms of hue relationships. When talking about color hues, it can be natural to think about primary and secondary colors. However, color movements are not dependent on primary and secondary colors. Color movements arise from spatial relationships between colors.

We can liken these color movements to the relationships between musical notes. If we play one note on the piano, we get from it a limited amount of information. Perhaps it is a high or low note. If we have perfect pitch, we might even know the exact note, but we are still lacking context. Once we add a second note, we are starting to say something; there is a conversation and a relationship.

In this chapter we will focus on the relationship of two colors, as this is the foundation upon which more complex compositions are built. As with musical notes, after choosing one color, the next color we choose begins a conversation with the first, and all subsequent colors continue that conversation. The approach to thinking about color proposed here is through their movements in relation to each other. In the communication between colors, how they talk amongst themselves is what drives the conversation. Color speaks in a similar way to music: combining and separating, creating harmony and discord. We will see examples of this and learn how to use it in our own work.

When studying these color relationships, the most important thing is our color sense. As we become attuned to these relationships, our overall sense of color will grow, and we will be able to see how colors work in ways that are often only seen in the great masters. The principles laid out here are not meant to supplant your intuition, on the contrary, the goal is to educate your intuition, and allow it to be more knowledgable, and thus, in the end, more free.

Two Colors Moving

Given the movement of colors on the spectrum, there are only a limited number of possible movement combinations. Let's start by investigating the movement directions of one color and then we will and the second to see the possibilities. In Figure 58 we can see two different yellows, each compared against a more central

yellow background. One moves towards orange, and the other towards green.

Figure 58. Two yellows compared against a central yellow. One moving towards green, the other moving towards red.

In Figure 59, the outside yellow square is contrasted with the greenish yellow inner square. The greenish yellow is moving towards the blue end of the spectrum, away from the outer yellow.

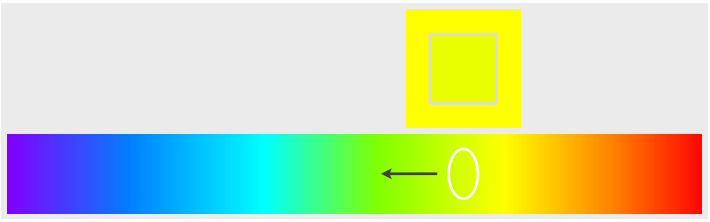

Figure 59. Greenish yellow moving towards the blue end of the spectrum.

In Figure 60, we see the situation reversed, yellow is now contrasted with reddish yellow. The reddish yellow is moving towards the red end of the spectrum, away from the outer yellow, and in the opposite direction of the greenish yellow seen in Figure 59.

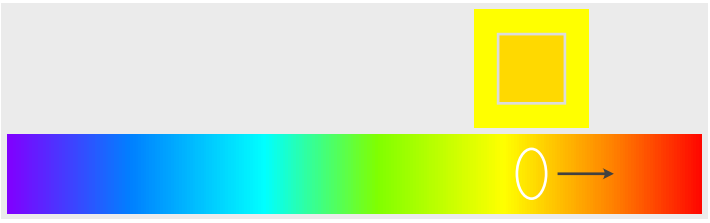

Figure 60. Reddish yellow moving towards the red end of the spectrum.

From the examples above one important conclusion we can draw is that a color can only move in one of two directions along the straight line of the color spectrum, left or right. If you prefer, you can state it differently by saying that the wave in the visible spectrum can gain or lose energy, thus shifting up or down, towards red or blue. While that can feel a bit cumbersome, it can be useful to clarify our point. Although I find it insightful to see how science informs these color shifts, while actually working with color, I don't need that extra information; left or right, that is all we need to know.

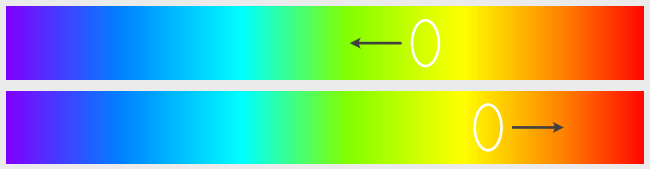

Figure 61. Colors can only move in one of two directions along the straight line of the spectrum, left or right.

Movement Combinations

Given these two directions, there are two possible movement combinations for two colors interacting and moving simultaneously.

1. One possibility is that the two colors move in opposite directions, one to the right and the other to the left (Figure 62).

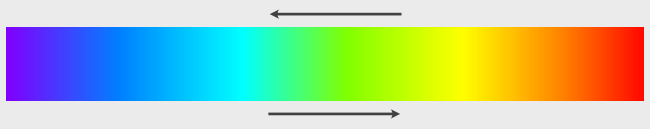

Figure 62. Colors moving in opposite directions on the spectrum.

2. The second possibility is that the two colors move in the same direction, whether to the left or the right (Figure 63).

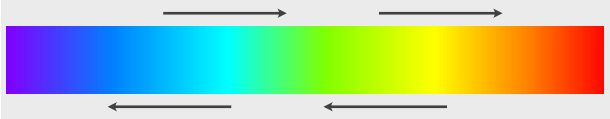

Figure 63. Colors moving in the same direction on the spectrum.

These are the possibilities: same direction or opposite directions.

Colors Moving in Opposite Directions

Let's start by looking at colors moving in opposite directions. In this case, the starting relationship of the two colors will greatly affect how they interact. For the moment we won't worry about the exact color, or its exact location on the spectrum, instead we will focus on the relative starting relationship and movements of the two colors.

Separating: moving from the center and outwards

Let's look at two colors starting from a center point and moving in opposite directions away from each other. You can think of this as starting from one color, or two colors very near to each other (Figure 64).

Figure 64. Separating: two colors starting from a center point and moving in opposite directions away from each other

We will call this color movement: Separating

We can consider this from the point of view of mixing paint as shown in Figure 65. Let's take some yellow paint and make two small piles with it. To one pile add a touch of green paint, and to the other pile add a touch of red paint. After mixing the colors, each of the two paint mixtures will look quite different, even though we started from the same place.

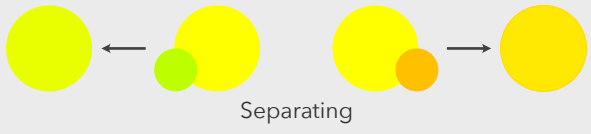

Figure 65. Mixing paints to create a Separating relationship. Orange and green are added to portions of the same yellow to create Separating colors.

Separating overall color effect: creates tension, disperses colors

Separating creates interest, tension, and contrast. However, it also dissipates the focus. Because we now have one color in one area of the spectrum, while the other color is in a different area of the spectrum. The overall colors are now more spread out across the entirety of the spectrum.

Joining: moving from the outside towards the center

Now let's look at two colors that start apart from each other and move in opposite directions towards each other (Figure 66).

Figure 66. Two colors start apart and move in opposite directions towards each other.

We will call this color movement: Joining

Returning to the example of paint mixture, let's put red and yellow paint on our palette, and add a little of each color into the other. Mix the red paint into the yellow, and the yellow into the red. The colors will start to look similar as they start to move towards each other (Figure 67).

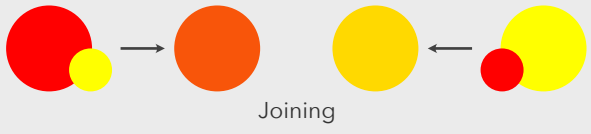

Figure 67. Mixing paints to create a Joining relationship. Red and yellow are mixed together to move towards each other.

Joining overall color effect: unifies and harmonizes, concentrates colors

Joining brings color together, creating unity and harmony. It also homogenizes the colors. Thus, we can view this movement as unifying. Because the colors are more focused in one area of the spectrum, the colors can feel strong. Perhaps this has something to do with lightwaves vibrating at similar rates. At the same time, there is less contrast among the colors, which can cause there to be less interest or diversity.

Colors Moving in the Same Direction

When two colors move in the same direction, the relative relationship of their movement does not change, whether they move to the left or the right. In each case, one color is moving towards where the other color was, but that second color is moving further on down the road, away from the first color. To achieve the effect of two separate colors moving in the same direction, there needs to be enough distance between the two hues, otherwise they may simply appear as the same or similar colors.

Chasing: maintaining color distance

Two colors that start at a distance from each other, and maintain that distance as they move in the same direction, create a connected movement. The first color may be seen as leading the second, or the second color may appear to be following the first. In some instances we can even feel that they are moving together in concert, shifting across the color spectrum.

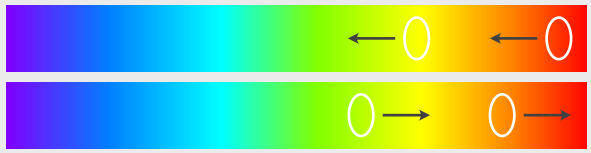

Figure 68. Colors moving in the same direction on the spectrum.

We will call this
color movement: Chasing

Mixing paints as shown in Figure 69, we will see something quite different. We need to add a third paint color to our palette. Squeeze out 3 small piles of color onto the palette: red, yellow, and

green. Mix a bit of the yellow into the red, that will move it towards orange and yellow. Now, add green into the yellow, that will move the yellow towards green, away from the yellow that the red was originally moving towards.

Chasing overall color effect: Shifts Context

Chasing can result in a shift of the color context, the general area in the color spectrum that we are working with. When I shift from a yellowish red to a greenish yellow, I have made a large change, from one area of the color spectrum to another. Using Chasing in practice tends to be quite complicated. Chasing creates tension in most cases, though in others it may feel like a smooth transition. In the next section, Color Movement by Example, we will see how Peter Paul Rubens used Chasing not only to make a color stand out, but also to create movement throughout the whole painting.

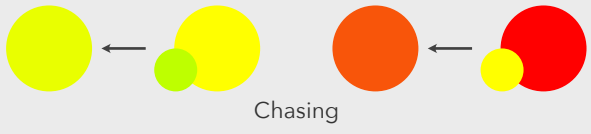

Figure 69. Mixing paint to create a Chasing relationship. Yellow is added to red, moving it towards yellow; green is added to yellow, moving it away from yellow.

Detailed Study

Now we will look at each of these three movements in depth. First we will analyze this by colors alone, and then in the following chapter we will look at examples of artwork that make use of these movements. Although we will focus on basic colors such as red, yellow, and blue, these movements can happen around any color. As we have discussed before, we are not concerned with question of primary and secondary colors. Changes in value and saturation can affect how clearly we see the movements, but the movements remain. Others aspects of color influenced by value, saturation, and temperature influence the overall effect. We will consider these aspects of color movement in Volume 2.

Separating

We described Separating as starting from one color, or from two colors close to each other, and moving out from there in opposite directions.

In Figure 70 we can see the colors moving out in opposite directions from yellow. In Figure 71 we can see this both on the spectrum, and around the color wheel.

Figure 70. Starting from yellow, Separating towards orange and green.

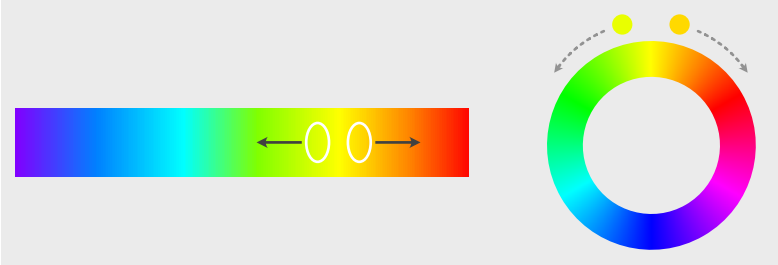

Figure 71. Separating seen on the spectrum and color wheel.

The two yellows in Figure 72 make for a clear comparison, which helps us to discern the direction of movement. Other times it can be more difficult to distinguish, such as when there is a variance in saturation or value.

Figure 72. Comparing two Separating yellows.

We can create a slightly more contextual situation by placing the two yellows together against a central yellow background. The background yellow was chosen as it lies in between the two Separating yellows. As in this case, we will often see colors that although not directly adjacent, can still be seen as Separating.

Figure 73. Comparing two Separating yellows against a yellow background.

Adding green and orange at the ends in Figure 74 adds a bit more to the context and helps us to see even more clearly the directions in which the colors are moving. This is important, as in our art work we can have very complex situations with many different colors.

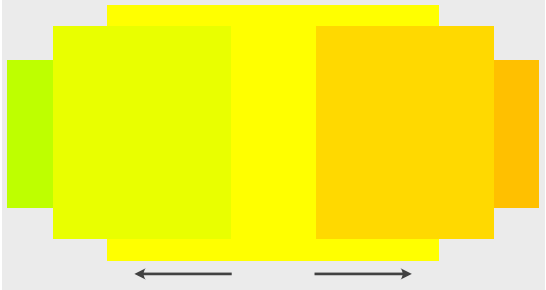

Figure 74. Orange and green added to the ends to give context for where the Separating yellows are moving.

Figure 75 shows how these color movements might develop if they were to proceed incrementally. The Separating colors might be at different steps along the incremental process.

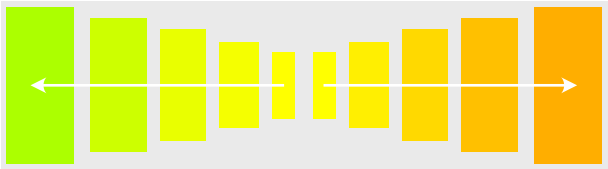

Figure 75. Separating colors developing incrementally.

Joining

Joining describes two colors starting apart and moving in opposite directions towards each other.

Let's start with yellowish red and reddish yellow as shown in Figure 76. If we let the colors continue in their movement, red moving towards yellow eventually becomes orange, and yellow moving towards red will also become orange as well; thus they are both moving towards the same color.

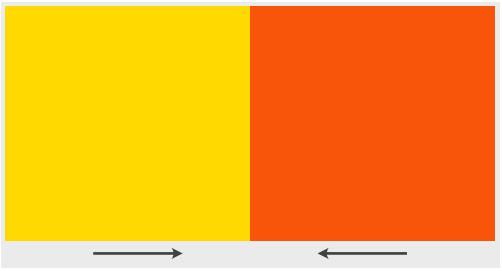

Figure 76. Joining reddish yellow and yellowish red.

Figure 77. Joining shown on the color spectrum.

In Figure 78 we can see these two colors coming together against an orange background, which functions as their central meeting point.

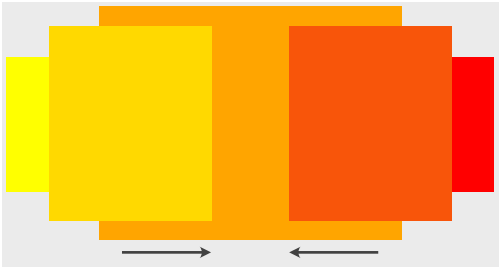

Figure 78. Joining shown against a central background. Both colors are moving towards orange.

In Figure 79 we can see how this color movement develops incrementally.

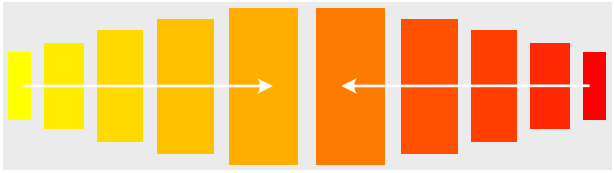

Figure 79. Joining shown incrementally. Both colors moving step by step towards each other. You might encounter the colors at different steps along the process.

Joining From a Distance

Colors can move towards each other from closer or further away. The strength of the joining becomes weaker as the distance increases. This means that colors closer together, with more in common, such as the previous example of yellowish red and reddish yellow will hold together more closely, and create a more concentrated area of color. Colors that begin further apart, such as a reddish blue and a reddish yellow shown in Figure 80, which both move towards red, will have a weaker bond. The feeling of joining together still exists, but the effect on the viewer is not quite as strong.

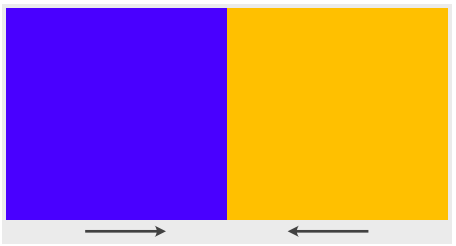

Figure 80. Joining from far away. The bond is not as strong as two colors Joining close to each other.

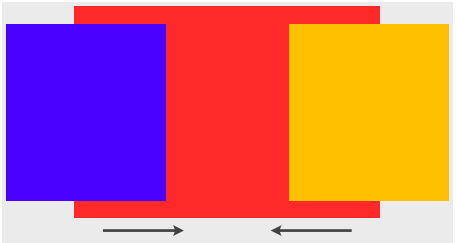

Figure 81. Joining from far away shown against a central background. Both colors are eventually moving towards red.

Chasing

Chasing occurs when two colors are moving in the same direction. It is an interesting relationship: one color is moving to where the other color was, but that color is no longer there. Regardless of which direction they are moving in, the relationship remains the same.

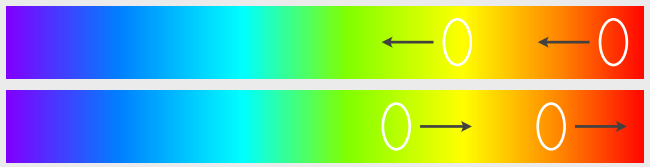

Figure 82. Chasing shown on the color spectrum.

Looking at this movement in the diagrams in Figure 82 it may seem fairly clear what is happening. However, when we see the actual color combinations in the wild, it can be a bit more difficult. In the two examples of Joining and Separating the distance between the colors change as a result of the movement. With Chasing, we have two colors that begin separated from each other, and remain apart.

Looking at these two colors next to each other in Figure 83, it can be a little difficult to see what's happening. Red is moving towards yellow, but yellow is moving on to green. It is all there, but it can be hard to decipher.

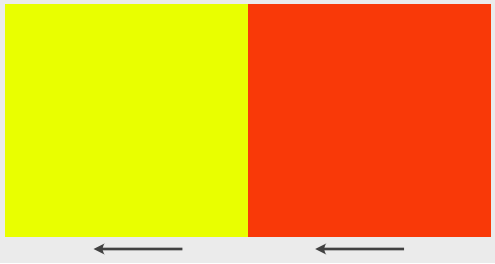

Figure 83. Chasing: red moving towards yellow, yellow moving towards green.

We can see the yellowish red incrementally moving towards orange, while the greenish yellow incrementally moves away from yellow in the direction of green.

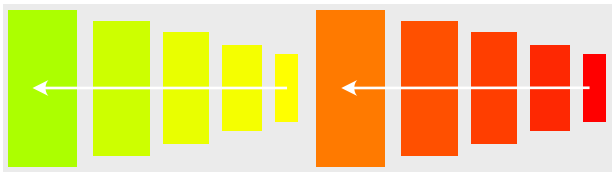

Figure 84. An incremental look at Chasing can help us to see how the colors are moving step by step.

Looking at this over a wider stretch of the spectrum can help. We can see where red is heading towards, and where the yellow is moving.

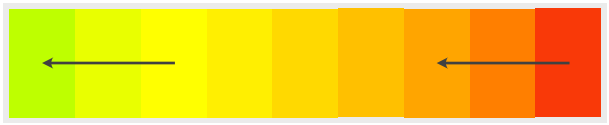

Figure 85. Chasing seen over the larger context of the color spectrum.

Let's break down the movements into parts to get a clearer understanding. Although Chasing is its own movement, we can understand it through the combination of Joining and Separating.

At this point in these examples, we have purposely focused on three colors, in order to keep our work from getting unnecessarily complicated. We have: yellowish red, reddish yellow, and greenish yellow.

1. Joining: yellowish red and reddish yellow

Figure 86. Joining: yellow moves towards red, and red moves towards yellow.

2. Separating: reddish yellow and greenish yellow

Figure 87. Separating: yellow moves towards red, and yellow moves towards green.

3. Chasing: yellowish red and greenish yellow

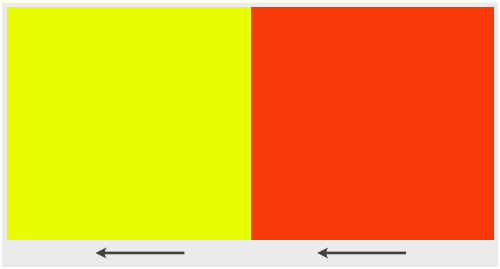

Figure 88. Chasing: red moving towards yellow, and yellow moving towards green.

In the examples above, Joining and Separating both shared one yellow, the reddish yellow. In Figure 89 we see again both the Joining and Separating movements that we looked at before, with the shared reddish yellow shown on the inside of the diagram.

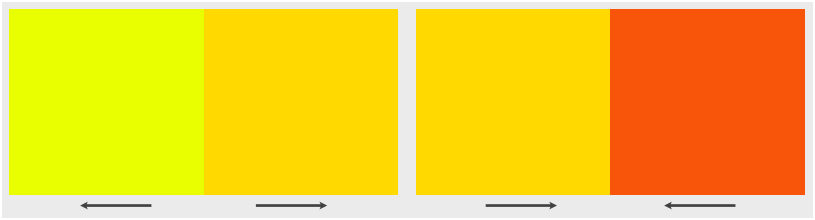

Figure 89. Joining and Separating contrasted next to each other. The same reddish yellow, shown in the center, is used for each pair.

Viewing all the three colors together, with each shown only once, we now have the reddish yellow shown in the middle. On the right it is Joining with the yellowish red, on the left it is Separating from the greenish yellow.

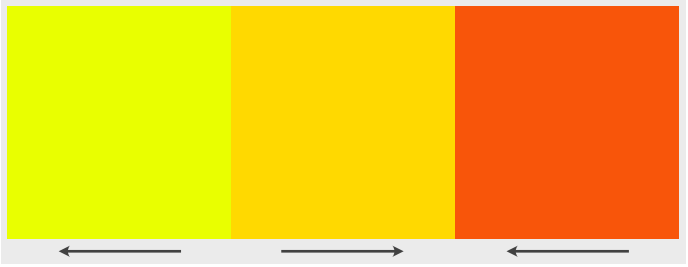

Figure 90. A simplified view of Figure 90, the reddish yellow is shown only once.

If we omit the middle, shared, reddish yellow, we are left with two colors, the yellowish red from the Joining, and the greenish yellow from the Separating. The result is a color moving to join together, only to find that its intended partner is Separating instead of wanting to join with it. This is Chasing.

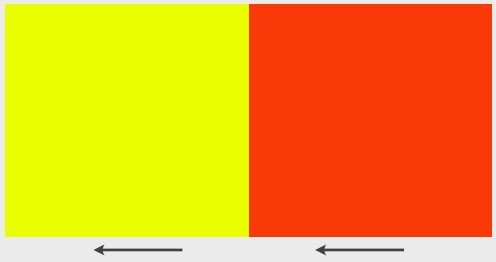

Figure 91. The reddish yellow has been removed, thus giving us the original Chasing relationship.

Tension and Resolution

Chasing is interesting as it can be used for creating tension as well as resolution.

In chasing a color, there is a certain amount of tension, as what I was looking for is no longer there.

However, it can also be used to lead one area of color into another moving from what might potentially have been a discordant relationship to a harmonious one.

Summary

When working with color relationships and movements, the most important thing is your color sense. If you don't feel the movement and interaction of the colors, then none of the theory matters. For me, it took quite some time for all of this to feel intuitive in the process of my work. I actually placed a chart showing the different movements on a wall in my studio for a while until it started to feel second nature to me. When I ran into a difficult question in my work, I would check the chart to see how I should handle it. However, I would not simply follow the chart blindly, as the actual artwork is usually quite a bit more complex than any examples we can create in a book. For example, sometimes a section far away is actually influencing the place in question, even though we may not realize it at first, thus creating a different relationship than we had first thought. Thus the chart becomes a suggestion of possibilities and ideas to consider, rather than rigid predetermined rules that cannot be altered.

It can be helpful to start with the simple examples in this book, and create small test pieces to get a feeling for these relationships. Once that begins to make sense, you can start using different colors to explore those same relationships. As time goes by, you will hopefully find it increasingly more natural to apply these relationships in your full artwork. It is important to listen as well as to educate and cultivate our intuition. Listen carefully to your work, study great artwork, spend time in nature, develop your ability to feel what is happening and what needs to be done in your work.

8. Color Movement Examples

Having investigated the three color movements from a more theoretical point of view, it will be helpful to see them in practical application. You can find many instances of these movements in all kinds of art. In this chapter, we will focus on two examples of each color movement that show the relationships clearly. As we go through this chapter recall the overall effects discussed in Chapter 7 and make note of their occurrences in the examples contained herein.

Separating

Example 1: 15th Century Iranian Ceramic Star

Let's start with the first movement that we discussed: Separating. For this example, we are going to focus on two blues, one moving towards green, and the other towards red.

Figure 92 shows a beautiful twelve pointed ceramic star from 15th Century Iran. As you can see, there are two clearly different blues in use. Blue 1 is a reddish blue, while Blue 2 is greenish. This creates a Separating movement where each color starts from blue but moves out in separate directions. The contrasting movement of these two blues creates a vivid, dynamic environment.

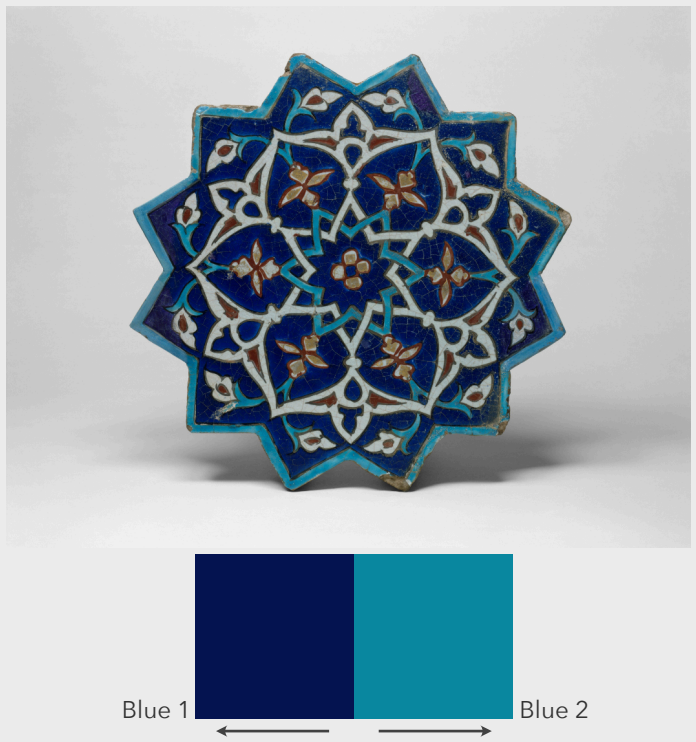

Figure 92. Twelve-Pointed Star-Shaped Tile, 1442–43 northeastern Iran, courtesy of Metropolitan Museum of Art.

The two blues move in opposite directions across the spectrum.

Figure 93. Separating: two blues on the color spectrum, moving in opposite direction.

We can see the two blues from the ceramic tile contrasted over an intermediate blue background, which helps to illustrate their movement in opposite directions. The two Separating blues from the tile are somewhat darker in value, and are not centered around what might be considered primary blue, but they create a Separating movement nonetheless.

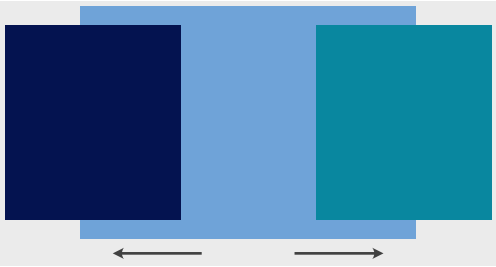

Figure 94. The two blues from the ceramic tile. The central blue used as a background is not a primary blue. Color movements are not dependent on primary colors.

In Figure 95, purple and green are added on to opposite ends of the image to give a feeling for where the separating blues are heading.

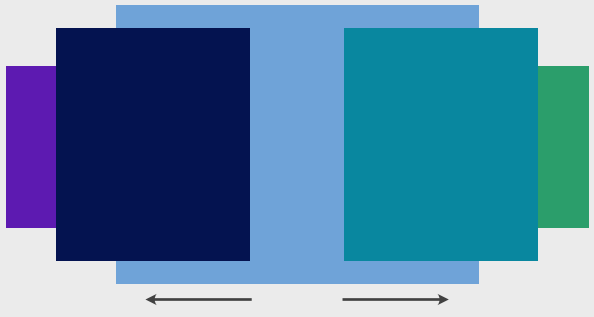

Figure 95. Purple and green are added on to opposite ends of the image to give a feel- ing for where the separating blues are heading.

If the twelve pointed star had been made using different types of blue, we would have a much different visual sensation. To study this possibility I have changed Blue 2 into Blue 3 in Figure 96. Blue 3 is slightly different than Blue 1, but close enough to appear as approximately the same hue. I kept the value for Blue 3 the same as it was with the blue-green of Blue 2, so that the value contrast we see in the picture is the same. We can see how much less movement there is in the piece when we don't have the two Separating blues. The modified version is still very beautiful, if more quiet and subdued. It functions through value contrast alone, without the color movement of Separating seen in the

original version. When creating our own work, understanding the results of choices made by others can help to guide our decisions.

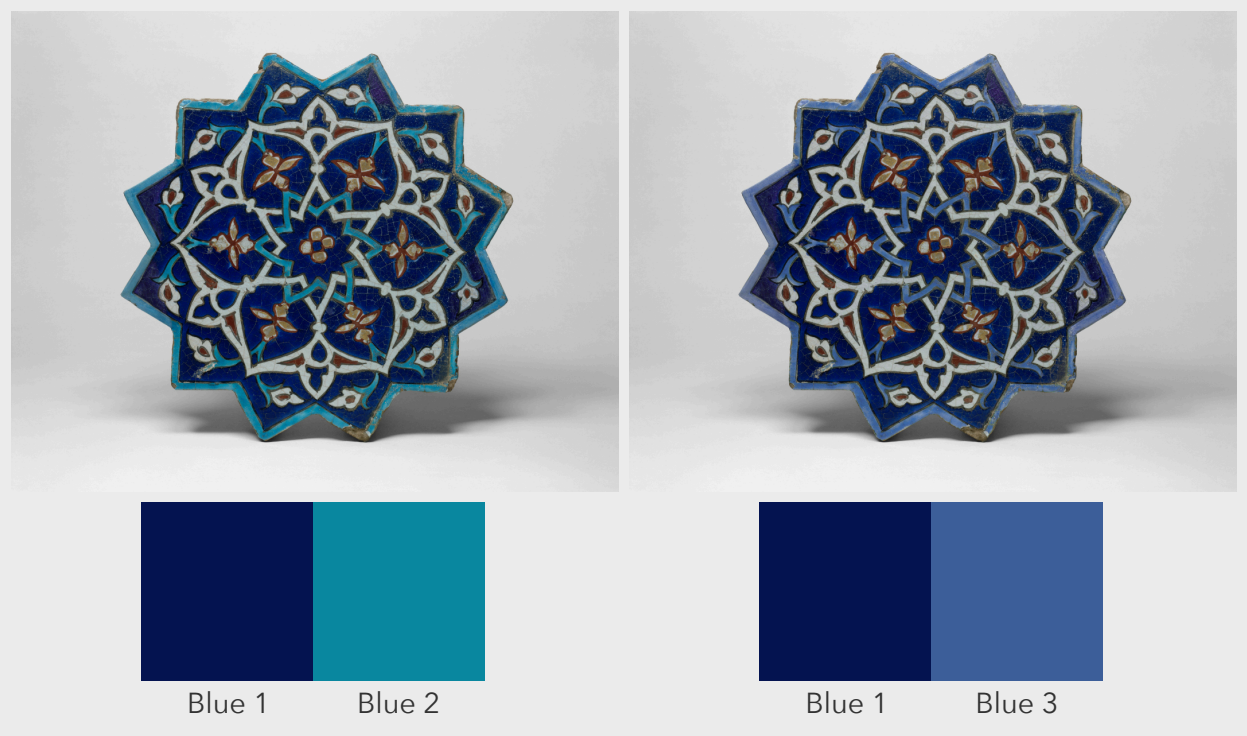

Figure 96. The greenish blue of Blue 2 has been transformed into Blue 3. the altered ceramic tile does not show as much movement as in the original.

Example 2: Berthe Morisot, Dans le parc

In Chapter 1, we noted the extensive amount of greens in the painting Dans le Parc by Berthe Morisot. Green is a notoriously difficult color to work with, but Morisot makes them sing through the use of the Separating movement of blueish and yellowish greens. The colors appear more striking in the context of the whole work than they do separately, as Morisot masterfully juxtaposed them to create movement and contrast while maintaining a sense of the composition as whole entity.

Figure 97. Separating greens in Dans le parc, by Berthe Morisot, circa 1874. Courtesy of Musée des Beaux-Arts de la Ville de Paris, Petit Palais.

Joining

Example 1: Edward Munch, Two Girls with Blue Aprons

Now let's look at some examples of Joining, where two colors moving in opposite directions start out further apart and move towards each other creating a harmonious relationship where they join together and feel as one.

Figure 98.
Joining on the color spectrum.

We will start by using the same colors as in Chapter 7: red moving towards yellow, and yellow moving towards red. In the painting Two Girls with Blue Aprons by Edward Munch, the background is a reddish yellow, while the sleeves of the clothing of the two girls are a yellowish red.

Figure 99. Munch, Two Girls with Blue Aprons, 1904–05.
Courtesy of Munch Museum.

Starting at red and yellow, the two colors move towards each other. If they were to continue on their trajectory, they would eventually meet together at orange.

Red and yellow are already very close to each other on the spectrum. By choosing a reddish yellow and a yellowish red, Munch has created colors that are moving even closer together to form a strong bond.

If Munch had selected a blueish red, we would have seen a very different effect. In Figure 100 the original painting is shown next to an altered version which shows the yellowish red changed to a blueish red. All of the reds have been altered, so that even the red hat and make-up have become blueish reds. This has the effect of making the girls stand out distinctly from the background, whereas in the original version of the painting they almost meld with the background. This is not a question of what is correct, instead it is about what kind of effect we want to achieve.

Figure 100. Joining of the original Munch painting compared with the altered version.

In Figure 101 we can see a comparison of the original color scheme with the altered version. In the original combination of colors the yellowish red sits very comfortably inside of the reddish yellow. The new combination gives us a very different feeling. The blueish red box does not sit as comfortably inside the reddish yellow. As shown in the incremental diagram on the right side, this would be a situation of Chasing instead of Joining.

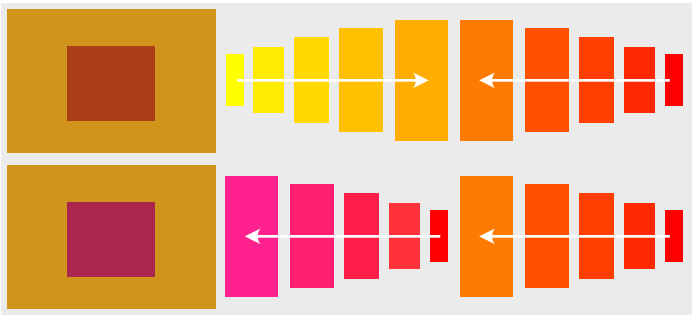

Figure 101. Comparison of original and altered color schemes.

We can compare the effects of the two colors looking at the simple compositions in Figure 102. As with Munch's painting, we can see that with the example on the left, the yellowish red and reddish yellow join together, whereas on the right, the blueish red stands out much more distinctly from the background reddish yellow color.

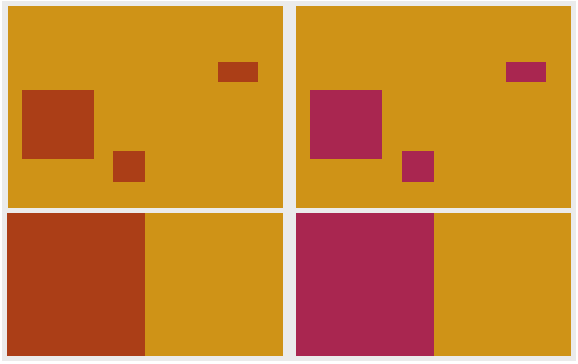

Figure 102. Simple composition with original and altered color schemes.

Example 2: Sandro Botticelli, Virgin and Child with an Angel

Let's take a look at two pairs of colors in the painting Virgin and Child with an Angel by Sandro Botticelli. In the first pair the blueish red of the Virgin's robe joins with the reddish blue of the child's cloth. In the second pair the same blueish red robe creates a Chasing movement with the Virgin's greenish blue robe. The two pairs act very differently in comparison. Looking at the blueish red robe with the two different blue robes in this painting shows the same effects we saw when looking at the original and modified versions of Munch's painting.

Figure 103. Virgin and Child with an Angel by Sandro Botticelli, Art Institute of Chicago.

Chasing

Example 1: Peter Paul Rubens, Daniel in the Lions' Den

An example of Chasing colors can be seen in the famous painting by Peter Paul Rubens, Daniel in the Lions' Den. The painting tells the biblical story of Daniel being forced to spend the night in a lions' den for worshipping God rather than the Persian King Darius I. Given this situation, Rubens is working to find a way to cast our eyes up to the small space of blue sky at the top of the painting to express Daniel's hope that his prayers will ascend to be heard by God. Rubens accomplishes this in a few ways. The most obvious way is through the physical posture and facial expression of the figure of Daniel himself. However, the color relationships that create the Chasing color movement, yellow moving towards red and red moving towards blue, also play a key role in this painting.

Figure 104. Peter Paul Rubens, Daniel in The Lions' Den, c. 1614/1616, courtesy of National Gallery of Art.

The largest color area in the painting consists of a reddish yellow created by the lions and the rocks. Against this backdrop, aside from the figure of Daniel sitting on the rock, there are two other elements that stand out in particular: the red robe next to Daniel, and the blue sky above. The red robe takes on a blue tinge, thus creating a blueish red that moves away from the reddish yellow towards the blue of the sky.

In Figure 105 we can see an incremental model of the color movements in the painting, showing the movement of the yellow towards red and the red towards blue. With a few simple colors, Rubens has created a complex, dynamic environment, which is full of dramatic tension and expressiveness.

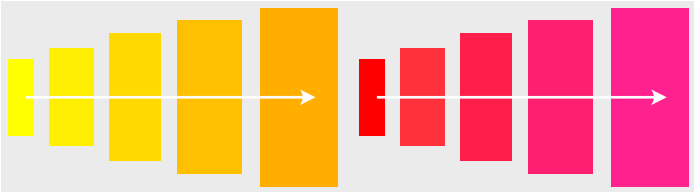

Figure 105. Incremental model of Chasing color movement from Rubens' painting.

Let's change the robe to a yellowish red so that it now leans towards the dominant reddish yellow of the lions and the den. This presents a distinctly different feel, where the robe joins more with the environment rather than creating the movement away towards the sky.

Figure 106. Comparison of color movements from original Rubens painting and altered version.

Figure 107 shows a model of the color relationships in the painting. We can see the effects of the two different robe colors. The original robe color of a blueish red stands out from the background and moves towards the blue of the sky, while the yellowish red merges with the background. The model created here is almost the same as the one we saw with Munch's painting, except that we have the addition of blue in Rubens' painting.

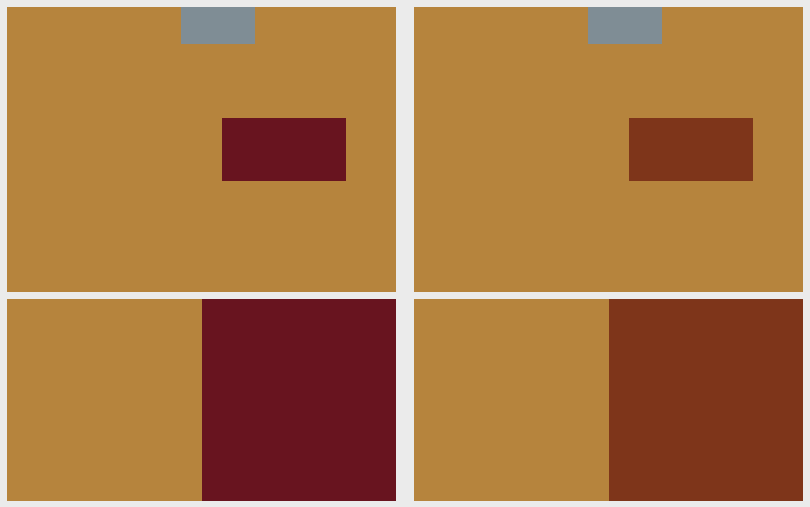

Figure 107.
Simple composition with original and altered color schemes from Rubens' painting.

Example 2: Paul Gaugin, Siesta

We can also see this chasing movement in the shirts of the two women in the foreground of the painting Siesta by Paul Gaugin. The shirt of the women in front is a reddish blue, and the shirt of the women next to her is a yellowish red. The diagram below the painting shows the reddish blue leading towards a yellowish red, which eventually wants to move towards orange.

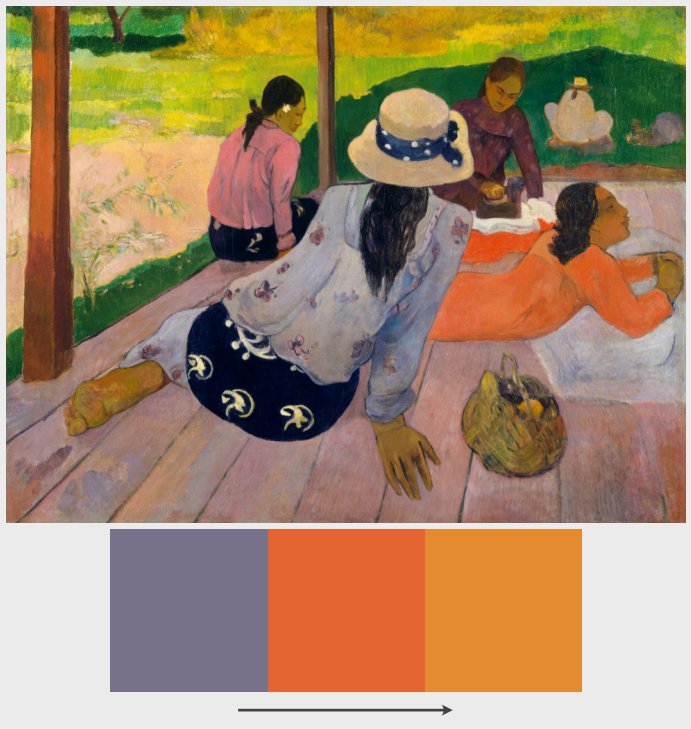

Figure 108. Paul Gaugin, Siesta, ca. 1892–94, The Metropolitan Museum of Art.

Through the examples in this chapter, we have seen how colors can be used to communicate with us through their movements and interactions. We have seen examples of spaces melding together, separating apart, and leading to new areas altogether. We can begin to imagine how we can use this language to create vibrant settings in our own work.

9. Bringing It All Together: Monet

We have focused on particular aspects of color movement individually in order to understand how they work. Putting all of this together and applying it to our own work can be a long process as there are many different permutations of color combinations and situations. In this chapter we are going to focus on one example that will allow us to look at these color relationships all together. For our example we will use Claude Monet's painting, Grainstack, Sun in the Mist,

Figure 109.
Grainstack, Sun in the Mist, 1891, by Claude Monet

from 1891. This painting provides an especially rich example. For one thing, it makes use of all three of the movements that we have discussed in this book. Additionally, we can see these movements applied on a larger as well as smaller scale; organizing both large areas of color, as well as smaller specific ones. We will look at various aspects of this painting, and then apply that to give us some insight into how to approach our own work. We have already spoken about the technical aspects of what these movements are and how they work, so in this chapter we will try to look more at the effect that they achieve.

Monet's work makes use of broken color which provides us the opportunity to see these color relationships on a small and large scale in the same work. However, it can also make it a bit harder at times to see the larger scale effects as they are often interrupted by smaller strokes of color moving through. When examining the painting for the larger color movements, it will be helpful to keep in mind the way we have grown accustomed to viewing impressionist paintings, which is to step back and let the smaller pieces fuse into the larger whole. At times we will want to examine smaller groupings of brush strokes to see how one small line of color relates to another, for example, at the edge of the grainstack. At other times we will want to see a larger area of color, even though it is interrupted by interceding lines of color, such as when we look at the ground and try to understand the overall sense of movement occurring there. In the end, the broken color of Monet's work allows for both aspects to occur at the same time, which is marvelous, and we want to both appreciate and learn from it.

Joining

Figure 110.
Joining color pairs.

The grainstack is the main figure of this painting, and it needs to feel as a central place for our eye to focus, much as if there were a person standing in the middle of a portrait painting. The main body of the grainstack makes use of a blueish red and reddish blue, creating a Joining movement which functions to keep it feeling as a unified whole. This same color combination can be seen at the base of the grainstack, connecting it to the ground directly below it. On the side of the grainstack is a yellowish red, which joins with the reddish yellow in the ground to connect those two spaces together.

Separating

There is a yellowish red in the grainstack that plays an important role in relation to the main blueish red. In Figure 111, we can see this yellowish red at the top of the grainstack, giving the feeling of the shining of the sun playing off of it.

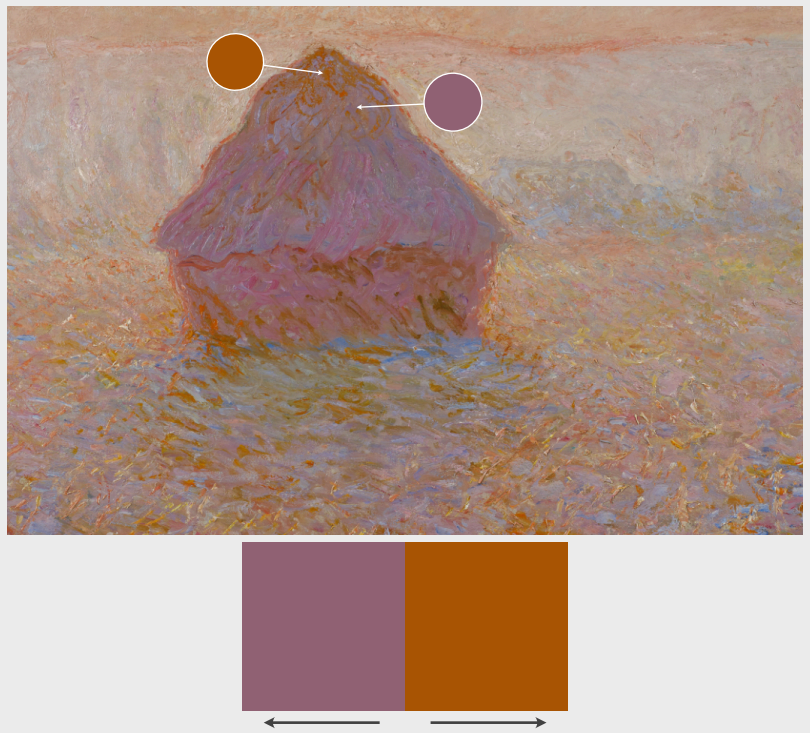

Figure 111. The yellowish red at the top separates from the reddish blue body of the grainstack.

If we look closely, we can also see a slightly darker yellowish red on the inside of the grainstack which plays the part of a shadow, indicated in Figure 112. Thus, we have seen yellowish red functioning as the shining of the sun, as well as shadow. While the change in value plays an important role in shifting between light and shadow, the two yellowish reds work in conjunction to give movement to the whole without dissolving the

overall feeling of unity. They play off of the blueish red to give the grainstack a dynamic feel, preventing it from becoming too heavy, static, and monolithic. Whether taking the place of sun or shadow, the yellowish reds fulfill the function of Separating from the main blueish red color space of the grainstack.

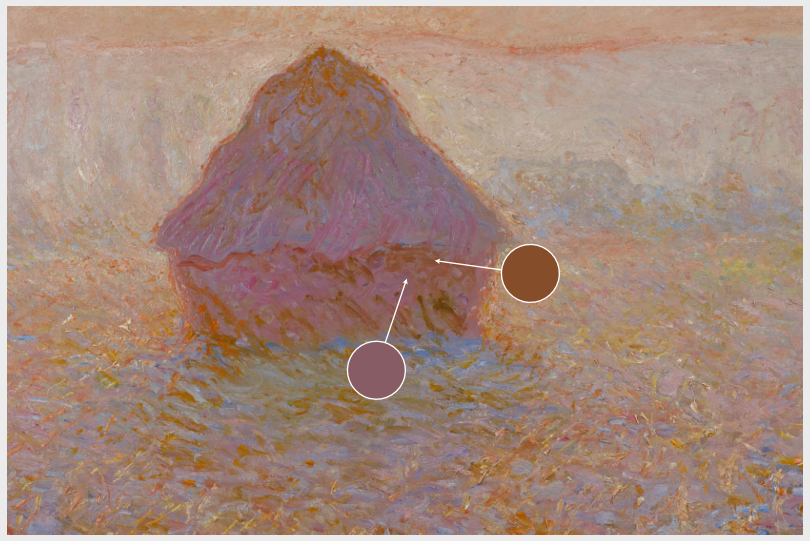

Figure 112. The slightly darker yellowish red inside the grainstack plays the part of a shadow, and also functions as a Separating movement.

The whole grainstack is shrouded in a line of yellowish red. This shroud serves a few purposes. It creates a shimmering effect through the Separating relationship with the main body of the grainstack. Except for the base, the shroud fully surrounds the grainstack. Thus, the grainstack is locked inside of it with nowhere to go, resulting in the shimmering effect. This separating is mitigated by the fact that there is a fair amount of yellowish red inside the grainstack as well. The shroud also plays an important role in the relationship of the grainstack to the background. Against the very light blueish area of the background it serves to make the grainstack

separate and stand out. At the same time it functions to join the grainstack with both the upper portion of the background and with the ground. The ground to the sides of the grainstack is a complicated area of color with reddish yellows and yellowish reds, as well as some reddish blues and blueish reds mixed in. Thus, although the shroud helps the grainstack to join with the ground, there is still enough Separating activity there to keep a stimulating level of movement.

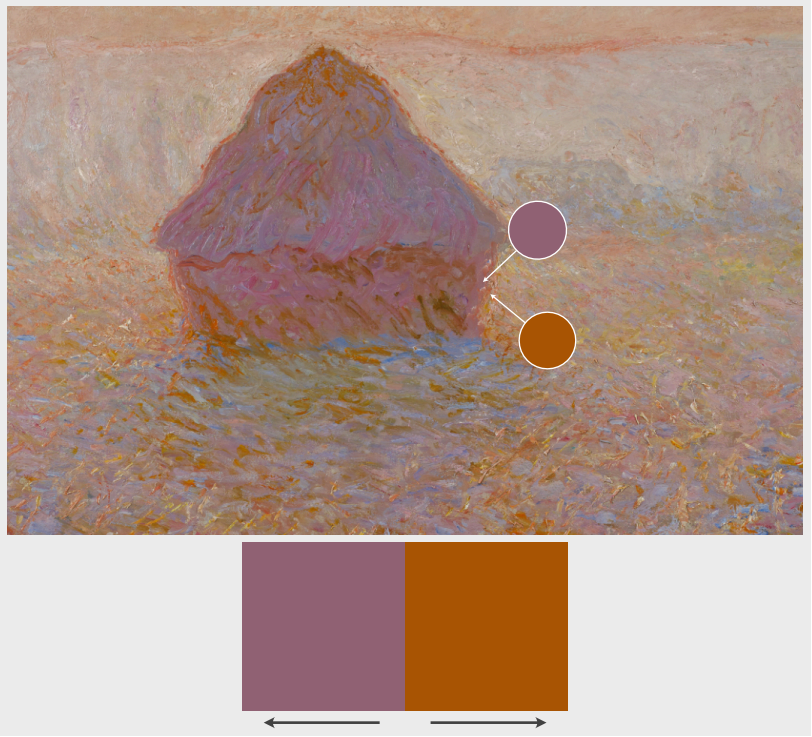

Figure 113. The whole grainstack is shrouded in a line of yellowish red.

Chasing

Looking at the ground in front of the grainstack, although there are many colors, we can simplify it to an area that is largely reddish blue, next to a yellowish red one. Going a bit further out from there we start to encounter areas of reddish yellow, which appear at first glance as light streaks of yellow. Thus, we can see an example of Chasing, with blue moving towards red, and red moving towards yellow.

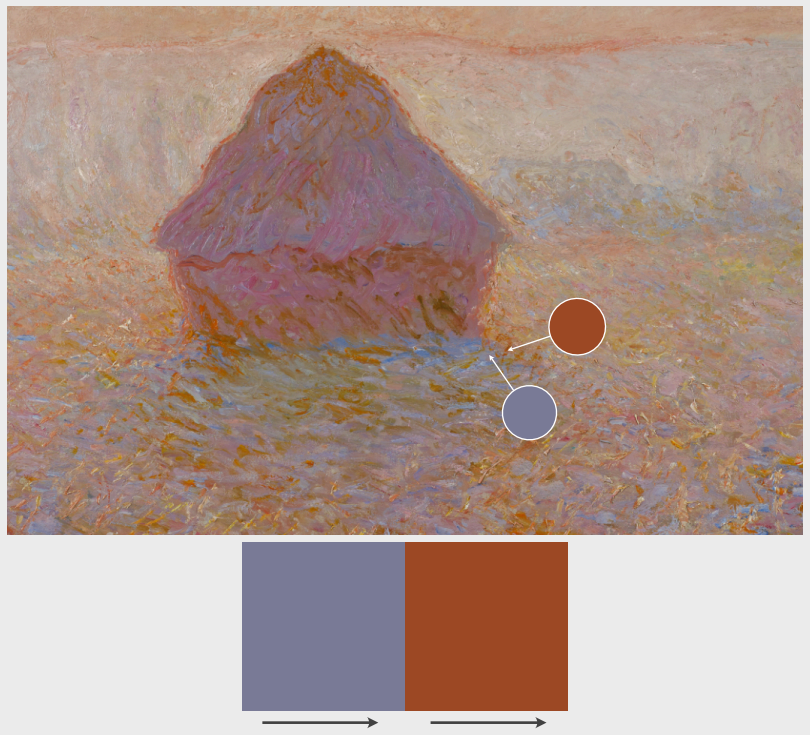

Figure 114. Chasing in the ground: starting from reddish blue, moving out to yellowish red, and then to reddish yellow.

This relationship causes the blue in the center to move outwards, giving an expansive feel to the ground.

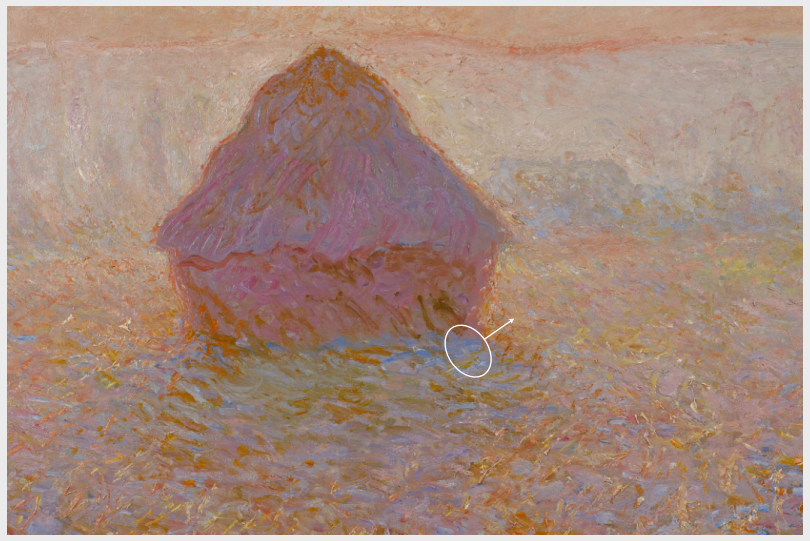

Figure 115. Chasing in the ground gives an expansive feel to outward motion.

Testing the Chasing

In Figure 116, the Chasing color movement is shown based on the colors in the painting. The central reddish blue is moving outwards to the yellowish red, which in turn moves towards the outer reddish yellow. More specifically:

1. The inner reddish blue chases the middle yellowish red.

2. The middle yellowish red joins with the outer reddish yellow.

3. This means that the red and yellow create a large area that the colors expand into as they move away from the central blue area.

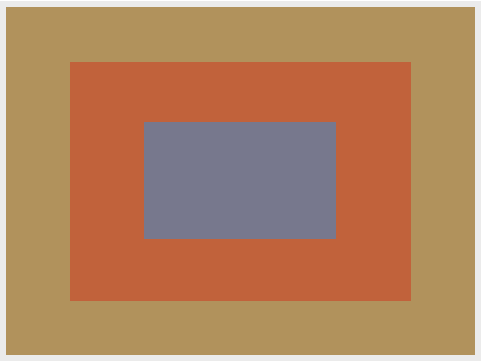

Figure 116. Chasing from the center outwards, patterned after the movement in the ground.

As an experiment, we can change the middle yellowish red to be a blueish red to see what kind of movement results, as seen in Figure 117. In this case:

1. The blueish red and reddish blue join together, creating a focus in the center of the diagram.

2. The outer reddish yellow is moving towards the central blueish red with a Chasing movement.

3. The overall movement is towards the center area focused around the red and blue.

The first image in our testing creates an expansive movement outwards, as in the ground in Monet's painting. The second image creates an inward movement focusing towards the center.

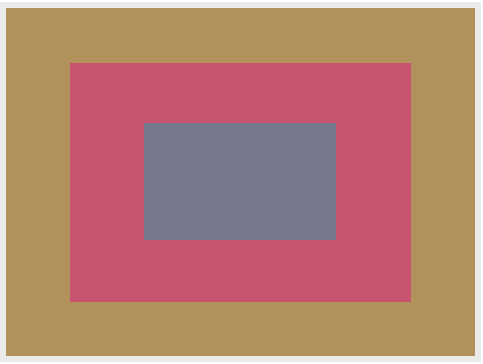

Figure 117. Altering the middle red to a blueish red, changes the focus to the center of the composition.

Overall Color Scheme

Let's back up and take a look at the overall color scheme of the painting from two points of view. One is looking at the central figure of the grainstack contrasted with a single colored background. The other is to consider the background alone, without the grainstack. These are color experiments that we can do when planning out a painting, or any kind of artwork. If we were designing clothing, a scene for a photograph, or a website, we might want to consider color schemes in similar ways.

Figure and Background

Let's take a look at the grainstack as a single color against the background, as if it were also a single color. In Figure 118, we can see the blueish red grainstack surrounded by a red-yellow area. This creates an overall sensation of separation, and causes the grainstack to stand out. The two colors may be Separating, but the grainstack is stuck in the middle, with nowhere for it to go, so it creates a sensation of it standing out, as a figure that calls the viewer's attention.

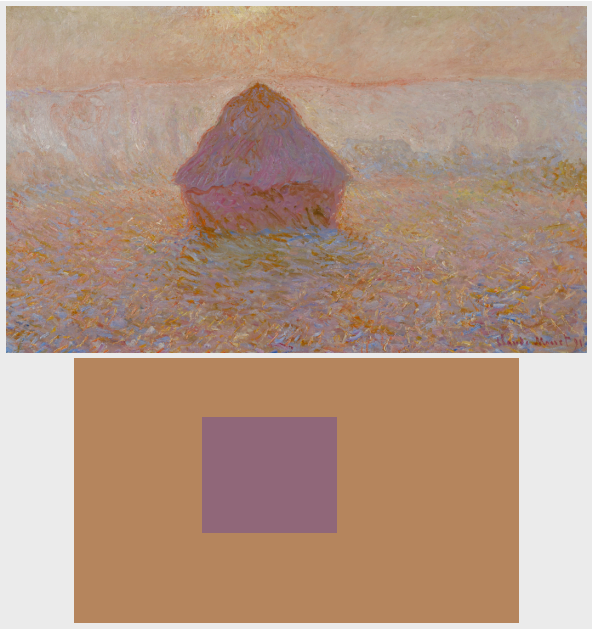

Figure 118. The grainstack as a single color against the background. The colors are Separating, causing the grainstack to stand out against the background.

As an experiment, I changed the overall coloring of the background to be more blueish, as we can see in the test pattern of the blueish red grainstack on a reddish blue background in Figure 119. In this case, the grainstack does not stand

out in the same way. Instead, we get an overall feel of a reddish blue, or a somewhat mauve color feel. The color is cohesive as the two areas join together to create a concentrated area of color, however there is not as much movement as in Figure 118.

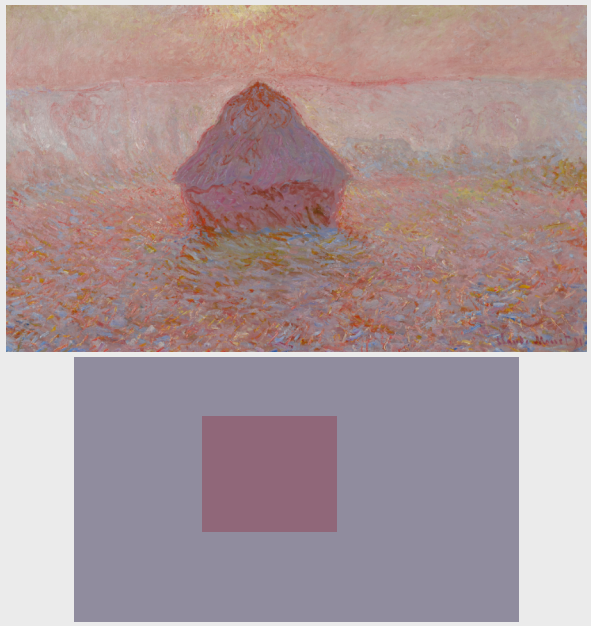

Figure 119. Changing the background to a bluish red creates a Joining movement between the background and the grainstack.

Background Alone

Now let's consider the background by itself. If I were painting this, although I might start with a light drawing of the grainstack, I probably would not paint it until I had laid down a light foundation of color for the background. If we were to think about the overall design of the painting, starting with the simplest possible idea of the background only, we could start with something similar to the image below.

Figure 120. The background of the painting begins with a Separating movement.

The top and bottom sections are yellowish red, and the middle section is blueish red, so they separate. You could approach this differently. You could easily make the center a blue-red, and it would be more of a chasing situation instead of separating. In the example here, the color is unsaturated as to almost be a chromatic grey, so there might not be clarity in the question of Separation or Chasing, but there is cer-

tainly a sense of tension and movement, which both Separating and Chasing create. That is enough to establish a dynamic underpainting for the work. In the actual painting, there are a variety of colors in these sections, which present rich multifaceted areas of movements and relationships, with places of Separating, Chasing, and Joining, but we would not start with so many colors all at once.

We could create a very different situation if the center stripe were to have a Joining motion with the outer sections. In Figure 121 I made the inner stripe a reddish yellow, while the top and bottom stripes remain yellowish red; an effective Joining motion which we have seen a number of times before. It creates a cohesive color area, as the colors are concentrated around the orange color range. However, it does not have the same kind of tension and movement as the previous example did when we employed the blueish red in the center. Thus, even from the early planning stages of the work we can consider what kind of overall movement we want to create.

Figure 121. Changing the middle section of the background to create a Joining movement.

Applying Lessons from Monet

As we can see, there is a lot to learn from this painting by Monet. He created a beautiful, moving painting which combined all of the color movements we have discussed in this book, and he did it on both a large and small scale. Having spent a good deal of time analyzing the color movements in the painting, we can now consider the process of constructing such a painting in order to be able to apply it to our own work. The question of color relationships is fundamental to the life of the painting. We start thinking about color relationships from the very first step of the artwork, and continue doing so throughout every stage of the work. Starting with the first step of Monet's painting we determined ways to create movement in the background with only two colors. With the grainstack we then added a third color that joins together with the middle band of color, and separates from the top and bottom. Adding the shroud around the grainstack then increased the intricacies of the color interactions. The broken color allows Monet to weave color movements through spaces to augment the dynamic feel without breaking the movement of the whole. The process continues like this through every phase of the work, sometimes focused on a small area, other times stepping back to consider the color movements of the whole piece. We continually ask questions to determine how the colors are progressing and if we have the kinds of movements and relationships that we want.

10. Developing Our Understanding

One of the things that I tried to show throughout this book is how we can look at and study a work of art in different ways. We can analyze in parts or by looking at the overall effect of the piece. We can simplify colors areas to understand how those colors are working and interacting. Experimenting with these ideas is an important part of the process of understanding color movements and learning how to work with them. We need to play and experiment with the possibilities both to understand them, and to see where they might go. To do this, we need to look at color relationships. We can study great artwork, as well as color relationships as they occur in nature.

Analysis and Feeling

In order to develop our understanding of color movements and relationships, we can work in two directions: from analysis to feeling, and from feeling to analysis. Working from analysis to feeling allows us to take movements we can decipher logically and understand the different ways they can make us feel. Starting from feeling and deriving analysis is equally important. Many times a work of art will give us a certain feeling, but we don't know why. If we want to better understand the work, and to be able to create similar feelings through our own work, we need to be able to understand how the results were accomplished.

Analysis to Feeling

1. Analyze color movements, see how they work and function both in the local area and in the overall color space of the piece.

2. Make note of how this feels. What sensations arise from the feeling of the color movement?

3. If we change the color movements, how does this change what we feel?

Feeling to Analysis

1. Feel the sensation that color relationships engender in you and make note of them as best you can.

2. Analyze the color relationships and movements to see what is causing that. For example, are they instances of Joining, Separating, or Chasing.

3. Also consider if these are relationships that we have talked about in this book, or are there other relationships that you are seeing. If you see new relationships try to analyze them to see what is happening.

Experiments with Color

In the course of this book we saw some small experiments that I did in the service both of understanding colors in a particular piece, as well as to see what might happen if the colors were altered. Similar experiments have long been a part of my learning process, and I encourage you to find a way of experimenting and asking questions that works well for you. You can work from what you see, and you can also create color combinations of your own.

Working from What We See

1. Replicate existing color relationships that you see. This might be colors that you see in artwork, clothing combinations, interior design choices, colors in nature, or anywhere that you see colors.

2. Analyze how those color relationships function.

3. Take those relationships and make small changes to see what happens.

Creating Your Own

1. Create your own color relationships and examine them.

2. You can do this is in a very determined way in order to try a specific color combination.

3. You can also work in a more free way where you try something without pre-planning and then examine what color relationships have occurred and how they work.

4. As with previous examples try changing these relationships and examining the new outcomes.

I especially like to experiment using colored paper, but you will find your own preferred way to work. You can cut out pieces from magazines, use pieces of cloth, use paint, work on the computer, or any other method that might appeal to you.

Play

As you are experimenting, remember to play. If you are fortunate, you may even be able to break things and find possibilities not covered by the defined principles. The unexpected can sometimes be our greatest teacher. We often forget how fundamental play is to our process. Take the opportunity to try different things without worrying about the outcome. Play is a process that allows us to explore new possibilities.

Color as Process

Throughout this book we have considered color as a process, rather than a concrete thing. I believe that this is the most useful way to understand color, and to create color combinations in artwork. Whether you are an artist, an art lover, or just someone who enjoys seeing colors, becoming sensitive to colors as a dynamic process can be a powerful force in our lives. Our goal is to create a personal relationship with color that allows us to understand and use them effectively. Cultivating the ability to see and understand color movements and relationships is the ultimate goal. Any theoretical discourse is aimed at aiding in that process. Seeing is the goal, theory is simply an aid to getting there. As we develop our ability to see and feel colors, we will naturally develop our own personal ways of working with them. Enjoy the process!

References

Dimmick, F. L., & Hubbard, M. R. (1939). The spectral location of psychologically unique yellow, green, and blue. The American Journal of Psychology, 52(2), 242–254.

Ekroll, Vebjørn and Faul, Franz, Basic Characteristics of Simultaneous Color Contrast Revisited, Psychological Science, OCTOBER 2012, Vol. 23, No. 10 (OCTOBER 2012), pp. 1246- 1255

Hurlbert, A. Colour vision: Is colour constancy real? Current Biology, 9 (1999), pp. R558-R561, 10.1016/S0960-9822(99)80354-6

Komban, Stanley Jose, Jose-Manuel Alonso and Qasim Zaidi, Journal of Neuroscience 8 June 2011, 31 (23) 8654-8658; DOI: https://doi.org/10.1523/JNEUROSCI.0504-11.2011

Komban, Stanley Jose & Alonso, Jose-Manuel & Zaidi, Qasim. (2011). Darks Are Processed Faster Than Lights. The Journal of neuroscience : the official journal of the Society for Neuroscience. 31. 8654-8. 10.1523/JNEUROSCI.0504-11.2011.

Kuehni, R. G. (2005). Color: An introduction to practice and principles (Second ed.). Hoboken, NJ: Wiley.

Kuhn, Karl F., and Frank Noschese. Basic Physics: a Self-Teaching Guide. Jossey-Bass, a Wiley Brand, 2020.

Mason, Peggy. Medical Neurobiology. Oxford University Press, 2017. p 1081

Pastoureau, Michael. (2001) Blue: the history of a color, Princeton, NJ : Princeton University Press, p. 181

"Talking Photometry - Colour Difference". Photometric Testing. Retrieved 26 March 2017.

Valberg, Arne. Light, Vision, Color. Wiley, 2005.

Wool, Lauren E et al. “Salience of unique hues and implications for color theory.” Journal of vision vol. 15,2 10. 6 Feb. 2015, doi:10.1167/15.2.10

Figure References

Figure 1. Twelve-Pointed Star-Shaped Tile dated A.H. 846/ A.D. 1442–43, From The Metropolitan Museum of New York, https://www.metmuseum.org/art/collection/search/446971?searchField=All&sortBy=Relevance&ao=on&ft=persian+mosaic&offset=0&rpp=80&pos=11

Figure 3. Berthe Morisot (1841-1895). "Dans le parc". Pastel sur papier brun collé sur carton. Vers 1874. From Musée des Beaux-Arts de la Ville de Paris, Petit Palais. https://commons.wikimedia.org/wiki/File:Morisot_-_Dans_le_parc,_Vers_1874.jpg

Figure 37. Photo by Albrecht Fietz, https://pixabay.com/photos/rainbow-cloud-evening-sun-rain-4047523/

Figure 43. Claude Monet, Waterloo Bridge, Morning Fog, https://www.philamuseum.org/collections/permanent/54676.html?mulR=595440498%7C16

Figure 44. Claude Monet, Waterloo Bridge, Gray Weather, 1900, https://www.artic.edu/artworks/103139/waterloo-bridge-gray-weather

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Figure 51. Adapted from: https://manoa.hawaii.edu/exploringourfluidearth/physical/waves/wave-energy-and-wave-changes-depth

Figure 57. Adapted from: Mason, P. (2017). Medical neurobiology. New York: Oxford University Press.

Figure 92. Twelve-Pointed Star-Shaped Tile dated A.H. 846/ A.D. 1442–43, From The Metropolitan Museum of New York, https://www.metmuseum.org/art/collection/search/446971?searchField=All&sortBy=Relevance&ao=on&ft=persian+mosaic&offset=0&rpp=80&pos=11

Figure 97. Berthe Morisot (1841-1895). "Dans le parc". Pastel sur papier brun collé sur carton. Vers 1874. From Musée des Beaux-Arts de la Ville de Paris, Petit Palais. https://commons.wikimedia.org/wiki/File:Morisot_-_Dans_le_parc,_Vers_1874.jpg

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Figure 103. Virgin and Child with an Angel by Sandro Botticelli, Art Institute of Chicago, 1475–1485 https://www.artic.edu/artworks/80530/virgin-and-child-with-an-angel

Figure 104. Peter Paul Rubens, Daniel in The Lions' Den, c. 1614/1616, National Gallery of Art, https://www.nga.gov/collection/art-object-page.50298.html

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About the Author

Figure 122. Robert Najlis in front of his painting: Cascading Lines of Sympathetic Vibrations, Home in A Home.

Robert Najlis is a an artist, working predominantly in painting, but also with interactive sound art and installation. His work considers our connection to the larger web of life, and suggests the permeability whereby all aspects of life touch and interconnect with each other. He brings together both traditional skills and new concepts, researching ideas from thousands of years ago to collaborate with current day quantum mechanics and artificial intelligence. Fundamental to all of his ideas is a focus on listening; feeling with sensitivity to the resonances around us.

He is a Fulbright scholar, with a masters of fine arts from the University of Massachusetts Dartmouth, and a masters in computer science with a focus on artificial intelligence and cognitive science from Indiana university. He also studied at the Art Students League of New York in the lineage of Hans Hofmann and George Bridgman.

Robert was born in Brooklyn, NY, and has also spent significant time in Latin America and Asia. In addition to his native English, he also speaks Spanish and Chinese.

Robert can be reached through his website: www.robertnajlis.com