Rachel Stokoe June 27, 2009

Introduction

The way we respond to color is similar to the way we respond to music: words fail us. Our perception and understanding of color slips from the realms of rational language, the sensations stimulate a different part of our brain, triggering emotions that may not be intellectually grasped, but are still tangibly moving. Robert Swain's paintings are the result of an intense 40-year study of color perception. Standing in front of one of his 10-foot canvases, arranged in a mathematically formulated grid to minimize perceptual variables and making color interaction their main concern, there is no denying color has transcendent properties (Figure 1.).

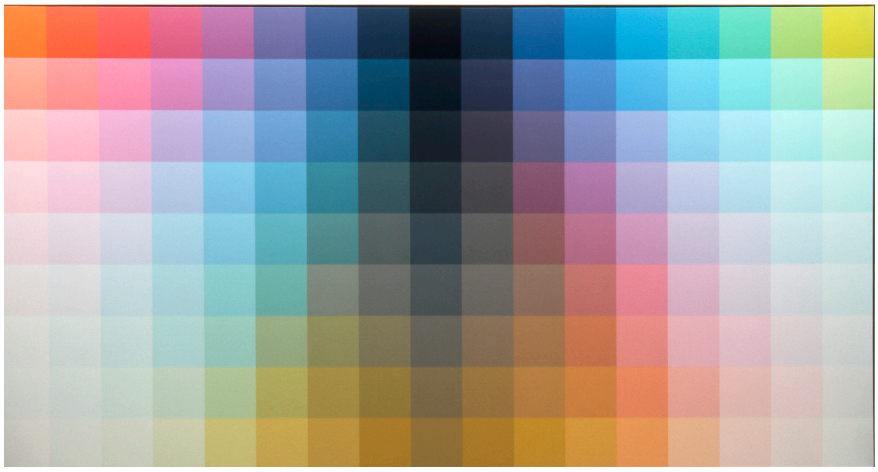


Fig. 1. Untitled, 1982-83, acrylic on canvas, 9' x 17', commission for Johnson & Johnson

While the actual effects of color may elude description, there is a history of color theory that can help us speak of this experience. Much like the standardized notes of the diatonic scale, there are incremental measurements and nuances of color that reveal the system from which sensation arises.

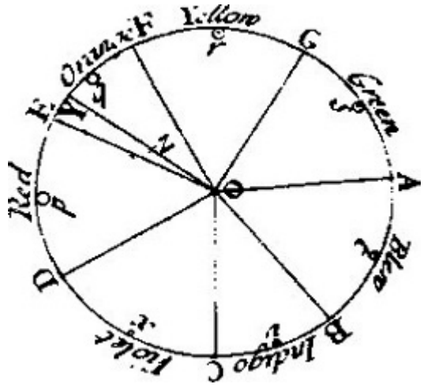
Color sensation is a more primal response than the narrative we construct around perception; it is free from cultural and personal encoding, though we may bring these ideologies into our final "read" of a painting. In this way, Swain's paintings have the ability to strip away the constructs we create when taking in the world, instead directing our attention to the phenomenon of the world itself.

This essay overviews the theoretical issues of Swain's work to give us the tools to understand color as an independent subject. There are key objective and identifiable truths about color that help us understand how color functions. First, it is important to establish the objective scientific and subjective interpretive at the base of color perception. With that in place, we can turn our attention to the color system itself, which will give us the background of objective color measurement, as well as the observable color phenomena (or the interaction of color) of Swain's work. Finally, there is an exploration of Swain's latest artistic endeavors, both in relation to these terms and in comparison to his previous work.

Newton and Goethe: The Scientific Versus the Romantic

In talking about Swain's paintings, there is a dual impulse. On the one hand, there is a perceptual response based on scientific fact. On the other, there is the subjective internalization of that perception. While a color in the world can exist, our observance of it and transmission from our eyes to our brain is central to our understanding of it. The works of Sir Isaac Newton and Johann Wolfgang von Goethe in their competing studies of perception and color best describes this duality.

Central to any discussion of color is the notion that color is actually light. Sir Isaac Newton was the first to discover this in 1666 and to publish his findings in 1704, refracting white light through a prism in order to divide it into the separate colored wavelengths that make up what we call a spectrum. Newton found each particle moved at different speeds, red moving the fastest and violet the slowest. He then created the first color wheel based on his observation that the color sequence, as in the rainbow, is fixed and that violet blends into red. He represented the spectrum as a full circle, with red green and indigo blue at equal steps.



Netwon's Color Wheel

We have since learned there were certain flaws in Newton's classifications. Newton divided his wheel into seven primary colors: red, orange, yellow, green, blue, indigo and violet. In a spectrum, there are only five discernable separations of color in the spectrum. Newton's addition of orange and indigo came from a desire to correspond the colors of the spectrum to more mystic sources. By corresponding color to the seven notes of the diatonic scale, Newton was relating an overall "harmony". By dividing the color spectrum into seven colors, Newton was tying color to the diatonic scale in the tradition of Greek sophists, who believed there was a connection between the colors, the musical notes, and astrology as related to the calendar. Because the musical scale so easily and irrefutably divides into the magic number seven, so too should color. In his model of the color wheel, Newton shows how the colors correlate with musical notes and symbols of the planet. Newton thought anything as fundamental as color must correspond to the other fundamentals which sophists grouped into sevens: 7 sacraments, 7 deadly sins, 7 heavenly spheres, 7 days of the week etc (Burton, p.41).

Nevertheless, without Newton, the science of light and color would not have been established. Apart from laying the grounds of color theory, Newton brought out the notion of color functioning as a light. At the root of Swain's paintings is a belief in light. Swain juxtaposes certain hues with the expressed purpose of highlighting their light-emitting qualities. This creates a glow, as each square of the grid interacts with an adjacent square of different color, producing a myriad of effects as your eye moves across color relations (Figure 2.).

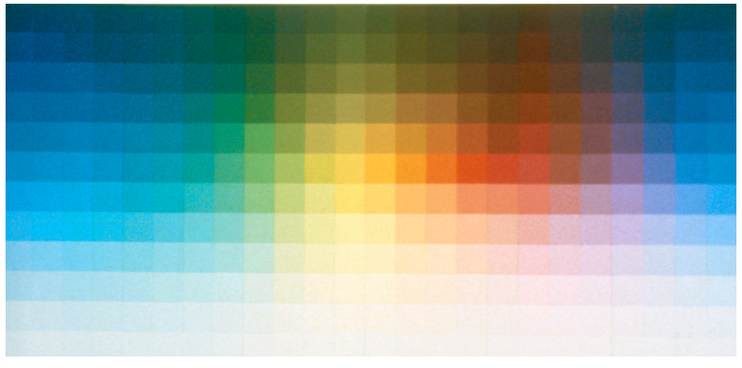
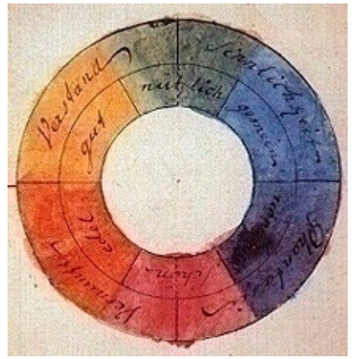


Fig. 2. Untitled (Corcoran), 1968, acrylic on canvas, 12' 6" x 26'

While Newton was important in establishing the science of color, Goethe brought attention to it from a more romantic and artistic perspective. He argued polemically against Newton's concept of wavelengths and that there was no color in the physical world, only light and dark. The light patterns are discerned by our eyes and transmitted to our mind, where they are given color. This redirection of emphasis highlights the subjective perceptual (Birren p.105).



Goethe's Color Circle

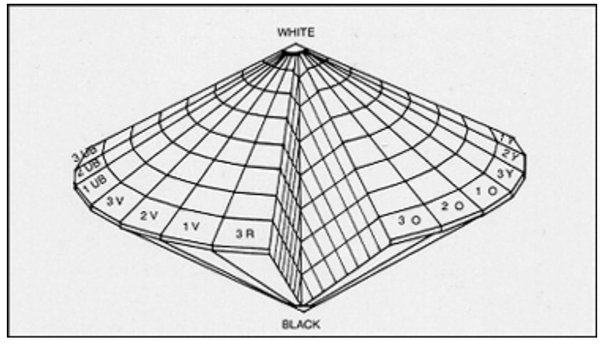
It is what gives subject matter to color, making our experience of it meaningful in itself rather than a transmission of different wavelength frequencies. As Swain himself has said, "art is not about establishing scientific truths. It's about establishing content for people" (Swain, March 18). Swain's art may rely on scientific phenomena to guide the effects of color interaction, but at the end of the day it is the content of color that is his interest. This moves his work from a textbook description of perception to the actual experience.

Color Systems: Ostwald, Munsell, Swain

With the groundwork of the scientific objective and subjective interpretive established as a double force in looking at Swain's work, there must be a way of measuring and delineating the colors themselves before gauging the effect of their interactions. For this, a color system must be in place to clearly show the gradation of color.

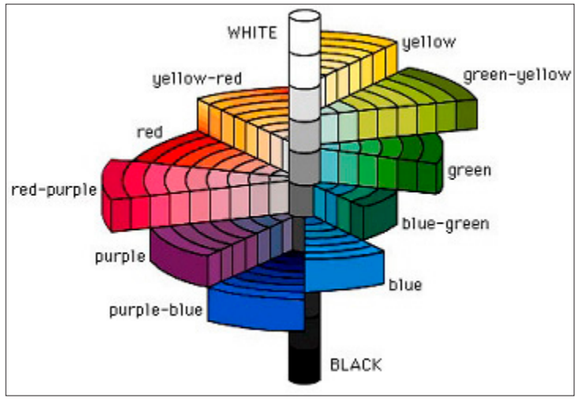
There have been many different color systems created, but two are of extreme importance when looking at how Swain derived his own: Albert H. Munsell and Wilhelm Ostwald.

Ostwald's color wheel consists of 24 equidistant steps with eight principle hues (yellow, orange, red, purple, ultramarine blue, turquoise blue, sea green, and leaf green) each with three steps. The color solid has a gray scale as the central axis, with colors increasing in purity toward the equator and thirteen steps of gray between the gradients of black and white. Organized three-dimensionally, each hue variant is located in a double cone shape, the hues are distributed horizontally and the white at the top and black at the bottom (Stromer, p.129). It is important to note that Ostwald forced his colors to fit into the geometric model, working his color sensations from the outside toward the gray column.



Ostwald's Color System

In comparison, Albert Munsell's system, (Atlas of the Munsell Color System, 1915) moves outward from the gray scale with perceptually equal steps and therefore takes the shape of a distorted sphere. Munsell's system describes the three dimensions of color by hue (the actual color), value (the lightness or darkness) and saturation (the color's intensity, or chroma, written as H V/C in the Munsell notation) (Stromer, p.125). Again, it is easiest to grasp the variants when looking at the model three-dimensionally, in order to see the corresponding value changes between colors. Because Munsell did not feel compelled to "fit" his model into a geometric shape, he could account for a larger array of variation. The result is an asymmetrical color tree, closer to a color cloud, with different hues having different variations in value and saturation. It is interesting to note that it was only in the 20th century with Munsell's system that we have a good color model. It is also interesting to note that a painter and not a scientist created this model! (The updated version of Munsell's atlas, the Munsell Book of Color, by his son Alexander, is still in use).



Munsell's Color System

For Swain, Ostwald's system is influential because the relations are based on harmonies, meaning the interrelatedness of the hues is apparent (Swain, March 18th). The problem, Swain discovered, was a lack of dark hues. Instead of building harmonies, Munsell's system excels at exploiting all the lights and darks of a given hue, in large part because Munsell refused to constrict his studies to a predetermined geometry.

In the 1970's, Swain began developing his color system. Swain's color system divides color into 30 hues, 33 value steps, and up to 9 degrees of saturation (Swain, p.188). Compare this to Munsell's system, in which each attribute of color has 100 hue steps (H), based on the five major colors and five intermediaries, each with ten steps; ten value steps (V) and an open-ended chroma scale © that could reach 12, 14 or more, depending in the stength of the color, resulting in a total of around 1,250 components. Swain's color system amounts to 2,200. The colors he derived from his model do not exist solely in the theoretical paradigm, but from careful measurement and mixing by hand. This idea of the artist's touch was also present when Swain created his color wheel. By staring at a particular hue and then establishing the after image as the complementary pairing on his wheel, Swain systematically went through each hue, to create a consistent spatial relation between colors in his devised system (Figure 3.).

Fig. 3. 24 Part Circle, 1971, acrylic on canvas, 8' 6" diameter

Seeing the three-dimensionality of color is important when looking at Swain's work. Because of the relationships he establishes between colors within a single work, the individual colors become autonomous agents, interaction and changing depending on contextual relations. The control of hue, value, and saturation in the work explores the specific relationships between specific colors, and, depending on these variables, they will respond differently to each other. This leads us to the topic of color sensation.

Chevreul and Beyond

There are three major classes of the interaction of color: simultaneous contrast, successive contrast, and reverse contrast (Ratliff, p.8). These in turn are determined by three major factors of color perception: composition, viewing distance and duration, and light source. Each is present in Swain's work and will be described in turn.

At the root of color sensation is the concept of simultaneous contrast, termed by Michel Chevreul in 1839. Simultaneous contrast is the law by which "two adjacent colors, when seen by the eye, will appear as dissimilar as possible" (Stromer, p.73). In other words, the perception of a color is affected by the color that surrounds it. This change is perceptual: a red hue does not literally lighten itself when placed in front of a violet background as opposed to a yellow, but our mind will "read" it as lighter.

In successive contrast, the perceptual change occurs when observing one color and then replacing it with another. The optical mixing has to do with after-image, as we take the information or sensation of the previous color into our reading of the next one. For example, the same gray will appear greenish when adjacent to red but reddish when adjacent to green.

The final is reverse contrast, or assimilation, color placed side by side may spread to adjacent regions, causing colors placed together to appear visually closer or more alike and a color takes on the hue of the surrounding color. An example would be a small white square placed on a larger red background and one placed on a larger blue background. The white square on the red background tends to look reddish, and that on the blue background becomes bluish. Again, the use of this technique lies in exploiting the perception of color, as each color is distinct in actuality but will combine in our brain to create uniformity.

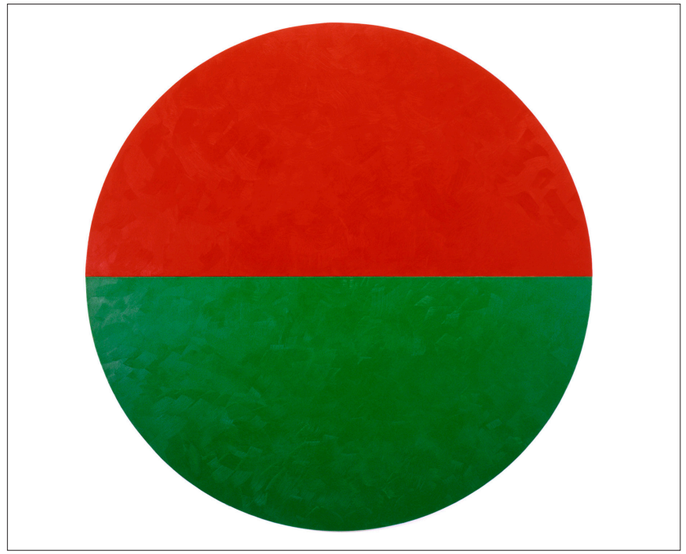


Fig. 4. Red and Green Circle, 1969, oil and acrylic on canvas, 8'6" diameter

Swain's Red and Green Circle Untitled, 1969 (Figure 4.) is a perfect example of Chevreul's principles. The complementary hues, of equal saturation and value placed side by side, heighten the unique qualities of both, creating an almost jarring contrast. However, when looked at for a long duration, a strange effect occurs. First, a white light appears where they meet. Slowly, the colors optically mix, producing a neutral grey glowing around the complementary tones—not on the canvas, but in our mind's eye.

Three major contextual forces determine the three interactions of color: composition (referring to the size, shape, number and sharpness of contour of the components of a painting), viewing distance and duration, and light source.

In essence, Swain only has control over one of the components: composition. Variables in viewing distance, duration and light source depend on the viewer and the placement of the painting; someone viewing one of his compositions in sunlight for an extended period of time will read what he sees differently than someone seeing the work in fluorescents while quickly walking by.

Surface, Film and Volume

"Balance is produced by the visual impact of the composition's components of shape and color" (Arnheim, p. 350).

Swain has established several fixed components in his study of color effect. For example, his composition by and large is based on a divided grid. For Swain, the use of the grid helps break color away from iconography (Swain, March 18th). The grid is basically passive, a vessel in which to carry color information. The sizes of the squares shift in Swain's work, depending on the size of the canvas and the desired color effect. Also, the number of squares change, depending on the actual size of the painting and compositional balance. Often, Swain will break the grids into larger and smaller sections, juxtaposing more color contrasts next to a more block-like formation. All of these decisions are premeditated, and meant to direct the viewer's experience. From his 2,200 units of color, Swain derives surprising combinations. For example, recontextualizing neutrals to elevate their presence on the canvas. "Even the colors that are very mundane seem to have a personality to me. They have a presence of substance. The problem is to find a context to exemplify the uniqueness of this, not in detriment to other colors but in and of themselves" (Swain, March 18th).

There is another experiential effect of Swain's work that relates to color experience as laid out by David Katz. Katz classified three ways of seeing color: surface color, film color, and volume color (Evertz, p. 88), in surface color, the color is seen as innately tied to the surface of the painting. Film color is the effect of color floating off the canvas dematerialized, the same way we see endless sky or the hovering glow of an after-image. Finally, volume color fills a 3-dimensional area of space. Thus, in contrast to film color, you are able to see within the color itself.

Swain's paintings traverse all three categories of color experience. Positioning different patterns of grid, certain areas will remain squarely planted in surface, while depending on your viewing duration, others will seemingly lift off the canvas. Still other gradations will seem to project outward, taking on the 3-dimensionality of volume color (Figure 5)

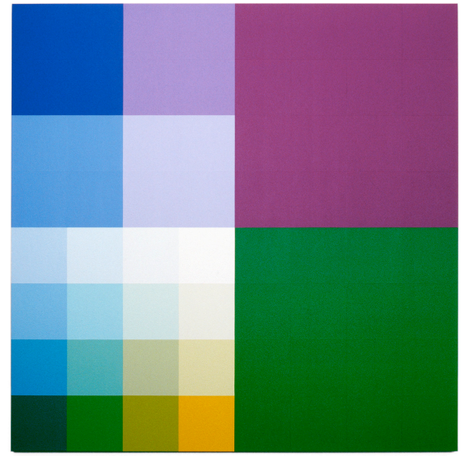
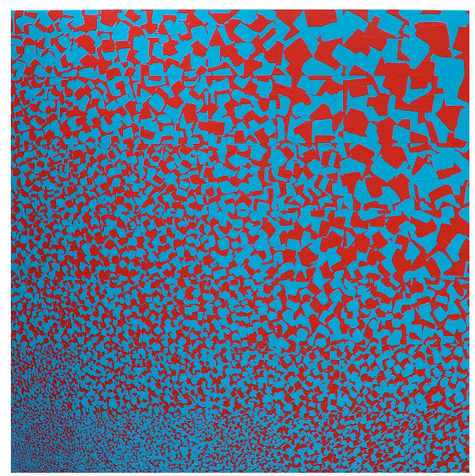


Fig. 5. Untitled, 1999-2001, acrylic on canvas, 8' x 8', [8x8-5A 4A 117B/117B x 4A]

The Brushstroke Series

Swain's latest work has introduced a critical new variable to the study of color painting: brushstroke. While still working within the confines of a predetermined grid pattern, he has added a textural, free form element to the application of paint. Primarily, Swain has directed his efforts to the interaction to two colors in each painting or grid section. Within a single work, he may vary the size of the brushstroke, but neither color dominates. Instead, they work simultaneously to highlight their inherently unique qualities without loosing any of their own. For example, in Figure 6., as soon as the blue catches your eye, it is equally transfixed on the red. The brushstroke seems to disintegrate toward the lower left quadrant of the canvas, but on closer inspection, the ratio and shape of pattern is proportionate and each brushstroke remains its own unique entity. Instead of modulation through color, the modulation within the painting is through brushstroke size.



Untitled, 2007, acrylic on cotton duck canvas, 7' x 7', [21-25-6 x 7-25-6], (07.06), collection of Albright-Knox Museum

These latest series of paintings bring to mind the studies of Georges Seurat, who posited a harmony through synthesis of color (Protter, p.165). The tactility of brushstroke, for Swain, is another way of activating perception (Swain, March 18th). Through his Seurat-like synthesis of color, Swain maintains a dynamic equilibrium, allowing the new paintings to take on the same qualities as his older, but with a new perceptual twist, drawing greater attention to the relational quality of paint. The textural brushstroke emphasizes the surface color in a way his earlier paintings did not, but, because of the color juxtaposition, he still manages to create film and volume color. In this way, his latest work furthers his original studies while activating our eye to acknowledge another dimension of color—tactile movement of the actual paint.

Conclusion

The usefulness of applying language to color perception lies in bringing the unconscious emotive qualities into an understandable realm. We may never be able to understand why we feel when we look at color relations, but we can understand how the color works. There is still the unknowable, which lies in the Goethe-like notion of subjective response. Robert Swain's paintings elevate our understanding of perception, by activating and isolating ways of seeing that are usually taken for granted. This heightened awareness can only be felt but not grasped. As Swain himself has said, "this is something you haven't experienced before. I cannot tell you how" (Swain, March 18th).

Rachel Stokoe June 27, 2009

Works Cited

1. Arnheim, Rudolf. "The Expression and Composition of Color." The Journal of Aesthetics and Art Criticism, Vol. 56, No. 4, (Autumn, 1998), pp.349-352. Blackwell Publishing.

2. Birren, Faber. "Color Perception in Art: Beyond the Eye into the Brain." Leonardo, Vol. 9, No. 2, (Spring, 1976), pp105-110. MIT Press.

3. Burton, David. "Red, Yellow and Blue: The Historical Origin of Color Systems." Art Education, Vol. 45, No. 6, (Nov., 1992), pp. 39-44. National Art Education Association.

4. Evertz, Gabriele. Light Sensations in Painting and Nature. Seeing Red: On Nonobjective Painting and Color Theory, pp. 84-96. Ed. Michael Fehr and Sanford Wurmfeld. Salon Verlag, Cologne 2004.

5. Protter, Eric. Painters on Painting, pp. 165-166. New York: Dunlap/Universal Library, 1997

6. Ratliff, Floyd. The Theory of Color and Practice of Painting. Color Function Painting: The Art of Josef Albers, Julian Stanczak and Richard Anuszkiewics, pp. 5-15. Wake Forest University Fine Arts Gallery, Winston-Salem, North Carolina, 1996.

7. Rossiter, Jill. The MLA Handbook: Rules for Format & Documentation. U.S.A.: D.W. Publishing Co. 2008.

8. Swain, Robert. Statement. Seeing Red: On Nonobjective Painting and Color Theory, pp. 188-190. Ed. Michael Fehr and Sanford Wurmfeld. Salon Verlag, Cologne 2004.

9. Swain, Robert. Personal Interview. 18, March 2009.

10. Stromer, Klaus, Urs Baumann. Color Systems. Trans. Randy Cassada. Konstanz: Regenbogen Verland Klaus Stromer. Germany, 1996.