

How Line is Perceived

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Abstract

Line or what we perceive line to be has been one of the first forms of communication and is still used today. It is also one of the basic building blocks in art education and a point at which to begin discussions of art. Images of what the brain perceives line to be travel through the eye and then to the brain where the imagery is then processed. Artists throughout time have used a variety of lines in their works of art as do artists of today. Even in the digital world, line continues to be a timeless element of art and means of communication.

Part I: Line Defined

The word line can be used to describe a variety of meanings in an array of contexts. The definition for line has a broad range of meaning both in and outside the art field. In the Farfax Dictionary the term is used to describe the “front line” of the army, the “line” people stand in while they wait, an electrical “line” or wire, and the word was also used to describe someone “getting out of line” as in their behavior (Line, 2009). A line can be defined in art terms as simple as “a thin mark on a surface created by a pen, pencil, or brush and an element of art” (Turner, 2001, p.276). When looking in *Arttalk*, Rosalind Ragans goes into a little more detail and describes a line as “a mark drawn with a pointed, moving tool or the path of a dot through space and is used by an artist to control the viewer’s eye movement” (Ragans, 1995, p.380).

When I define line in the art classroom I discuss the line as a point moving across the page, and also go into detail about the different types of lines: vertical, horizontal, diagonal, curved, and zigzag, and the variety of ways a line can be changed to vary the emotion or personality of the artwork. Lines can be thick, thin, dotted, or even change directions depending on what the artist is trying to communicate. When defining line, it is also important to include that it might not only be the mark that is made, but also a line could be the difference between textures, values or colors, that our brain interprets as a line.

Part II: How the Image of a Line Travels through the Brain

If line exists and can be defined, how then do our brains interpret what is seen? Cezanne stated, "There are no lines in nature" and one might say sure there are, I see them and they have defined! (Bickley-Green, in press). But what does the eye actually see and what is it that the brain is interpreting? The brain transforms the difference between two values or objects as a line. Artists interpret the start and stop of an object, value or color change as being a line. The brain is conditioned to see and compare any boundary or change in the visual field as the appearance of a line. A line simply is a symbol that represents the value, color, directional, or any other change that occurs. The visual system compares the luminance areas, or measure of photons reflected from a surface, in the image area. (Bickley-Green, in press).

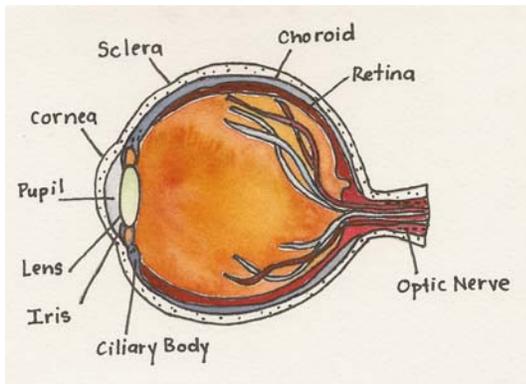
In order to talk about how lines are seen and how artists interpret the boundaries, we must also talk about how our eyes and brains work together. When we see a line or a visual boundary the image enters our eyes first through the lens. The eye focuses on some object or image and its surroundings. The image is then focused to a light sensitive membrane in the back of the eye called the retina. The retina is actually part of the brain and actually transforms or converts the image and light patterns into signals the brain understands (Nationmaster, 2004).

Once the image goes through the lens and to the retina, the image is sent into the visual cortex, part of the occipital lobe. It then disperses to either the dorsal stream, which begins in the occipital lobe and travels to the parietal

lobe, or to the ventral stream, which again begins in the occipital lobe and this time travels through the temporal lobe, for further processing. Images that go through the dorsal stream are processed quickly. The dorsal stream crosses neurons that process contrast, movement, directions and edges. High contrast shapes, movements in space, jagged lines, and sharp angles are all processed here (Quinn, 2004).

The ventral stream processes color, texture, and details. Images here are processed more slowly. This part of the brain is activated by lower contrast images, smooth curved lines, color, texture, details, and subtle value shifts (Quinn, 2004). It is important for artists and designers to consider both the “Where” (Dorsal Stream) and “What” (Ventral Stream) streams when creating artwork in order to catch and hold interest.

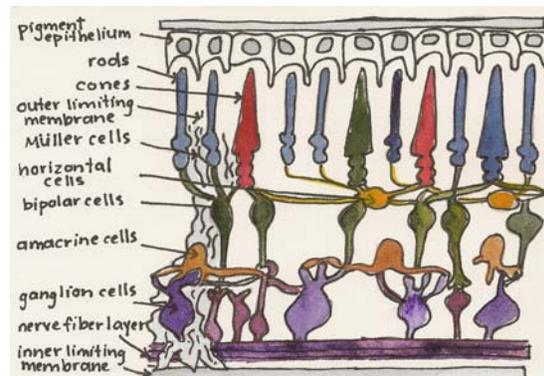
The Visual System



Olander, C. (2009). *The Visual System*. [Watercolor and sharpie]. Collection of the artist.

The image and light enter the eye through the lens.
It then travels to the retina...

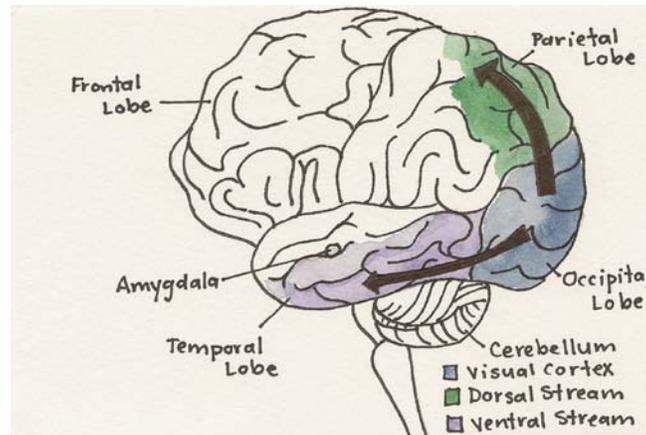
The Retina



Olander, C. (2009). *The Retina*. [Watercolor and sharpie]. Collection of the artist.

The retina then converts the light and image into something the brain can understand. The message then goes to the visual cortex in the occipital lobe where it travels next into the dorsal or ventral streams to be further processed.

The Dorsal and Ventral Streams



Olander, C. (2009). *The Dorsal and Ventral Streams*. [Watercolor and sharpie]. Collection of the artist.

The Dorsal Stream

(or "Where" Stream)

- Guidance of Actions
 - Spatial Awareness
- Analyzing Movements
 - Contrast

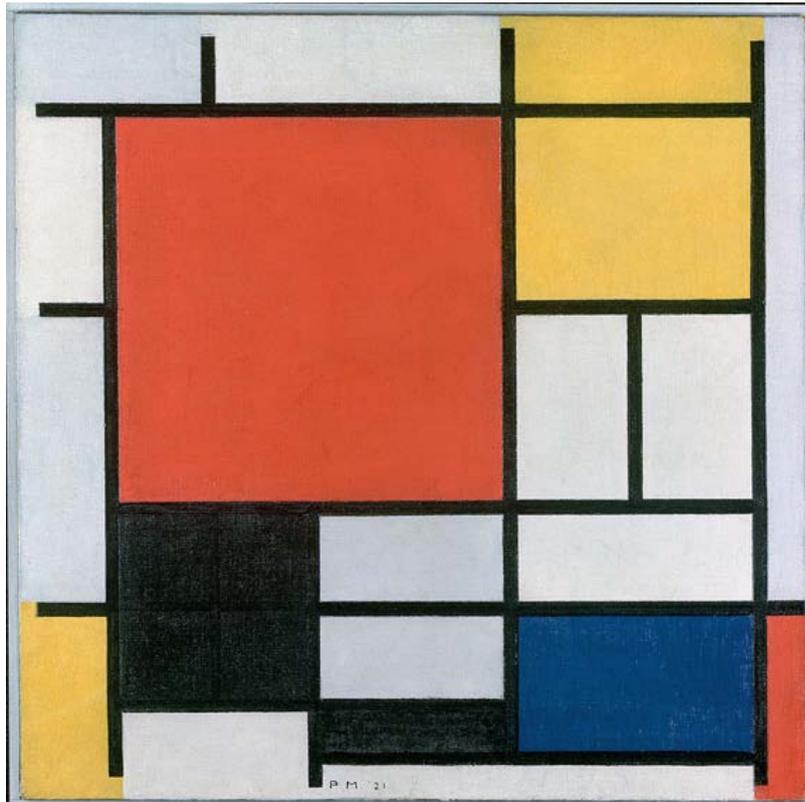
The Ventral Stream

(or "What" Stream)

- Object Recognition
- Form Representation
 - Details
- Descriptions
 - Color

Part III: How Artists have used Line in the Past

Artists throughout time have been in search for connections and truths in art: Wassily Kandinsky and his connection to color and music as well as Piet Mondrian and his connection to line. Semir Zeki states in his *Essays on Science and Society*, that "Mondrian, in search of the constant truths concerning forms, settled on the straight line as the major feature of his compositions" (Zeki, 2001). Zeki also goes on to say that Mondrian is not the only artist who incorporates the line in their art when he states, "The straight line has also been used artistically in variable ways by many other painters, including Kazimir Malevitch and Barnett Newman" (Zeki, 2001).



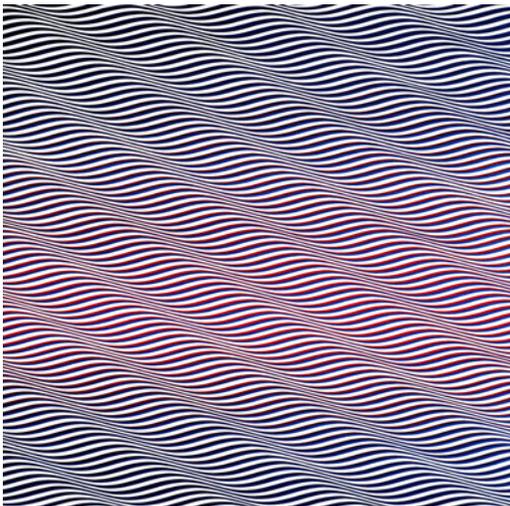
Mondrian, P. (1921). Komposition mit großer roter Fläche, Gelb, Schwarz, Grau und Blau. [Oil on canvas] Mondrian/Holtzman Trust, c/o HCR International, Warrenton VA USA. Retrieved July 16, 2009 from Art Daily. <http://www.artdaily.com/images/2007/12/08/01koln.jpg>

Here Mondrian explained his reasoning behind some of his perpendicular lines,

It is possible that, through horizontal and vertical lines constructed with awareness, but not with calculation, led by high intuition, and brought to harmony and rhythm, these basic forms of beauty, supplemented if necessary by other direct lines or curves, can become a work of art, as strong as it is true (Genn).

Mondrian uses a very simple composition of straight vertical and horizontal lines and the addition of only primary colors. He takes a scene and then abstracts and minimizes the subject in order to simplify things down to the very essence of the forms.

In contrast, Bridget Riley takes the line and curves it and repeats it in order to create optical illusions. Here she takes a curved line that varies in width and repeats it in each row only shifting it slightly to the left as it moves down the picture plane. She slightly changes the color of the line adding to the optical illusion effect. Here our eyes and brains possibly wonder if the color changed or if it is part of the illusion.



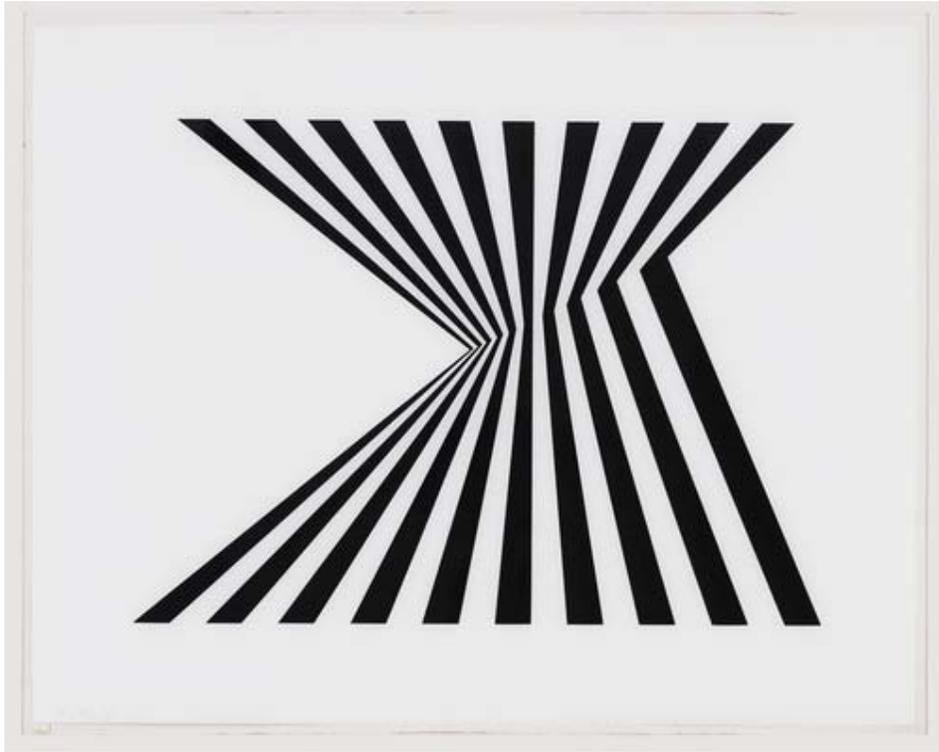
Riley, B. (1967). *Cataract 3*. [PVA on canvas]. British Council, London. Retrieved July 16, 2009, from Wikipedia. http://en.wikipedia.org/wiki/Bridget_Riley

In *Arrest* Riley uses vertical lines that are once again curved and repeated. She shifts the lines just slightly up as they move from the dark center to the right of the page. On the left side she uses a slightly different line as the values fade off the page. Both Mondrian and Riley have simplified their compositions down to the use of line and an economy of color and value changes. The obvious emphasis is on line.



Riley, B. (1965). *Arrest*. [Emulsion on Canvas]. Retrieved July 16, 2009, from Grant Wiggons.
<http://www.wiggz.com/blog/2009/02/bridget-riley-verner-panton/>

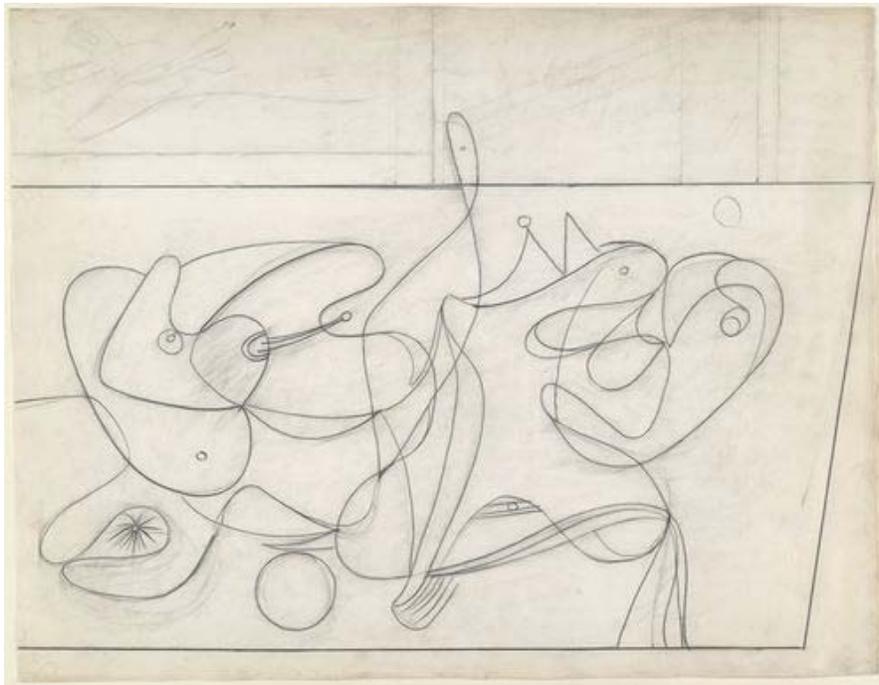
In *Untitled Fragment 1* from *Fragments* Riley once again uses only 10 straight zigzag lines to create her composition. Here the optical illusion of an eleventh line is created at a diagonal through the work of art as each line she creates changes direction as it crosses this invisible line.



Riley, B. (1965). *Untitled Fragment 1* from *Fragments 1/7*. [Screen print on perspex]. Tate Collection, London, P07104. Retrieved July 16, 2009, from The Tate Collection.
<http://www.tate.org.uk/servlet/ViewWork?cgroupid=999999961&workid=12589&searchid=9666&tabview=image>

Arshile Gorky, like Mondrian and Riley, uses line as his emphasis. He also moves away from the figurative and more representational objects in order to abstract the forms and create only the essence of nature in his work. He, like the other artists uses very few colors and values in his work. His lines, unlike Mondrian and Riley, however, appear more uncontrolled. He wanted his art to appear unplanned and automatic and leave the

viewer's eye wondering in the artwork longer. His artworks are made up of linear units or "hybrids" with multiple meanings (MoMA, 2009). Arshile Gorky stated that "Drawing is the basis of art" (Princethla, May 2004). It is with line and the moving point across his page that the images come from the brain and to his paper. He, like other surrealist artists prided themselves on the automatic response from brain to paper. Here with lines, Gorky is able to move the eye around the artwork letting the brain tap into its imagination. Gorky was able to get to the basics of line, using pencil and crayon, his favored drafting materials (Princethla, May 2004). With his drawings having multiple meanings the viewer is able to drift through consciousness dreaming up limitless possibilities.

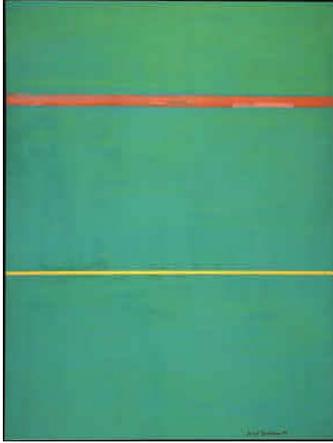


Gorky, A. (c. 1931-32). *Study for "Nighttime, Enigma and Nostalgia."* [Pencil on paper]. Gift of Richard S. Zeisler. Estate of Arshile Gorky / Artists Rights Society (ARS), New York. Retrieved July 16, 2009, from MoMA. http://www.moma.org/collection/browse_results.php?object_id=79222

Part IV: Summary and Personal Application of Line

I find the element of line interesting because it is the basis for other elements of art. From lines shapes can be made, and from shapes, forms. Lines can then be used to add value and texture to the forms, and then be used to place the forms in the foreground or background depending on where a horizon line or another object is placed. Just by changing the utensil being used, the color, value, or feeling can change. A line is a starting point, literally, from which to move in different directions and variations. A line has a personality and a character that the viewer is able to determine and imagine endless potential. It is hard to talk about the other elements of art before first understanding and discussing line.

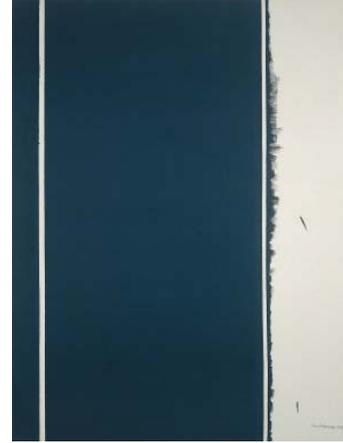
Lines have been used from the beginning of time as a means of communication and have been used to draw symbols or maps and are still being used today in creating digital maps. People use the digital line drawings everyday to get from one place to another or to map out their route. Lines are being used not only in contemporary art and digital art, but they have been used throughout time. Barnett Newman's paintings below are very modern and simple looking compositions with several vertical lines which leaves the imagination to finish the thought.



Newman Example 1



Newman Example 2



Newman Example 3

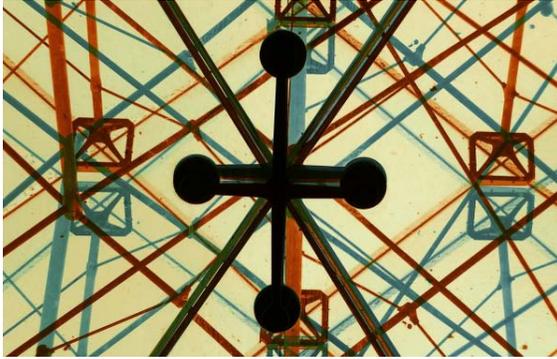
Exp. 1 NewmanB. (1949). *Dionysius*. [Oil on canvas]. Washington: National Gallery of Art: Gift of Annalee Newman, 1988.57.2. Retrieved July 16, 2009 from the National Gallery of Art. http://www.nga.gov/cgi-bin/tinfo_f?object=70526

Exp. 2 NewmanB. (1951-2). *Adam*. [Oil on canvas]. London: Tate Modern Collection, T01091. Retrieved July 16, 2009, from the Tate Collection. <http://www.tate.org.uk/servlet/ViewWork?cgroupid=999999961&workid=10640&searchid=9394>

Exp. 3 NewmanB. (1965). *Twelfth Station*. [Oil on canvas]. Washington: National Gallery of Art: Collection of Robert and Jane Meyerhoff, 1986.65.12. Retrieved July 16, 2009 from the National Gallery of Art. http://www.nga.gov/cgi-bin/tinfo_f?object=69382

At the Newman show at the Philadelphia Museum of Art, one curator spoke of Newman's artworks, "Despite their apparent simplicity, Barnett Newman's paintings are among the most challenging works of art of the twentieth century" (Williams, 2009). Even though his artwork appears simple, his use of lines and color together evoke emotions from the spirit.

Artists are continuing to use line in their works and now combining the line emphasized works of art with digital effects in order to enhance the visual experience. Below a photograph is transformed into a line study using Photoshop.



Steele, M. (2009). *Ceiling of the Louvre*. [Photoshop]. Collection of the artist. Retrieved July 16, 2009 from Spray Graphic. <http://www.spraygraphic.com/ViewProject/758/normal.html>

Here artist, Max Steele actually transforms the ceiling of the Louvre into a study of overlapping lines.



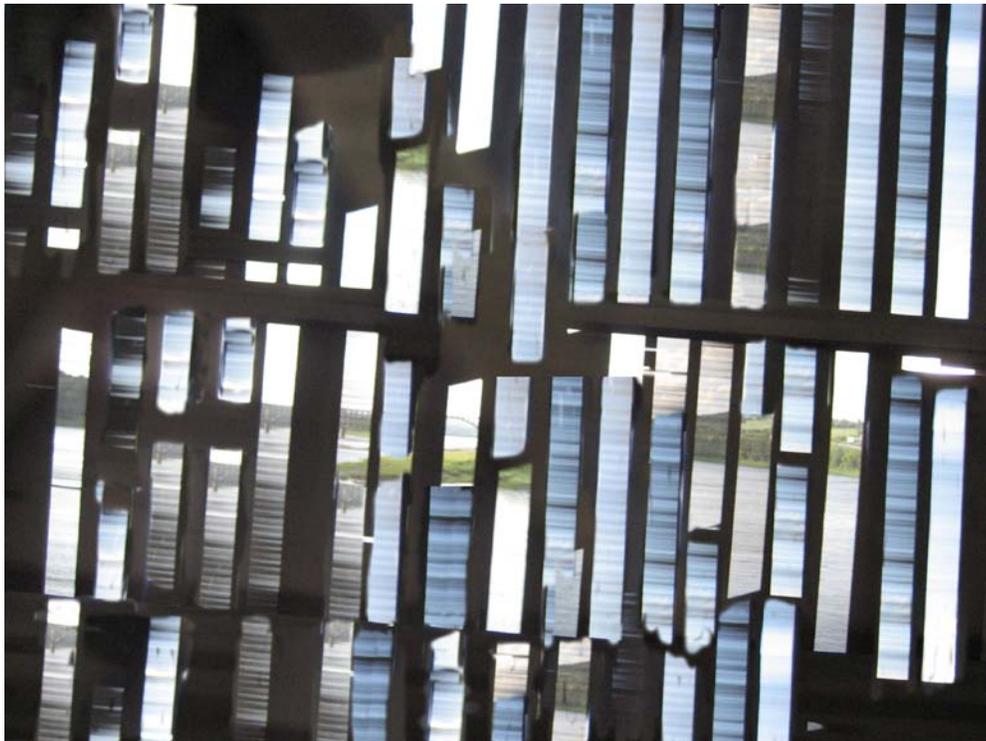
Steele, M. (2009). *Line and Color Study*. [Photoshop]. Collection of the artist. Retrieved July 16, 2009 from Spray Graphic. <http://www.spraygraphic.com/ViewProject/758/normal.html>

These digital images have a crisp quality that is unlike other more traditional mediums such as pencil or charcoal.

Below are several line images of my own digital work created in Photoshop from photographs I have taken. I tried to find images that were interesting or had a line quality that stood out to me and then found patterns I liked and used the clone tool to repeat line patterns or the filter to add a different effect. In all of the images, as different as they may be,

I have used a variety of line, (vertical, horizontal, diagonal, curved and zigzag) to create the different compositions.

This was a photograph I took in the longest covered bridge in Canada while riding in the car. The bridge had strong vertical lines, and I really liked the contrast of some of the more blurred short horizontal lines.



Olander, C. (2009). *Lines in Motion*. [Photoshop]. Collection of the artist.

The next image is from a photograph I took of the ceiling of the Solomon R. Guggenheim Museum ceiling. I cloned line images and then cropped the photograph.



Olander, C. (2009). *Guggenheim Ceiling*. [Photoshop]. Collection of the artist.

In *Lion Fish*, I repeated the strong striped pattern on the side of the fish, along with the more subtle pattern on the tail and fins to create the line pattern.



Olander, C. (2009). *Lion Fish*. [Photoshop]. Collection of the artist.

The simplicity of the lines created from the shadows on the steps stood out to me in this photograph. Here I outlined the shadows and then used a filter.



Olander, C. (2009). *Stepping Shadows*. [Photoshop]. Collection of the artist.

It is amazing how simple a line seems, but how complex it really can be in all its variations and deviations. The same assignment in line could have endless interpretations, which is a by product of the nature of art and creativity. I am drawn back to the examples I used from Mondrian, Riley, Gorky and Newman. Their line compositions appear so simple and effortless, however, I then think of the comments from the curator at the Philadelphia Museum of Art and how he talked about the challenging aspects of Newman's work. The possibilities for line are endless, and as the eye and brain continue to analyze images and contrasts, the imagination will continue to explore the infinite potential in art.

References

- Barrett, D. C. (2009). *The collection: About this artist*. Retrieved July 14, 2009, from MoMA Web site:
http://www.moma.org/collection/browse_results.php?criteria=O%3AAD%3AE%3A4929&page_number=1&template_id=6&sort_order=1#bio
- Bickley-Green, C. A. (in press). *Art Elements: Biological, global, and interdisciplinary connections*. Dubuque, IA: Kendall Hunt.
- Genn, Robert. *Piet Mondrian art quotes*. Retrieved July 14, 2009, from The Painter's Keys Web site:
http://quote.robertgenn.com/auth_search.php?authid=65
- Gorky, A. (c. 1931-32). *Study for "Nighttime, Enigma and Nostalgia."* [Pencil on paper]. Gift of Richard S. Zeisler. Estate of Arshile Gorky / Artists Rights Society (ARS), New York. Retrieved July 16, 2009, from MoMA.
http://www.moma.org/collection/browse_results.php?object_id=79222
- Kolb, H., Fernandez, E. ,& Nelson, R. (2003). Simple anatomy of the retina. *Webvision: The Organization of the Retina and Visual System*. Retrieved July 10, 2009 from:
<http://www.webvision.med.utah.edu/sretina.html>

Line. (2009). The free dictionary by Farfax. Retrieved July 24, 2009, from

<http://www.thefreedictionary.com/line>

Mondrian, P. (1921). *Komposition mit großer roter Fläche, Gelb, Schwarz,*

Grau und Blau. [Oil on canvas]. Mondrian/Holtzman Trust, c/o HCR

International, Warrenton VA USA. Retrieved July 16, 2009 from Art

Daily. <http://www.artdaily.com/imagenes/2007/12/08/01koln.jpg>

Museum of Modern Art, (2009). *The Collection.* Retrieved July 16, 2009,

from MoMA Web site:

http://www.moma.org/collection/browse_results.php?object_id=792

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NewmanB. (1949). *Dionysius.* [Oil on canvas]. Washington: National Gallery

of Art: Gift of Annalee Newman, 1988.57.2. Retrieved July 16, 2009

from the National Gallery of Art. [http://www.nga.gov/cgi-](http://www.nga.gov/cgi-bin/tinfo_f?object=70526)

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NewmanB. (1951-2). *Adam.* [Oil on canvas]. London: Tate Modern

Collection, T01091. Retrieved July 16, 2009, from the Tate Collection.

[http://www.tate.org.uk/servlet/ViewWork?cgroupid=999999961&wor](http://www.tate.org.uk/servlet/ViewWork?cgroupid=999999961&workid=10640&searchid=9394)

[kid=10640&searchid=9394](http://www.tate.org.uk/servlet/ViewWork?cgroupid=999999961&workid=10640&searchid=9394)

NewmanB. (1965). *Twelfth Station.* [Oil on canvas]. Washington: National

Gallery of Art: Collection of Robert and Jane Meyerhoff, 1986.65.12.

Retrieved July 16, 2009 from the National Gallery of Art.

http://www.nga.gov/cgi-bin/tinfo_f?object=69382

- Olander, C. (2009). *Guggenheim Ceiling*. [Photoshop]. Collection of the artist.
- Olander, C. 2009. *Lines in Motion*. [Photoshop]. Collection of the artist.
- Olander, C. 2009. *Lion Fish*. [Photoshop]. Collection of the artist.
- Olander, C. 2009. *Stepping Shadows*. [Photoshop]. Collection of the artist.
- Olander, C. 2009. *The Dorsal and Ventral Streams*. [Watercolor and sharpie]. Collection of the artist.
- Olander, C. 2009. *The Retina*. [Watercolor and sharpie]. Collection of the artist.
- Olander, C. 2009. *The Visual System*. [Watercolor and sharpie]. Collection of the artist.
- Princethla, N. (2004, May). Line Readings: Arshile Gorky's Drawings. *Art in America*, 92(5), 134-139. Retrieved July 14, 2009, from Academic Search Premier database.
- Quinn, H. (2004) *Where/What vision system and design*. Retrieved July 10, 2009, from http://www.evolt.org/article/Where_What_Vision_Systems_and_Visual_Design/22/60261/index.html
- Ragans, R. (1995). *Arttalk*. New York: Glencoe/McGraw-Hill.
- Riley, B. (1965). *Arrest*. [Emulsion on Canvas]. Retrieved July 16, 2009, from Grant Wiggons. <http://www.wiggz.com/blog/2009/02/bridget-riley-verner-panton/>

Riley, B. (1967). *Cataract 3*. [PVA on canvas]. British Council, London.

Retrieved July 16, 2009, from Wikipedia.

http://en.wikipedia.org/wiki/Bridget_Riley

Riley, B. (1965). *Untitled Fragment 1* from *Fragments 1/7*. [Screen print on perspex]. Tate Collection, London, P07104. Retrieved July 16, 2009, from The Tate Collection.

<http://www.tate.org.uk/servlet/ViewWork?cgroupid=999999961&workid=12589&searchid=9666&tabview=image>

Steele, M. (2009). *Line and Color Study*. [Photoshop]. Collection of the artist. Retrieved July 16, 2009 from Spray Graphic.

<http://www.spraygraphic.com/ViewProject/758/normal.html>

Steele, M. (2009). *Ceiling of the Louvre*. [Photoshop]. Collection of the artist. Retrieved July 16, 2009 from Spray Graphic.

<http://www.spraygraphic.com/ViewProject/758/normal.html>

Turner, R. M. (2001). *Portfolios: State of the art program*. Austin, Texas: Barrett Kendall Publishing, Ltd.

Visual System. (2005). Encyclopedia: Visual perception. *NationMaster.com*.

Retrieved July 10, 2009, from

<http://www.statemaster.com/encyclopedia/Visual-perception>

Williams, Scott (2009). Barnett Newman. Retrieved July 25, 2009, from Philadelphia Museum of Art Web site:

http://www.philamuseum.org/micro_sites/exhibitions/newman/index.html

Zeki, Semir (2001, July 6). Essays on science and society: Artistic creativity and the brain. Retrieved July 14, 2009, from Science Magazine Web site: <http://www.sciencemag.org/cgi/content/full/293/5527/51>