Line

chapter one

For the Reader: General Introduction

It is common knowledge that that the artist is both something of a scientist and of a "bricoleur" (Levi-Strauss, 1966, p. 22).

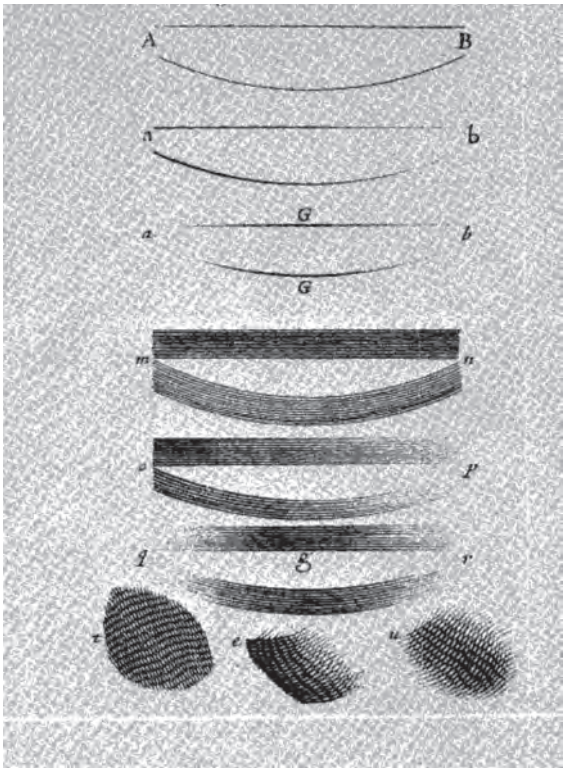
This study explores the visual components of images for the purpose of sharpening the artist's and designer's skills in understanding and using visual art elements, and learning how others have used the elements in images and three-dimensional art. The topics for the study are limited to common visual-art elements identified by art theories proposed by visual-art practitioners in many cultures. Generally, artists wrote theories of art to teach their colleagues and students art skills. Writings by artists explain their understanding of studio art-making and designing. Because visual imagery is communication that occurs in physical, social, political, cultural, educational, scientific, and economic settings, many interdisciplinary concepts are related to the image- and object-making. As noted by Levi-Strauss, the artists' images and forms become material cultural and, as such, represent knowledge. Connections between art and mathematics, geometry, chemistry, and psychology emerge.

In this book, unless otherwise noted, the term **artist** refers generally to form-maker and may denote artist, craftsperson, draughts person, and/or designer. The **Try It!** studio projects at the end of each chapter give the student an opportunity to explore ideas in the text. Certain art works are referred to throughout the text with the hope that the student will gain a deeper understanding of the complexity of images.

Formal Elements in Art

Conventionally, study of the formal elements of art has been a feature in visual-art instruction since the beginning of the 20th century (Podro, 1965). Other researchers identify the invention of photography as the point at which artists began to analyze abstract qualities needed to represent the visual world (Bradley, Harris, & Jenner, 2006). Henry William Fox Talbot developed the photograph as a way to facilitate his artistic drawings. But prior to the development of photography, careful analysis of the components of visual images began in the West with the invention of printing in 1450 (Cazort, 1997). By 1540, transferring an image from a drawing to a

block was the work of the specialist "whose business it was to draw with lines that were suitable for their technical purpose" (Ivins, 1969, p. 44). Examples of analyses of line and creating form and value are in Bosse's *Treatise on Engraving* (1645). However, as demonstrated in the follow chapters, artists in many cultures at many times considered and wrote about the elements of art. Notably, in 479–501 Hsieh Ho wrote *The Six Canons* of painting, wherein he refers to the structure created by a brush [line], the representation of form, the nature of color, and the organization of the elements in place [space] (Mai-Mai Sze, 1963).



The lines in Bosse's sample page show marks made by an engraving tool. The straight and curved lines in (AB) illustrate even widths from one end of the line to the other; (ab) taper at the right side; (aGb) tapers at both ends; (mn) shows that a series of parallel even lines create an even value; (op) the series of tapering parallel lines create a dark value on the left and a lighter value on the right; (qgr) the series of tapering lines at both ends create a value from light to dark to light. Generally parallel lines such as these that create value are called hatch marks. The sets of crossed lines in (r), (e), and (u) are cross-hatch marks. The set (r) is created with lines of even width; set (r) is created with lines that taper on the right and the value area starts as a dark shade and becomes grey or lighter; and the set (u) created with lines that taper at both ends is light on the right and left edges and darker in the middle.

There are no lines in nature. Cezanne

> *PEIRCE: The American philosopher Charles S. Peirce, the founding father of semiotics—the science of signs—proposed a distinction between icon, index and symbol. An icon is a Sign that represents its Object in resembling it. An index is a Sign that represents its Object without being actually connected with them. A symbol is a Sign that represents an Object essentially because it will be so represented. (in* Charles S. Peirce, Selected Writings, *Dover Publications, 1958, p. 368)*

Lines, as intentional mark-making for decorative pattern, are found on bone artifacts from early Paleolithic times. One may conjecture that the convention of lines as imagery began much earlier than the artifacts illustrated in this chapter, and speculate that many early groups used lines in body and object ornamentation. Ice Man, a frozen, 5,300 year-old, mummy found in 1991, had 57 line tattoos. However, other than the tattoos on Ice Man, most painted or drawn images created on organic surfaces such as skin, bark, and wood have not been found. The tattoos on the Ice Man, a frozen 5,300 year-old mummy, are among the few drawings on organic surfaces that have been found. Most early images on surfaces such as skin, bark, and wood have deteriorated. Objects made of perishable line-like materials such as reeds, vines, and fibers would have started a tradition of visual communication through visual elements such as line, shape, and color long before the creation of the more durable images discussed below.

Line as Sign: Developing Symbol, Icon, Index

Line as a major element for communicating information appears in early extant artifacts, and continues through the history of image-making. This history demonstrates that lines share various kinds of information: pictures of animals and people, decorative embellishments for buildings, visual recording of spoken languages, maps, drawings for buildings, and geometric constructions. To better understand one characteristic of this visual information, we will use a classification system borrowed from semiotics, the study of signs. The semiotician Charles Peirce created a complex scheme to examine and classify how we make meaning from experience. Meaning may be gained through words, visual images, sounds, odors, flavors, gestures, or objects. Peirce identified over 50,000 classifications for signs. In part of the system applicable to the visual arts, there are three basic types of signs. Some images are symbols–the image is conventionally understood to represent object or idea; some images are icons–images that resemble the visual appearance of object; and other lines are indices or images that show a causal relation to the referent. Photographs are sometimes used to illustrate this idea because the image is created directly by recording a light pattern. Although Peirce's basic classification is simple, in application an image might be a combination of the classes, depending upon how the image is interpreted by the viewer.

To further complicate the semiotic classification of visual form, we will see that the initial communication of the configuration changes over time. As a particular mark becomes an artistic convention, new artists use the mark in different ways and contexts.

Line: Index (Marks)

Prehistoric artifacts created by humans show marks that create intentional line patterns, and are among the first recorded evidence of visual communication or visual signs. An early example is a pattern composed of diamond-shapes incised on ochre plaques by artists who lived about 75,000 years ago. The artifacts were found in Blombos Cave, Africa. The image below may be considered an index, because it shows the direct trace of the tool that scraped the line into the surface of the stone.

Blombos Cave Ochre. Pattern composed of diamond–shapes. Illustration by Michael Robert Williams (in collection of the author) after an image in "Emergence of Modern Human Beavior: Middle Stone Age Engravings from South Africa" by Christopher S. Henshilwood et al (2002), DOI: 10.1126/science.1067575.

However, the arrangement of lines in image can be identified by the contemporary viewer as an intentional pattern because the marks scraped or incised into the flatten surface of the ochre block are recognized as a pattern of repeated diamonds or parallelograms and triangles framed between horizontal lines. In this example, the image may also be considered a **symbol**. We cannot make meaning from the incised lines that we see, other than to interpret to some degree how the marks were made and, based on that observation, conjecture that the marks were made not to convey information but are the traces of an action. The **index** mark suggests that one or more humans scraped the rock, perhaps to obtain a powdered form of red ochre.

Lines: Icons (Pictorial Representations)

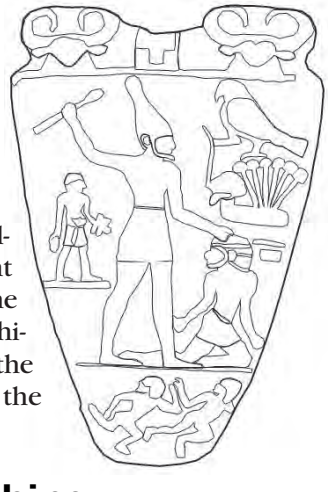
The cave of Chauvet-Pont-d'Arc presents early line drawings of animals. Scientific studies of the drawings of two rhinoceroses and one bison suggest that the pictures may have been made between 30,340 and 32,410 years before the present time. These images are **iconic** or pictorial and, again, while we do not know the details of the message, we do know that the artist is communicating something about rhinoceroses and bison. We share a common referent with the artists. (See http://www.culture.gouv.fr/culture/arcnat/chauvet/en/)

Lines: Symbols (Representing Ideas and Language)

Lines are also the elements of written languages. These visual analogs for aural languages developed independently in three regions of the world. More than 5,000 years ago in southern Mesopotamia, cuneiform marks were incised on clay. The cuneiform marks are not iconic or pictorial in the sense of being mimetic or looking clearly like identifiable objects, but they may be both indices and symbols.

A particularly famous mathematical example of cuneiform is the clay tablet known as YBC 7289. This tablet is inscribed with a set of numbers using the Babylonian sexagesimal (base-60) system. In this system, a symbol resembling a less-than sign (we will use <) represents the value 10 and a symbol resembling a tall narrow triangle, with the tip pointing down, represents the value 1 (we will use |). For example, the value 30 is written (roughly) like this: <<<. This value can be seen along the top-left edge of YBC 7289. (Case study: YBC 7289. Clay tablet YBC 7289 showing cuneiform inscriptions that demonstrate the derivation of the square root of 2.) Retrieved May 23, 2008, from http://www.stat.auckland.ac.nz/~paul/ItDT/HTML/node46.html. West Semitic Research/Yale Babylonian Collection.

Ancient Egyptian Narmer Palette, ca. 3100 BCE, Hierakonpolis. Retrieved from http://en.wikipedia.org/wiki/History_of_writing#Proto-writing. Illustration by Martika Minger.



Egyptian hieroglyphics appear in 3100 BCE, and although this use of lines and marks to share ideas might have been transmitted from Mesopotamia to Egypt, the hieroglyphics were often pictographs. Some Egyptian hieroglyphics were both icons and symbols. Like a pun, the picture represented a form but the meaning resided in the sound of the name of the represented form.

Apart from the Middle Eastern development of cuneiforms and hieroglyphs, Chinese pictographs developed about 1500 BCE and began as Jiaguwen or Oracle bone script. The inscriptions show a writing system that was developed during the Bronze Age in the second half of the 3rd millennium. One scholar suggests that the images were language symbols rather than pictures or icons.

The history of oracle bone scripts provides an interesting example of how line forms develop over time and how far-reaching the influence of an image design may be. Historians note that the structure and meaning of the pictographs on the bones created in the Shang period were already well developed before the images were used in the Oracle divination ritual and appear as inscription on bronze vessels to identify the owner of the object. The vertical arrangement of the pictographs on the Oracle bones may have led to the vertical organization of Chinese calligraphy. Later, after more than 3,500 years, the Oracle bone artifacts were rediscovered in China in the 1890s. Great interest in the unearthing of the ancient pictographs effected a change in the style of modern Chinese calligraphers of the period. See http://www.china-window.com/china_culture/script_calligraphy/oracle-inscriptions-jiagu.shtml for images and more information about the meaning of the oracle bone fragment imagery.

Mesoamerica was the third location where written language developed in about 500 BCE to 1697 CE. Mesoamerican scripts were a complex, pictorial form of signs also called **hieroglyphs**. These representations of aural language or simplified representations of visual form provided records of past events and cosmologies.

For example, the Humboldt Celt, believed to have been carved at around 900 BCE, shows several groups of symbols likely worked together to convey some kind of a message. Interpretation by John Justeson indicates that the celt likely served as a formalized greeting from the ruler of one site to another, since the group that depicts two arms touching is a typical Mesoamerican gesture of greeting, and the group that depicts a hand casting corn represents a ceremony marking special occasions. Mesoamerican Writing Systems. See http://www.ancientscripts.com/ma_ws.html for a diagram of the image.

The ceremonial celts put symbols together to give a sequence of ideas. Fans of Indiana Jones movies will recognize how these ancient scripts have inspired the creative, fictional narrative in the *Kingdom of the Crystal Skull.*

Lines Represented in Maps and Geometric Relations

The element of line also was employed in map-making, measurements of property and buildings, geometry, and diagrams showing proportional relations. The oldest known plan of an actual site is found in the petroglyphs of the Val Camonica in northern Italy. In our simplified semiotic analysis, these maps represent icons and symbols. In the map below, the lines representing rivers and streams have the configuration of the actual rivers and streams in the region and thus are

From "The Oldest Known Plan of an Inhabited Site Dating from the Bronze Age, about the Middle of the 2nd Millennium BCE Rock-Drawings in the Val Camonica," Walter Blumer, *Imago Mundi,* Vol. 18, (1964), pp. 9–11. Reprinted by permission of Taylor & Francis Group, http://www.informaworld.com.

icons. The dots may be symbols for trees. In modern maps, linguistic symbols or names give additional information.

Egypt, Babylon, India, and China had practical geometries or line systems to represent measurements. Perhaps as a result of map making and drawing plans for buildings, ancient scholars and designers began to develop geometrical and mathematical drawings. For a discussion of Egyptian mathematics and images of mathematical papyri see http://www-history.mcs.st-andrews.ac.uk/Indexes/Egyptians.html

In Asia, ancient Indian mathematics is recorded in the Sulbasutras, appendices to religious texts called Vedas. The Sulbasutras gave rules for constructing sacrificial alters and some geometric constructions including an approximation of Pythagoras' Theory. One of the more celebrated of these constructions is a method for squaring a circle. In the development of mathematics, this construction eventually shows how *pi* was developed over time in many Asian cultures as the functional application of builders when they planned and constructed buildings. In this case, lines used in maps and building plans begin as icons and through conventional use over time become symbols in geometry.

An Early Definition of Line

Since its translation from Greek into Latin in the 12th century, *Euclid's Elements*, written in 300 BCE, has influenced artists and architects in Western cultures. The first four definitions in *Euclid's Elements* define line.

Definition 1.A point is that which has no part.
Definition 2.A line is length less breadth.
Definition 3.The ends of a line are points.
Definition 4.A straight line is a line that lies evenly with the points on it.

From a practical point of view, very early architects and builders in many cultures used a concept of space that started from hands-on concerns related to building structures and defining or organizing spaces. These geometries developed independently in India and the Middle East.

Lines in Art-Making Theory Manuals

Drawing and painting manuals written by both Eastern and Western artists contain references to lines as building blocks of visual images. In China, Hsieh Ho (ca. 479–502) formulated *Six Principles of Painting*. The second of the principles refers to the use of the brush as forming the structure or framework of the image. Sanskrit treatises, called *citrasutras*. provide an in-depth and systematic analysis of the texts on the theory of Indian painting.

In Italy in 1435, Leon Battista Alberti began his treatise on painting by describing how lines create form. His text echoes the Euclidean definitions and uses those geometry definitions to describe how lines create the illusion of form and space in paintings. Many Western artists will continue this tradition.

Line in Contemporary Design Theory

The roots of contemporary design theory that used the element of line start at the beginning of the Industrial age in England.

William Morris

Rejecting the poor quality of the first industrially manufactured housewares and architecture, William Morris promoted design based on the careful observation of nature in order to create visual transitions between natural and human-made forms. His organic, rhythmic linear designs were based on plants and other living objects. The designs were metaphors for living in harmony with nature. Morris felt that aesthetic theory was intricately related to political, economic, and social issues. However, the objects that he designed did not necessarily reflect integration between the techniques of the new industries and a significant change in

form. Instead, he continued the 18th-century arts and crafts tradition and drew additional inspiration from Gothic art and architecture. The design discussed below reflects his interest in making a house decoration that brings plants and animals into the interior living space.

Images created with lines were most functional for Morris' designs for books, wallpapers, tiles, and fabrics. His interest was in the narrative of the designs and how these narratives were related to the lives of the people who owned them rather than the functional abstract qualities of the line form. The lines created iconic forms. (See http://www.morrissociety.org/sand/trellis.html for an image of William Morris' wallpaper.)

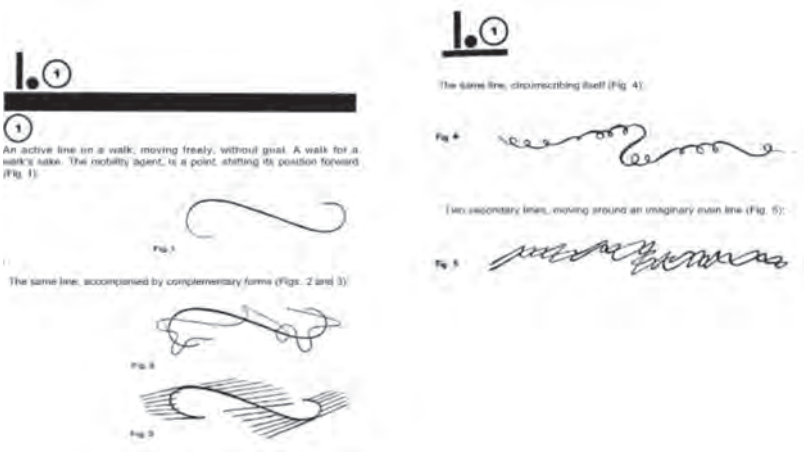
Bauhaus

Also responding to the effect of industrial manufacturing on the quality of life and the interrelations of aesthetics and political, economic, and social concerns, a number of German artists, designers, and teachers, including Walter Gropius, began looking for ways to integrate the training of artists, architects, crafts persons, and industrial designers with the goal of creating a higher quality of modern industrially produced objects. Gropius opened the Bauhaus, a school to instruct students of varied educational preparation to work in the visual arts and design fields. The Bauhaus art images grew in an entirely different direction from the images developed by Morris.

Bauhaus art teachers led by Johann Itten formulated the introductory design course for artists, crafts workers, designers, and architects. The course addressed topics common to many visual art and design applications. New pedagogical theory developed in this school as a result of the instructors' interest in identifying basic art concepts that would apply to the broad range of visual art and design fields. In addition, the Bauhaus teachers sought to develop art theory based on Gestalt theories of perception and expanded spirituality from Eastern religions.

In *Point and Line to Plane* (1926), Wassily Kandinsky elaborates and extends the concept of a science of art. Explicating the relation of art to classical geometry, Kandinsky looked for basic elements of visual art that would lead to a grammar and finally a theory of composition that could be used by artists, designers, and architects. His book articulates how mathematical expression is common to all the arts. The artist-teacher Paul Klee also sought to develop an inclusive rubric to teach the general structure of visual form. Using the language of geometry, he begins with the statement that a line is a point going for a walk; thus he identifies commonalities between the developments of visual form and geometry for the Bauhaus classes.

Drawings from the Pedagogical Sketchbook by P. Klee, 1968, © 2010 Artists Rights Society (ARS), New York/VG Bild-Kunst, Bonn. Retrieved May 27, 2008, from http://www.scribd.com/doc/2480962/Paul-Klee-Pedagogical-Sketchbook.



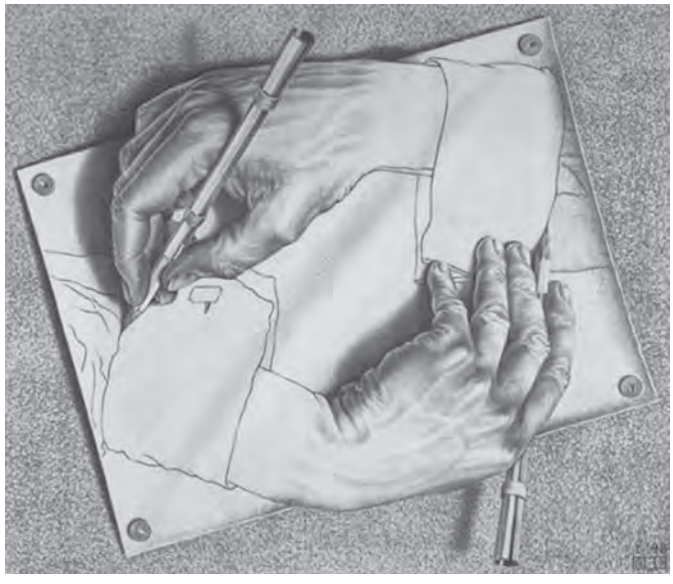
Klee's lines illustrated above provide a semiotic puzzle. According to Klee's text, the lines represent the path of point, so using this interpretation the lines are symbolic. Without the text, some of the lines may be seen as resembling pen and ink exercises—in one sense the trace of a pen; with this interpretation the lines are indices. Explorations of line qualities as exercises in handwriting manuals and architectural drawing manuals were common in turn of the 20th century schools from kindergarten to technical colleges. These lines suggest the artist's interest is similar to the concerns of Blombos Cave artists' and Bosse's enterprise—each of the artists explores line combinations for the visual effects created by the lines that they made.

Seeing Line

Perhaps Euclid, Cezanne, and Klee were right about line.

The experience of line is the result of our visual system's comparison of luminance areas in the visual field. Luminance is a measure of photons reflected from a surface. One photon has the potential to activate one neuron. The place where one area of luminance ends and another begins is perceived as a boundary or edge. Artists sometimes draw these perceived boundaries as lines. The activity is a learned convention. The line is a short-hand simulation of our visual experience. The appearance of the boundary as a line is inferred by our visual system working in tandem with other perceptual systems and visual clues.

For example in Escher's depiction of *Drawing Hands,* the boundaries of the lower sleeves and cuffs of the shirt are represented only in lines even though in tactile experience the creases and edges are folded, rumpled white cloth. In tactile experience, there is no line in nature outlining the cuff of the sleeve. Escher



Escher, M.C., Drawing Hands, Cornelius Van S. Roosevelt Collection, Image courtesy of the Board of Trustees, National Gallery of Art, Washington and © 2010 The M.C. Escher Company-Holland. All rights reserved. www.mcesher.com.

uses line as a symbol to represent the boundary of two luminance areas: shadows formed by the different layers of fabric and the fabric value compared to the table surface. However, to depict the hands, Escher draws the outer edges of the fingers of the lower hand as a darker value (luminance) against the white of the paper or the lightness of the other fingers.

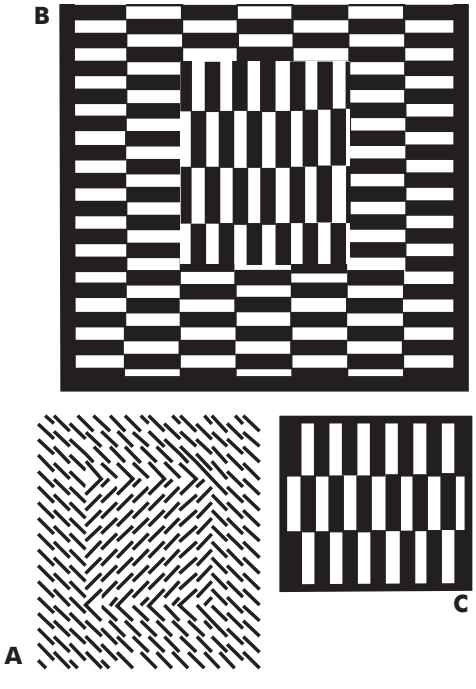
Illusion of Line Where No Lines Are Drawn

Variation on Ouchi Illusions by author.

A. In this illusion, the diagonal lines in the center square may appear darker. Additionally, the vertical columns of diagonal lines on the left and right sides of the composition form illusory edges.

B. Rows and columns of stripes appear to be on different levels.

C. This image isolates three rows of stripes. The middle row usually appears closest to the viewer.

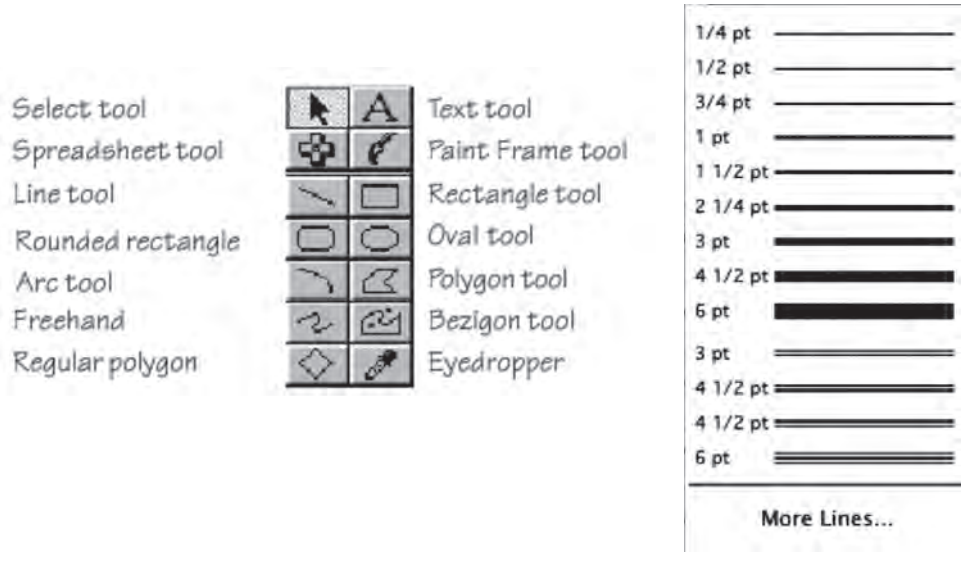


The Ouchi pattern provides an opportunity for us to experience the appearance of an outline around each of the circles. The boundaries of the rainbow in *Melencolia I* shows a similar illusion. The image of the truncated cube also demonstrates how our visual system leads us to interpret the shared edge of the top, triangular face and the adjacent pentagonal face as a line rather than contiguous areas of two grey values.

Dürer, Albrecht (1471–1528). *Melencolia I,* 1514. Engraving, plate 9½ x 7⅜ in. (24 x 18.5 cm). Harris Brisbane Dick Fund, 1943 (43.106.1). The Metropolitan Museum of Art, New York, NY, U.S.A. Image copyright © The Metropolitan Museum of Art/Art Resource, NY.

Line and Computers

MacPaint (1984) drawing tools menu. Some line selections on Microsoft Word 2004 for Mac.



Early computer-generated images were created by plotters with pens or brushes that created lines. Since the introduction of the graphical interface (1983), Apple computers, and MacPaint application programs (1984), line has been a primary element for computer artists and designers. The artist could choose straight, curved, or free form lines of different widths and arrangements. Contemporary artists and designers are more likely to use the variety of draw tools that are available on the Adobe programs Illustrator and Photoshop. With these programs, artists have the possibility of controlling all of the attributes of line that engravers such as Bosse had in 1645 by manipulating with burin cuts the shape of the beginning and ending of the line and the width of the line. The degrees of sharpness and texture are also among the wide range of choices for computer artists.

Photoshop images are constructed as bitmaps or rasters. Common bitmap formats are JPEG, PNG, PICT, and TIFF. These images are composed of small squares or pixels. Most computer screens have 100 pixels or dots per inch. This is abbreviated as 100 ppi or 100 dpi respectively. The disadvantage of this format is that the image cannot retain its resolution or sharpness if it is enlarged. When the image is scaled up, the computer creates new pixels and estimates the color values based on the surrounding pixel values. Vector drawings are composed of scalable objects created from mathematical equations. The image resolution is not affected by changing the scale. Photoshop has the capacity to allow the artist to create vector drawings and paint (pixel images); however, the drawings are rasterized when they are saved. Artists who intend to print large images include the scale of the final image at the beginning of the process when the dimensions of the image are entered into the document settings.

Below are line patterns created on Photoshop. Illustration A shows just a few of the line choices that can be made using the brush tool. Light and dark lines, fuzzy and crisp edges, and wide and narrow lines can be selected and combined from a vast menu of line attributes. Illustrations B and C show the development of contemporary hatch lines similar to the lines made in the engraving sample by Bosse in 1645. The hatch marks were drawn in the Photoshop vector program and then rasterized to be saved.

Line in Contemporary Images

Paul Brown was one of the early digital printmakers who programmed the computer to make drawings before the development of the graphical interface (Wands, 2006). Now Brown works with an Apple MacIntosh platform. Brown (2000) writes that the images in *The Book of Transformations* (2000) are a series of "pre-computed animation tables where one member of a tile family is in betweened to each other member." The configuration of these forms has been influenced by Brown's interest in the *I Ching*. Images from the *Book of Transformations* form the basis for Brown's work in the time-based work *Chromos*. The illustrated forms are examples of symbols. (See http://www.paul-brown.com.)

Line in Cartoons

The word **cartoon** has origin in the Italian *cartone* and means heavy sheet of paper or preliminary drawing for a mural or painting. Historically, line is the primary expressive element in cartoons. Cartoons, particularly, call our attention to the formulaic use of line to share information. In the cartoon of the running dog, the six slightly curved lines behind the dog are symbols for speed.

In the history of cartoons, the use of fantasy, caricature, and humor in visual form can be traced to gargoyles and grotesque images, many of which use line as the primary expressive element. These images can be found in Asian, African, Australian, and European cultures. Japanese *manga* is perhaps one of the most celebrated examples of this form of expression that has a long tradition.

Authors suggest that manga drawings continue a Japanese pictorial practice that began on temple scrolls and was further popularized by the woodcuts of Katsushika Hokusai in the late 18th and early 19th century. (See the Hokusai Mu-

The lines parallel to the arm and whip suggest the past positions of the forms.

seum site at http://www.book-navi.com/hokusai/hokusai-e.html.) The images of people in Hokusai's Sori Style Period (1785–1804) and Taito Period (1810–1820) show the historic roots of Manga drawing.

Disney and other Western cartoonists also may have influenced the development of contemporary Japanese manga images. As a modern day example of cultural transmission, these Japanese comics were introduced to the United States in the 1980s to be enjoyed by a wide audience.

Instructions for creating manga images follow the traditional pedagogic method of reducing an image to its constituent parts, learning how to create the parts or elements, and then constructing an image from those parts. (See http://www.howtodrawmanga.com/ howtodraw/tutorials.html)

Summary

Line images have served as visual communication and record keeping. In iconic imagery, lines are marks artists created to represent our perception of the edges of things. The denotative value of line configuration may change over time from being an icon to being a symbol. Artists study and use lines as components of more complex images. Line images have been created on human bodies, tools, and on tokens used for commerce, to represent property, to record and transmit

building plans, to make calculations, and to transmit aural languages. The materials and tools of the artist determine the visual characteristics of lines. However, over time, artists have developed many technologies to simulate the appearance of lines made by other tools.

Try It!

Projects:
Materials—Use a pencil to make small sketches for the following assignments. Do the final images in pen and ink, or in a digital format of your choice.

1. We have seen in this chapter that artists have explored the image-making or the potential illusions of line irrespective of the appearance of an object.
    a. Using Klee's definition, draw five lines going for walks over various types of terrain. For example, imagine the paths of a very small ant walking over sand, gravel, grass, bark of a tree, and surface of an orange peel.
    b. Using the cartoonists' vocabulary, draw (1) sets of speed lines that show three different speeds; (2) two lines that show the flight of a bee compared with a drifting helium-filled balloon; (3) lines that imply an explosion and, in another frame, lines that show an implosion; (4) lines that suggest a wilting plant; and (5) lines that represent sound.
    c. Using manga style, draw (1) five clumps of hair and (2) combinations of clumps of hair to make two different hairstyles.

2. We have seen in Bosse's publication that artists explore the illusions created when lines are grouped together.
    a. Create an optical illusion of an edge without drawing a specific line to represent the edge.
    b. Create the optical illusion of a curved or wavy surface using curved lines of different widths.

3. Traditional Chinese painters studied brushstroke techniques by copying the brushstrokes of other painters. These strokes are named according to forms, but after learning the characteristics of the lines, the artist can use the techniques to represent other forms. The studio of Ch'ing Tsai T'ang published a *Discussion of the Fundamentals of Painting* in 1679. After discussing the dispositions that an artist should have to begin painting, *The Six Canons of Painting* and other standards and rules of painting, the authors suggest that the artist practice sixteen various brushstrokes. Some brushstrokes types are: spread out hemp fibers, entangled hemp fibers, big ax cuts, small ax cuts, cloud heads or thunderheads, an eddy or whirlpool, the veins of a lotus leaf, the wrinkles on a devil's face, and the hair of cattle. Try using brush and ink to practice these line patterns (Sze, 1963).

For Further Study

Matthew Ritchie

Line is the primary visual building block in Matthew Ritchie's art. He creates line images of cells, viruses, universes, and structures of religions among other topics. These linear works take material form as traditional drawing and oil painting, digital imagery, 3-d sculpture, vinyl decals, and many other media.

See

http://www.pbs.org/art21/artists/ritchie/#

Julie Mehretu

Julie Mehretu's large network paintings ostensibly represent architectural spaces but metaphorically imply the invisible cyber networks that connect people around the globe.

See

Heartney, E. (2010, November). Invisible networks. *Art in America*, pp.140–151.
http://www.pbs.org/art21/artists/julie-mehretu/

References

Cazort, M. (1997). Photography's illustrative ancestors: The printed image. In A. Thomas, & M. Braun Eds. *Beauty of another order: Photography in science.* Yale University Press. 14-25.

Behrens, R. R. (2004). Art, Design and Gestalt Theory. *Leonardo On Line.* Retrieved from http://www.leonardo.info/isast/articles/behrens.html

Bradley, R. J., Harris, A. R., & Jenner, P. (2006). The neurobiology of painting. *International Review of Neurobiology 74.* Academic Press.

Brown, P. (2000). Stepping stones in the mist. Retrieved from http://www.paul-brown.com/WORDS/STEPPING.HTM

Ivins, W. M. (1969). *Prints and visual communication.* M.I.T. Press. History e-book project. ACLS Humanities E-book.

Jones, A. (2006). Animated images: Images, agency and landscape in Kilmartin, Scotland. *Journal of Material Culture 11* (1/2), 211–225. Retrieved from http://mcu.sagepub.com/cgi/reprint/11/1-2/211

Keightley, D. N. (Autumn, 1996). Art, ancestors, and the origins of writing in China. *Representations 56*, Special Issue: The New Erudition, 68–95. University of California Press.

Levi-Strauss, C. (1966). The savage mind. Chicago, IL: The University of Chicago Press. English translation by George Weidenfeld and Nicolson Ltd. Originally published in French *La Pensee sauvage,* 1962.

Manga University. *Drawing tutorials.* Retrieved from http://www.cablenet.ne.jp/%7ejapanime/tutorial/hair1.html

Maynard, P. (2005). *Drawing distinctions: The variety of graphic expressions.* Cornell University Press.

Podro, M. (1965). Formal elements and theories of modern art. Second National Conference of the British Society of Aesthetics. *British Journal of Aesthetics 4* (6), 329–338.

Sze, M. (1963). *The Tao of painting: A study of the ritual disposition of Chinese painting*, 2nd ed. New York: Bollingen Foundation.

The pursuit of the ideal: The life and art of William Morris. University of Michigan, Special Collections Library. Retrieved from http://www.lib.umich.edu/spec-coll/morris/kelms.html

Thompson, J. (2007). How Manga conquered the U.S.: A graphic guide to Japan's coolest export. *Wired Magazine, (15) 11.* Retrieved from http://www.wired.com/special_multimedia/2007/1511_ff_manga

Wands, B. (2006). *Art of the digital age.* Thames and Hudson.

Weingarden, L. S. (Spring, 1985). Aesthetics politicized: William Morris to the Bauhaus. *Journal of Architectural Education (1984-), 38* (3), 8–13.

Name: _____

chapter one

Line

Reading Review Questions

1. Write the definitions and provide examples for each type of representation:

   a. symbol

   b. icon

   c. index

2. Compare and contrast the definition of a line in geometry and a line in art.

   a. geometry definition:

   b. art definition:

3. What perceptual experience forms our experience of line? Why do we "see" a line in the Ouchi pattern?

4. What are the earliest line drawings that exist?

5. What is the historic foundation of Japanese Manga drawings?

6. List or collect visual examples of at least ten images of line representations. Consider how the line is used in each of the items you listed or found. Is the line a symbol, icon, or index?

Studio Reflection

1. Describe one or two ideas about line as described in this chapter that are most applicable to the line drawing assignments you did this semester.

   a.

   b.

2. What types of line images or diagrams do you see or use in your specialization or academic major?