# Visual Metaphors, Visual Communication and the Organization of Cognitive Space

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**Abstract**

It is a well documented fact that written language began as picture writing; they began as visual metaphors. This is evidenced by a range of visual writing systems such as hieroglyphics and Chinese. What differs among these visual metaphors is their spatial organization. Egyptian hieroglyphics has a spatial marker that directs the reader on how to visually follow the iconic system. Chinese, on the other hand, has articulated visual space into a Cartesian graph of vertical and horizontal spaces and icons are placed in these spaces in accordance with implied directional markers. As writing instruments changed, many writing systems changed. Hieroglyphics was restructured into cuneiform writing (wedge-shaped writing), and eventually the brush gave form to discursive ideograms. The alphabet (CVCV) was based on a triconsonantal system of writing (CCC) common to the language of the Near East and it was this system that provided the rationale for alphabetic writing. The focus of this paper is on the organization of visual space and how this organization differs across cultures. The English writing system, for example, exists of an abstract alphabetic system that has been abstracted from an original picture writing system. Alpha and Beta were the first two pictures of the Alphabet. This paper will address how Modern English is structurally organized as a system. It will also discuss the iconic morphology of the Chinese writing system.

## Introduction

Some cultures rely more heavily on visual thinking than others. For this reason, it is necessary to distinguish between modern industrial cultures that are based on the linear thinking of the alphabetic writing system and the non-linear and visual thinking of cultures that use iconographic and ideographic writing systems. However, all writing systems began as picture writing (Coulmas, 1993). This means that these earlier cultures were more closely connected to visual thought. The practice of seeing or the Habitus of seeing was more closely linked to the theoretical expressions of seeing. With the advent of the triconsonantal root writing systems of Hamitic and Semitic writing systems, this connection to the practice of seeing was divorced and more emphasis was placed on theoretical models of representation (Olson, 1994). After the renaissance, another shift away from the embodiment of experience occurred with the rise of representational thinking. Foucault (1970, 1972) demonstrated this shift in representation with the rise of the novel (a literary depiction of real human experiences) and the rise of theater (the depiction of life on stage). Although the theater

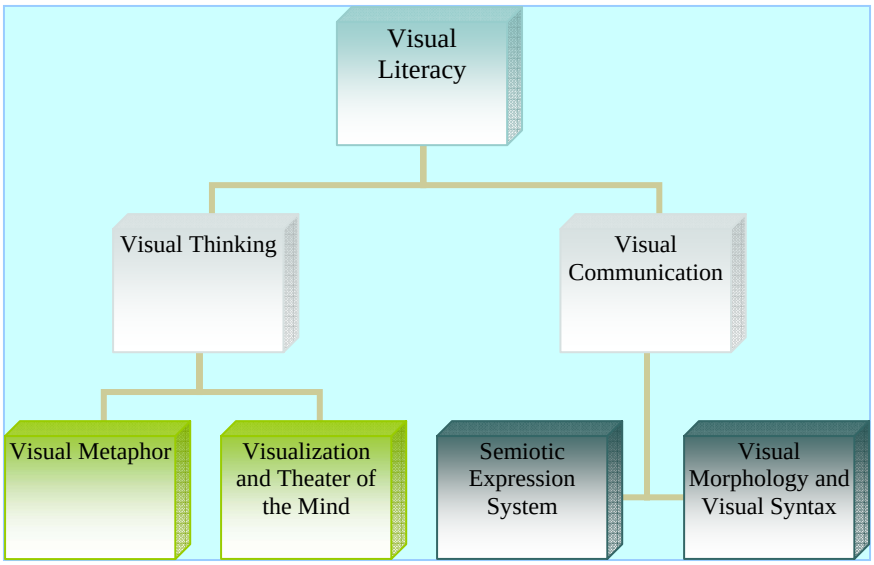
encourages visual thinking, the rise of the novel did not. It led to linear thinking. It led to the organization of concepts expressed in a linear system, a concatenation of signs. Only recently, with the advent of the consumer culture in which advertisements are processed simultaneously as visual symbols and where computer screens provide visual models of human information processing, can one argue that visual thinking is once again emerging within linear cultural models. This new shift has been called the renaissance of visual thinking (Sevaldson, web link).

Visual thinking is a part of a larger phenomenon known as visual literacy. Visual thinking, however, has to do with the cognitive processes involved in orchestrating visual information in the mind. It differs from visual communication which has to do with the creation and exchange of visual semiotic systems for the purpose of conveying information, emotions, and episodic memories. The focus of this paper is on visual metaphors and how they are embodied into pictographic and ideographic writing systems.

**Visual Thinking**

Arnheim (1969) challenged the old distinctions between thinking and perceiving and between intellect and intuition. According to established tradition, words were the primary components of thinking and language preceded perception. Arnheim (1969: 15) contended that "all perceiving is also thinking, all reasoning is also intuition, all observation is also invention." He argued that the mechanisms by which the senses understood the environment are identical with the operations that psychologists refer to as "thinking." Artistic expression, he noted, is a form of reasoning. Perceiving and thinking, he added, are intrinsically intertwined. A person who paints, writes, composes, dances, he adds, thinks with their senses (Arnheim, 1969: 16). What Arnheim is trying to say is that "visual perception is a cognitive activity." Traditional psychology neglects the gift of understanding things through the senses. They divorce concept from precept. Thought is divorced from perception and treated as abstractions. The eyes have been reduced to instruments that identify and measure (Arnheim, 1974: 13). "The capacity to understand through the eyes has been put to sleep and must be reawakened." This capacity involves the creation and apprehension of images by means of balance, shape, form, growth, space, light, color, movement, dynamics, and expression. These are the very elements referred to by Dondis (1973) as the components of visual grammar.

Visual thinking is part of a larger concept that has been defined as visual literacy (Dondis, 1973). Visual thinking, for example, includes the creation of visual metaphors that can be readily found in the use of commercial advertising, comic book strips, religious art, and pictographs. These all involve the use of visualization, the creation of new visual forms within the theater of the mind (Rodríguez, St. Clair, & Joshua, 2005). Visual communication is another aspect of visual literacy. It involves the use of a given semiotic system for the expression of visual thinking. Among modern industrialized nations, two basic types of expression systems occur: linear orthography as evidenced in English, or quadrangular pictography as evidenced in Chinese. Each of these writing systems provides different constraints on expression of visual thinking.




**Visual Literacy**

Dondis (1973) developed and expanded on the concept of visual literacy. He wanted to provide the basic grammar of visual communication. He argued that certain basic elements are arranged in a visual space to produce art and other forms of visual communication. These forms and the concepts that they embody are not new. They are known to all practitioners of art. What is new is the claim that they embody the basic grammar of visual communication. There are other theoretical models of what kinds of elements constitute visual grammar (Sonneson, 1989), but the grammar presented by Dondis is consistent with traditional art theory.

| The Basic Morphological Forms of Visual Grammar[1] | |
|---|---|
| Dot | The dot is the minimal visual unit. It functions as a pointer or a marker of visual space. If a dot is placed in the center of visual space, it provides a balanced picture. If it is placed either to the left or the right of the center, it needs to be countered by another visual element (Arnheim, 1988). Centricity stands for a self-centered attitude that is characteristic of human beings. The infant sees himself as the center of the world around him. A social group, a group or an organization, is also compelled to recognize that it has a center. Things are organized around that center. |
| Line | A line is produced by moving a point in space. Lines may be thick, thin, straight, curved, jagged, or wiggly. Lines may also be implied as when four dots are placed on a page |

[1] Although many contributors to visual communication theory prefer to call these elements "the alphabet of visual art," these forms function as morphological forms, iconic morphs.

| | |
|---|---|
| | and linearly linked by the mind that searches for such recognizable patterns. Lines also invoke feelings. Vertical lines imply tranquility and rest; horizontal lines demonstrate power and strength; oblique lines imply movement, action and charge; curved lines create calm and sensual feelings (Szabaro, 1986). |
| Shape | There are certain basic shapes that command visual space. They are the circle, the square, the triangle, and their various extensions. These shapes enclose a two dimensional area. Shapes may be organic (curved edges, continuous) or geometric (sharp edges or angles). Spaces that are determined by shapes and forms. When these shapes and forms exist, the shapes are positive. When they exist outside of these shapes and forms and lurk around them, they are negative shapes. |
| Space | Shape encloses a two dimensional area. Space can be created by overlapping shapes or forms in front of each other by using holes and cavities. Space can provide the illusion of depth. |
| Color | Color is light reflected from a surface. It can create emphasis, harmony, emotions, unity, and dimension. Color has three distinct qualities: Hue (color), value (from light colors to dark colors), and intensity (from bright colors to dark colors). |
| Texture | This is a quality that is closely related to touch. |
| Value | This has to do with a range of shadows from light to dark. It provides a sense of space and depth to an object and emphasizes its tri-dimensional aspects. |
| Form | This is a quality that encloses a volume or three-dimensional area. |

These elements are arranged according to visual principles that provide it with the syntax of a visual grammar.

| **Principles of Visual Syntax** | |
|---|---|
| Unity, Harmony | This relates to the oneness or the wholeness of visual space. Colors, shapes, lines, textures, and patterns are arranged to create a harmonious unity. |
| Variety | Variety is achieved by using different kinds of lines, colors, textures, and shapes. |
| Balance | Balance involves the equalization of elements in a work of art. Elements may be organized into symmetrical, asymmetrical or radial patterns. |
| Emphasis | This refers to placing greater attention to certain areas or objects in art. Emphasis can be created through the sudden or abrupt changes in opposing elements. |

| | |
|---|---|
| Rhythm | This is created by repeating objects or elements within a visual space. These repetitions may be either regular or irregular. |
| Movement | This refers to the arrangement of parts in a work of art to create a visual reaction that is either fast or slow. This is done by the use of patterns, contrasts, and lines. |
| Pattern | This involves the repetition of lines, shapes, colors, and textures. |
| Graduation | This is accomplished by combining elements in a series of gradual changes in shapes or color. Or darkness. |
| Proportion | This has to do with relationship of elements to each other within the whole of a visual space |

What one finds in the work of Dondis (1973) and Arnheim (1988) is the use of the principles of Gestalt psychology. This theoretical framework is behind their claims about how the mind orders and interprets visual space.[2] Dondis (1973), however, goes on to explain why one needs to understand the grammar of visual space: "Visual expression is the product of highly complex intelligence, of which we have pitifully little understanding. What you see is a major part of what you know, and visual literacy can help us to see what we see and to know what we know" (p. 19) What is implied in this pronouncement is the Gestalt claim that human beings organize images based on similarity, proximity, open direction and simplicity. For example, a collection of dots arranged in a circular motion should be perceived as a "whole." That is to say, it should be perceived as a circle (Chen, 2000). As Arnheim (1974) would say "a person unable to conceive [of this] integrated structure of the whole lacks the ability to create a genuine work of art."

**Iconographic Cultures**

Not all print cultures are the same. Some print cultures are more involved in visual thinking than others. Some cultures are more involved in thinking with their senses than others. Hence these different cultures evoke different cognitive repertoires of human information processing. Anyone who has been to a bookstore in Tokyo, for example, will notice how the design cover of all Asian books in the shelves are works of visual art. The elements of the language are aesthetically organized within visual space. Each book cover makes an artistic morphological statement with its careful placement of icons, color, shapes, forms, and other elements of design. In the United States, by way of contrast, the organization of language is linear and the design of book covers is organized around words and the constraints of syntax. There is no significant use of the elements of visual syntax. Book covers

[2] The founding Gestalt theorists, Max Wertheimer, Wolfgang Köhler, and Kurt Koftka, defended the notion of a universal mode of perception within the arts. They argued that "the most natural phenomena are not described adequately if they are analyzed piece by piece." Wertheimer (1945) argued that each portion of the mind maintains a "dynamic fundamental relationship to the whole form." These Gestalt psychologists believe that efficient psychology depends on an understanding of the "whole" as opposed to focusing only on distinct "parts" and their roles.

are meant to be read linearly and not visually. Arnheim commented on this very use of visual thinking when he visited Japan under a Fulbright Scholarship (Verstegen, 1996: 208). In Japan, he noted, one finds a country in which daily life "still preserved the remnants of aesthetic form." It is a culture in which a person thinks with his senses (Arnheim, 1969: v). It is a culture in which one is immersed in the "company of paintings, sculptors, architects, photographers and film-makers" which allows one to consign his attention to the psychology of art.

With the advent of computer technology, it is argued that many industrialized nations are moving into the realm of an iconography as a system of visual expression. They are becoming industrial culture because of the advent of computer graphics and the uses of hypertexts. The reason for this is obvious: the computer is a visual medium. What needs to be added to this insight about human information processing, however, is that television is also a visual medium and the impact of television on the human psyche is even more pronounced. Visual thinking is spatial thinking. It involves the recognition of patterns and visual configurations instead of verbal ideas. Visual thinking is also non-linear. It involves radial connections between links and hypertexts. It provides a new way of assessing information, prioritizing, and determining criteria. Visual literacy is rapidly becoming the new literacy in cultures that use mediated technology. As a consequence, it is important that visual thinking become an important part of document design in composition classes (Brizee, 2003). This claim that visual thinking enhances current linear thinking models is not new. Polya (1945) argued that visual thinking would enhance mathematical problem solving. Arnheim (1969) has made similar claims. What is new in the area of visual literacy is the realization among architects and design engineers that they are immersed in a renaissance of visual thinking (Sevaldson, web link).

**Chinese Writing and the Elements of Visual Grammar**

Cultures differ in the visual organization of their writing systems. There are two dominant patterns: linear or quadrangular. English, for example, is based on linear writing. The letters within a word are organized linearly. Letters form a sequence from left to right. This system is called orthographical writing (straight writing). The Romans distinguished between straight (Latin: rectus) and slanted (Latin: obliquus) forms.

| | |
|---|---|
| The orthographical forms are written on a base line.<br><br>Some letters rest on this line (a, b, c, d, e, f, h, I, k, l, m, n, o r, s, t, u, v, w, x, z).<br><br>Others also have letters that were both above and below the base line (g, j, p, q, y). | A B C D E F<br>G H I J K L M<br>N O P Q R S<br>T U V W X Y Z<br>a b c d e f<br>g h i j k l m<br>n o p q r s<br>t u v w y z |

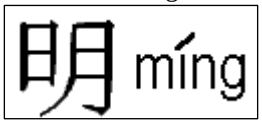
In Chinese, however, the visual elements of a word are placed within a quadrangle and ordered both vertically and horizontally.

| | | | |
|---|---|---|---|
| Left before right | 日 | 明 | |
| Left slanting before right slanting | 丿 | 人 | |
| Center before wings | 亅 | 小 | |
| Horizontal before vertical | 一 | 十 | |
| Outside before inside | 冂 | 闲 | 因 |
| Top before bottom | 一 | 二 | 三 |

With a minimal syntax of basic strokes within a quadrangle, one is able to generate a complex array of visual signs. [See chart on next page.]

Through the use of these strokes, the language is able to portray pictographs that are essentially visual metaphors. Many of these pictographs were simplified and stylized into ideographs which are graphical representations of compound ideas.


The next stage in the development of this visual thinking system involves the creation of compound pictographs and ideographs that contribute to the meaning of the compound characters. For example, *ming*[2] means bright. [The superscript "2" and the rising mark above the "i" in "ming to the right indicates that the syllable is made on a rising tone.]. It is a compound in which the sun is the sign on the left and the moon is the sign on the right. Together, these signs mean "bright." Writing systems involving pictographs and ideographs change with the advent of new writing instruments. The introduction of the brush as a writing instrument transformed the writing of Chinese characters into an art form known as calligraphy. Traditional Chinese calligraphy and painting provide demonstrations of the beauty of the line. In calligraphy, for example, lines of different direction, force, and speed are painted by brush to express the cadence of force (both



horizontal and vertical), and these lines turn in direction. These lines are combined with a fluency that reflects the aesthetic achievements of the calligrapher or the painter.

| Stroke | Direction | Name | In Context |
|---|---|---|---|
| 丶 | ↘ | diǎn | 你 字 寫 |
| 一 | → | héng | 言 天 甚 |
| 丨 | ↓ | shù | 到 田 甚 |
| 丿 | ↙ | piě | 你 禾 字 |
| 乀 | ↘ | nà | 天 禾 變 |
| 亻 | ↗ | tí | 漢 我 挑 |
| 乛 | ↘ | hénggōu | 字 愛 電 |
| 亅 | ↙ | shùgōu | 小 到 你 |
| 乚 | ↗ | xiégōu | 我 戴 戈 |
| 乛 | ↓ | héngzhé | 回 國 要 |
| 乚 | ↳ | shùzhé | 忙 甚 緣 |

**The Physiology of Visual Thinking**

The brain consists of two halves or hemispheres which are structurally identical. Does this mean that human beings are born with two brains? If they are born with two brains, are they different? Do they perform different tasks? The answer to this question appears to be impossible to answer because the two brains are connected by millions of nerves by means of the *corpus collosum* and both minds function in complete harmony. However, it has been known for more than a century that despite their similarity and despite their close linkage, both hemispheres perform different functions. The left hemisphere is specialized for speech which is a linear system of expression. In cultures that favor verbal rhetoric, the left hemisphere has been favored for its analytical abilities and the right hemisphere has been relegated to a minor role. In the beginning of the 1960s, Sperry became involved in research

conducted by Penfield and Roberts (1959) in which the *corpus callosum* was severed in order to prevent severe neurological misfiring in epileptic patients. Sperry designed methods to demonstrate that the two hemispheres in these patients had their own stream of conscious awareness, perceptions, thoughts, ideas, and memories. In these patients, the right hemisphere was cut off from the corresponding left hemisphere. Sperry (1961) was able to demonstrate that the left brain was superior to the right in abstract thinking, the interpretation of symbolic relationships, and in performing detailed analysis. In other words, the left brain is responsible for the operation of mathematical calculations. The left brain hemisphere is also the dominant hemisphere in the control of the motor system. Since the motor system is used in phonation, the physiology of speech, it is evident that the left brain plays a major role in the communication of speech.

What is surprising about Sperry's investigation is that the right hemisphere is, in many ways, superior to the left. It has the capacity for concrete thinking, the apprehension and processing of spatial patterns relations and transformations. Hence, it is superior to the left hemisphere in the perception of complex sounds. It is also superior to the left in the appreciation of music and recognizes melodies more readily. It can also more accurately distinguish voices and tones. Face recognition and other kinds of topographical information are also associated with the right hemisphere.

What does this mean? It means that the left hemisphere is involved with linear thinking and logic and the right hemisphere is the imaginative and creative part of the brain. Those who argue that visual thinking enhances the brain are really saying that they live in a culture that is left brain dominant. Visual thinking is about thinking with mental images (Robertson, 2003). The left brain hemisphere categorizes and overlooks things that do not fit into its categorical schemes. The right hemisphere, on the other hand, has the capacity to remember vivid images. It goes beyond the categories formulated by the left brain hemisphere. One sees a scene with the right brain hemisphere. One also imagines that scene with the right brain hemisphere. As a matter of fact, they appear to make the same kind of neuronal firing within the brain. This means that the right brain hemisphere resembles the real experience. When one visualizes a scene, one is seeing in the mind's eye. Seeing the world with the left hemisphere of the brain is tantamount to seeing a categorized world. Seeing the mind with the right brain hemisphere is the equivalent of experiencing the rich experience of being-in-the-world.

Robertson (2003) has hypothesized that the reason those people who have difficulty in mastering the analytical and sequential tasks of the left hemisphere is because they think in images. He argues that children and people with autism and dyslexia have difficulty with language and as a consequence they excel in visual thinking. What is missing from Robertson's hypothesis is the fact that many of the great minds in the sciences and the humanities are bicognitive (Ramírez and Casteñeda, 1975). What is the significance of these findings with regard to the focus of this essay? It means that linear orthographical systems of writing are processed with the left hemisphere of the brain. They are processed logically. Pictorial writing systems, on the other hand, are processed with the right hemisphere of the brain and use visual thinking. Those who are embodied within visual cultures live in a different world from those who are encased in linear orthographical cultures. Those in visual cultures are immersed in the details and the experiences of life. They are immersed in the emotions of life. They exist in a special state of being-in-the-world. Those in linear cultures are involved with the linear processing of information. They exist in a rational and logically

organized world. They are divorced from their Habitus (Bourdieu, 1977; Bourdieu and Wacquant, 1992).

**Concluding Remarks**

In the theory of societal types (Lenski, Nolan and Lenski, 1991), it is argued that industrial nations make up a similar category. They share the same kinds of social structures. This concept needs to be modified. There are two different kinds of modernized societies. One of them has a linear way of thinking and uses a linear model of orthographical communication and the other has a non-linear approach and uses the simultaneous mode of processing visual information. They also differ in that linear industrial nations exist in a world that is predominantly rational and concerned with abstract logic and abstract theoretical models of reality. Societies that use visual thinking, on the other hand, exist in the present and are immersed in the vivid details and the emotions of life. Robertson (2003) would add non-literate societies to this group. They use visual thinking because they do not command linear thinking and the demands of that kind of literacy system. Does this mean that societies that use visual thinking are not also in command of logic and abstract analysis? The answer depends on whether a society is literate or not. There are many societies that use both visual thinking and linear thinking. Japan, Korea, Hong Kong, Taiwan, the People's Republic of China, are among those nations. The majority of their citizens are bicognitive. They function well with both hemispheres of the brain. Also, within societies that are predominantly linear in their orientation to human information processing, there are many individuals who are bicognitive. These are the individuals who excel within their own cultural domains. They are the creative geniuses that command both logic and imagination.

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