

### **Gestalt Theory in Interactive Media Design**

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#### **Abstract**

Gestalt psychology was developed during the 1920's by three German psychologists, Wertheimer, Koffka and Kohler. Visual artists and designers of the twentieth century adopted gestalt perceptual factors to improve their work. Books including Kepes's *Language of Vision* (1944) and Arnheim's *Art and Visual Perception* (1954) codified gestalt visual principles for use in design education. What these scholars did not anticipate is the evolution of interactive designs such as web pages, and how gestalt visual principles apply to interactive documents. This article examines a select group of major gestalt visual principles and places them within the context of interactive media design.

#### **Introduction to Gestalt Theory**

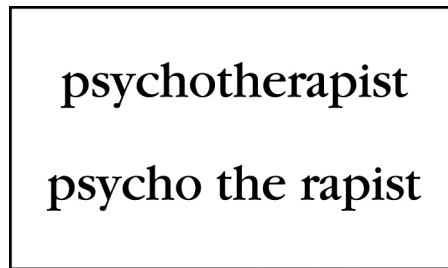
Gestalt, (pronounced "ge-shtalt"), is a German word, which loosely translated, means "configuration." Austrian and German psychologists conducted much of the initial research behind gestalt theory in the late 1800's and the early 1900's, among them Christian von Ehrenfels, Max Wertheimer, Kurt Koffka, and Wolfgang Kohler. Gestalt theory grew out of the field of psychology, but has influenced researchers from a multitude of disciplines, including linguistics,<sup>1</sup> musicology,<sup>2</sup> instructional design,<sup>3</sup> human-computer interaction,<sup>4</sup> architectural healthcare design,<sup>5</sup> sustainable design,<sup>6</sup> and art and visual communication.<sup>7</sup> Visual artists and designers were interested in gestalt laws of perception because they provided a scientific method explaining human perception and our tendency to "group" things. Wertheimer's visual research, in particular, explored why some images seem to belong together as part of a unit or group while others seem separate. Max Wertheimer explained Gestalt Theory:

"The fundamental "formula" of Gestalt theory might be expressed in this way: There are wholes, the behavior of which is not determined by that of their individual elements, but where the part-processes are themselves determined by the intrinsic nature of the whole. It is the hope of Gestalt theory to determine the nature of such wholes."<sup>8</sup>

Another explanation is that gestalt refers to a structure, configuration, or layout that is unified and has specific properties that are greater than the simple sum of its individual parts. For example, a person reading text perceives each word first as a complete word and its meaning rather than seeing individual letterforms. Each letterform is clearly an individual unit, but the greater meaning depends on the arrangement of the letterforms into a specific configuration (a word). Another analogy is the individual frames in a movie. Each frame in a movie may be considered separately, and judged on its compositional strength, but it is the rapid projection of multiple frames across time that forms the perception of movement and narrative continuation.

Gestalt theory provides rational explanations for why shifts in spacing, timing, and configuration can have a profound effect on the meaning of presented information. While gestalt visual principles are easy to grasp, they are very powerful. Ignoring Gestalt visual theory may result in unexpected interpretations by the reader (see Figure 1),<sup>9</sup> and therefore impede clear communication.





**Figure 1**  
Gestalt theory explains why simple changes  
in spacing can dramatically change meaning.

### **Gestalt Theory in Art and Visual Communication Education**

What made gestalt theory appealing to visual artists, educators, and visual communicators is that the school of psychology sought to explain "pattern seeking" in human behavior. These gestalt visual laws provided scientific validation of compositional structure, and were used by design educators in the mid-twentieth century to explain and improve visual work. A survey of design literature and textbooks, from the 1940's to the modern day, reveals that gestalt theory is a vital component of design education. In his 1944 book *Language of Vision*, Gyorgy Kepes, a teacher at the New Bauhaus in Chicago, used illustrations by Wertheimer, Koffka, and Kohler to assist his discussion of the laws of visual organization and psychological forces.<sup>10</sup> In his books, *Art and Visual Perception: A Psychology of the Creative Eye* (1954) and *Visual Thinking* (1969), Professor Rudolf Arnheim applied gestalt principles of psychology to the way humans perceive and process visual information.<sup>11</sup> <sup>12</sup> A professor in the Psychology of Art at Harvard University, Professor Arnheim published over 13 books exploring the influence and relationship of gestalt theory to art and design.

Gestalt theory is still a thriving part of art and visual communication education. In 2002, Roy Behrens, a graphic design professor and author, wrote a thoughtful article about the application of gestalt to a graphic design curriculum.<sup>13</sup> Even this author, obviously, finds great value in gestalt theory, incorporating it into her writings,<sup>14</sup> graphic designs, visual communication curriculum, and with some extrapolation and adaptation, into her interactive media design curriculum.

Part of the usefulness of gestalt visual laws in design and visual communication education is that they are easy to grasp and implement. These laws of gestalten have been particularly useful to print designers to create meaningful and organized two-dimensional designs such as logos, posters, magazines, book jackets, and billboards. Gestalt theory offers visual communicators a framework of analytical understanding upon which to base meaningful design decisions. As Greg Berryman, in his book *Notes on Graphic Design and Visual Communication* points out, "Gestalt perceptual factors build a visual frame of reference which can provide the designer with a reliable psychological basis for the spatial organization of graphic information."<sup>15</sup>

While visual communicators have for some time used Gestalt theory as an organizational tool for two-dimensional forms, little has been published about its meaningful application to interactive media designs that include motion and interaction. This gap in the literature of the visual communication field that needs to be addressed, especially as designers are increasingly being commissioned to create web pages, podcasts, interactive kiosks, animations, and human-computer interfaces that communicate clearly, quickly, and with visual flair. Considering that



interactive media designs (whether web or multimedia documents) may include multiple media in complex interactive environments, it is helpful to examine traditional gestalt perceptual organizational rules and understand their application to interactive media design.

### **An Overview of the Laws**

This section defines the gestalt laws of perception and elaborates upon their application to interactive media design. Designers of interactive media can use the gestalt laws of perception to explore how we interpret and organize visual information from our surroundings.<sup>16</sup> Furthermore, as interactive media designs may include sound and time-based content (such as embedded video), interactive media designers may draw upon the gestalt laws of perception to structure user experiences.

While by some counts there are over 114 laws of Gestalten, with many of them applying directly to visual forms,<sup>17</sup> historically artists and designers have focused on a handful of perceptual laws to improve their two dimensional works, such as paintings, photographs, posters, book covers, and so on. Some of the most visually important of these gestalt visual laws are figure/ground, proximity, closure, similarity, and continuation. This article concisely explains these laws of gestalt to assist designers in clear understanding of these influential laws. These laws, if understood and implemented, offer a method by which designers of web pages and interactive designs may improve the visual organization and communicative power of their documents.

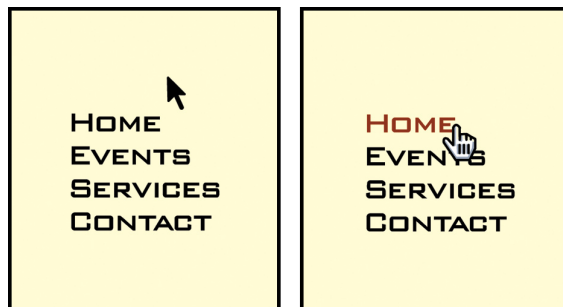
**Figure/ground:** The fundamental law of gestalt that helps us identify objects (figure) as distinct from their background (ground). This law of perception is dependent upon contrast. Images and text must be visible to be understood. An example of the use of the gestalt law of figure/ground is this text itself. You can read these words because of the effective utilization of figure/ground; the figure (text) is visible because of the contrast with the ground (page background). Varying degrees of contrast can detract or enhance legibility (see Figure 2). This basic application of figure/ground is true in static print pages as well as in interactive pages.



**Figure 2**  
Figure/ground contrast affects legibility.



In interactive media designs, an example of the figure/ground law of perception is seen in text rollovers; when the user's mouse pointer rolls over a text link, the link typically alters or changes colors (see Figure 3). Changes in the figure/ground relationship are important and provide valuable feedback to the user by visually informing the user that action will occur when the link is clicked. But for this feedback potential to exist, the links must exhibit "good" figure/ground gestalt in several states, most usefully in the normal and the over state. Figure 4 shows a detail of a web page with links that exhibit poor contrast in both the normal state (top image) and in the over state (bottom image). The color of the links is too similar to that of the background in both the normal and the over states, making it difficult for the user to readily discern that an active feature is in place. The user should not have to work in order to perceive the link as separate from the background. The links in Figure 5 depict "good" figure/ground in both the normal (top image) and in the over state (bottom image). By understanding and applying the gestalt law of figure/ground, the designer of this web page improves the visibility of the links and therefore enhances communication. In links, there are multiple opportunities to work with effective figure/ground as links may have multiple states (such as normal, over, down, and click). Additionally, some of these states may initiate animation or other functions. In this circumstance each state and the associated animation or function requires examination of the figure/ground law to ensure maximum user understanding.



**Figure 3**

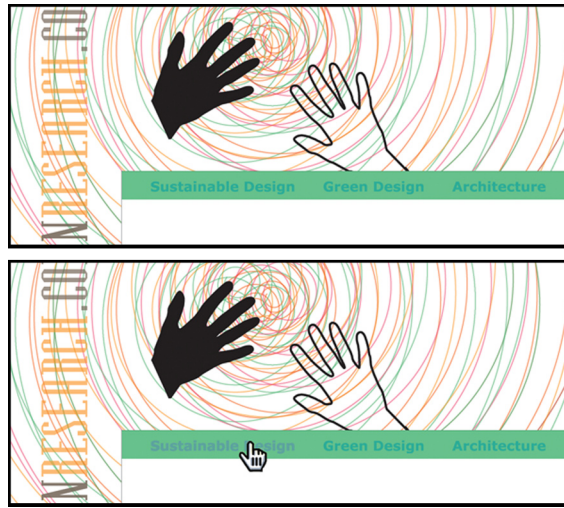
An example of the law of figure/ground at work within interactive links.

It is worth mentioning that some webmasters include hidden links a.k.a. "Easter eggs" within their pages, providing an insider's "back door" to other content. Such hidden links also draw upon the law of figure/ground by purposefully minimizing contrast between the figure and the ground. This deliberate use of figure/ground to hide or confuse is one of the laws of gestalten underlying camouflage.

**Proximity:** Items that are spatially located near each other seem part of a group, while items that are apart are perceived as separate (see Figure 6). Kepes offered the following explanation about reading words as groups: "We read words as segregated wholes because their letters are closer to one another than are the last and first letter of two words."<sup>18</sup> Irregular spacing, as seen previously in Figure 1, whether in print or on screen in interactive designs, may cause the reader to interpret textual materials in unexpected ways.

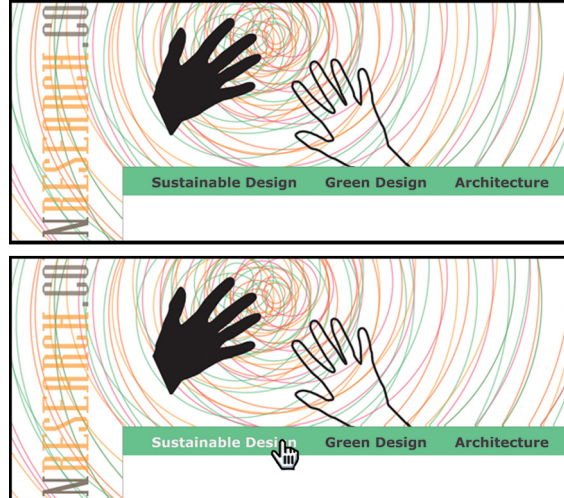
In interactive media design, the closer items are spatially or temporally located near each other, the more likely they are to be considered part of an organized and unified group. When text or links are separated by a gap, the reader must work harder to determine which information belongs





**Figure 4**

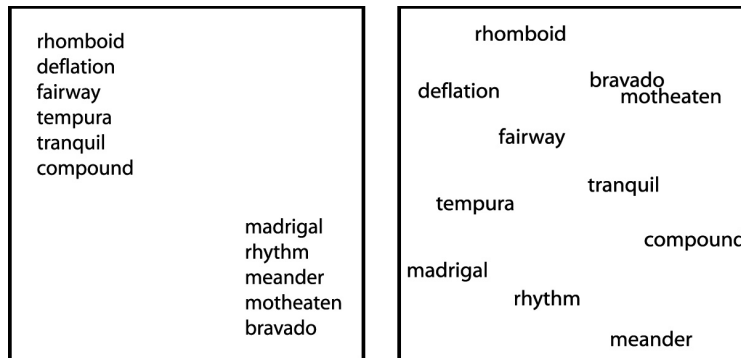
In this detail from a web page, both the normal state (top) and the over state (bottom) of the links lacks contrast from the background, and exhibits poor figure/ground.



**Figure 5**

Increasing the contrast of both the normal state (top) and the over state (bottom) of the links improves their legibility and informs the user through color change that the links are active.

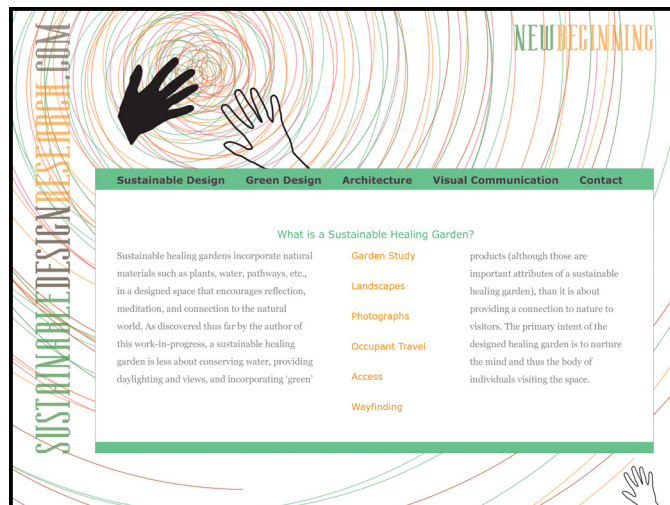




**Figure 6**

The law of proximity dictates that items located close together seem part of a group (left), while items that are not close together are perceived as separate (right).

together, as is seen in the web page in Figure 7. Article text is broken up into two columns and similar color links placed between the two columns. The user, in reading the article, must visually track from the bottom of the text column on the left, traverse the links, and continue reading the remainder of the article on the right. Rearranging the web design using the principle of proximity results in a visually more organized design (see Figure 8), with article text conveniently placed in one column for easier reading. Tucking the links closer together and arranging them to the left of the article informs the reader that they belong with the article information, but are secondary to the main links at the top. Yet another type of links, nested links, draw further upon the power of to help the user understand which links are primary and which links are secondary (see Figure 9).



**Figure 7**

Dividing the article text into two columns separated by links violates the law of proximity, and makes the user work harder to read the text.





**Figure 8**  
Reuniting the text into one column and moving the links to one side is a better use of the law of proximity and improves readability.



**Figure 9**  
Proximity helps inform us which links are primary and which links are secondary.

**Closure:** Humans have a natural tendency to visually close gaps in a form, especially in familiar forms (see Figure 10). When information is missing, we will focus on what is present, ignore the missing parts, and fill in the gaps with a familiar, line, tone, or pattern to complete the form.<sup>19</sup> Once a form has been identified, even when additional gaps are introduced, we still tend to visually complete the form, (see Figure 11). We seek to close forms to make them stable.



# CLOSURE

**Figure 10**

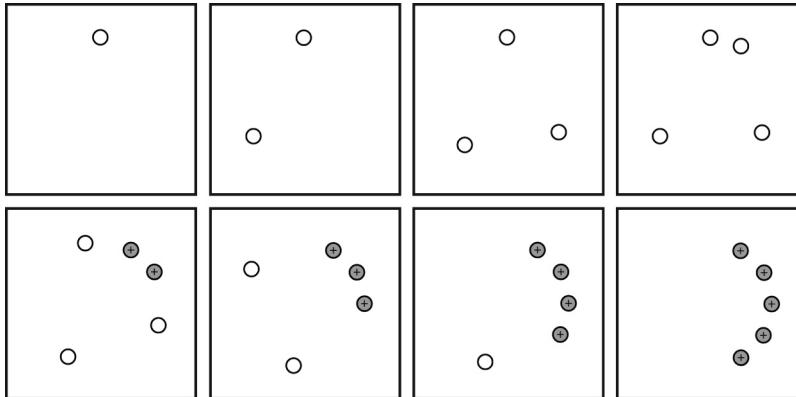
The law of closure at work. We tend to close gaps in forms.



**Figure 11**

Even after sequentially removing parts of the form from left to right, the viewer still readily identifies a leaf. *Note: figure influenced by closure image in Behren's *Art, Design, and Modern Camouflage*, 2002.*

In animated elements, such as those found in an interactive document, the user observes the movement of objects and extrapolates an implied line. Closure occurs even faster when the objects move in a predictable, regular pattern, such as in Figure 12, where the balls move in a regulated, arcing manner, seeming to circumscribe the outline of a circle. Even when the motion ceases and a partial semicircular shape is described, the user will remember the motion, and combined with the curved shape onscreen, have a tendency to “close” the shape to form the impression of a circle. This law often works closely with the law of continuation to form a stronger experience or perception.



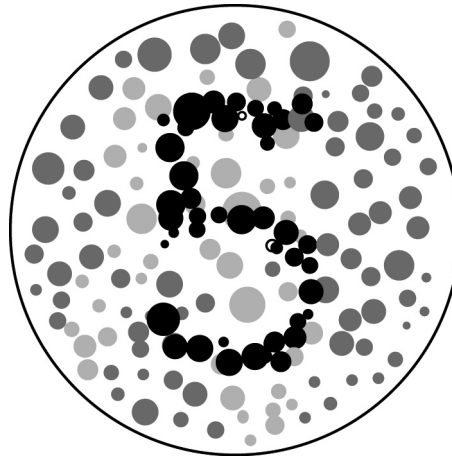
**Figure 12**

This screen sequence of animated elements demonstrates the law of closure. The predictable motion of the circles seems to circumscribe a larger circle, even when the shape is incomplete.

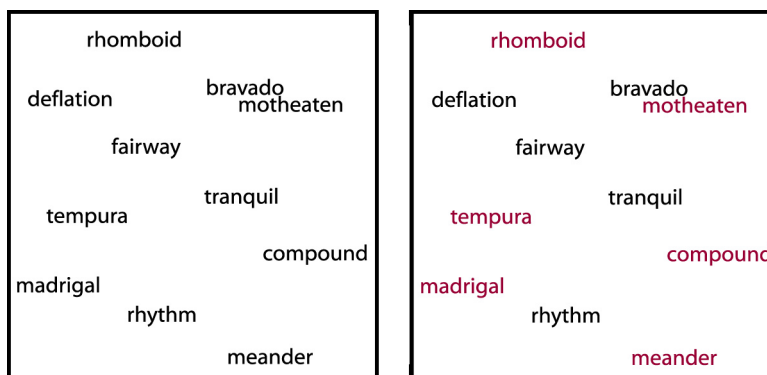


**Similarity:** Visual elements that are similar in shape, size, color, proximity, and direction are perceived as part of a group (see Figure 13), even if the items are spatially separated (see Figure 14). The flip side of the law of similarity is that since we seek to group, dissimilar objects are readily apparent.

In interactive designs, keeping text, links, and animated elements similar increases the tendency of the reader to believe the objects belong together either physically or conceptually. Additionally, items that move in a similar way, such as expanding links (see Figure 15), or animated elements are perceived to belong together.



**Figure 13**  
The law of similarity. Items that look similar seem to belong together. *Note:* figure influenced by the Psuedolsochromatic Plate Ishihara Compatible color vision test.



**Figure 14**  
The words in the left square are scattered randomly and little perceptual grouping is apparent. Changing some of the words in the right square to red makes them similar, and they seem part of a group.





**Figure 15**

The size, color, and motion makes each set of nested links seem grouped.

**Continuation:** The human eye seeks the relationships between shapes: continuation occurs when the eye follows along a line, curve, or a sequence of shapes, even when it crosses over negative and positive shapes (see Figure 16). Kepes, while discussing static lines on a page, commented that “Every linear unit has kinetic inertia.”<sup>20</sup> In interactive media designs lines may be static or in motion. The power of a line in motion to attract the human eye is well known. Designers can use moving lines to direct the user’s attention to specific content, to entertain, or to establish a style. In motion design, the eye will follow a kinetic, animated sequence of objects, even if they fade in and out (see Figure 17). Some consideration of the effect of color on animation is important. Kepes states “The Law of Continuance is also valid for the graduation or progression of hue, value and chroma.”<sup>21</sup> The eye moves along a direction of hue or value gradation similar to the way it moves along a line.

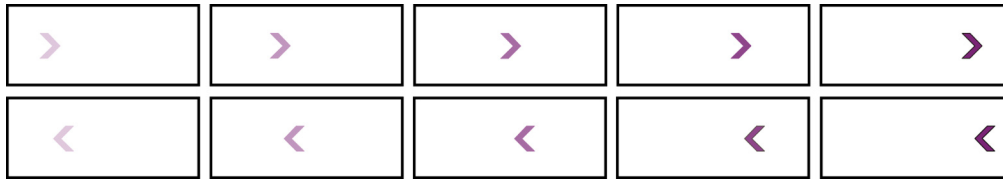


**Figure 16**

The eye seeks similar shapes even if they cross over negative or positive areas.

Continuation applies to time-based experiences in that we seek to understand patterns not only in space, but also across time. For instance, we perceive a melody instead of single individual notes. Songs play across time, and because we construct patterns across time, our minds group the individual notes into a musical experience. How well a time-based experience is perceived as a continuous object or event is also affected by the law of proximity in that events closer together in time are more likely to be perceived as related and continuous.





**Figure 17**

This sequence of screens from an animation shows the law of continuation at work. Our eyes follow the arrow as it fades in, turns, and fades out.

## Conclusion

Gestalt theory has been highly influential on researchers from a range of disciplines, including psychology, linguistics, architectural healthcare design, musicology, sustainable design, and art and design. Artists and designers have long used gestalt visual principles in their two-dimensional works such as paintings, posters, and magazine layouts to improve composition, organize information, and enhance visual communications. While gestalt visual laws are present in all visual designs, whether two-dimensional or interactive, there are significant gaps in the research applying gestalt theory to interactive media designs. This paper examined crucial gestalt visual laws within the context of interactive media design in order to partially address that gap, and to hopefully inspire other visual researchers to further elaborate on the body of gestalt literature.

Understanding gestalt visual laws within the framework of interactive media design provides educators and students with a scientific structure by which they can analyze and visually improve their interactive designs. Skillful application of gestalt can result in web and multimedia designs with stronger compositions that facilitate communication.

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- <sup>21</sup> Kepes, *Language of Vision*.