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Visual Form and a Typology of Purpose: A Peircean-Based Approach to
Visual Information Design Pedagogy

Christina L. P. Rosenquist

A selected project submitted to the faculty of
Brigham Young University
in partial fulfillment of the requirements for the degree of
Master of Arts

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ABSTRACT

Visual Form and a Typology of Purpose: A Peircean-Based Approach to Visual Information Design Pedagogy

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Master of Arts

Visual information design is a vital part of modern communication. Currently discussion is occurring in most disciplines to determine more effective ways to incorporate visual information design into all their communication, including website and document design. These discussions typically focus on elements of traditional graphic design that tell the student *what* is “good” graphic design; however, traditional graphic design depends on trial and error, luck, and best practices, with only rare attempts to construct general principles. Selection of visual elements is usually based on designer preference rather than any consistent conceptual framework or empirical support for design decisions. Another approach to visual information design was introduced by Alan Manning and Nicole Amare, based on the work of C. S. Peirce, who created a number of three-part typologies aimed particularly at modes of communication in relation to purpose. Manning and Amare’s approach to visual information design maps specific visual elements to consistent definitions based on both formal characteristics and useful functions, as predicted by analysis in terms of primary Peircean categories. These definitions provide a consistent framework for selecting the appropriate visual elements that have the desired communicative effects. Manning and Amare’s work was written for an academic audience. The primary purpose of my Master's project is to adapt their information-design concepts for a more general audience, particularly students. An abbreviated and simplified version was created online and was pilot-tested in two undergraduate Linguistics classes for students who are pursuing an editing minor.

Keywords: Peirce, Visual information design, pedagogy

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Chapter 1

Introduction

Effective visual communication is a vital part of all communication in the twenty-first century, and teachers from many different disciplines for several years have been looking for better ways of teaching their students how to incorporate visual elements. Discussions typically focus on elements of traditional graphic design that tell the student *what* “good” graphic design is; however, traditional graphic design depends on trial and error, luck, and best practices, with only rare attempts to construct general principles. Selection of visual elements is usually based on designer preference rather than on any consistent conceptual framework or with empirical support for design decisions.

The problem with the best practices approach is that it is not always clear why a design works, or why a design with the same visual elements does not work. For example, the sales letter in Figure 1.1 (next page) shows the result of a student assignment where the goal was to use visual elements to more effectively communicate the message of the document, and a revision using Peircean theory analysis of that assignment.

The sales letter was the result of a classroom approach to business communication proposed by Linda Stallworth Williams (2008). Her method included classroom discussion using tenets of traditional graphic design: “In total, our discussion of visual communication covers the following tools and topics: fonts, colors, white space, arrangement, images (photographs, drawings, cartoons, noncopyrighted clip art, etc.), information graphics (tables, charts, etc.), pull quotes, contrast, and headings” (Hilligoss, 1999 as referenced in Stallworth Williams, 2008, p.48). This is the typical approach to teaching information design to non-design students; the students are taught some visual elements, and are shown examples of best practices to demonstrate

“good” design. But application of these visual elements does not always improve the design (see next page for images).

It is evident from the sales letter that the student was implementing visual elements with only emphasis in mind. This is the typical result of traditional graphic design approach to teaching. The biggest issue, however, is that the overall purpose of the document is mostly lost because of the document format. The issue of purpose and how it is affected by visual elements is rarely addressed by traditional graphic design. In this case, the document’s primary purpose is better served if the information is presented in a different form, like a postcard, rather than a sales letter. This observation drives the Peircean revision, over and above issues of emphasis and persuasion.

Revision of documents based on intended purpose was the topic of an article I wrote for *Business Communication Quarterly* in March 2012. My revision to this sales letter was based on the following idea:

I propose that visual elements should be chosen not only with the primary purpose of the document in mind but also with an idea of what that particular type of visual element’s primary purpose is, and how that purpose adds to or detracts from the overall document purpose. For example, when a designer creates an advertisement, he or she will typically deploy an image (realistic drawing or photograph) related to whatever is for sale. Images naturally serve a dual purpose: (a) to evoke feelings in a potential customer relating to desirable object(s) but also (b) to actively focus potential customers on a specific point of information. Images are effective visual elements if (and only if) their natural purposes align with the actual document purpose, but they can fail or misfire if the image chosen

somehow distracts from or misaligns with actual document purpose. (Rosenquist, 2011, p. 48).

In this revision, the vital information has been extracted from the body text of the letter and placed in expected places on the postcard (sender address in the upper left corner, addressee in the center, right half of the card). An image is used as a “teaser” to persuade prospective buyers to go to the sale, positioned in a prominent place on the back of the card. Also, the postcard format lends itself to the primary purpose of the document: it is made from cardstock, is easily transportable, and the information is limited, making it easy to scan.

The key to this revision is that all of the visual elements support the primary purpose of the document, and each visual element is implemented according to its primary purpose: the image is used as a feeling-oriented focal point; bullet points are small and direct attention away from themselves; communication of information is supported by the script that is part of a “postcard” scenario, making it easy to find pertinent details quickly.

This example serves to illustrate the general lack of real understanding of what constitutes effective teaching of visual information design. Selection of visual elements is usually based on designer preference, rather than any consistent conceptual framework or empirical support for design decisions. This is standard practice in graphic design pedagogy; the basic approach is to give students a list of “dos” and “don’ts,” raising the expectation that if you follow these guidelines, your product will effectively communicate your purpose. However, there is an inherent flaw to this approach:

There is a problem with the assumption that students automatically become better designers when they are merely made aware of visual design choices and possible ethical implications. That could be true, but there is no guarantee that this is true, without a

method to help students understand specific effects of the visual elements and the purposes which those effects typically will and will not serve. A more typical outcome will be that students will stir the visual design elements together in random ways that will not be effective, and both they and the instructors may have difficulty articulating exactly why the overall result is not effective. (Rosenquist, 2012, p. 52)

In other words, knowing *what* visual elements to use doesn't guarantee that a designer knows *how* and *when* to use them. Without understanding that visual elements have an underlying structure and framework that dictates what they most effectively serve, designers are left to pick a visual design strategy to implement based on models they've seen, and hope that the purpose they intend to serve is actually realized by the document.

Another approach to visual information design was introduced in several articles by Manning and Amare written beginning in 2006 and culminating in a textbook called *A Unified Theory of Information Design*, currently in press, based on the work of C. S. Peirce, who created a number of three-part typologies aimed particularly at modes of communication in relation to purpose. Manning and Amare's approach to visual information design maps specific visual elements to consistent definitions based on both their formal characteristics and useful functions, as predicted by analysis in terms of primary Peircean categories. These definitions provide a consistent and predictable framework for selecting the appropriate visual elements that have the desired communicative effects.

Although this new approach has application in any discipline that uses visuals, Manning and Amare's work was written for an academic audience. Their explanation of Peircean categories is presented in technical language with the understanding that the target audience is familiar with conceptually dense text. Furthermore, the explanation includes discussion beyond

how to categorize specific visual elements, and was designed to be informational, rather than pedagogical. Hence, there were no exercises provided for practicing the theory being advanced. All of these characteristics make accessibility of this approach difficult for any other audience.

The primary purpose of my Master's project is to adapt Manning and Amare's information design concepts for a more general audience, particularly students. It consists of four pedagogical modules that teach five of the ten Peircean categories. Each module was created using analogy and examples that help to translate the dense theory into more understandable language. The basic approach was to simplify the theory and abbreviate it to basic concepts, with exercises for each module designed to help students practice what they had just learned. This project was pilot-tested in two undergraduate Linguistics classes for students who were pursuing an editing minor.

Discussion of this project is organized as follows: I will first give a brief overview of Peircean visual information design analysis, then I will review the existing visual design literature, identifying conceptual and procedural problems in each of these key areas:

- Decoratives
- Signals and Reference Arrays
- Images
- Diagrams

Second, I will discuss how the Peircean analysis repairs those problems. The purpose of Peircean analysis is to provide a concrete, consistent, and repeatable method by which visual elements can be implemented in a design. I will demonstrate how to define visual elements according to characteristics intrinsic to their form, their method of reference, and the interpretation that is consistent with specific characteristics of form and reference. Next, I will

discuss how the primary purpose of the document informs the types of elements needed to support that purpose.

Third, I will present classroom materials and exercises geared to instruct students in effective visual design that avoids pitfalls seen in the existing literature. These materials were constructed primarily on concrete examples, with more difficult concepts explained by analogy. I will show how students created more effective visual design implementations using Peircean theory than they did when they did not have that framework to inform their choices. Not only were the students overall better able to create design that supported the general purpose of their documents, but they were able to discuss and support their choices based on the framework they had been taught.

It is important to note here, that the Peircean analysis is highly dependent on information-dense reference arrays and diagrams like the periodic table of elements. Dense-knowledge representations are encompassed by Peircean theory, but students need training in brief information bites first, so the focus of this discussion is, admittedly, in information bites. Visual information designers always need to make sure viewers have sufficient coded knowledge (like the knowledge of chemistry is required to understand the periodic table and make the table useful) to interpret informative visuals. With that introduction, I move to a brief and simplified introduction of Peircean analysis.

Overview of Peircean Method

Peirce created a system of categorizing signs (meaningful forms) using a number of three-part typologies. All of these typologies are organized in terms of three major categories:

- feeling generation (*firstness*)
- action provocation (*secondness*)
- information assertion (*thirdness*)

mapped to the extreme points of a triangle (See Figure 1.2). Specifically, pure *firstness*, *secondness*, and *thirdness* correspond with visual design concepts of variety, contrast, and pattern used in the evaluation and revision of the sales letter example above.

The primary purpose of visual variety with characteristics of *firstness* is to evoke feeling; the primary purpose of visual contrast with characteristics of *secondness* is to indicate, or point; and the primary purpose of visual pattern with characteristics of *thirdness* is to

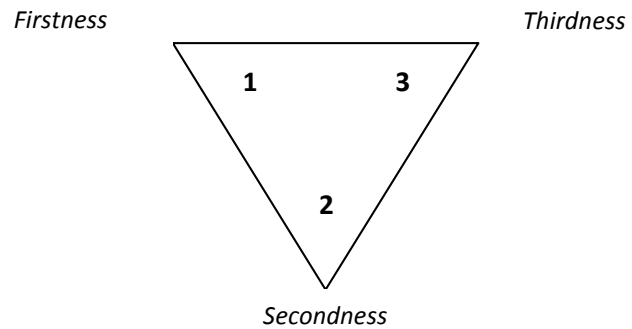


Figure 1.2: The Peircean triangle with three basic categories.

inform. Although our emphasis here is on visuals, Peirce constructed a classification strategy that can be used to analyze a variety of situations. Peircean analysis has been used to describe ethics (Chambers, 2001), plot analysis (Young, 2003), linguistics (Robertson, 1994), and visual information design (Alton, 2010; Manning and Amare, 2012). These basic categories can be expanded into a 10-class system, and each of the 10 major classes is associated with three key parameters that define at least 6 subtypes (see Figure 1.3, next page).

What Peirce primarily provides us is a typology of visual design types (10 major classes) that is directly integrated with a typology of visual design purposes. Students can use it to choose the visual element that best serves the purpose of the document and the readership. I propose that effective information design occurs when these visual elements are implemented deliberately for their inherent purposes.

10 Major Classes of Visual: Defined by Three-Part Numerical Definition

10 Major Classes of Visual: Each has 3 key parameters

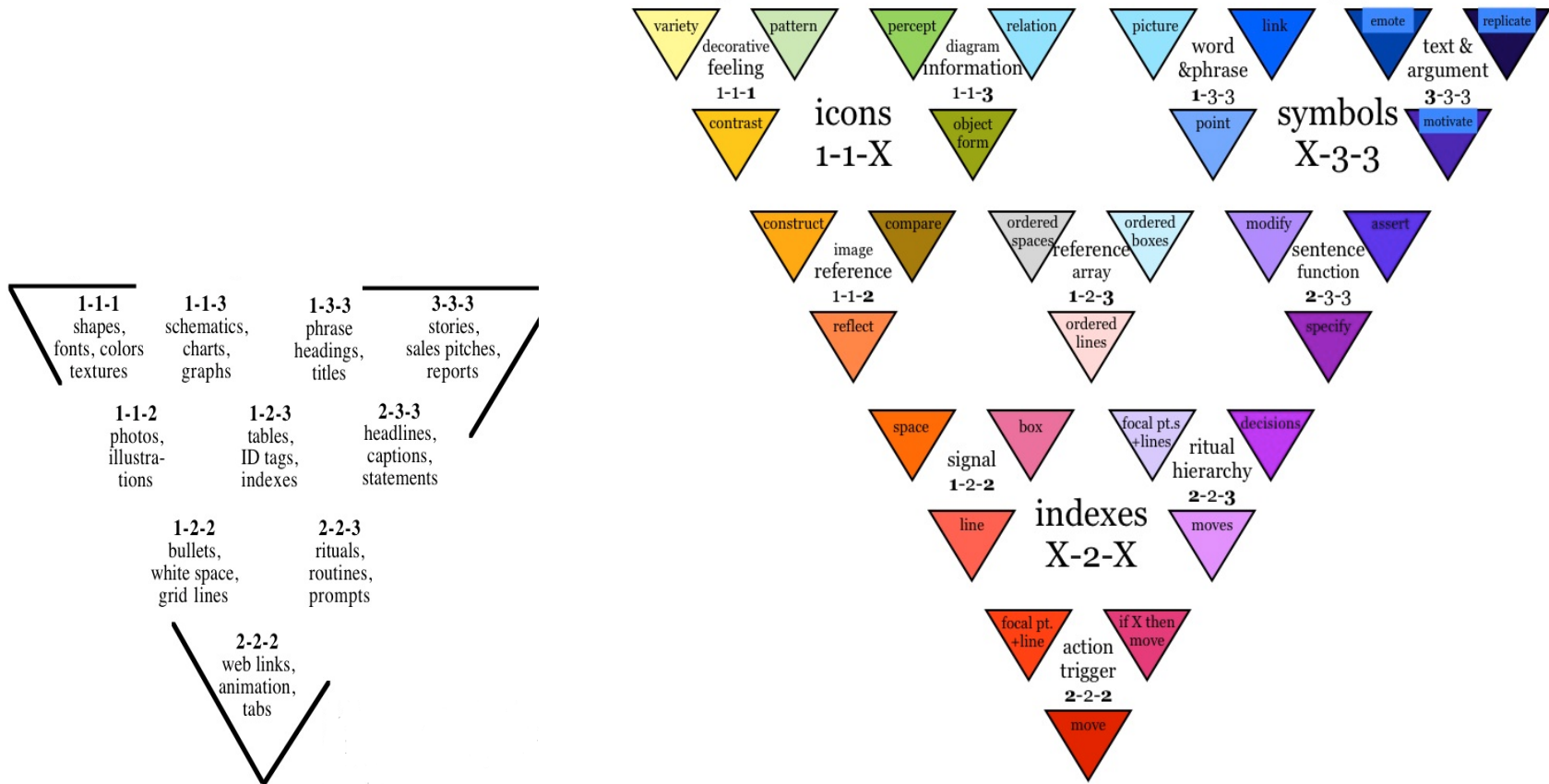


Figure 1.3: Visual elements assigned to Peircean categories. The 10-part system (left) is defined by *form*, *reference*, and *interpretation*. Each of these ten categories can be further defined into its own three-part system. Note: All the category names, corresponding visual elements, and functions are based on the work of Manning and Amare (2012). Visuals are reprinted by permission from the authors. Reference information for their body of work on this subject is included in the Works Cited section.

Project Limitations

This project will discuss five of the ten visual categories: Decoratives (1-1-1), Signals (1-2-2), Reference Indexes (1-2-3), Images (1-1-2), and Diagrams (1-1-3) (See Figure 1.4):

The other visual types are equally important, but learning modules for these are still under development. The five types covered in this project are structurally simpler and therefore more accessible to students in an introductory course.

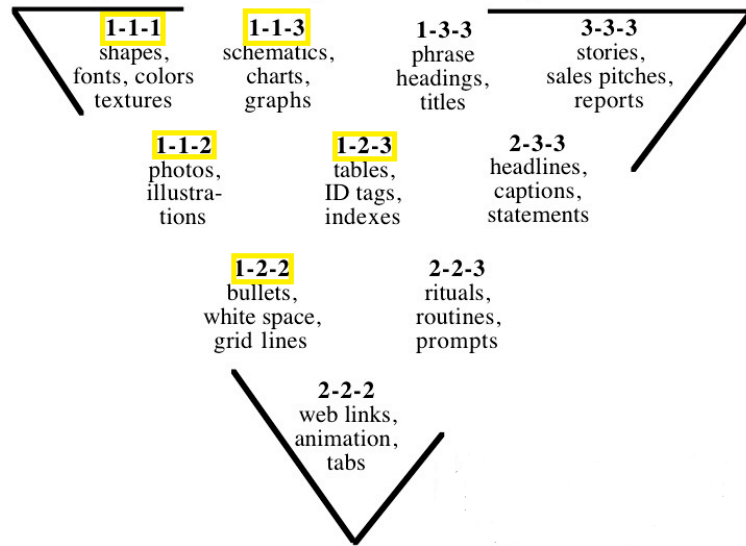


Figure 1.4: Visual elements that will be subject of discussion in this project. Other elements are important, but are still the subject of ongoing analysis.

Chapter 2

Review of Literature

Traditional graphic design manuals do not offer a coherent theory of the relationship between form and purpose that explains why specific visual elements should be used. Evans and Thomas (2008) state that “design is not a collection of formulas that, if followed and applied, ensures effective results. Design is a fluid process that is guided by the designer’s sense of intuition, reason, and aesthetic judgment” (2). The problem with reliance on subjective feelings is that it is rarely reliable for producing repeatable results. Repeatability comes with structure. Also, subjective feelings about the effectiveness of a design become increasingly unreliable the longer a designer or editor spends with the design. Familiarity causes designers to no longer see what is really on the page, as every editor who has missed an “obvious” typo knows.

Pedagogically, design manuals attempt to implement structure by asserting that as long as the designer implements the accepted principles of design (“Primary principles: unity, variety, hierarchy, dominance, proportion, balance; and Secondary principles: scale, emphasis, rhythm, movement, proximity, and repetition” [Evans and Thomas, 2008, p. 2]), any visual element can be used.

Furthermore, “design principles are usually not strict rules, but rules of thumb that might even oppose and contradict one another” (Agrawalla, Li, and Berhouzoz, 2011, 62). In other words, there is no pedagogical practice for traditional graphic design. Because this discipline typically transferred knowledge using a “practitioner/apprenticeship” method, each practitioner taught his or her apprentice based on personal experience, with no real consistent structure that each practitioner followed. This has caused most breakdowns of effective design.

Communication breakdowns happen when visual elements are used either for a purpose they are themselves not suited for, or for a purpose other than the primary document purpose. Identifying these breakdowns is crucial to being able to fix them. But once identified, it is vital that the designer knows why communication is failing.

This section will offer a critique of traditional graphic design by discussing further examples of communication breakdown that occur because key visual components have been deployed as directed in the design manual, but without any clear sense of purpose. These components are 1) Decoratives, 2) Signals and Reference Arrays, 3) Images, and 4) Diagrams. I will also discuss how Peircean theory of visual information design allows analysis of design problems and points the designer to a resolution of those problems as shown by model revisions that repair the communication breakdown in each example.

Decoratives

The main effect of visual variety is to evoke feeling. We call visuals with this primary purpose *decoratives*. Visual elements such as color, backgrounds and borders, and typefaces all have primarily decorative qualities, and therefore are suited to a decorative's primary purpose, which is to evoke emotion. Sometimes, however, the overuse of decoratives can distract the viewer from the purpose of the document. For example, consider the following website designs (next page).

In the figure 2.1 left, there are several decorative elements that obscure the actual purpose of the web page, which is to help people with their financial investments: 1) overuse of jarring color combinations, 2) high-contrast backgrounds, 3) decorative border with no purpose, 4) multiple typefaces in varying colors and sizes. These issues will be discussed next.

The role of color in design is complex and is the most researched attribute of visual design (Evans and Thomas, 2008, p.107). Current color theory suggests that "color is

stimulating, calming, expressive, disturbing, impressional, cultural, and associative.” (Holtzschue, 104). Color’s ability to have these different types of effects often leads novice designers into overuse. Furthermore many designers assert that no limitations on color combinations should be set. For example, Holtzshue (1999) states that “since almost everyone has different favorite colors or combinations of colors, the idea that a favorite combination might be aesthetically ‘unlawful’ is absurd” (92; See also Carbaga, 1999). However, some color combinations are jarring, as shown in the first example in Figure 2.1 (next page).

It is easy for the novice designer to implement color, especially when students are told that color can be used to “create mood, highlight, show organization, enhance design theme, create unity, [and] improve eye movement” (Sammons, 112). With no other instruction about color given, using it for any and all of these purposes might seem to be a good choice. However, Sammons also suggests that “color [be] used sparingly to emphasize important information” (114). This instruction seems to conflict with the previous statement. It is also unclear how these two suggestions relate to each other.

Furthermore, students are also told that an attribute of good design is that it uses contrast. Again, contrast is easy to do with color, but has some unpredictable effects, and little instruction is given to guide implementation. Evans and Thomas (2008) suggest that “it is a judgment of how much of one color compared to another color is needed to achieve harmony or balance” (128). In the first website, the background colors stand in stark contrast to the type and link colors, but the presence of contrast does not assure that this is a good design decision.



Figure 2.1: A web page example of overused decoratives and a suggested revision based on Peircean visual information design theory. Page found at <http://sourbrains.org/2011/04/18/digital-assets-or-digital-liabilities-flawed-designs/bad-web-design>. Design on the right is my revision.

The use of borders to separate information is another traditional design guideline that easily goes awry because the exact effects of lines, hard or implied, are rarely directly addressed, but fall under the traditional principle of line. Evans and Thomas (2008) state “line functions in a variety of ways. . . . It can exist purely to serve itself as a graphic element used to separate information, lead the eye in a particular direction, or imply alignment” (21). This vague description does not help a novice designer to know how to use lines. Novices commonly use lines decoratively without concern for simultaneous indicative effects that confuse the purpose of the visual design.

Another decorative issue is the multi-colored border at the bottom of the site. Its ostensible purpose may be to separate the counter from the rest of the site, but there is really no good reason for doing this. More likely, it is a sequential set of blinkers that falls into the realm of action triggers, rather than decoratives. From a decorative standpoint, its biggest issues are a lack of unity and the attempt to fulfill an indicative, rather than a decorative purpose.

Finally the typeface choice, color, and size also serve to distract the viewer from the primary purpose of the site. Traditional graphic design typically stresses the importance of choosing the right typeface. For example, Golombisky and Hagen (2010) state, “well-styled type not only sets the document’s tone but also directly impacts its readability, legibility and visual hierarchy. Failure to follow best typesetting practices, at best, can leave your audience with a negative impression and, at worst, can leave you with no audience at all” (86). But this and most design manuals fail to give more information than that typefaces have a “personality” and should be chosen based on those characteristics (Forsyth and Waller, 1995; Mackiewicz, 2005; Riley and Mackiewicz, 2011, chapter 1). The example website has chosen a typeface that has “fun” characteristics, but this adds to the mismatch of effect and purpose when the designer chooses

different font colors for emphasis. Clearly they were trying to be inviting to the viewership, but implementation of these graphic elements skews “inviting” to “unreliable,” not a good feeling to have about a stockbroker website.

The web page revision shows a judicious use of color and stays away from colored text, which is frequently difficult to read. That this particular use of color has the desired effect and is consistent with the website’s purpose is explained by the Peircean definition of decoratives and their primary purpose:

If the primary purpose of a visual is to share a feeling...then the very prominent decorative elements are appropriate. However, if the primary purpose of a visual is to indicate or inform, then only muted, subtle decorative elements may be appropriate, and then only if these decorative elements are kept below the threshold of distraction.”(Manning and Amare 2012, p. 23)

In terms of this website design, its primary purpose is to persuade viewers to use this company’s services. In the original example, the decorative elements not only fail to assist in fulfilling this purpose, but they actively work against it because the decoratives evoke feelings that actually obscure the seriousness of the site, causing the viewer to lose confidence in the company.

Summing Up

The following table summarizes the main issues that traditional design manuals create when they give design students guidelines on how to use decorative elements:

Table 2.1: Summary of Decorative Issues Created by Traditional Design, and Peircean Solutions

Traditional Design Guideline	Problem Created By This Guideline	Peircean Theory Solution
Color can be used to implement all of the basic design principles.	Color is used indiscriminately to implement all design principles with no understanding of its primary purpose, that of evoking feeling.	When designers understand that color is primarily used to evoke feeling, they know how to use color in combination with design principles to create a specific effect and they know why it works.
The use of contrast is a good design feature.	Exploring only contrast using color or other decorative features has really one feeling result, that of agitation.	Unless the designer is creating an agitative design and is doing this using color contrast, he or she will not be in control of the design results.
Interesting borders help separate information.	Designers look to variety to make things like borders interesting, making the borders themselves more of a focal point.	Designers know the difference between the purpose of a signaling border and a decorative border, and can select the type that supports document purpose.
The correct typeface can enhance or derail the viewer's understanding of the document's purpose.	There is no real understanding of why this happens, other than some studies done on typeface personality.	High variety typefaces convey fun. High contrast typefaces convey agitation. Highly patterned typefaces (regular) convey resolution (the same purpose as anything characterized by Peircean <i>firstness</i> , <i>secondness</i> , and <i>thirdness</i> .)

Note: Summary of decorative element issues caused by traditional graphic design instruction with solutions offered by Peircean analysis.

Most of the decorative issues stem from traditional graphic design's mandate to use different methods of drawing attention to important aspects in the design. This is easiest to do using decorative elements, but will backfire because decoratives are best used to convey a feeling. Any other purpose of a document is often lost because of overpowering decorative elements. With careful analysis, Peircean theory helps the designer analyze and adjust the design's decorative elements to enhance document purpose.

Signals and Reference Arrays

Visual signals are used to focus attention to certain areas of a document. Signals can be unordered (like bulleted items) or ordered according to a known framework (like an index or table). Signals can also be simple font style changes like bold or italics. In short, signals force the viewer's eye to a place in the document because it contrasts with other elements in the document. Most design manuals suggest minimal usage of bullet points, focal points or other signaling devices (Atkinson, 2005; Cyphert, 2004; Sammons, 2007), but each of these elements is discussed separately, rather than as a group with similar purpose or function.

For example, signaling is discussed in terms of visual hierarchy: "Hierarchy is the established order, importance, and emphasis given to visual elements, from those that are dominant to those that are subordinate. A designer must manage the size, placement, and balance of the elements used so the viewer can read the image and extract the intended meaning" (Evans and Thomas, 2008, p. 5). Losing the viewer's attention is attributed to a lack or misuse of visual hierarchy (Evans and Thomas, 2008, p.6). While understanding the principle of hierarchy is helpful for a designer, it still doesn't give the designer any knowledge about the properties of visual elements that draw attention in a specific way, as signals do: they draw attention to something next to them.

Furthermore, White suggests that, "the best design moves the reader across the page in order of the type and images' significance" (White, 2011, p. 89), but this fails to do more than establish that defining order is important. When design manuals do suggest methods for creating hierarchy, they simply suggest using multitude of methods to establish it: "Position (top vs. bottom, left vs. right, Size (large vs. small), Emphasis (bold, italics, etc), Levels of headings" (Sammons, 2008, p. 59). Students are likely to think less about how they implement these

characteristics as long as they use them in their document. The sales letter document from the beginning of this discussion is a good example of this:

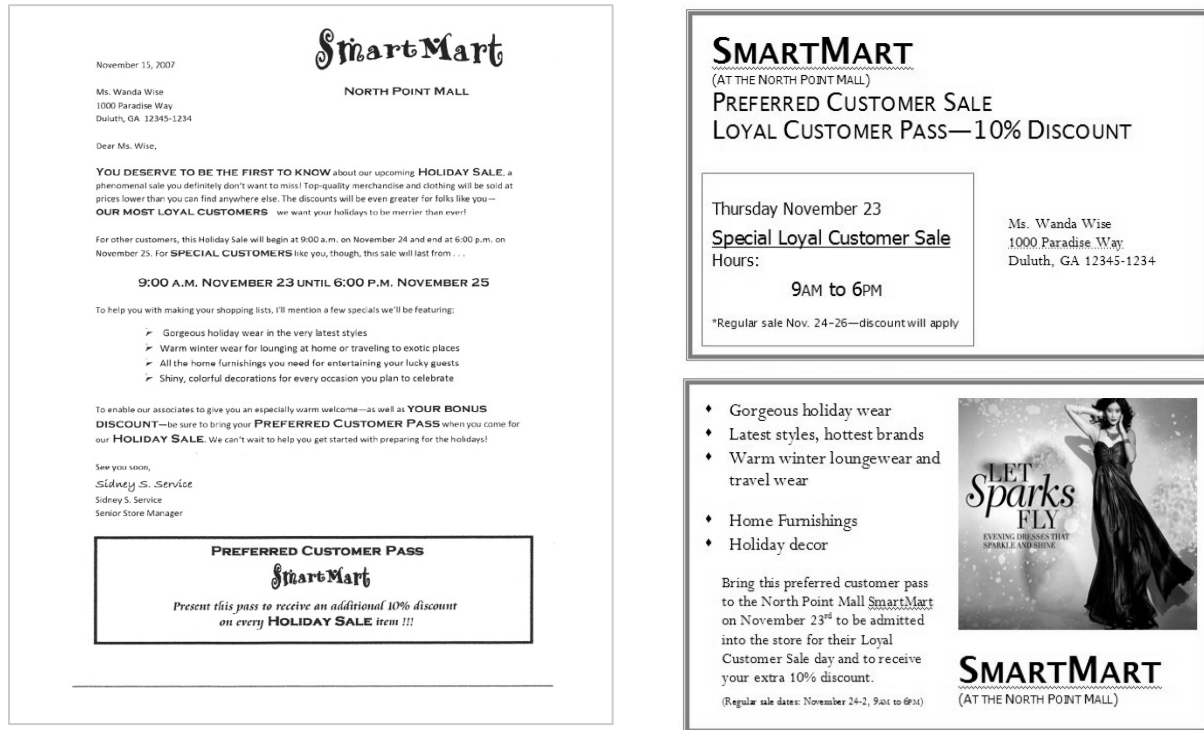


Figure 2.2: As stated in the introduction, this sales letter and revision shows how the use of indicative strategies can backfire when overused. The overuse of signal elements causes the viewer to look in many directions without a clear purpose for the movement. The revision is scannable, allowing the viewer to take in the vital information at a glance. From “Visual Form, Ethics, and a Typology of Purpose: Teaching Effective Information Design” by Christina L. P. Rosenquist, 2012, *Business Communication Quarterly*, 75, p. 45-51. Copyright 2008 by SAGE Publications. Reprinted with permission.

This example shows an attempt to establish hierarchy by emphasizing what is important in the document, but fails to do anything but move the viewer’s eye from one signaling element to another. There are at least ten unordered signal elements in the form of bolded text, typeface changes, boxes, alignment changes, and bullet points, all of which are competing for the viewer’s attention. This kind of design solution occurs when students are told that “using various font styles and sizes can call attention to information that the writer wants to make sure that the reader does not overlook” (Stallworth Williams, 2008, p.49).

More than four attention-getting elements are problematic when they are not ordered. George Miller suggested in 1956 that a person's "span of absolute judgment," meaning the "clear and definite limit to the accuracy with which we can identify absolutely the magnitude of a unidimensional stimulus variable" has a limited number: seven, plus or minus two (92). However, Doumont tested this theory in 2005, and revised the estimate to about four items. He states: "Limit the number of items presented as an otherwise unstructured group to well under seven (I propose five as a limit, three for maximum effectiveness)" (127). Unfortunately, most design manuals still use the "seven, plus or minus two" range (Sammons, 2007, p. 70).

Other writers have suggested that "[adding] variety, color, and movement to your presentations may be the only way to hold the learner's attention" (Gerstle, 1999, p. 275). Instruction that emphasizes holding the viewer's attention without describing effective methods leaves the designer to randomly select elements that may or may not work to any communicative purpose—it is effectively the same as providing all of the ingredients necessary to bake a cake without telling the baker what he or she is making, or how much of each ingredient to use.

The sales letter revision uses many of the same elements as the original does, but has reduced the information to the vital and scannable, orders the information by a known ritual, and limits the signal elements to one major element (boxed information on the front and bullet items on the back). Driving this revision is the ethical obligation the designer is under to keep the viewer from getting tired when trying to understand what the document's purpose is. According to Manning and Amare (2006), "indicative strategies are likewise common in visuals...., but because these actually provoke physical response in an audience, they must be under strict ethical control. An ethical deployment of bullet points would compel an audience to notice only what they truly need to notice to follow the essential logic of the presentation" (200). In other

words, the overuse of signal elements fatigues the viewer who is, in effect, forced to look everywhere a signal element occurs. When this is done solely to keep the viewer’s attention, it has the opposite effect. The viewer gets tired of following the signal elements without getting to any clear reason for continuing, and stops looking.

Reference Arrays—Indexes and Tables

The same issues are in play for reference arrays (tables, catalogs, indexes, etc). These are a set of signal elements that exist in a logical order relative to the other information in the form. In other words, the data in tables are meaningful because of how each cell relates to the ones next to it. However, graphic design manuals don’t deal with how to effectively format a reference array, just how to place it in the overall layout.

In Peircean terms, tables are similar to signals in that you find information based on adjacency, but tables belong to an indexing category in that they are built to convey information based on a known structure. Traditional graphic design does not deal with tables specifically; but technical writers do. Amare, Nowlin, and Weber (2011) state that “anyone going into the technical editing field must be able to edit any form of graphic that presents raw data” (187), and that tables are best used to show “specific data that draw comparisons between variables”(187). A “good” table is defined by a combination of “contrast, structure, arrangement, and separation,” using “uncluttered” data and a “generous use...of white space” (190).

Similarly, Sammons (2007, 107–8) suggests different types of tables and what they are good for:

Type of Table	Purpose
Text	Summarize and compare text
Decision	Show options
If-then	Show conditions and actions
Troubleshooting	Show problems, causes, and solutions
Procedure	Show steps

She then suggests methods of formatting for better presentation: “Use row and column headers and labels; align text in columns; avoid placing text next to gridlines,” for example (108). Riley and Mackiewicz (2011) devote a full chapter to tables (89–104), and provide criteria for deciding whether to use a table, instruction on how to make effective tables, steps for how to build a table in MS Word, and guidelines for integrating the table into the surrounding text (89). This information is better at guiding implementation, but still does not address under what circumstances this kind of visual element should be implemented.

The examples below show a graph (part of the 1-1-3 diagram category) and a reference array, with one of the implementations of data more effective than the other:

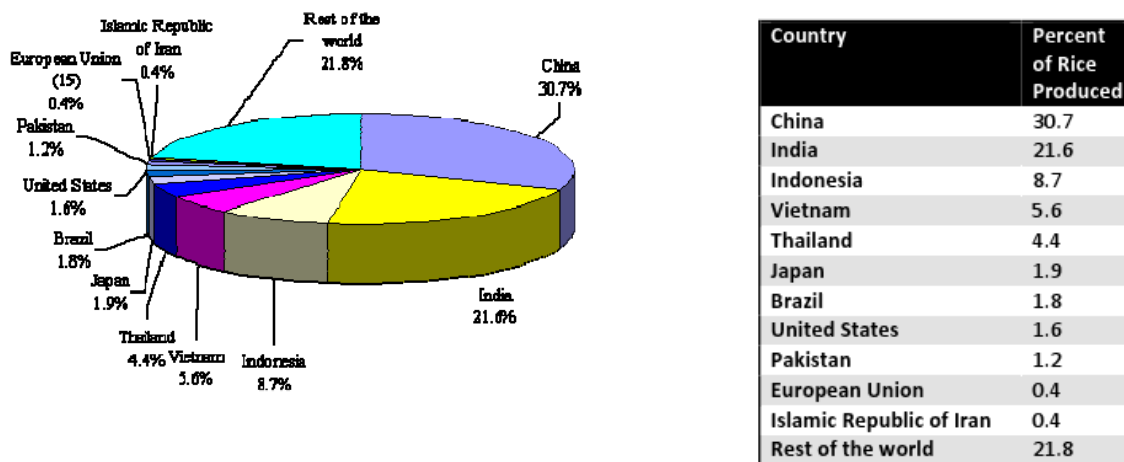


Figure 2.3: A pie chart and its revision to a basic table. In the first example, color and 3D graphics make it difficult to see what the data means. The table allows the viewer to understand the information quickly. Pie chart found at the following address: <http://r0.unctad.org/infocomm/anglais/rice/market.htm>. Accessed 3/29/2012. Redesign by Stacy Owens, undergraduate student in Elang 410r, Winter 2012.

By the instruction given (that “they can be dressed up with pictorial representations or can become eye-catching visual additions to a layout when color is applied to their lines” [Evans and Thomas, 2008, p. 100]), the first example in pie chart form would be the most “attention-getting,” as it includes color and dynamic shape to lend visual interest. However, it is difficult to understand what the actual purpose of the chart is because the data is scattered around the pie, is

only connected with lines, and is in no discernible order. A reference array, by definition, must have a logical order to be effective.

The table, on the other hand, imposes order using volume, and this order is readily apparent. It is simple, easy to scan, and does not hide its information in useless decorative elements. Manning and Amare (2006) explain the effective use of reference arrays in terms of ethics: “An ethical deployment of an informative visual would be a diagram, chart, table, or graph that enables an intended audience to extract the statements or ideas needed to follow the author’s thoughts” (201). In other words, the designer’s primary purpose is to create a reference array that displays data truthfully, and that puts information into a manageable sequence (Manning and Amare, 2012, p. 84).

Summing Up

The following table sums up communication issues created when designers use traditional design guidelines for the use of signals and reference arrays in document design:

Table 2.2: Summary of Design Issues and Solutions by Peircean Analysis

Traditional Design Guideline	Problem Created By This Guideline	Peircean Theory Solution
Getting the viewer's attention is the most important purpose of any design.	Only being concerned about getting the viewer's attention leads to undisciplined use of visual elements which detracts from and sometimes works against the actual purpose of the document.	Helps the designer create the right kind of attention on the right elements of the document, eliciting the right kind of result from the viewer.
Create "focus" and use hierarchy to show order of importance.	Advice is too general to have any real impact on how the visual relates to document purpose.	Changing designer focus to using a limited number of signals helps to clearly define document purpose and to lessen the chance of viewer fatigue.
Clarity for tables is defined in terms of headers, rows, and lines.	A "method of delivery" rather than "content" focus usually overlooks the importance of logical sequence and propositional extraction..	Focuses on primary purpose of document and signal or array supported with logical sequences and visual emphasis on key propositions.

Note: Summary of signals and reference array element issues caused by traditional graphic design instruction with solutions offered by Peircean analysis.

Traditional design guidelines move the designer away from issues that relate to the actual information. Designers focus on the cosmetic (decorative) aspects of the document or on creating viewer eye movement, and miss the more crucial problems of inaccurate or misleading information and viewer fatigue.

Images

Discussion about “visuals” in graphic design means “pictures,” and the difference between visual and verbal language. For our purposes, images (pictures) will be defined as realistic reflections of physical objects. This will include photographs and realistic illustrations, but not iconic images, which fall under a different category.

Riley and Mackiewicz (2011) dedicate a full chapter to photography, focusing on integration with text, selection of appropriate images, and integration into the document (105, 128). Evans and Thomas state that “designers often use imagery to grab an audience’s attention and to establish an immediate connection with the audience” (73). Riley and Mackiewicz agree, saying, “while photographs can also present explicit information, often they are used for another reason—to contribute to the tone of your document” (130).

Traditional graphic design gives imagery a great deal of power. Golombisky and Hagen state that

Images—photos, illustrations, infographics—set tone, add interest, provide additional information and visually break up intimidating blocks of type. The right image can add color, texture, line and movement to your layouts. The use of images adds eye entry points and communicates visual hierarchy. Images help create rhythm to assist flow, thus providing your readers with much-needed direction (132).

With all of the work that an image is supposed to do, it seems important to know what kind of image to choose. But design manuals seem to assume that the designer will know what kind of image to choose, and just need to know how to place it in the document. This can be problematic when the student designer is looking for a certain “tone” but doesn’t really

understand how an image affects the primary purpose of the document. The following examples illustrate effective and less effective image choice:

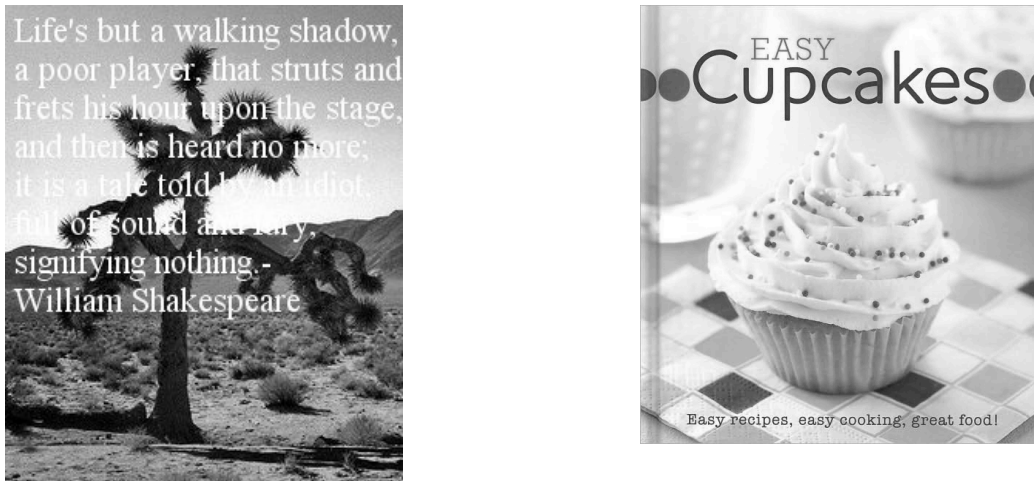


Figure 2.4: Comparison of a poorly chosen image and a well-chosen image. The message of the poster (left) is obscured by the image while the message conveyed by the book cover supports the persuasive purpose of the book. Joshua tree image found at Wikimedia Commons. Image attributed to Joho345. Retrieved August 8, 2011, from <http://commons.wikimedia.org/wiki/File:Joshuatree.JPG>. Adapted with permission. Book cover from Easy Cupcakes,(cover image) by Parragon Books 2009, New York: Parragon Books, Ltd. Copyright [2009] by Parragon Books.

To illustrate, the poster in Figure 2.4 is an example of a poorly chosen image. The image competes with the text and makes it difficult to determine, without really stretching to find connections, how image and text relate. A deeply reflective viewer might construct justification for the fading-text-over-image design of the Joshua-Tree Shakespeare-quote poster, but ordinarily this is not a winning strategy. Text typically needs to be placed in areas that do not “step on” the image and vice versa. Text needs to more apparently complement the imagery and vice versa. Most viewers don't have time to reflect deeply on most visual information. In contrast, the second example is a well-chosen image. Not only is the focal point unmistakable (cupcake pointing to title text like an arrow), it is precisely suited to the nature of the document (a book of cupcake recipes), and is complementary to, rather than distracting from the text.

Because images are easy to implement, novice designers choose them to create the “feel” of a document. In fact, students are often given encouragement to use images; Evans and Thomas (2008) state, “when designers want to communicate a mood or affect viewers on an emotional level, nothing speaks more clearly than a photograph or an illustration” (74). This type of instruction, which is too general to teach effective use of an image, leads designers to use any image, without considering whether that image supports the actual purpose of the document.

Consider, for example, the stockbroker website in the section on decoratives (figure 2.1) that has the picture of a duck used as a focal point. The designer was trying to convey a fun, personable website, and the image supports this, but only supports “fun”; it doesn’t support the primary purpose of the website, and actually distracts the viewer from the seriousness of the site. In the revision, the image is changed to reflect another method of persuasion. The picture of a family with a young child focuses the viewer’s attention on investing for the future of the children. This allows an emotional connection to the concept and adds a persuasive element, supporting the document’s purpose to have the viewer use the company to manage his or her investments. Clearly, correct image choice is vital to the success of the design. But students are usually given a warning not to misuse their images, with no instruction on how to implement them well: “The right image can help you connect and communicate with members of your intended audience, whereas the wrong image can confuse and alienate the” (Evans and Thomas, 2008, p. 74).

Choice of image in Peircean theory is wholly dependent on the purpose of the image itself with the assumption that this purpose should support the primary purpose of the document. Images have both decorative and indicative qualities, but not informative (no propositional content). This limits where images can be implemented effectively.

Summing Up

The following table shows issues with traditional design guidelines as they pertain to the use of images in documents:

Table 2.3: Summary of Design Issues and Peircean Solutions

Traditional Design Guideline	Problem Created By This Guideline	Peircean Theory Solution
Use images to set the tone of your document.	There are no real guidelines on what the precise effect of an image is, only that it has an effect.	Images are defined according to the type of effect they will have on the viewer based on <i>firstness</i> (fun), <i>secondness</i> (agitation), and <i>thirdness</i> (resolution).
Use images to get the viewer's attention.	Designers will tend to use images with obvious emotional content to draw viewer attention, rather than using an image that supports the purpose of the document.	Images are used to evoke a certain emotional reaction that supports the mutually held goal of both designer and viewer.
Don't use the "wrong" image.	Traditional design gives no parameters for understanding what is "wrong" with an image.	Images have known feeling values and can therefore be analyzed for their effectiveness in supporting document purpose.

Note: Summary of image element issues caused by traditional graphic design instruction with solutions offered by Peircean analysis.

Traditional design focuses on an image's obvious ability to evoke a feeling, making implementation of images easy. However, while traditional design warns against using the wrong image, they never discuss how to determine what makes an image "wrong." A Peircean analysis of the type of image the designer is using defines the kind of emotion a specific image (or image type) will evoke, allowing the designer to choose the "right" image to support the document's primary purpose.

Diagrams

Diagrams are included in the discussion of what traditional design calls “informational graphics,” but Peircean theory categorizes them differently, and defines where and how they should be implemented more specifically. Pride-Thorne, Murphy, and Seenauth, (2009) begin their discussion of informational graphics (including diagrams) by saying “the first measure of a successful graphic is the comprehension of the data that is being introduced” (206). This idea is supported by most business and academic texts (Amare, Nowlin, and Weber, 2011; Golombisky and Hagen, 2010; Riley and Mackiewicz, 2011; Tufte, 1983) though not always supported by traditional design instructors.

Effectively, if charts and graphs are even mentioned in design manuals, they are only discussed as a “way to hold a viewer’s attention” (Evans and Thomas, 2008, p. 97). The formatting information given is that “[graphs] can be dressed up with pictorial representations or can become eye-catching visual additions to a layout when color is applied to their lines” (Evans and Thomas, 2008, p. 100). Other design manuals state vaguely that “information mapping is patterning or tabulation of data so it signals relevance and connections that are best illustrated, not merely described verbally (White, 2011, p. 133). But this text only defines information mapping in the most general sense and gives no instruction about how to effectively implement a chart, table, or graph.

Evans and Thomas (2008) include diagrams (charts and graphs) in their imagery chapter and suggest that, like images, “charts are more likely [than raw data] to engage a viewer’s attention” (97). They further state that “[charts and graphs] also help readers visualize how the numbers look in a more meaningful and visually dynamic way” (97). However, after a brief

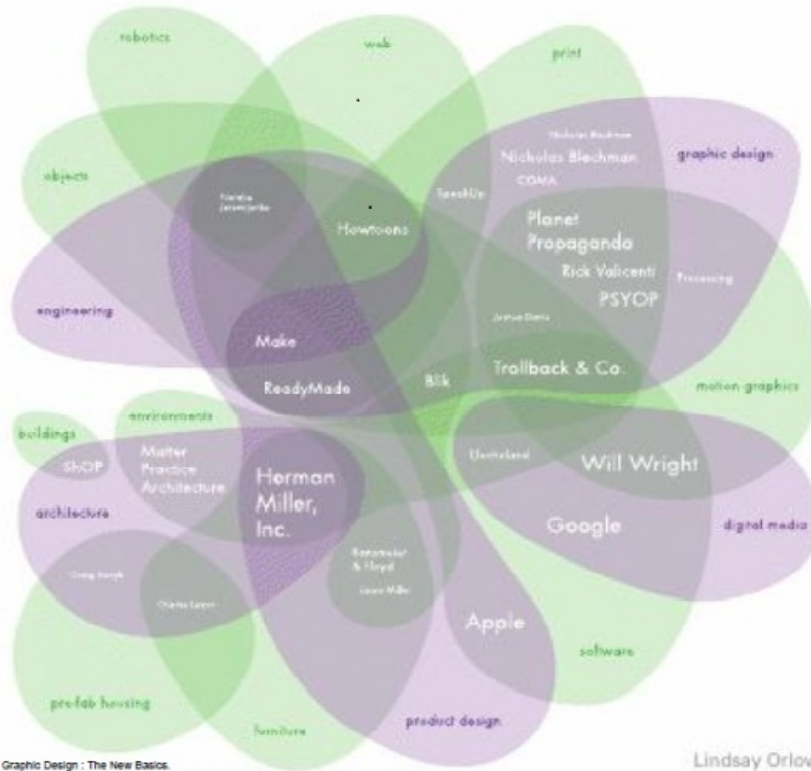
description of pie charts, bar charts, and graphs, they leave this discussion with no other substance.

Another issue is that design manuals suggest that the aesthetic factor should not be overlooked. For example, Cole and Lupton (2008) argue

information graphics do have a role to play in expressive and editorial graphics. The language of diagrams has yielded a rich and evocative repertoire within contemporary design....They can be clean and reductive or rich and expressive, creating evocative pictures that reveal surprising relationships that impress the eye with the sublime density and grandeur of the body of data. (199)

The difficulty with this concept is that information gets lost in the quest for aesthetic delivery and removes the diagram from its intended purpose (which is to convey information), moving it into the realm of the decorative (see Figure 2.5):

Alexandra Matzner



Lindsay Orlowski

Lupton, Ellen. *Graphic Design: The New Basics*. New York, NY, USA: Princeton Architectural Press, 2008. p.202
 http://tile.ezproxy.com/ib/byuprovo/Doc?id=10343588&pg=202
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	Graphic design	Product Design	Digital media	Architecture	Engineering
Motion graphics	Trollback & Co. PYSOP Rick Valcenti Planet Propaganda		Google Will Wright		
Software		Apple	Google Will Wright		
Furniture		Herman Miller		Herman Miller	
Pre-fab housing				SHOP	
Buildings					
Environments					M P Architecture
Objects					
Robotics					
Web					Readymade Make B&K Howtoons
Print	B&K Trollback & Co. PYSOP Rick Valcenti Planet Propaganda COMA Nicholas Blochman				

Figure 2.5: A diagram that obscures both text and relationship information because of the decorative aspects of the design. These relationships could be shown in the table (right), but the design is such that the text is illegible and the relationship between the data is unclear. Diagram attributed to Lindsay Orlowski, in Ellen Philips Lupton, and Jennifer Cole's book *Graphic Design: The New Basics*, (New York: Princeton Architectural Press, 2008), 202.

This diagram illustrates Lupton and Cole's view that diagrams can be aesthetically pleasing; unfortunately, most informational content is lost in the process. Although it is unified in color and form, this diagram is more decorative than anything else. It is intended to show the relationships between the categories and headings, including the overlap, but the viewer cannot extract this information from the diagram as it is presented. Furthermore, the type is so small for some of the company names that the text is illegible.

The revision attempts to extract the information from the diagram, but is largely unsuccessful, showing how difficult it is to understand the diagram's information. Many of the table cells are empty, either because there was no data for the cell or the text was too small to decipher what the information should be. If, as even design manuals suggest, the primary purpose of diagrams and other informational graphics is to communicate effectively (Evans and Thomas, 2008, p. 2), it cannot be considered good design to create an informational graphic where that data is obscured.

According to Peircean theory, "diagrams generally work best if they do not contain many overtly decorative or image-like elements, especially colors or shading touches, that distract from their informative core" (Manning and Amare, 2012, p. 51). Alton (2010) concurs, quoting Tufte (2001): "*Chartjunk* is Tufte's way of defining anything that is added to a chart that does not augment the data. Tufte believed that 'graphics do not become attractive and interesting through the addition of ornamental hatching and false perspective to a few bars. Chartjunk can turn bores into disaster but it can never rescue a thin data set' (121). In other words, focus on the data and not the decoration" (28). This issue of over-decorating diagrammatic information has roots in Peircean ethics. In short, chartjunk puts a visual designer's decorative-flourish purposes ahead of

not the decoration” (28). This issue of over-decorating diagrammatic information has roots in Peircean ethics. In short, chartjunk puts a visual designer’s decorative-flourish purposes ahead of the viewer’s purpose of extracting clear information. This is ethically problematic when the resulting visual should meet the shared goals of both designer and viewer. For an extended discussion of Peircean analysis and ethics, see Manning and Amare, 2011.

Summing Up

The following table shows the main issues with traditional design's directions about using diagrams (informational graphic):

Table 2.4: Summary of Design Issues with Peircean Solutions

Traditional Design Guideline	Problem Created By This Guideline	Peircean Theory Solution
Use charts and graphs to engage viewers' attention	This suggests that simply having an informational graphic will be sufficient to get the viewer's attention and ignores the designer's responsibility to use the graphic to convey information.	Focuses on methods of clearly portraying the data so that the information is understandable.
Make graphs and charts "eye-catching" with colors or images.	Data in the graphic (the graphic's actual purpose) can be easily obscured by overuse of decorative elements.	Designers understand why a decorative element (primary purpose to evoke emotion) distracts from the primary purpose of an informational graphic (to convey information) and so minimize their use when building diagrams, charts, or graphs.
Make sure the information graphic conveys data accurately.	This nod to ethical implementation of data doesn't really explain how accuracy is jeopardized by some graphics, just that accurate data is expected.	Understanding the primary purpose of both decorative and informative aspects of charts and graphs allows the designer to analyze whether information is being accurately portrayed or obscured.

Note: Summary of decorative element issues caused by traditional graphic design instruction with solutions offered by Peircean analysis.

Traditional design tends to give contradictory advice for implementing informational graphics. Although design manuals all discuss the need for accurate information portrayal, they tend to also want to "pretty up" these types of elements with decoration. Peircean design defines why that detracts from the primary purpose of instructional graphics and leads the designer to avoid making decisions that will take away from an informative document's primary purpose.

Conclusion

Current graphic design theory is noticeably vague about what constitutes effective visual presentation. A basic graphic design textbook introduces the vocabulary of “primary principles”, “secondary principles”, and “elements” as a definition of what constitutes graphic design (Evans and Thomas, 2008, p. 1). However, like most instruction on design, the authors are limited to an explanation of vocabulary; they discuss *what* should be considered when working on design project, and then show examples of the principle in question.

The problem here is that the novice designer, for whom this text is intended, still doesn't know how to build a design that communicates effectively. They know how implementation of one principle worked in one instance, but without general principles to help them pick specific visual elements, all they can do is imitate what worked for that situation. In other words, they have been given a tool box with a number of different tools in it, but are left to themselves to see if a particular repair requires a hammer or a wrench. Unfortunately they don't know what each tool is used for, so they pick one to see if it works.

Manning and Amare suggest that nothing is more important than choosing visual elements that support the shared goals of designer and viewer. Specifically, they state that “an effective, ethical visual is one that serves attainable, sustainable purposes, purposes shared jointly by both the creator and the viewers of that visual” (2012, p. 1). Furthermore, they propose that visual elements are mapped to consistent definitions based on both their formal characteristics and useful functions. These definitions provide a consistent and predictable framework for selecting the visual element that has the desired communicative effect.

The need for a visual design implementation framework is supported by education theory. Myron Dembo suggests that “learning is facilitated when a learner becomes aware of the

inherent organizational structure of new material, or imposes an organizational structure on the material when no such structure initially exists.” (2001, p. 30). In fact, the ability to learn can only happen well when it is structured: “psychologists have found that it is difficult, and sometimes impossible for humans to learn unorganized bits and pieces of information...without imposing patterns of organization on the information” (Gaskins & Elliot, 1991).

Manning and Amare’s approach provides the organizational framework that makes learning possible; however, the textbook written to explain the theory did not include pedagogical material. My project is intended to fill this gap, but some background in Peircean theory is necessary for understanding the modules. There are two introductory modules, which I will summarize in the next section, that should be included when teaching the four modules presented, but which are abbreviated for the purposes of this paper. The students in the classes where these modules were piloted, did receive this background material before the modules were taught.

Chapter 3

Peirce—Foundations—the Triangle

Imagine a one-thousand piece jigsaw puzzle spread out on a table.

At first, everything looks like a jumbled variety of color and shapes.

You can't tell where to begin;

if you haven't seen the box the puzzle came in, you couldn't tell what kind of picture it is.

FIRST

Variety, as is typical of puzzle pieces, produces an undifferentiated pile of *fun possibilities*: the puzzle picture could *potentially* be an infinite number of things.

Assuming that you want turn the pile of possibilities into some specific picture, what you do next is find the corner pieces—two straight sides. In other words you look for exactly four puzzle pieces distinctly different from all the others: you find not just variation (since each puzzle piece is unique) but you must find more radical contrasts. Then you separate the other pieces with flat sides and begin building the framework.

SECOND

Contrast separates specific pieces from otherwise undifferentiated variation, and this enables you to *act* on the puzzle, to build a *concrete* frame.

Finally, you begin filling in the framework, matching the colors or the bits of a picture to pieces already in place, following what emerges as a pattern. When you are finished the individual

pieces have presented their own pattern, and that pattern organizes a coherent whole—variety, framed with contrast, producing a pattern, a “big picture”; in other words, a piece of information.

THIRD

Pattern *organizes* variety otherwise
undifferentiated and contrasts otherwise
undirected to produce *coherent information*.

Figure 3.1 shows the basic Peircean categories mapped out onto the extreme points of an inverted triangle. This will become a familiar method of visualizing Peircean elements.

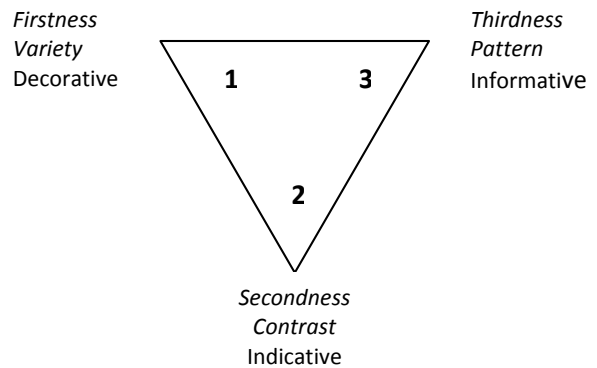


Figure 3.1: The Peircean triangle with basic elements and vocabulary.

For Peirce “everything we perceive and think about is constituted by compounds of [these] categories” (Manning and Amare, 2012, p. 13). This perception happens in a specific order, and this order is reflected in the names of Peirce’s categories. Peirce determined that three core, primary categories would both the minimum number necessary AND the maximum number necessary to build classification systems of any size, just as three primary colors, mixed in different proportions, can make millions of distinct colors; just as three kinds of particles, protons, neutrons, and electrons, make up all normal kinds of matter in the universe; just as three essential steps are involved in the (re)construction of any puzzle.

To identify what the three core, primary categories for any classification system might be, Peirce studied carefully the writings of earlier philosophers (Plato, Aristotle, Kant, Hegel, etc.), but being a scientist, he also made careful observations of the actual world, and he

determined that three kinds of experience could not be reduced to, or explained by, any other kind of experience:

First, the experience of *feeling various possibilities* before anything happens.

Second, the experience of *contrast between action and reaction* after things actually did happen.

Third, the experience of *patterned repetition of variety and contrast*, where patterned repetition ultimately defines all the habits of people and all the laws and principles of the universe, which *informs* us about why things actually could, did, or will happen.

In contrast to these primary categories of experience, all other kinds of experience CAN be reduced to and explained by these three Peircean categories (in theory).

Peirce's primary categories are utterly basic, but precisely because they are basic and elemental, they are tricky to describe in words because words and languages are NOT utterly basic. Peirce therefore used as shorthand labels for his categories, the terms *firstness*, *secondness*, and *thirdness*, which reflect the usual order in which we experience of each of these categories, as illustrated in the puzzle example.

Because we'll mainly talk about the key forms and purposes of visual design here, we will also use the following terms as a shorthand for the Peircean categories:

- (1) variety/feeling,
- (2) contrast/action, and
- (3) pattern/information

Variety in visual form best serves the *purpose* of evoking *feeling*.

Contrast in visual form best serves the purpose of provoking *action*, and

Pattern in visual form best serves the purpose of asserting *information*.

As we classify many kinds of things in terms of Peircean categories, it helps to visualize these primary categories as extreme points of a triangle (see Figure 3.2):

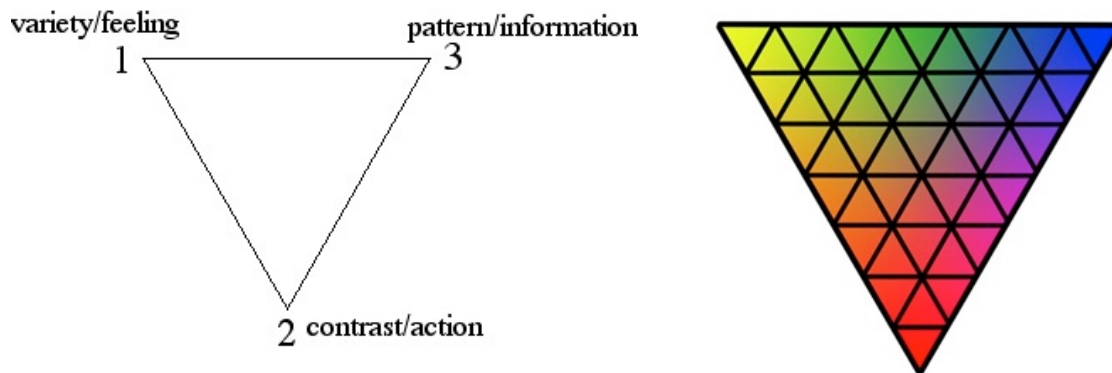


Figure 3.2: The Peircean triangle corresponds with colors. Primary colors are yellow (*firstness*), red (*secondness*) and blue (*thirdness*). Image found at <http://www.daviddeen.com/imprint/issue25/issue25.html>.

You can think of this triangle as a representation of the whole range of possible experience: every meaningful perception, action, and thought occurs somewhere within of this triangle (in theory), just as every shade of color occurs somewhere between the primary colors of yellow, red, and blue.

Once we have established the basic categories, it is helpful to see how they can be applied to different situations. Next we will look at how Peircean categories can be applied to emotion, to personality traits in the workplace, and to plot types.

Applications of the Peirce categories

The point of all of this categorization is to be able to apply them to various situations. What we find is that different scenarios can be analyzed by their basic characteristics and functions using the three basic Peircean categories. We will demonstrate with three examples below.

A typology of emotions (Manning and Amare, 2009)

Now let's consider how we create a system of classification, using the Peircean categories, for some specific kinds of experiences. Say we want to build a system for classifying different kinds of feelings (i.e. emotions). We would mark out a smaller triangle in the corner of the largest Peircean triangle, in the domain corresponding with *feeling* (see Figure 3.3):

This process is much like classifying shades of yellow in the yellow corner of a color triangle. Here we would find very yellow shades of yellow, more reddish shades of yellow, and more bluish shades of yellow.

By analogy with the yellowest shades of yellow, we find feelings most intensely matching Peircean *firstness*, like an unassembled puzzle, *free*, even *aimless* feelings, but also potentially *fun* feelings. By analogy with the redder shades of yellow, we find feelings of Peircean *firstness* (i.e. feeling) tinged with *secondness* (i.e. feeling of action), quite descriptive of the feelings experienced while in the early stages of assembling a challenging puzzle, *agitation*, even *anger*, but also for regular puzzle-solvers typically a feeling of *motivation*. By analogy with the bluer shades of yellow, we find feelings of Peircean *firstness* tinged with *thirdness* (i.e. feeling of pattern), quite descriptive of feelings experienced while in the later stages of

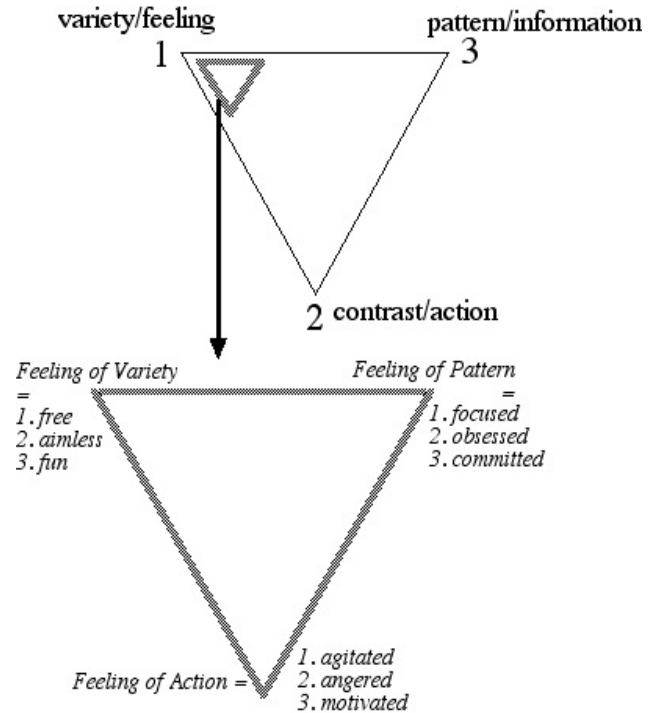


Figure 3.3: The Peircean categories as they apply to a typology of emotions. Adapted from Amare and Manning, 2009. Used by permission.

assembling a challenging puzzle, *focus*, even *obsession*, nearly always a sense of commitment to finishing the puzzle.

We should note in passing that any given emotional state can be perceived or described in neutral terms, or in negative (i.e. “sad”) terms, or in positive (i.e. “happy”) terms. In any case, the neutral, negative, and positive values of emotion are themselves classifiable in Peircean terms;

- i. Neutrality is like an unstarted puzzle or a blank page, undefined potential, and thus a kind of Peircean *firstness*.
- ii. Negativity is a kind of contrast or opposition or reaction, and thus a kind of Peircean *secondness*.
- iii. Positivity is a kind of attitude that we’d like to sustain or repeat in a patterned way over the long term and is thus a kind of Peircean *thirdness*.

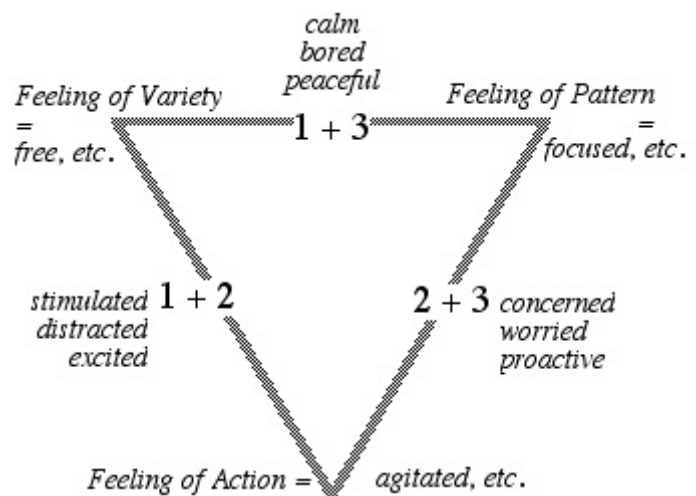


Figure 3.4: The Peircean categories as they are combined to form three middle categories. Adapted from Amare and Manning, 2009. Used by permission.

In this same mode, classifying emotions, we can consider the sides of the Peircean triangle in addition to the corners numbered 1, 2, and 3 (see Figure 3.4). That is, we should think about the sides we could label as 1+2, 1+3, and 2+3. The 1+2 feelings would be emotions intermediate between free feelings and agitated feelings. These would be feelings of inclination to action with a weaker sense of compulsion than agitation, but feelings not quite as undirected or aimless as mere fun.

As before, we can think of 1+2 feelings in neutral terms (stimulation), negative terms (distraction) or positive terms (excitement). Note that this 1+2 class of emotions is the complementary opposite of type 3 emotions in exactly the same way that orange (yellow + red) is the complement of blue. That is, *distraction* is essentially a feeling opposite to the feeling of *focus* or *commitment*. By the same token, 1+3 “green” emotions of *calm*, *boredom*, or *peace* would be the complementary opposites of “red” type 2 emotions, such as agitation. By the same token, 2+3 “purple” emotions of *concern*, *worry*, or *proactivity* would be the complementary opposites of “yellow” type 1 emotions such as *(care)free* or *fun*.

To summarize to this point, notice how we have constructed a classification system for emotions that (so far) includes 18 discrete subcategories and 21 subcategories if we add *neutrality*, *negativity*, and *positivity* (like grey, black, and white) to the shades of primary and secondary emotions (like primary and secondary colors) illustrated above. Each of these 18 subcategories is derived as a different combination and configuration of just the three primary Peircean categories, *firstness*, *secondness*, and *thirdness*, or in other words, *variety*, *contrast*, and *pattern*.

Peirce himself believed that similar methods could be used to effectively classify every kind of experience, and to do this not to arbitrarily describe types of experience, but rather to explain and predict many key aspects of experience. The model of emotion above, for example, can predict and explain why feelings of stimulation or excitement are and must be antithetical to feelings of focus and commitment.

In addition to its general usefulness as a descriptive tool, the validity of the Peircean model of categories is established by the way that it provides precisely these kinds of useful explanations and predictions. In the remainder of this section, we will review other applications

of Peircean categorization before moving to the specific tasks of visual design classification. This Peircean visual design classification will ultimately improve our ability to explain effective visual designs and predict to what extent new designs may be effective.

Personality traits in the workplace. (Chambers, Manning, and Theriot, 2000)

The Peircean categories can also be applied to the way people work together, and can be used to determine what types of people will work well as a team. A person's sense of self, i.e. their personality, is typically closely tied to their occupation. This is why people tend to have a crisis of identity if they lose a job or have to change occupations. Peircean categorization explains this connection between occupation and personality: both are patterns of action and thus located in roughly the same place in the Peircean universe, along the right edge of the triangle between Pattern (*thirdness*) and Action (*secondness*) (see Figure 3.5).

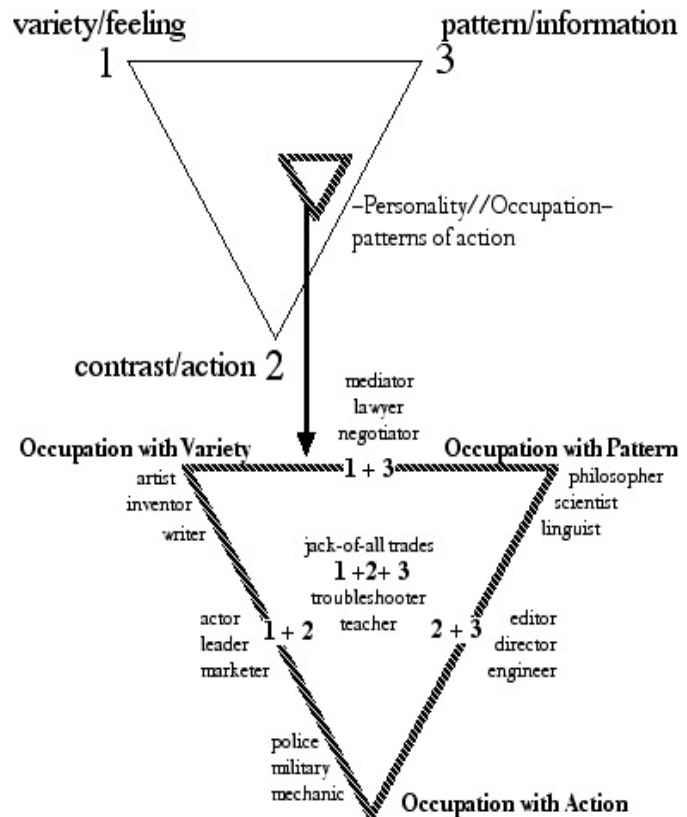


Figure 3.5: Peircean categories applied to personality types in the workplace. Adapted from Chambers, Manning, and Theriot, 2000. Used by permission.

Career counselors typically administer personality tests in helping people choose careers. For example, if someone personally thrives in the making or discovering of order and pattern in their world, this person might work well as a philosopher, a scientist, or a linguist, all of whom look for patterns in thought, in the physical world, or in language. Because of the

correspondence between color and the Peircean categories noted earlier, we could describe people occupied with discovering pattern in their personality, and in their work, as Peircean “blue” personalities.

Using the same strategy we would identify someone who was mainly occupied with putting pattern into action as having a Peircean “purple” personality. Many editors are of this personality type (though certainly not all). It is also a common personality of engineers, and in the business world, managers and directors who are not the official “leaders” but who nevertheless make sure everything gets done.

It’s worth noting that if a “purple” personality is too consumed by actively enforcing order and pattern on others, he or she may have difficulty working with anyone, but most of all with Peircean “yellow” personalities—in other words, those persons who thrive on variety and the need to have fun in their work: artists, inventors, and writers, writers who ironically are most dependent on “purple” editors, their complementary opposites.

Entrepreneurs (i.e. people who create and grow new businesses) are frequently Peircean “orange” personalities, given that they like variety in their work, but they also have to put plans into action to be successful. The entrepreneur is also necessarily a self-marketer and a team leader in the new business. Usually, on that team they need some kind of “yellow” inventor on one hand, and a “red” mechanic on the other, someone to actually manufacture the product or otherwise put the business plan into action. Actors are another kind of “orange” personality. Like a leader or a marketer, actors have to get attention to be successful, and create in their audience a feeling (*firstness*) of a physical reality (*secondness*), which is the essence of acting out a convincing illusion.

Note that the Peircean analysis of their occupations explains why it is a huge temptation for marketers and leaders to rely so much on illusion (i.e. one kind of *firstness* plus *secondness*) rather than actually making promises and keeping them (i.e., another kind of *firstness* plus *secondness*), but ethical leaders and marketers must especially resist this specific temptation.

People occupied with balance between yellow and blue (variety and pattern) tend to be “green” peacemakers, possibly negotiators; people whose primary goal is to make sure the members of the team get along. Peircean “white” personalities are usually people capable of filling a wide range of needs, such as troubleshooters, teachers, and for that matter, good mothers.

This is the kind of person that used be called a “jack-of-all-trades.” “Yellow” personalities often imagine themselves to be “white” because of the yellow/*firstness* love of variety BUT what yellows only fantasize about, the true “white” personality is more driven to actually accomplish in a patterned way because of the stronger red/*secondness* and blue/*thirdness* components in their personality.

Stories—writing (Young 2003)

Writing for film or books, all storytelling actually, has basic elements that can be categorized by the Peircean method too. All stories need a background or *setting* against which *conflict*-driven action and *resolution* occur.

Background setting is the yellow/*firstness* aspect of writing and includes the place, circumstances, plot exposition, and character development from which the story develops. *Motivating conflict*, is the red/*secondness* aspect of plot writing. Every story needs a reason for the reader or viewer to keep reading or watching the story. If the red aspect of the plot is weak, you lose your audience. Because of the action aspect of this end of the triangle, well-handled pace in writing is crucial to maintaining the interest of your audience. *Resolution and outcome* is

the blue/*thirdness* aspect of plot writing. Here all the conflict comes to an end, and characters, setting, and situations come to some sort of final point. When authors and screenwriters don't (as often happens) write an effective resolution, readers and viewers come to the end of the story and retain a sense of agitation because there are things left "undone" in the story.

Table 3.1: Three-part Typology for Stories

	Setting	Conflict	Resolution
1	Innocence	Perception	Uncertain
2	Ongoing conflict	Physical struggle	Physical victory
3	Bystander	Loyalty/law	Law applied

Table 3.1: Three defining categories of stories. Combining these elements in unique sets of three constitute definitions of story types and show how a well-formed story of that specific genre is developed.

In some cases, a lack of resolution might be a way to keep a story going, as in a soap opera, or slice-of-life art film (especially as real life is characterized by a continuation of plot rather than a resolution), but stories with "cliff-hanger" endings, or no clear ending at all, don't always motivate the viewer or reader to return to the story. We like resolution. There is a mental and emotional release when a story or situation has closure, so most popular stories will end up with a resolution at the end (even though it may take to the end of the trilogy).

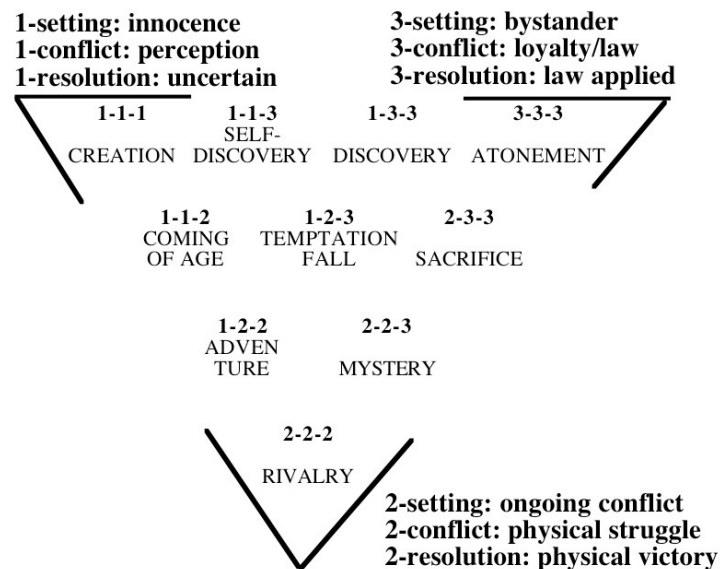


Figure 3.6: Peircean categories applied to story types. Adapted from Young, 2009. Used by permission.

An even more elaborate Peircean analysis of storytelling emerges when we see that *setting*, which is *firstness*/yellow overall, nevertheless can have red shades and blue shades. *conflict*, which is *secondness*/red overall, nevertheless can have yellow shades and blue shades, and *resolution*, which is *thirdness*/blue overall, nevertheless can have yellow shades and red shades (see Figure 3.6).

Because there are three distinct Peircean levels of *setting*, three distinct levels of *conflict*, and three distinct levels of *resolution*, we can develop a fairly elaborate classification of story types as shown above.

This story-type system works in the same way as other Peircean systems we've seen, but notice that we've identified two kinds of 1+2 category (1-1-2 and 1-2-2), two kinds of 1+3 category (1-1-3 and 1-3-3), and two kinds of 2+3, (2-2-3 and 2-3-3). Essentially, this is like identifying two shades of orange between yellow and red, two shades of green between yellow and blue, and two shades of purple between red and blue.

Note that a CREATION story (extreme yellow/*firstness*) doesn't especially need physical conflict or a clear resolution. The creation-type story is more about the world or characters that a storyteller creates than what happens to them. It's enough that characters create conflict among themselves based purely on how they perceive each other. At some point the story can end if at least one perception problem is resolved, but several other problems may remain. An acceptable creation story is thus level-1 setting, level-1 conflict, and level-1 resolution, or 1-1-1 for short (see Table 3.2).

Table 3.2: Creation Story Definition

	Setting	Conflict	Resolution
1	Innocence	Perception	Uncertain
2	Ongoing conflict	Physical struggle	Physical victory
3	Bystander	Loyalty/law	Law applied

Table 3.2: The shaded characteristics pertain to the definition of a “creation” story where it begins in innocence, has a perceptual conflict, and they find some resolution, but perhaps not everything is resolved.

A more normal kind of story though, is an ADVENTURE, where a peaceful (i.e. innocent) setting is interrupted by physical conflict with a clear enemy, and the main character has to physically fight and defeat that enemy. A proper adventure is thus level-1 setting, but level-2 conflict and level-2 resolution, or 1-2-2 for short (see Table 3.3):

Table 3.3: Definition of Adventure Story

	Setting	Conflict	Resolution
1	Innocence	Perception	Uncertain
2	Ongoing conflict	Physical struggle	Physical victory
3	Bystander	Loyalty/law	Law applied

Table 3.3: The shaded categories represent the definition of an “adventure” story, where it begins with an innocent hero who is tossed into a physical struggle, but eventually triumphs over the enemy.

This system of classifying stories helps us understand exactly why some stories don’t have workable conflicts or effective resolutions.

Rule of Precedence

The general rule is that a story has to EITHER maintain the same Peircean level of setting, conflict, and resolution OR rise in level as it moves from setting to conflict to resolution. In other words a level-1 resolution (uncertain) is fine for a CREATION story because it starts and stays at level 1, but an ADVENTURE story that ends not with victory but with uncertainty (1-2-1), is unsatisfactory because it rises to a level-2 conflict but doesn’t maintain a level-2 resolution.

For example, think of a simple story where the hero goes out to kill the dragon to save the otherwise peaceful village, but who is, instead killed by the dragon. The fate of the village is left

undetermined, and the audience is left hanging, hence the unsatisfactory resolution for a (1-2-1) story.

The rule of precedence is most easily visualized with the Peircean three-number definition for stories and visual design elements. The numerical definition *1-2-1 is easier to see as a problem than “Rhetic Indexical Qualisign,” which is the wording Peirce uses to define the same issue.

Visual Design Strategies (Manning and Amare, 2012)

As it turns out, Peircean analysis shows us that visual designs work in a system very similar to the story system shown above. When visual designs work, it is typically also because they also maintain or rise in level as they move from **form** to **reference** to **interpretation** (directly parallel to *setting - conflict - resolution*).

Table 3.4: Peircean Definition Categories: Parallel to Story Categories

	Form	Reference	Interpretation
1	Unified variety	Similarity	Feeling
2	Trigger and action	By physical adjacency	Physical action
3	Setting, conflict, resolution	By coded system	Information (true/false)

Conversely, when visual designs fail, it is typically because, just like failed stories, they drop in level as they move from **form** to **reference** to **interpretation**.

A typical example is a PowerPoint slide show, a report with slides full of bullet points, more bullet points than the audience can separately see and remember (physical actions). In many ways an over-bulleted slideshow is like a failed adventure: 1-2-1, ending in mere (frustrated) feeling rather than (useful) action.

Next we will show how the three-category basic system becomes a ten-part subsystem to which visual elements can be mapped based on three-characteristic definitions (see Figure 3.7).

Visual Effects and Purpose

Visual design traditions have a fairly adequate vocabulary for describing design techniques: Shape, space, line, size, color, texture, and typography. Those techniques are generally understood to have specific kinds of effects: Unity, contrast, emphasis, rhythm, proportion, balance, etc.

What is distinctly lacking in the visual design tradition is an adequate vocabulary for describing *purposes* of visual design: why we want one type of form and effect and not another in specific contexts, apart from vague and not-too helpful statements like “consider your audience” etc.

Peircean analysis will provide us with a terminology of purpose (vocabulary), along with methods of determining when and how specific visual design

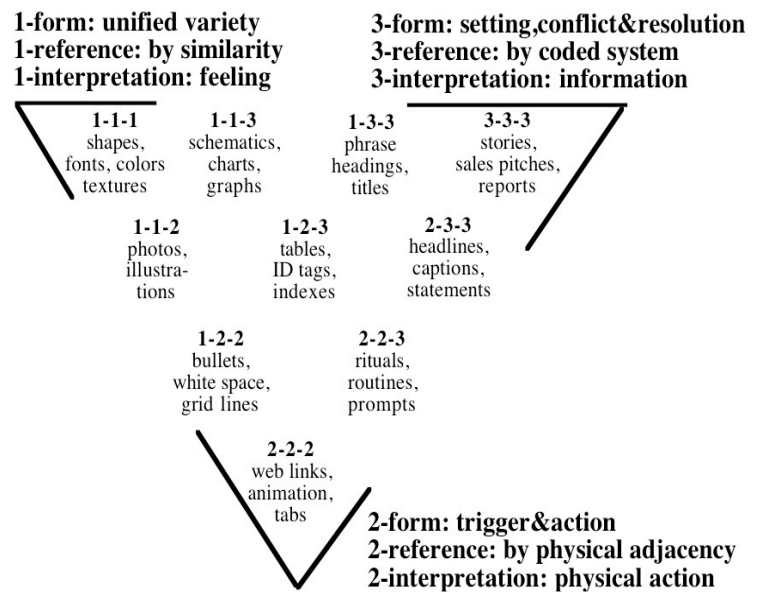


Figure 3.7: A typology of visual elements based on Peircean categories. Adapted from Manning and Amare, 2012. Used with permission.

strategies effectively serve some purposes but not others (framework), and whether and why specific visual design strategies are inadequate for some purposes but suitable for others (application). To get there, we must first understand the Peircean concepts of **form**, **reference**, and **interpretation**:

First: Suppose you come out of your house one morning, and find a box with a hinged lid on your doorstep.

- Before you open it, a closed box is a whole world of variety and possibility.
- Before you open it, a closed box is a nagging itch to scratch, a call to action.
- After you open a box and see what's inside, you'll still need at least one more thing.

Second: You do what comes naturally when you find a box: you open the lid to see what's inside:

- Scenario 1: a puff of yellow smoke and the smell of lemons.
- Scenario 2: a handgun and bullets.
- Scenario 3: several sheets of paper: a long message written in numerical code.

Third: No matter which scenario above you pick, three things are likely to be true:

- You'd refine the appearance of the box in your imagination, to fit what was inside.
- You felt compelled to wonder what the box and its contents are for.
- You won't know what they're for, without more information.

Visuals get their meaning (according to Peirce) in the same way that the box gets its meaning in the example above, by three separate elements: form, reference, and interpretation.

Form is the box itself, what you see on the outside. It doesn't convey much in the way of meaning, but if the form is wrong for the contents (reference and interpretive purpose) of the visual, meaning can be skewed. A very small box (an inch wide or less) would be adequate to contain a puff of smoke and a smell, but such a box would be inadequate to hold a handgun or several sheets of paper. A larger box, just adequate for a handgun, could still be wrong for several standard sheets of paper, unless they were awkwardly folded. In other words, form doesn't determine reference, any more than a box determines its contents, but the form has to be adequate to the reference, just as a box has to be adequate (the right size) for its contents.

Reference always has two parts, cause and effect, like the action of opening the box to see the thing found inside the box. Reference is some kind action, connecting a visual form to whatever thing the visual form is meant to represent. Reference is NOT the end of the process of finding meaning, however. The thing inside the box, like the effect of a visual form, is only understandable when you know the *purpose* behind it, when you know how the thing or effect is supposed to be understood. That brings us to Interpretation.

Interpretation is like finding inside the box, along with whatever thing the box contains, one additional slip of paper with a message on it that you can make sense of, explaining the purpose of the thing in the box:

Interpretation of Scenario 1: "Cool Magic Trick, huh?"

Interpretation of Scenario 2: "LOOK OUT for the TIGER!"

Interpretation of Scenario 3: "A=the smallest prime number; B=the smallest odd number..."

Each of these interpretive messages raises more questions, but each also provides a starting point for constructing the meaning of the box and its contents ASSUMING the interpretation is appropriate to the contents.

The interpretation of Scenario 1 suggests that the box is for someone who likes magic. The interpretation of Scenario 2 suggests that the box is for someone who needs to take action. The interpretation of Scenario 3 suggests a starting point for decoding the numerical message.

Just as a box has to match contents, contents have to match an interpretive message about purpose. If we want a someone to translate a coded message (Scenario-3 content), it's useless to give the interpretation/purpose of Scenario 1 to the box-and-contents of Scenario 3, that is, to interpret the stack of coded papers as a cool magic trick; OR give the interpretation/purpose of Scenario 2 to the box and contents of Scenario 3, that is, to give an agitative warning about an approaching tiger with no hints about decoding the pages (what now seem to be a message about how to deal with the tiger).

By analogy, the form and reference of a visual design must adequately serve an interpretive purpose.

Recall from the foundations section that both stories and visuals have to maintain a certain level (=scenario number) of setting-conflict-resolution or form-reference-interpretation.

Both stories and visuals may rise in scenario/level as they advance from "box" (setting/form) to "contents" (conflict/reference) to "explanation" (resolution/interpretation) but they cannot drop in scenario/level without creating a disconnect, a broken story, analogous to this mismatch of box contents and interpretive message. Such disconnects are very common in visual design, particularly in the hands of inexperienced designers.

For example, novice designers will use decorative elements (borders, font styles, or color) to create interest in websites or blogs; however, if the site is primarily supposed to be about conveying information to viewers, that information will be lost if the viewer becomes distracted by a tastefully unified but useless display of color, typography, and design flourishes.

In effect this is like giving viewers a stack of information they have to decode, but the interpretive message from the novice designer is only “Look at my cool visual-magic tricks.” The Peircean shorthand for this ill-conceived design strategy is 1-3-1: the form/box is mainly decorative (level 1), though it references/contains information (level 3), and viewers can only readily interpret that information in terms of feelings like “wow” and “how cool is this?” (level 1 again).

Another common disconnect happens when a supposedly informative visual design requires several distinct reference actions simultaneously from viewers: a dozen or more links in a horizontal menu, in no particular order, blinking headlines in different font styles, eye-catching animation, clashing colors, horizontal and vertical lines moving the eye in various directions, extreme contrasts of light and dark shapes, big and small shapes, etc.

In effect this is again like giving viewers a stack of information they have to decode, but the interpretive message from the novice designer is actually only “LOOK OUT! LOOK OUT! LOOK OUT!...”

The Peircean shorthand for this ill-conceived design strategy is 2-3-2: the form/box is mainly indicative (level 2), though it references/contains information (level 3), and it only interprets that information in terms of action like “look here!” “click here,” “click over here too,” etc.

Although we can describe and explain ill-formed visuals with the standard Peircean classification system, the system itself is organized in terms of those visual types that are well-formed relative to specific interpretation levels,

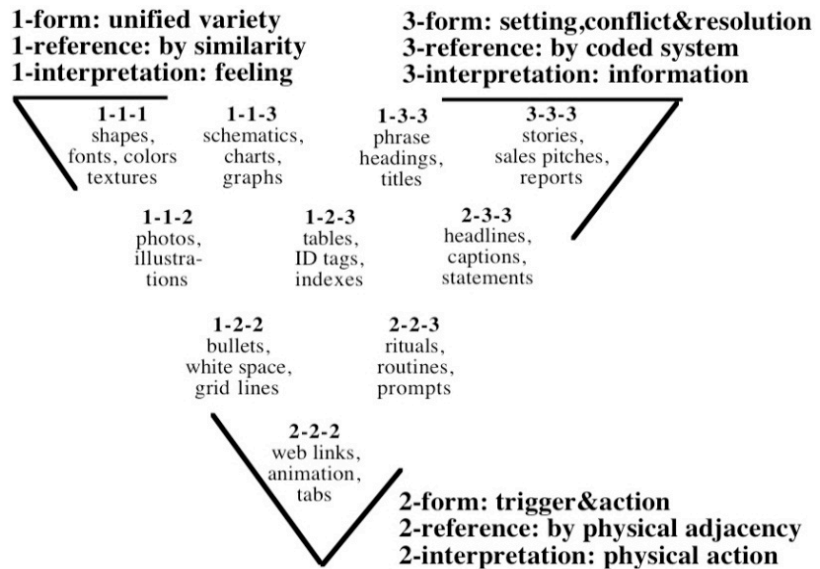


Figure 3.8: Visual elements defined by form, reference, and interpretation. Each element’s definition is a unique combinations of these three elements. Adapted from Manning and Amare, 2012. Used by permission.

or in other words, the purposes appropriate to each kind of visual (see Figure 3.8). We will now review each of the levels of Form, Reference, and Interpretation, as each relates to visual design purpose.

Form = First Number

The possible form-levels of a visual element are triadic in nature (like all of the Peircean categories). By means of its form, a visual element can

- (at Level 1:) bring some variety of forms into one unified form,
- (at Level 2:) trigger an action/reaction with two contrasting signals, and/or
- (at Level 3:) organize a unit of information as three (or more) sequenced statements.

Table 3.5: Levels of Form Element

	Form	Reference	Interpretation
1	Unified Variety	Similarity	Feeling
2	Trigger/Action	Physical Adjacency	Physical Action
3	Setting-Conflict-Resolution	Coded System	Information (true/false)

These levels of form are the major kinds of container that visual communication comes in. These form types, you should notice, are already defined in terms of their *intended effects*, in other words the first phase of visual-design purpose,

to create unified variety,

to trigger an action with two-part contrast, or

to provide a three-part pattern for information.

Each container/form must serve the purpose of the visual. Recall how useless it would be to try to cram several sheets of paper into a one-inch cube that could only easily contain a puff of smoke and a smell, and consider Figure 3.9:

In the mid-1800s, William Morris began printing books with an eye on the early

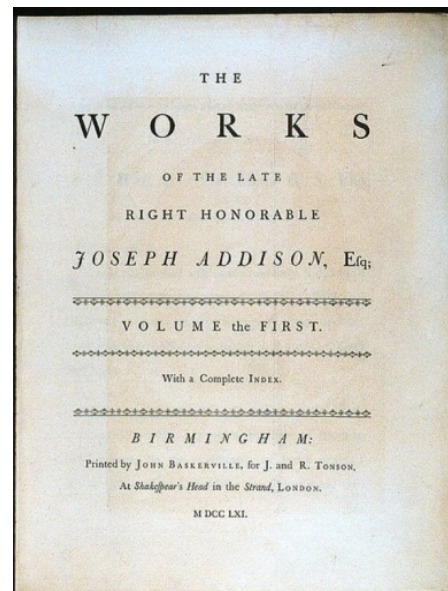
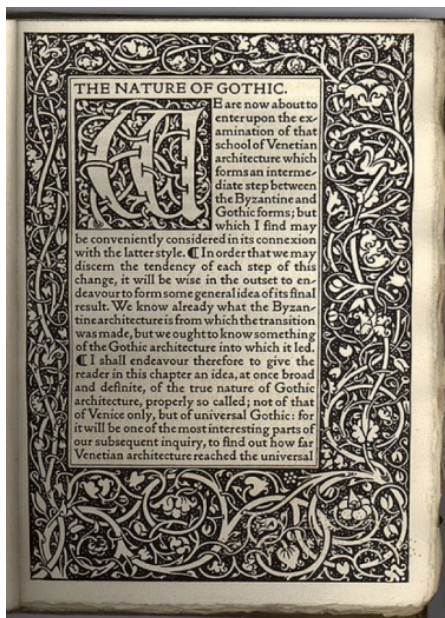


Figure 3.9: Pages printed by William Morris (left) and John Baskerville (right) serve to illustrate forms that do not (left) and do (right) support the primary purpose of the document. Images found on Wikipedia.org.

illuminated manuscripts, which are heavy with decorative elements. And although the books he created with Kelmscott Press were beautiful, they are really hard to read because the words themselves get lost in the decoration around the text block. Essentially, this is putting information in the wrong kind of box, the wrong kind of form, which blocks easy access to the information.

In contrast, John Baskerville, who worked in the mid-1700s was most concerned that the text was readable. Not only did he design books for easy readability, he created a new type of paper and ink to more clearly print the text and built a typeface (Baskerville, above right) that is still used because it is easy to read in large blocks of text.

Unified Variety. Note that the decorative elements in the Morris example above could effectively frame a decorative picture, even though it is a difficult container for any substantial block of textual information. Decorative elements are, by definition, 1-1-1 visuals:

Level 1 Form: unified variety

Level 1 Reference: by similarity (e.g. a border similar to leaves and vines)

Level 1 Interpretation: the purpose of evoking feeling.

Table 3.6: Definition of Decoratives by Peircean Elements

	Form	Reference	Interpretation
1	Unified Variety	Similarity	Feeling
2	Trigger/Action	Physical Adjacency	Physical Action
3	Setting-Conflict-Resolution	Coded System	Information (true/false)

Several visual design types with higher levels of purpose/interpretation also have level-1 form (unified variety), *but not so much variety* that *feeling* overwhelms any other interpretation level. Compare again the Morris and Baskerville pages above. Both page designs accomplish an

overall visual unity: the Morris page by a carefully balanced asymmetry between the various forms, the Baskerville page by a relatively simple, centered alignment of text.

The Baskerville page above is a *title* page, and as such would be classified as a 1-3-3 visual:

Level 1 Form: unified variety

Level 3 Reference: by coded system (i.e. the English Language)

Level 3 Interpretation: the purpose of asserting information (see Table 3.7).

Table 3.7: Definition of Title Page by Peircean Elements

	Form	Reference	Interpretation
1	Unified Variety	Similarity	Feeling
2	Dual Sequence	Physical Adjacency	Indicative Action
3	Setting-Conflict-Resolution	Coded System	Informative Pattern

Now, despite the overall unity in both the Morris and the Baskerville pages above, each page also includes one strong contrastive element. This constitutes a separate visual-design element and this separate element has a different level of visual form: Morris’ oversized illuminated “W” and Baskerville’s oversized, capped, bold WORKS line.

When a visual element contrasts sharply with a background of more unified elements, the viewer or reader experiences a reaction to the contrastive element. In this case,

the contrastive visual element is an action trigger;

the contrastive visual has a form level 2, higher than level-1 unified variety; and,

the contrastive visual must have a higher-level purpose than decorative feeling.

Trigger and Action. Level 2 Form is unlike Level 1 where the visual is contained within itself as a unified representation of feeling, Level 2 Form triggers an action on the part of the viewer after it is separately recognized as distinct from and opposed to background unity. In the Morris and

Baskerville examples above, the viewer’s eye is physically drawn to the high-contrast element which dominates the page. The viewer’s eye is then physically led to other visual elements immediately adjacent to the dominant element.

A webpage link is a more modern visual design element with this same level of trigger and action form. Here, not just the eyes but also the hands of the viewer are physically moved to click on the link and this click triggers a move to the next webpage, adjacent in the sense that the computer will automatically load new page information by physically following the link to stored data. In either case, we classify this visual as 2-2-2:

Level 2 Form: trigger and action

Level 2 Reference: by physical adjacency

Level 2 Interpretation: the purpose of causing physical action.

Table 3.8: Definition of High Contrast by Peircean Elements

	Form	Reference	Interpretation
1	Unified Variety	Similarity	Feeling
2	Trigger/Action	Physical Adjacency	Physical Action
3	Setting-Conflict-Resolution	Coded System	Information (true/false)

Level 2 Form is always characterized by movement or cause-effect connections and therefore is a deliberate disruption of unity in which a contrastive form stands out against a unified background. This disruption is allowed IF and ONLY IF the purpose of the visual is more than decorative, more than the mere creation of feeling. Notice that a merely decorative border, for example, is essentially ruined by contrastive elements that grab attention without pointing to anything worth noticing (see Figure 3.10):

Though unacceptable as mere decoration, Form Level 2 is required in three distinct types of visuals in the Peircean classification system. Besides 2-2-2 forms like focal points on a page and webpage links, contrastive visual form is necessary for visual representations of procedural steps or rituals (i.e. 2-2-3 visuals, the process of buying something online, for example), where the following links must be distinctly visible AND understood as physically adjacent steps in a patterned sequence.

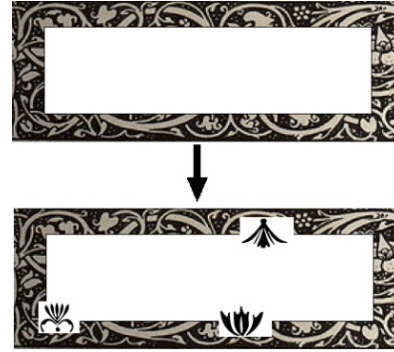


Figure 3.10: A decorative border interrupted by indicatives with no purpose distracts from the intended feeling of the visual.

1. SIGN IN
2. PLACE ITEM(S) IN CART
3. PROCEED TO CHECKOUT

In this case, each contrastive action has to be interpreted as part of larger pattern of information.

Similarly, each sentence of text is essentially a Form Level 2 visual (i.e. 2-3-3), since a complete sentence always requires a visible contrast between a pointing <subject> and the action of asserting a predicate. <A tiger> IS coming, for example.

Level 2 Form: trigger and action (= subject and predicate)

Level 3 Reference: by code (i.e. the English language)

Level 3 Interpretation: the purpose of asserting information.

Table 3.9: Definition of a Sentence by Peircean Elements

	Form	Reference	Interpretation
1	Unified Variety	Similarity	Feeling
2	Trigger/Action	Physical Adjacency	Physical Action
3	Setting-Conflict-Resolution	Coded System	Information (true/false)

What you need to remember about Form Level 2 is that the reader or viewer is required to do something where these kinds of visuals are used. In other words, a creator of visuals should use Form Level 2 visuals if and only if the defined purpose is to impel the reader or viewer to a certain action or series of actions.

Form Level 3 is only found in text elements. As the teaching modules will not include the text forms (because that would require describing the entire field of Linguistics), we will leave the third level as yet undiscussed.

Reference = Second Number

Reference is defined as the action by which the viewer or reader links the visual form to a feeling, physical object, or concept. There are, as always, three levels of reference action,

(at Level 1:) based on similarity between a visual form and what it resembles,

(at Level 2:) based on physical adjacency between a visual form and what it is next to,

(at Level 3:) based on patterned codes relating a visual form to other forms or concepts.

Table 3.10: Levels of Reference by Peircean Element

	Form	Reference	Interpretation
1	Unified Variety	Similarity	Feeling
2	Trigger/Action	Physical Adjacency	Physical Action
3	Setting-Conflict-Resolution	Coded System	Information (true/false)

As with the levels of form, these levels of reference are already defined in terms of *intended reference strategy*, in other words the second phase of visual-design purpose, on the path to interpretation.

Forms are *iconic* if their reference target links to the form by similarity.

Forms are *indexical* if their reference target links to the form by adjacency.

Forms are *symbolic* if their reference target links to the form by a code pattern.

Peirce's terms *icon*, *index*, and *symbol* are familiar in most discussions of visual design; however, most of those discussions more or less forget or ignore what Peirce actually meant by those terms, so we must be cautious to clarify their intended reference.

Icon. When visuals are defined by Level 1 Reference, it means that the viewer finds a referent for this type of visual based on similarity to something else that he or she is already familiar with.

- 1-1-1=Decorative colors and abstract shapes evoke feelings similar to past experiences with similar forms.
- 1-1-2=Images evoke a sense of physical objects that are physically similar to the image.
- 1-1-3=Diagrams, maps, and graphs evoke conceptual relationships based on similar relationships in the visual.

It's common to assume that only images (reflections of physical objects) are icons, or that everything visual is also somehow an image in a vague sense. This is not correct in the precise Peircean sense however. Images are just one kind of icon, and the term *image* specifically is defined by physical reflection of the physical appearance of an object (see Figure 3.11).



Figure 3.11: Image icon (1-1-2) of a cat.
<http://en.wikipedia.org/wiki/File:WhiteCat.jpg>

The picture in Figure 3.11 is an image icon in the precise sense, a direct reflection of how one cat looks. This picture (Figure 3.12) is a diagram icon, showing relationships (facial-feature ratios used to draw a cat) abstracted away from physical detail.

The picture in Figure 3.13 is primarily a decorative icon; the resemblance to an actual cat or actual cat proportions is very remote, but somehow the forms evoke feelings similar to the feelings experienced by most people in the presence of an actual kitten.

Index. When visuals are defined by Level 2 Reference, it means that the viewer finds a referent for this type of visual based on its physical connection to something else, usually the visual’s proximity to other elements in the visual field.

There are four basic categories of visuals that are indexical in the Peircean sense:

1-2-2—**Signals** that direct attention to adjacent information; lines and negative “white” space are the most common and important kinds of indicative signal, to organize lists and direct eye movement, etc. (see Table 3.11).

Table 3.11: Definition of Signals (1-2-2) by Peircean Elements

	Form	Reference	Interpretation
1	Unified Variety	Similarity	Feeling
2	Trigger/Action	Physical Adjacency	Physical Action
3	Setting-Conflict-Resolution	Coded System	Information (true/false)

1-2-3—**Reference arrays** that organize 1-2-2 signals (such as lines and space) into patterns of information; ordered lists, tables, reference indexes, etc. (see Table 3.12).

Table 3.12: Definition of Reference Arrays (1-2-3) by Peircean Elements

	Form	Reference	Interpretation
1	Unified Variety	Similarity	Feeling
2	Trigger/Action	Physical Adjacency	Physical Action
3	Setting-Conflict-Resolution	Coded System	Information (true/false)

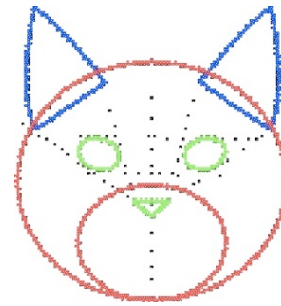


Figure 3.12: Diagram icon (1-1-3) of a cat.
<http://nevit.deviantart.com/art/How-to-draw-Cat-face-99045316>



Figure 3.13: Decorative icon (1-1-1) of a cat. Created using Word.

2-2-2—**Indexical action triggers** discussed earlier: focal points on a page, animation that invariably drags the eye toward it, and web links that physically change the visual to another page (see Table 3.13).

Table 3.13: Definition of Action Triggers (2-2-2) by Peircean Elements

	Form	Reference	Interpretation
1	Unified Variety	Similarity	Feeling
2	Trigger/Action	Physical Adjacency	Physical Action
3	Setting-Conflict-Resolution	Coded System	Information (true/false)

2-2-3—**Ritual action sequences** discussed earlier: these organize 2-2-2 action triggers into sequenced patterns of action such as narratives and procedures (see Table 3.14).

Table 3.14: Definition of Ritual Sequences (2-2-3) by Peircean Elements

	Form	Reference	Interpretation
1	Unified Variety	Similarity	Feeling
2	Dual Sequence	Physical Adjacency	Indicative Action
3	Setting-Conflict-Resolution	Coded System	Informative Pattern

Visuals with Level 2 Reference only become meaningful when viewers see what is next to them, or specifically, what they are pointing to. Because the term “index” in modern usage generally refers to one specific kind of visual (1-2-3 reference arrays), we introduce the term *indicative* to more transparently refer to this entire class of pointing visuals.

As noted above, line and space are the most basic kind of indicative signal (1-2-2). Bullet points essentially serve to visually define a line of list items, and also each point indicates its specific, adjacent list item. At the same time that these visual elements contribute to the formal unity of a page design, they are also guiding eye movement that may have initially been put in motion by a focal-point action trigger (2-2-2). More or less space between a visual line of items serves also to indicate which items are more closely “connected,” which relates to the core reference strategy of physical adjacency or in other words *proximity*.

The single major limitation of indicative signals is that viewers can only handle so many of them before literal, physical eye fatigue sets in. This problem can be overcome to a significant degree however, if the indicative signals are organized in a larger pattern; in other words, if the 1-2-2 signals are converted into a 1-2-3 reference array, e.g. a table (see Table 3.15).

Table 3.15: Signals require organization by an understood pattern.

Cat-Human
Interaction
Types

- socialized
- pedigreed
- owner fed
- home sheltered
- unsocialized
- common pet
- semi-feral
- generally fed
- building sheltered
- feral
- forage fed
- pseudo-wildcat
- unsheltered

=>

Classification based on human interaction^[15]

Population	Food source	Shelter	Socialized
Pedigree	Fed by owner	Human homes	Yes
Pet	Fed by owner	Human homes	Yes
Semi-feral	General feeding	Buildings	Yes
Feral	General feeding/foraging	Buildings	No
Pseudo-wildcat	Foraging/hunting	None	No

Source: Wikipedia.org

Symbol. When visuals are defined by Level 3 Reference, it means that the viewer finds a referent for this type of visual based on a coded pattern in which this particular visual, a standardized form, is part of a systematic array of other visuals, also standardized forms: letters in an alphabet, words in a dictionary, sentences in an array of grammatical patterns, texts in an array of genre patterns, etc. Text forms are the only visual elements that have Reference Level 3 and are beyond the scope of this project, so we will leave the Reference discussion at this point. The main thing to remember is that words, sentences, and texts are just as much visual elements as are colors, forms, images, diagrams, lines, white space, etc.

Interpretation = Third Number

As mentioned in the beginning of this unit, interpretation of visual form and visual reference constitutes the ultimate purpose of the visual.

Table 3.16: Levels of Interpretation by Peircean Elements

	Form	Reference	Interpretation
1	Unified Variety	Similarity	Feeling
2	Dual Sequence	Physical Adjacency	Indicative Action
3	Setting-Conflict-Resolution	Coded System	Informative Pattern

A visual is well-formed or ill-formed to the extent that it is adequately or inadequately organized to serve an interpretive purpose that meets the needs of viewers. As with form and reference, there are three distinct levels of interpretation (see Figure 3.14).

- (at Level 1:) to evoke feeling, or in other words to decorate.
- (at Level 2:) to provoke action, minimally the action of pointing, in other words to indicate.
- (at Level 3:) to assert propositions, promote patterned understanding, or, to inform.

A visual can maintain a certain level of purpose, or it can rise in its purpose as it moves from intended form effect to intended reference strategy to intended interpretive purpose, but if the level of purpose declines at any point, the visual design with break down and be, in a descriptive sense, ungrammatical, because it breaks the precedence rule.

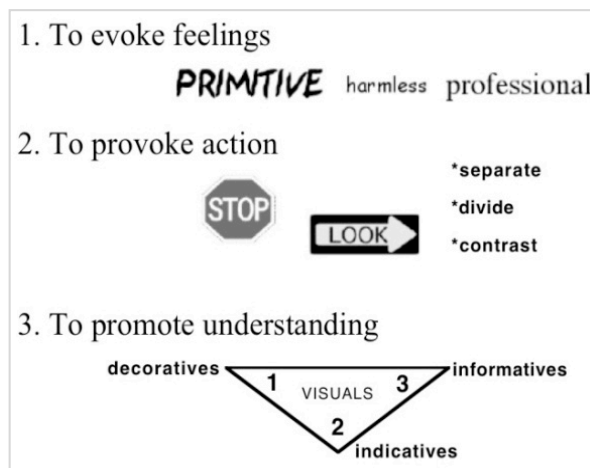


Figure 3.14: Visual description of Peircean categories as specified by Manning and Amare (2012). Used by permission.

Summing Up

As we have seen, these three levels of form, reference, and interpretation are used to identify ten well-formed visual types. The next four chapters will discuss five of the visual types using teaching modules: Decoratives (1-1-1), Signals and Reference Arrays (1-2-2 and 1-2-3 respectively), Images (1-1-2), and Diagrams (1-1-3). Each of these teaching modules will be followed by an example set of exercises, along with actual student responses taken from participants in the two classes where this project was used as textbook material, and an analysis of the students' responses.

I will then conduct a brief discussion on how students performed on their first midterm exam, comparing the 2009 class (with the original Manning and Amare text) with the classes where the teaching modules were piloted (2011 and 2012), and conclude with a discussion of student response, a surprising learning outcome, and suggestions for further study.

Before moving on to the teaching modules, however, it is important to reiterate that the students were taught the information from the previous chapter (Peirce Foundations, and Visual Effects and Purpose) as a foundation for the following four modules.

Chapter 4

Module 1: Decoratives

Decoratives are visuals whose primary function is to set a specific mood, feeling, or tone. Decorative elements are found in nearly all visual designs, either in background or foreground, so it is very important to understand how they work and also to have a clear sense of any decorative visual's limitations.

Decoratives are the most basic kind of visual (i.e. expressing mostly Peircean *firstness*) and so are the most accessible visual design mode for designers, particularly the less experienced. Careless or inexperienced designers most easily and often misuse, overuse, or ineffectively use decorative elements in visual design.

Though decoratives are the easiest type of visual to implement, they are problematic precisely because they may not serve well the more advanced indicative and informative purposes that a visual might need to serve. For example, browsing through the social network pages of junior high or high school students yields a cacophony of colors and background patterns, typeface choices that reflect the mood of the textual content rather than the need to be readable, and layouts defined by decorative elements that end up drawing more attention to themselves than to the content of the page itself.

In traditional design terms, poorly executed decoratives implement variety without its counterpart unity. According to Evans and Thomas (2008), unity is “the control of variety” (3). This means that, in traditional visual design, to make the different facets of a design meaningful and communicative, the designer needs to find the unifying element that brings order to variety. This traditional observation is certainly correct, but Peircean analysis allows us to both explain

this observation and expand upon it in considerable detail, adding a discussion of purpose to the discussion of the visual forms and effects that create unity.

Peircean Definition

In Peircean terms we define an effective decorative visual element as having a container (Form level 1) of Unity, containing something understood by Similarity (e.g. yellow smoke = lemon smell, Reference level 1), and an interpretive message of Feeling (Interpretation level 1), or 1-1-1 in Peircean notation (see Table 4.1).

Table 4.1: Definition of Decoratives by Peircean Elements

	Form of...	Reference by...	Interpretation as...
Level 1	Unified Variety	Similarity	Feeling
Level 2	Dual Sequence	Physical Adjacency	Indicative Action
Level 3	Setting-Conflict-Resolution	Coded System	Informative Pattern

Note: The defining components of a decorative, shown by the shaded cells. Form level 1, Reference level 1, and Interpretation level 1 (1-1-1).

Peirce hoped to classify everything in the universe in terms of these three categories. This project could only conceivably succeed if Peirce’s three-part strategy of classification has essentially infinite telescoping capability. Recall how we “zoomed in” on the *firstness* corner of the Peircean Triangle to develop a three-cornered classification system just for types of emotions (i.e. potential feelings), and we also “zoomed in” on the 2 + 3 side of that same Peircean triangle to develop a three-cornered classification of personality/career types (i.e. patterns of action).

In exactly the same way, we can now “zoom in” on just the 1-1-1 corner of visual types to develop a more detailed system for assessing decorative effectiveness. This system is, as usual, triangular, but we can also present it as Table 4.2 below, exactly analogous to Table 4.1 above.

Table 4.2: Parameters of Decoratives

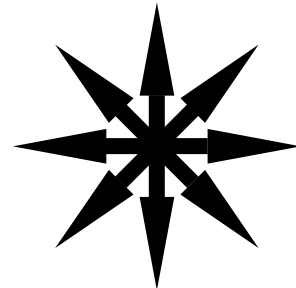
1=Formal Unification of...	1=Reference by Similarity to...	1=Feeling Interpreted as...
1=Variety and/or Yellow	1=Unrestricted Possibility	Free/Aimless/Fun
1+2		Stimulation/Distraction/Attraction
2=Contrast and/or Red	2=Physical Object Reaction	Agitation/Anger/Motivation
1+3		Calm/Boredom/Peace
1+2+3 and/or Black/White		Neutral/Negative/Positive
2+3		Concern/Worry/Proactivity
3=Pattern and/or Blue	3=Predictable Regularity	Focus/Obsession/Commitment

Note: Expansion of the 1-1-1 Decorative Category= “Zoom in” on Level-1 Form/Reference/Interpretation Subcategories

Table 4.2 will be our main reference and design-assessment tool for decoratives, so take a few moments to study and internalize it.

The basic rule of decoratives is that some sublevel of unified form evokes some sublevel of feeling by some sublevel of perceived similarity between form and feeling.

For example, this decorative (if you look at just the pointy arrow part) evokes a reaction (feeling) to sharp objects (Ouch! or Danger!) by virtue of its similarity to other pointy things (spears, knives, etc.) that are familiar to the viewer.



As we examine this rule more closely, it follows naturally that particular subcategories of unified form are better suited to purposefully evoke particular subcategories of feeling (hence “pointy things” evoke “danger” feelings). Fundamentally, even well-unified decorative forms (in the traditional sense) can misfire (in the Peircean analysis) if any decorative elements evoke

1. distinct and conflicting feelings, disrupting unity;
2. feelings distinct from the overall feel of the visual, disrupting similarity; or

- feelings inconsistent with the overall purpose of the visual, disrupting interpretation.

Conversely, the decorative element succeeds if specific kinds of unified form and similarity align well with intended feeling effects, and these feeling effects align with the overall purpose of the visual design.

Unification of Distinct Forms

The tapestry pattern shown in Figure 4.1 integrates several distinct forms into one overall effect, as shown in the adjacent design assessment, a table showing the elements at work (from Table 4.2) and their typical effects. What is particularly interesting is that the potentially agitating red color is muted by darkening, which keeps that design element from coming into strong conflict with the overall peaceful effect of the form (variety + pattern).

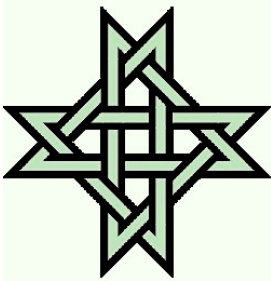


1=Formal Unification of...	1=Reference by Similarity to...	1=Feeling Interpreted as...
1=Variety (tree branches) and yellow	1=Unrestricted Possibility	Freedom
2=Red [muted by 1+2+3]	2=Object Reaction	[agitation]
1+3	=TREE	Calm/Peace
1+2+3 [mutes 2]		[neutralized]
3=Pattern (border)	3=Predictable Regularity	Focus

Figure 4.1: The various decorative elements (in the absence of any specific contextual modifications) probably add up to an overall calm interpretation (variety + pattern); potentially agitating effects of a red shade (2) are specifically muted the addition of 1+2+3 dark pigment (neutralizing effect). The usual interpretations of TREE as a resting place (i.e. in the shade) are consistent with the non-representational forms of variety and pattern (1+3). Image found at <http://www.thepersianroom.net/>.

The Celtic knotwork shown in Figure 4.2 shows a similar but complementary effect: the potentially calming effects of a green shade (1+3) are specifically muted with a lighter (i.e. pastel) tone, and in that case the knotwork pattern instead combines with the sharp/contrasting endpoints (2+3), adding up to a feeling likely to be more concerned or proactive than the overall

peaceful feeling that was created in 4.1. This in turn is consistent with the idea of the Christian cross with its usual interpretation as a symbol of physical sacrifice and intellectual conviction.



1=Formal Unification of...	1=Reference by Similarity to...	1=Feeling Interpreted as...
2=Contrast (pointy turns)	2=Object Reaction	Agitation/Motivation
1+3 [muted by 1+2+3]		[peace]
1+2+3 [mutes 1+3]		[neutralized]
2+3	CROSS and/or THORNS	Concern/Proactivity
3=Pattern (knotwork)	3=Predictable Regularity	Focus/Commitment

Figure 4.2: Various decorative elements (in the absence of any specific contextual modifications) probably add up to an overall concerned interpretation (contrast + pattern); potentially calming effects of a green shade (1+3) are specifically muted the addition of 1+2+3 light pigment (neutralizing effect). The usual interpretations of CROSS or THORNS as emblems of physical sacrifice and conviction align with the formal properties of the design. Found at <http://commons.wikimedia.org/wiki/File:Knotwork-cross-%28simplest%29-or-eightfold-star-%28irregular%29.svg>.

Both 4.1 and 4.2 exemplify the essential decorative mode in which a range of distinct form elements are unified to create a single coherent emotional effect.

In contrast, in Figure 4.3 we have a rendering of a Star of David interrupted with a swastika—distinct and conflicting decorative patterns, each infused with intense and conflicting object references and therefore likely to induce intensely conflicted feelings, specifically to be offensive or offended feelings.



1=(*Dis)Unification	1=Reference by Similarity to...	1=Feeling Interpreted as...
2=Contrast (*exceeding unity)	2=Provoking-Object Reaction	Agitation/Anger (in fact)
	NAZIS vs. JEWS	
2+3		Concern (at least)
3=Pattern (*conflicting) and blue	3=Predictable, Regular conflict	

Figure 4.3: Decorative disunities (distinct patterns) parallel to some degree the problematic (concerning) cultural interpretation of the form. Image found at <http://worldsymbols.blogspot.com/2009/12/raelian-emblem.html>.

The probable offensive reading of 4.3 is fairly apparent given the cultural meaning of the two patterns, and the Peircean analysis itself also suggests at least concern with the design. That is, the two distinct patterns make the forms difficult to unify, and so the likely feeling evoked by the form is at minimum agitation and focus (=concern). If cultural awareness is added to the analysis, the form-reference-interpretation level of the decorative actually drops as it moves from form to interpretation, from 2+3 to 2, and so in a cultural sense at least the design is ill-formed in its interpretation. It is likely to be interpreted as deliberately insulting. The formal Peircean qualities of the design anticipate to some degree the conflicted cultural interpretation.

Object Reference and Cultural Experience

In assessing the emotional meaning of a form, similarity to prior experience is the first place a person goes to find ways to interpret a visual. For a decorative, this is a simple matter of what it reminds you of—its similarity to what you've seen before. For example, the iconic eye picture (figure 4.4) is recognizable because it looks like a person’s eye in basic shape and overall components, even if it is not a precise physical reflection.



1=Formal Unification of...	1=Reference by Similarity to...	1=Feeling Interpreted as...
1=Variety (spiral)	1=Unrestricted Possibility	Free/Fun
1+2 (spikes in a curve)		
2=Contrast (black/blue)	2=Object Reaction	Agitation/Motivation
1+2+3	EYE	Neutral/Negative/Positive?
3=Blue/repeated spike-points	3=Predictable Regularity	Focus/Commitment

Figure 4.4: Generic form-feeling associations pull in all directions equally (1+2+3); the emotional interpretation of the decorative form will then depend on contextual factors, such as the specific cultural meaning attached to a staring eye. Found at www.commonswikimedia.org.

Part of the meaning of this or any decorative form is carried by *generic form-feeling associations*. Part of its meaning is carried by associations to *specific object qualities* that tend to evoke certain feelings. The Peircean analysis necessarily focuses on the generic associations, which are more widely applicable and less variable, associations familiar to any human from any culture:

- High-variety-form and Yellow (morning sunlight) = freedom, potential and possibility.
- High-contrast-form and Red (blood) = the survival-based reflex to react.
- High-pattern-form and Blue (sea, sky, horizon, distance) = repeating patterns and/or places that require a fixed purpose to reach.

Cultural awareness is necessary to fully evaluate the secondary, variable, object-based associations, to know the emotional associations typically attached to particular objects in particular cultures.

Nevertheless, the cultural-object feelings evoked in *competent* decorative designs tend to align with the generic form-feeling associations identified in the Peircean analysis, as was illustrated in 4.1 and 4.2, above. In the case of 4.4, the Peircean analysis adds up to neutrality; all key emotional interpretations are more or less in balance, which could lead to a neutral, a negative, or a positive interpretation, depending on how we might decide to contextualize our response to a single, staring eye. In some contexts this form might be read, for example, as the “all-seeing” eye of God, which might be read then as either *kind* (a positive variety of *calm*) or *judgmental* (a negative variety of *concern*). In some cultures, an isolated staring eye is typically taken as a bad omen, an “evil eye,” and so it would be given a distinctly negative emotional reading.

In any case, a visual design editor should generally pursue cultural object associations and generic form-feeling effects that DO in fact align, so that the overall unity of the design is assured.

Separating Decorative Interpretation from Other Interpretive Levels

Decoratives are typically mixed with other visual design elements with “higher” levels of indicative or informative interpretation. If you find yourself wondering about the difference (between purely decorative elements and indicative or informative elements), then try removing a particular design element, as shown in Figure 4.5. What we find is that the information is retained when the color is removed, showing that color is, in this case, purely decorative.

Decoratives are interpreted in terms of their *affective* element, or the way that particular decorative makes the viewer feel. Recall that information (in the precise sense of specific asserted propositions) requires a higher level of interpretation than feeling, and

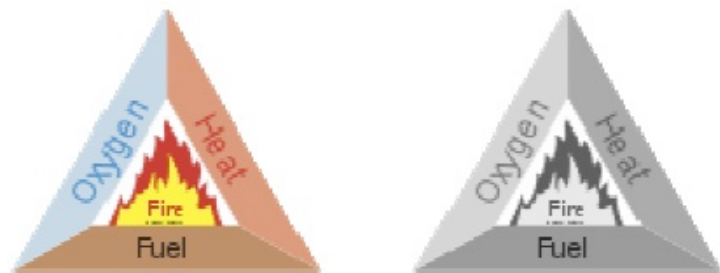


Figure 4.5: Information should remain when supportive decoratives are removed. Image found at <http://www.triplepundit.com/2006/10/askpablo-the-tailpipe-mystery/>.

therefore decorative elements by themselves are not reliable conveyors of information.

For example, it is possible to use distinct color in a chart to convey information, as in a color-coded key, but this is risky if the key-label colors are not distinct enough or are not reproduced faithfully. If information is lost when color is removed or distorted, then the color was more than decorative. Hence, it is more effective to use words to label key information, and

colors to create subtle feelings that reinforce the key labels. That way, if color is removed or distorted in a reproduction of the chart, the information can still remain.

Although color is removed from the right-side version of the Figure 4.5 diagram, the information about what a fire needs to sustain it remains. What does get lost is the feeling associated with the respective colors: cool blue air, hot red heat, grounded brown fuel. These are useful emotional reinforcements for the information, but it is best not to make those elements essential.

Use with Caution

Decoratives can be used unethically, if they are substituted for information viewers expect or need, or if they are a distraction from pertinent information. Pie charts, for instance, are notoriously easy to manipulate

so the actual quantities being compared have distorted

significance because of the

decorative color or shape of the

“pie.” Any time the informative

content of a visual is skewed or

hidden using decorative elements,

then that visual is ethically

suspect.

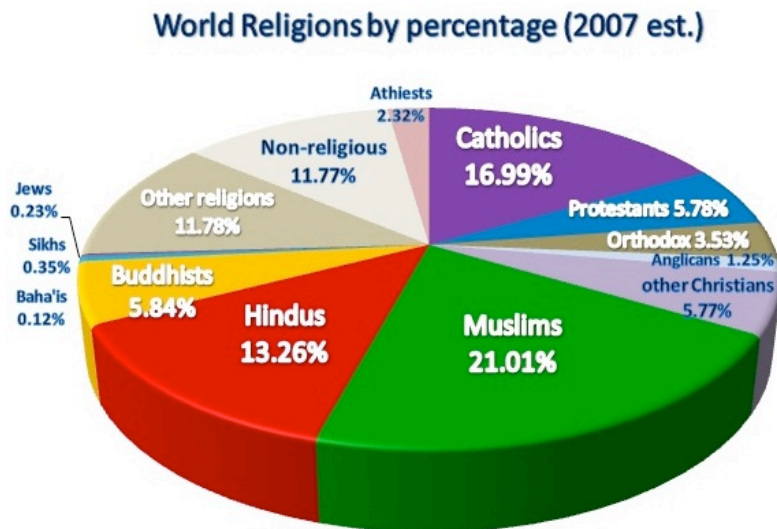


Figure 4.6: This 3D pie demonstrates how visual perception of relative size can be skewed by the 3D shape. Image found at <http://outsideperception.wordpress.com/2011/12/04/christmas-is-coming-santa-isnt/>.

In Figure 4.6, the relative size or perceived importance of the wedges nearest the viewer are naturally exaggerated. For example, it's not immediately apparent in the example that atheists, non-religious, and “other religions” combined make a larger total percentage of world

population than do Muslims, and that the combined populations of Christian religions make a larger percentage than any other group. Finally, in this case, the wide variety of colors may translate into a *variety = fun* emotional interpretation, inconsistent with the serious subject matter of the visual.

Main Types of Decoratives

To review, there are several types of visuals that are decorative in nature, and whose primary function is to evoke a specific mood, tone, or feeling from the viewer:

Form alone. Shapes and textures that have qualities of variety, contrast, and/or pattern which add up to an emotional response.

Color and Form. Color is an added dimension of form but is inseparable from form: a solid area of colored space (“negative space”) is still a form; a form specifically lacking in variety, contrast, or pattern; a form which tends to neutralize or calm the basic emotional effects of colors. Likewise, several different colors in a single visual add up to a formal “variety” feature that tends to evoke a sense of freedom/fun regardless of the individual colors’ effects.

Color and more specific kinds of formal variety, contrast, and pattern usually have to be added together to create emotional effects, as illustrated in Figures 4.1, 4.2, 4.3, and 4.4 above.

Images Interpreted as Emotion-Object Associations Rather than Object-Indicators

As noted, images used as decoratives have two dimensions, the generic associations created by their color and form, and then the specific associations that viewers have to the kind of object represented.

Typefaces. We will now discuss typeface form in more detail:

A typeface is what is informally called a font by most people in the computer age. But fonts are really just complete character sets in one specific style of some specific typeface

design; for example Arial Black, Arial Narrow, and Arial Bold, are all fonts of the same typeface. Typefaces, being form shapes fundamentally, are also predominately decorative in nature.

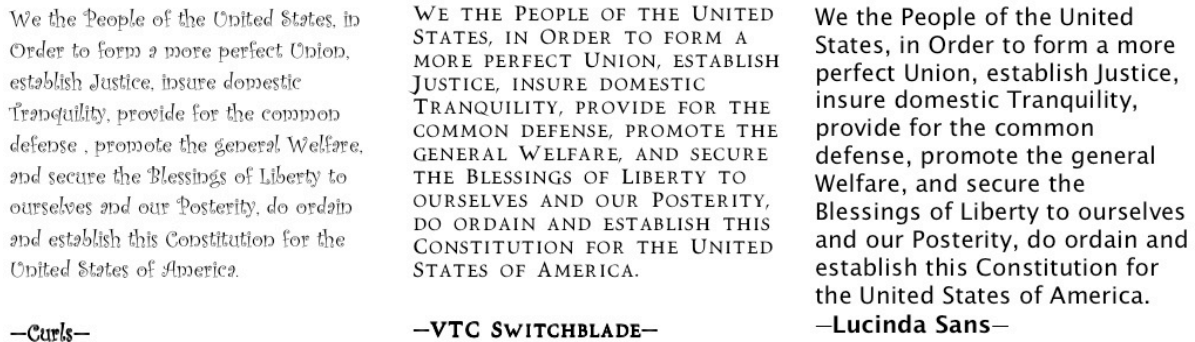


Figure 4.7: Typeface change affects feeling in significant ways, but not information content.

Like the change from color to grayscale in Figure 4.5, a change in font does not affect the information content of a visual (Figure 4.7), but that change can influence the feeling of a document, and if the font-caused feeling is wrong for the overall purpose of the document, the viewer becomes aware on some level and is frequently uncomfortable with the mismatch.

Therefore, choice of typeface becomes very important when the designer is deciding how to convey information. Choosing the wrong typeface can distract readers from the document’s intended purpose.

Typefaces are essentially decorative forms that evoke feelings, and they do this according to the same Peircean principles we have been discussing. As always, the key form parameters for typefaces are

variety	distinct ears, ligatures, swashes, tails, axes, etc.
Contrast	greater cap/x-height, aspect, and thick/thin ratios
Pattern	smaller variety features and contrast ratios

Figure 4.8: Critical form features of typeface design. Adapted from Manning and Amare, 2012. Used with permission.

- Variety (evoking freedom/fun),
- Contrast (evoking agitation/motivation), and
- Pattern (evoking focus/commitment) (see Figure 4.8).

As noted, the typical combinations of these features produce similar emotional responses.

As in all visual design decisions, choosing the right typeface is based on the primary purpose of the document and the shared goals of the designer and viewer. If communication is supposed to inform, then choosing a typeface whose primary characteristic is either variety or contrast

flouts the intended purpose and is likely to create an emotional distraction (aimlessness or agitation).

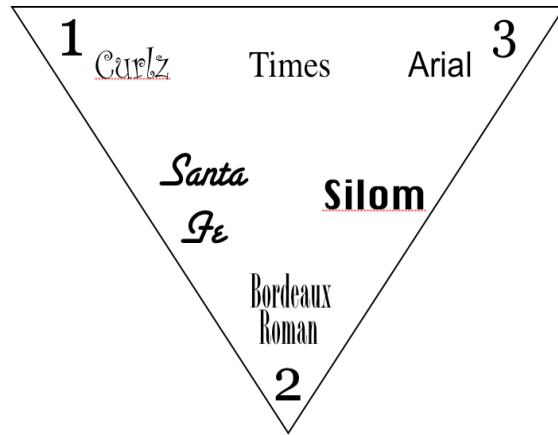


Figure 4.9: Peircean classification of typeface “personalities” which translate into their effective

For primarily informative purposes, a typeface characterized either by *thirdness* (pattern=focus) or 1+3 (variety + pattern=calm) would be best for conveying information, i.e. Arial or Times Roman (see Figure 4.9). For visuals that are intentionally light-hearted or “fun,” a typeface like Curlz, characterized by *firstness* (variety=freedom, fun) is fully acceptable.

In contrast, if the text is predominately indicative, meaning that it needs to draw attention to itself and perhaps move viewers to action, then a display typeface that uses contrast to create agitative feeling, like Bordeaux Roman is appropriate. But, as we will see with other indicatives, high-contrast forms must be used sparingly. Indicatives, when overused on a single page tend to fatigue the viewer who doesn’t know where to look first. This will be discussed further when we look at signals and action triggers.

Summing Up

- A Decorative's (1-1-1) primary function is to set mood and tone for a document and these are the most basic type of visual element.
- Decoratives have six subcategories that are defined by their use of variety, contrast, or pattern.
- Decoratives are implemented well when their form evokes the feeling that is intended by the designer; however, because everything on an emotional level is highly subjective, we can only track tendencies for these kinds of visual elements.
- Color, typefaces, borders, and patterns are all types of decoratives that can be employed with various effects.

Exercise Sample—Decoratives

Note: Students were initially only asked to attempt the exercises and were given a pass/fail for their efforts, but in exercise followup they were always shown an optimal student response, such as are shown below. Students' learning from these model responses was then measured in exams (discussed later in the Results section).

A similar approach to exercises was used in all units.

Model Exercise 1

Identify three decorative features in this chart.

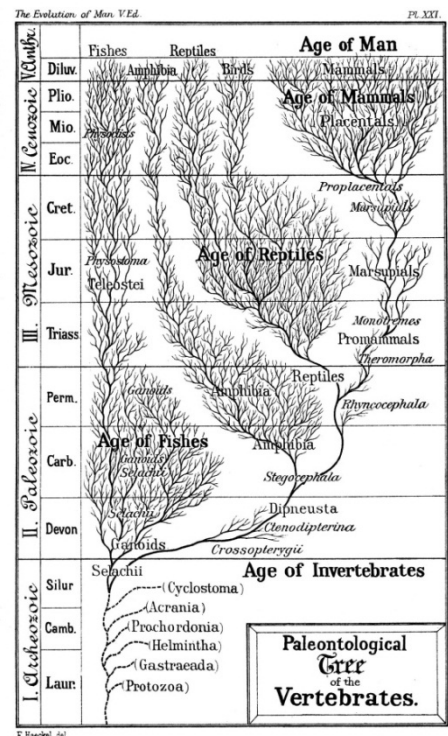
For each decorative feature, assess its generic emotional interpretation and state whether that interpretation is consistent with the informative purpose of the chart.

Student Response:

1. The tree image: Gives an emotional feeling of life and growth. Although the idea of the tree fits with the theme of the chart, its presence feels distracting and slightly chaotic.

2. The cursive font running up the side of the chart: The font evokes a reminiscent emotional response because it is a common font for medieval representations. The fancy font feels out of place on a scientific, informational chart.

3. The italic font within the tree structure: This font is used to separate different types of reptiles but without a key, it's difficult to determine exactly what things the italic font is being used to separate.



Analysis

This student response shows a clear understanding that decorative elements should support the primary purpose of the document. He or she was able to identify decorative elements (the tree form and the various display fonts) that are somewhat distracting from that purpose and suggest possible revisions that would make the diagram easier to understand.

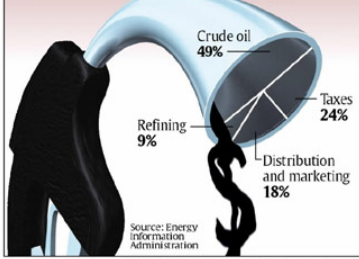
Model Exercise 2

Find one image OR one diagram with problematic design in which at least one problematic element can be explained as a drop in purpose level as the problematic element moves from form to reference or from reference to interpretation.

Student Response:

What gas bucks buy

The average price of regular gas climbed to \$1.85 per gallon as of Jan. 24, up 3.4 cents from a week earlier and up 23.1 cents from a year earlier. What we pay for:



Source: Energy Information Administration
By Shannon Rellly and Marcy E. Mullins, USA TODAY

Found at www.usatoday.com.

Analysis

In the diagrams chapter we discuss how pie charts are typically problematic. This student identifies the obvious information problem (a drop in interpretation level 3 to level 2 is a change from the visual element conveying information to simply looking like something the viewer has seen before). She also takes it a step further and describes how the actual chart is skewed in form even without the distracting image. Recognizing how any informational visual becomes purely decorative is a crucial analysis point when identifying where visuals have communication breakdowns.

This pie chart is so image heavy you hardly notice the chart, which makes it fall from being a 1-1-3 element (diagram) to being a 1-1-2 element (image). Also, if the rest of the diagram were eliminated, the elliptical nature of the pie chart itself skews the information and makes the information hard to pull accurately, so that would make it fall to a 1-1-1 anyway, even though it wants to be 1-1-3.

Chapter 5

Module 2—Signals and Reference Arrays

Signals and Reference Arrays are two of the visual types with indicative properties. Indicatives are those visual types that carry no meaning in themselves, but are meaningful because of what they are pointing to. Signal elements that simply point are the simplest form of indicative; however, when a set of signals are ordered by logical sequence, they become reference arrays. When signals are ordered, the viewer is able to internalize more than a few without getting fatigued. Both of these visual elements will be discussed in detail next.

Signals

Signals are visuals whose primary function is to draw attention to something OTHER than themselves, to point to an adjacent visual element; typically this adjacent element is either an action trigger (such as a focal point or weblink[s]), OR a piece of information, a table entry or title, label, heading, caption, or block of text.

Signal elements are found in most contemporary visual designs, whether subtly embedded inside images or in the larger layout strategy of the page, so it is very important to understand how signals work, and also to have a clear sense of any signal's limitations.

The primary limitation of signal elements (1-2-2 visual type) as well as action triggers (2-2-2 visual type) is that effective

visual design can only bear a very limited number of them; **more than four** can cause problems,

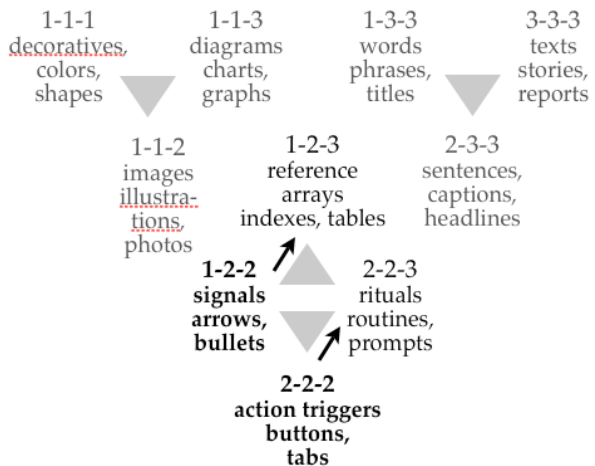


Figure 5.1: More than four signals or action triggers need to be ordered by some kind of logical sequence (a reference array or ritual sequence) so they can be followed without fatiguing the viewer. Adapted from Manning and Amare 2012. Used by permission.

unless signals are organized by a larger sequential pattern to create a reference array (1-2-3 visual type), or unless action triggers are organized by a larger sequential pattern to create a ritual sequence (2-2-3) visual type.

Signals by themselves convey no meaning; their meaning only emerges in a physical, adjacent relationship with something else. The most common mistakes that designers make with signals are these:

- to overuse them,
- to overwork viewers with no focused purpose, and
- to deploy signals that point to nothing, or to nothing of real importance to the overall purpose of the design.

Visual-design editors should be especially aware of these common mistakes, but to do this, editors need to be very practiced in identifying those visual elements that are working as signals, i.e. indicators of adjacent visual elements.

Peircean Definition

In Peircean terms we define an effective signal as having a container (Form level 1) of Unity, containing something understood by Physical Adjacency (i.e. pointing to something more important than the signal itself), and an interpretive message of Indicative Action (Interpretation level 2), or 1-2-2 in Peircean notation (see Table 5.1).

Table 5.1: Definition of Signals by Peircean Elements

	Form of...	Reference by...	Interpretation as...
Level 1	Unified Variety	Similarity	Feeling
Level 2	Dual Sequence	Physical Adjacency	Indicative Action
Level 3	Setting-Conflict-Resolution	Coded System	Informative Pattern

Note: The defining components of a signal, shown by the shaded cells. Form level 1, Reference level 2, and Interpretation level 2 (1-2-2).

As we saw in previous units, Peirce’s three-part strategy of classification has essentially infinite “zoom-in” capability. Recall how we “zoomed in” on the 1-1-1 level of decorative visuals. In that case, zooming in allows us to develop a more nuanced framework for analyzing specific kinds of decoratives, and now different kinds of signals.

When we “zoom in” on just the 1-2-2 region of visual types, meaning on various subtypes of signals, we find these subtypes of Unified Form, Reference by Adjacency, and Indicative Interpretation.

Table 5.2: Subcategories of Signals

examples	1=Form Unified by...	2=Adjacency to...	2=Indicative Emphasis on...
background color	1=Negative Space	1=visual shape/figure (including text)	shape/figure in foreground
bullet points	1+2	1+2=points along implied line	shape/figure next to each point
arrow line	2=Line	2=line endpoint/focal point	element at end of line
margins	1+3	1+3=area enclosed by implied box	shape/figure enclosed
white space lanes/gutters	1+2+3	1+2+3=areas along/inside implied rows/grid	shapes/figures enclosed
row/column lines	2+3	2+3=areas along/inside visible lines/grid	shapes/figures <i>strongly</i> enclosed
emphasis box	3=Closed Line (=Shape/Box)	3=area enclosed by shape/box	shapes/figure <i>strongly</i> enclosed

Note: Expansion of the 1-2-2 Signal Category= “Zoom in” on Level-1/Level-2 Form/Reference/Interpretation Subcategories

Table 5.2 will be our main reference and design-assessment tool for signals, so take a few moments to study and internalize it.

The basic rule of signals is that

- some sublevel of unifying *form* (space/line/enclosure) PROVOKES
- some sublevel of *form-indication* by
- some sublevel of *physical adjacency* between form and form.

In other words, when the viewer sees a set of bullet points on a page (*form*), he or she is naturally caused to look (*form-indication*, or pointing) at the list item next to the bullet (*physical adjacency*).

As we examine subtypes of signal indication more closely, it follows naturally that particular subcategories of *signal form* are better suited to purposefully evoke particular subcategories of indication.

OF PARTICULAR NOTE:

Visible lines, grids, or boxes may not accomplish more than *invisible* lines, grids, or boxes *implied* by alignments of figures or text lines in negative space.

In general, using visible lines to accomplish a purpose where implied lines would do is a kind of “level drop” that occurs when a subtype 2+3 or 3 signal is used to accomplish a 1+3 or 1+2+3 purpose.

Only use visible lines, grids, and boxes for strong emphasis. Otherwise it’s best to rely on implied lines, etc.

Fundamentally, even otherwise well-constructed signals (in the traditional sense) can misfire (in the Peircean analysis) if any elements of signal form or signal indication are out of line with the specific kind of indication the signal is suited to accomplish.

Reference Arrays

It’s worth repeating that signals fail primarily because they indicate nothing, or nothing of real importance, OR they indicate too many things, such that a clear indicative focus is lost.

Peircean Definition

It’s also worth repeating that a large number of signals ONLY become usable if organized as a higher Peircean visual type (1-2-3):

- a **reference array** or in other words,
- a **sequenced index** rather than an unorganized set of signals.

Table 5.3: Definition of Reference Array by Peircean Elements

	Form of...	Reference by...	Interpretation as...
Level 1	Unified Variety	Similarity	Feeling
Level 2	Dual Sequence	Physical Adjacency	Indicative Action
Level 3	Setting-Conflict-Resolution	Coded System	Informative Pattern

Note: The defining components of a reference array, shown by the shaded cells. Form level 1, Reference level 2, and Interpretation level 3 (1-2-3).

If we “zoom in” on just the 1-2-3 region of Peircean visuals, we find 1-2-3 subtypes are almost identical in form and reference to the 1-2-2 signal subtypes BUT these subtypes of form and reference are invariably PLURAL and interpretation must be in terms of ORDERED information.

Table 5.4: Subcategories of Reference Arrays

examples	1=Form Unified by...	2=Adjacency to...	3=Informative Order of...
background colors	1= Negative Spaces	1=visual figures/texts	figures/texts
chunked bullet points	1+2	1+2=points along implied lines	figures/texts next to points
table-grid lines	2= Lines	2=line endpoints/focal points	figures/texts at end of lines
white space boxes	1+3	1+3=areas enclosed by implied boxes	figures/texts enclosed
white space lanes/gutters	1+2+3	1+2+3=areas along/inside implied rows/grid	figures/texts enclosed by grid cells
row/column lines	2+3	2+3=areas along/inside visible lines/grid	figures/texts strongly enclosed by grid cells
emphasis boxes	3= Closed Lines (Containers)	3=areas enclosed by shapes/boxes	figures/texts strongly enclosed

Note: Expansion of the 1-2-3 Reference Array Category = “Zoom in” on Level-1/Level-2/Level-3 Form/Reference/Interpretation Subcategories

Table 5.4 will be our main reference and design-assessment tool for reference arrays in general,

so take a few moments to study and internalize it. Of course, Table 5.4 is itself an example of a reference array with most of the signal subtypes embedded within it. How many signal subtypes can you spot?

Now let's consider further examples of signal elements, their ineffective use contrasted with their more effective use. Let's start with the most basic kind of signal, subtype 1, which is negative space, often called white space even though it is not always white.

Ordinarily, a plain white background (or some other muted color) provides adequate negative space, signaling of the figures/shapes in the foreground. Negative space has to be carefully balanced against the foreground elements that it signals. Negative space that is too loud (in color contrast) calls excessive attention to itself (see Figure 5.2). Since the proper purpose of signals is pointing to adjacent information, this purpose is frustrated and made ill-formed if the signals call undue attention to themselves. Negative space also calls undue attention to itself if there is too much of it relative to foreground elements.

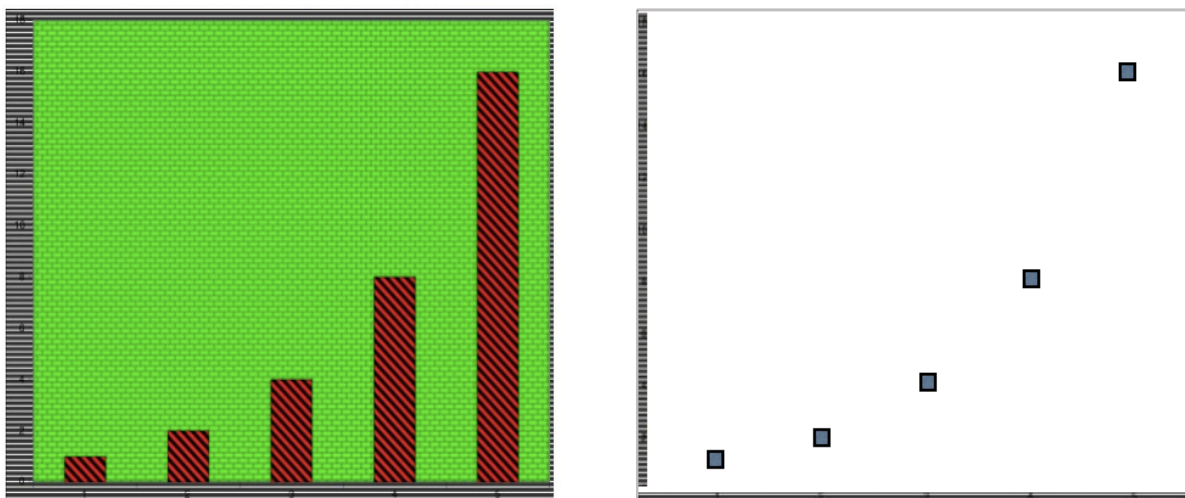


Figure 5.2: Contrast in background serves only decorative purpose. It should have some sort of informative purpose. Compare with the version on the right where white space is used solely to point to the graph points. Image on the left found at <http://en.wikipedia.org/wiki/Chartjunk>. Image on the right constructed.

Notice one other very important use of negative/ white space here, to break up (or in other words “chunk”) item lists so that they generally contain four items or less (see Figure 5.3).

It’s less visual work to examine two item-blocks, each block with three-four items, than it is to examine one block of seven unordered items.

Packing List

- clothes
- music
- pajamas
- pillow
- snack
- toothpaste
- toothbrush

Packing List

- clothes
- music
- pajamas
- pillow
- snack
- toothpaste
- toothbrush

Sometimes it is claimed that seven item lists are always fine, but this is a myth. Actual research going back to the 1950s (Miller, 1956) proves that viewer attention and memory starts to break down at four

Figure 5.3: When there is too much white space the list items become disconnected from the signals; too little white space draws more attention to the lack of white space than the list itself. Sufficient white space maintains the connection between the adjacent signal and list item, keeping the viewer’s attention on the list itself.

unordered or unpatterned items, and falls apart completely after seven items. Seven is an upper limit, not the optimal number for visual attention and memory (see also Doumont, 2002).

The next most basic kind of signal, subtype 1+2, is the line implied by shapes in negative space. Bullet points are perhaps the most familiar example. Novice designers are often tempted to use small (or even large) images as bullet points. This is nearly always a bad idea (Figure 5.4).

Overnight things to bring

-  toothbrush
-  pillow
-  change of clothes
-  favorite music
-  pajamas that are warm
-  toothpaste, the blue kind
-  snack for midnight

Packing List

- clothes
- music
- pajamas
- pillow
- snack
- toothpaste
- toothbrush

Images make for problematic bullet points: first because they call more attention

Figure 5.4: Using pictures, even thumbnails as bullet points distracts the viewer from what the bullet is supposed to be pointing to. The second list attempts order by alphabetizing, but still needs chunking. Images found at <http://commons.wikimedia.org/wiki/File:Emoticons.gif>.

to themselves than to adjacent information; second because they do not create clean implied lines.

Images can legitimately indicate menu items, but the cardinal requirement of menu images is that they be similar to each other, recognizably part of the same catalog or menu set (see discussion of this image subtype in Chapter 6). The images in Figure 5.5 are identical in size, but the reference objects in each image do not align well either in style or concept with the others, which is a problem when the viewer tries to create a unified line out of these figures.



Figure 5.5: Using images for menu items is only effective the images are small, unified in form, and match what they are representing. Found using www.commons.wikimedia.org.

It's also important to realize that horizontal menus naturally disrupt the physical adjacency of text labels, which can be a problem. We can better see both similarity and contrast in text labels when they are arranged vertically, with the first letter of each label fairly close to the first letter of other labels.

Things you can do on this site:

Improve Memory

Shoot Satellites Down

Read Sarcastic Comments

Visit Underground City

Notice too that the line of menu labels is much improved if the labels have parallel grammatical structure. The parallel labels would help the images to be interpreted as belonging together. Images generally require labeling to focus their purpose, especially if their purpose is indicative.

Finally, notice that the four elements in 5.4 are in no particular order: this means that this is, overall, a 1-1-2 signal line (implied) rather than a reference array (1-2-3), and that is fine because there are only four elements. Larger sets of signals generally must be organized by the information they point to, or they become too hard to absorb as information.

In Figure 5.6, the difference between a sense of chaos and a sense of an organized index arises from two things, arranging index entries and subentries in lines and alphabetizing the entries and subentries.

action and reaction Peircean *Secondness*, 13 *Thirdness* interpreted through, 13,14 action indices Peircean sign type, 2 action provoking forms indicatives, 16 actions ethical vs. unethical, 8, 9, 11 in definition of ethics, 5 “true” 9 attainable goals, 1, 6, 9 bullets as indicatives, 4 provoking action, 4 chapter summaries, 10

action and reaction Peircean *Secondness*, 13 action indices Peircean sign type, 2 action provoking forms indicatives, 16 actions attainable goals, 1, 6, 9 ethical vs. unethical, 8, 9, 11 in definition of ethics, 5 “true” 9 bullets as indicatives, 4 chapter summaries, 10 provoking action, 4

Alphabetical order is perhaps the most basic and common kind of information ordering but other ordering strategies are

Figure 5.6: An “index” without an ordered sequence of elements serves little purpose.

possible, AS LONG AS they are immediately apparent to viewers. Elements are also commonly ordered based on how they unfold in time, as shown below.

It is important, though, not to disrupt the formal-unity requirement (1-2-3) of a reference array, such as an index or table, with extraneous flourishes like typeface changes and other contrasting decorative forms. Table designs should be as uncluttered as

Steps		Participant Responsibility		
		Programmer	Reviewer	Recording Secretary
Before the meeting:				
1	Schedule time and place for review	✓		
2	Compile and copy design or code for each participant	✗		
<i>After the meeting:</i>				
1	Distribute actions list			⌘
2	Resolve points of concern	*		
3	Notify reviewers of actions taken	☑		
During the meeting:				
1	Appoint a recording secretary	◇	⊗	
2	Review the design/code (for completeness, accuracy, and quality)		Ⓚ	
3	Give feedback (on identified issues)		☆	
4	Create action list (errors, discrepancies, inconsistencies)		⌘	⌘

Figure 5.7a: Table lacking unified elements. Merely decorative contrasts destroy unity, create excessive indicative effects to no purpose, which overwork viewers.

possible, as shown by the improved version of 5.7a in Figure 5.7b.

It would probably be better still to organize the above table with implied lines, created by negative space and element alignment, rather than using so many hard dark lines, but we will leave that revision as an optional exercise.

Steps		Participant Responsibility		
		Programmer	Reviewer	Recording Secretary
Before the meeting:				
1	Schedule time and place for review.	✓		
2	Compile and copy design or code for each participant.	✓		
During the meeting:				
1	Appoint recording secretary	✓	✓	
2	Review design/code (for completeness, accuracy, and quality)		✓	
3	Give feedback (on identified issues)		✓	
4	Create action list (errors, discrepancies, inconsistencies)		✓	✓
After the meeting:				
1	Distribute actions list			✓
2	Resolve points of concern	✓		
3	Notify reviewers of actions taken	✓		

Figure 5.7b: Table with more unified elements. The relationship among cells is more evident when list headings and indicative marks have unified forms defining clear lines.

Summing Up

- Signals (1-2-2) are primarily used to draw attention to something other than themselves.
- Overuse of signals is a common problem in traditional graphic design because designers focus on keeping the viewer's attention.
- There are six sublevels of signals that get progressively more visually intrusive, so it is best to use lower levels of indicatives unless the higher level is required to support the primary document purpose.
- Reference arrays (1-2-3) are information-containing ordered sets of signals whose information is meaningful as it is compared to what is adjacent to it.
- Indexes, catalogs, and tables are types of reference arrays that have to be ordered to enable the viewer to find information.
- Reference arrays are best deployed without many decorative elements, which distract the viewer from the relevant information.

Exercise Sample—Signals and Reference Arrays

Model Exercise 1

Explain the major problem with this visual design in terms of signal elements and physical adjacency:

Student Response:

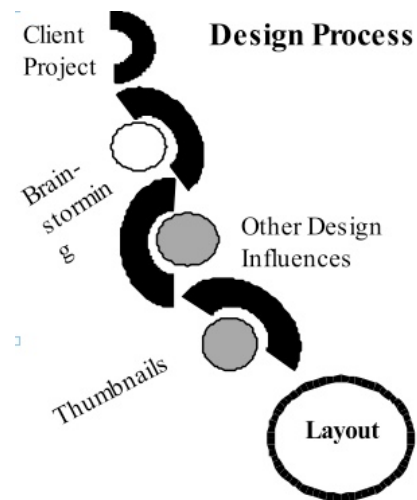
The major problem with this design is that it is extremely hard to work out which aspects of the (confusing) diagram the text boxes are relating to, due to issues of physical adjacency. The title for the entire chart is supposed to be “Design Process,” but this is located close enough to the diagram (relatively speaking; it is only slightly farther away from the image than “Thumbnails”) that it appears to be a diagram label, not a title. The other text boxes are placed at awkward angles and in confusing positions so that it is hard to decipher which diagram they refer to. For example, “Brainstorming” is located in close proximity to both the white circle and the black semi-circle; as these shapes themselves are not hugely indicative of which is the actual action point, it is hard to decide which one the text relates to. Additionally, the text is (horribly) broken up into three lines (“Brain-storming”), which makes the text shape bigger and therefore allows it to be physically adjacent to the two different items. The remainder of the text boxes (with the possible exception of the unambiguous “Layout”) suffer from similar problems.

Another issue of physical adjacency in the diagram above is the positioning of the spheres and dark semi-circles. The semi-circles are too large and too close (in proximity, size, and shape) to the spheres to fulfil their intended role, which is as indicators of sequence in a flow diagram. The diagram would have functioned better by using straight, thin arrows placed between the spheres instead of the heavy semi-circles above.

Ultimately, the confusing physical adjacency, whimsical diagonal placement of the text, use of multiple styles and typefaces, and variety of shading in the diagram combine to create an overall effect of 1-1-1 (Decorative; Feeling) instead of the intended signal purpose. This means the graphic is ill-formed in regards to its purpose.

Analysis

This is a good example of the kind of detail that Peircean theory allows for design analysis. Most viewers would look at this design and know that something is awry. This student is able not only to analyze what is wrong in terms of the overall purpose, but can break down the analysis to each element, including text, shape, diagrammatic function, and document purpose.



Model Exercise 2

Consult some informative source and locate a bullet list of items that is too long and has no apparent informative order. Revise the list so that it is chunked into smaller groups of items, and impose some informative order on the list. Show the revision in your exercise email.

Emphysema signs (from WebMD):

- Barrel chest
- Clubbing
- Pursed-lip breathing
- Polycythemia
- Hypoxemia (hypoxia)
- Hypercarbia
- Cyanosis
- Malnutrition

Revised list of signs:

Blood Deficiencies

- Hypercarbia
- Hypoxemia
- Polycythemia
- Cyanosis

Exterior signs

- Malnutrition
- Clubbing
- Pursed-lip breathing
- Barrel chest

Analysis

The use of signals to separate information is an important visual element, but is one that is frequently used to excess. This student's revision of an unordered bullet list not only incorporated chunking to make the list accessible at a glance, but he/she also took time to give each list a heading. It would have been more helpful to alphabetize the list within each structure, but each list is so short, that it is not crucial to the viewer's ability to find the necessary information.

Chapter 6

Module Three—Images

Images are visuals whose primary function is to reflect the appearance of a physical object, either exactly or approximately. Image elements are found in most contemporary visual designs, either in background or foreground, so it is very important to understand how they work and also to have a clear sense of any image's limitations. Because digital images can be created and shared very easily (through digital photography and the internet), it is tempting to overuse them in visual design, or to use them carelessly.

Images by themselves can effectively represent physical objects, but they cannot convey propositional (i.e. sentence-like) information reliably or precisely without the assistance of clarifying text or other informative visual elements (See Figure 6.1). It is a common mistake to assume that an image conveys some informative idea effectively to viewers, when in fact viewers will interpret the image in various ways that the designer did not anticipate because he or she is so familiar with both the image and the perceived idea it will convey, that the raw, multi-interpretable quality of the image is overlooked.



“The Lamb” in the North Sea.



Our oceans:
A valuable natural resource.



Great. Just a mile to go.



Who knows what danger
lurks under the water...

Figure 6.1: Images do not contain propositional information by themselves, but only by accompanying text, which can change both feeling and meaning depending on its content. Image found at http://commons.wikimedia.org/wiki/File:The_Lamb_-_geograph.org.uk_-_181128.jpg.

As we saw in the decoratives chapter, neutral *emotional* responses to form and color are fairly consistent, and the designer has some control over the effects manifested in the images chosen for a visual design. The designer has considerably less control over the conceptual and evaluative (“good” vs. “bad”; “like” vs. “dislike”) responses to form and color. The designer likewise has even less control over how any given viewer will respond to an image (by itself) in terms of concepts and evaluations, since that response is governed by viewer’s prior experience with objects and images similar to the current image being viewed.

However, good designers can compensate for the lack of control over conceptual/evaluative response to images by being careful to choose ones with forms and colors corresponding with the desired generic emotional response, AND by framing their images with titles, captions, and other information to steer the conceptual/evaluative response. Poor image design generally results from a failure to choose and frame the image properly in terms of other visual elements.

At minimum, designers can and should make sure that their selected images do reflect clearly enough some object(s) that viewers are likely to recognize. Few things in visual design are more irritating than images of objects that the viewer can’t identify. This is simply because the primary purpose of an image is to be interpreted as indicating an object, preferably a recognizable object.

Peircean Definition

In Peircean terms we define an effective image as having a container (Form level 1) of Unity, containing something understood by Similarity (i.e. looking *like* something the viewer recognizes, Reference level 1), and an interpretive message of Indicative Action (Interpretation level 2), or 1-1-2 in Peircean notation (see Table 6.1):

Table 6.1: Definition of Image by Peircean Elements

	Form of...	Reference by...	Interpretation as...
Level 1	Unified Variety	Similarity	Feeling
Level 2	Dual Sequence	Physical Adjacency	Indicative Action
Level 3	Setting-Conflict-Resolution	Coded System	Informative Pattern

Note: The defining components of an image, shown by the shaded cells. Form level 1, Reference level 1, and Interpretation level 2 (1-1-2).

As we saw in previous chapters, Peirce's three-part strategy of classification has essentially infinite “zoom-in” capability. Recall how we “zoomed in” on the 1-1-1 level of decorative visuals to develop a more nuanced framework for analyzing decorative form and color in terms of a detailed spectrum of emotion response.

In exactly the same way, we can now “zoom in” on just the 1-1-2 region of visual types, meaning various subtypes of images, to develop a more detailed system for assessing image effectiveness. This system is, as usual, triangular, but we can also present it as Table 6.2 below.

Table 6.2: Parameters of Images

1=Form by	1=Similarity to...	2=Object Indicative of...
1=Construction	1=Possible Physical Object(s)	qualities and feelings
1+2		prototype example
2=Reflection	2=Specific Physical Object(s)	specific person/place/thing
1+3		concept
1+2+3		menu/index item
2+3		story character
3=Comparison	3=Pattern of Physical Object(s)	pattern/principle/regularity

Note: Expansion of the 1-1-2 Image Category= “Zoom in” on Level-1/Level-2 Form/Reference/Interpretation Subcategories

Table 6.2 will be our main reference and design-assessment tool for images, so take a few moments to study and internalize it.

The basic rule of images is that

some sublevel of image *form* evokes

some sublevel of object-*reference* by

some sublevel of perceived *similarity* between form and object.

In other words, the way someone chooses to produce an image, say a kid’s school picture, with a standard blue background, over-smiled face, slicked back hair and collared shirt (*form*), makes someone looking at that picture pull from his or her memory an understanding of what that picture is trying to draw out of the viewer (*reference*), by what the viewer’s experience with “school pictures” is (*similarity*). If the viewer has no experience in American public schools, he or she may have a very different reaction than someone with American public school experience does.

As we examine this rule more closely, it follows naturally that particular subcategories of image form are better suited to purposefully evoke particular subcategories of object indication (Table 6.3).

Table 6.3: List of Image Subtypes—also called parameters


	1=Form by	1=Similarity to...	2=Object Indicative of...
Image subtype 1	1=Construction	1=Possible Physical Object(s)	qualities and feelings
Image subtype 1+2	1+2 Construction and Reflection	Idealized Physical Objects	Prototype example
Image subtype 2	2=Reflection	2=Specific Physical Object(s)	specific person/ place/ thing
Image subtype 1+3	1+3 Construction and Comparison (implied comparison of this figure with the corresponding	Abstraction of relational patterns from a physical object	Concept

	"male" figure.)		
Image subtype 1+2+3	1+2+3 Construction and Reflection and Comparison	Array of related physical objects	menu option/ choice index
Image subtype 2+3	2+3 Reflection and Comparison	Mental or physical object that triggers a sequence of events	story character
Image subtype 3	3=Comparison	3=Pattern of Physical Object(s)	pattern/ principle/ regularity


Note: List of Image subtypes and their definitions based on Form, Reference, and Interpretation.

Fundamentally, even well-constructed images (in the traditional sense) can misfire (in the Peircean analysis) if any elements of image form or image similarity are out of line with the specific kind of object indication the image is meant to provoke. Conversely, the image element succeeds if form and similarity align with object-indicative purpose.


Let's look at image sublevel examples individually:

Example-Image subtype 1	1=Form by	1=Similarity to...	2=Object Indicative of...
 <p>Image found at www.commons.wikimedia.org.</p>	1=Construction	1=Possible Physical Object(s)	qualities and feelings

Explanation for Image subtype 1: Objects suggested by images may not physically exist. Rather, they are often objects in the mind only. This is most apparent when the image is of obviously constructed form, as, for example, drawn with crayon or watercolor paint. Images of this type best serve to evoke feeling and at most can only suggest general types of objects. The figure portrayed is probably female, but might be a princess or a peasant, depending on context.


Example-Image subtype 1+2	1=Form by	1=Similarity to...	2=Object Indicative of...
 <p>Image found at www.commons.wikimedia.org.</p>	1+2 Construction and Reflection	Idealized Physical Objects	prototype example

Explanation of Image subtype 1+2: Objects reflected by images may have existed only briefly, as posed or, in other words, constructed models that were photographed. The photograph is then carefully selected from dozens or hundreds of others, enhanced via image software and cropped to create a specific effect. Images of this type best serve to indicate “models” or “prototypes” of what are considered ideal objects. For the modeling purposes of the image, it does not matter particularly who the specific person in the picture is.


Example-Image subtype 2	1=Form by	1=Similarity to...	2=Object Indicative of...
	2=Reflection	2=Specific Physical Object(s)	specific person/ place/ thing

Explanation of Image subtype 2: Candid photographs come closest to being images that directly reflect reality. The person shown did not have time to pose; the image is one of a kind rather than


one of dozens that was specially picked to portray the subject, and the image was not cropped or enhanced to eliminate distracting real-life detail. Images of this type are actually very rare in professional visual design but personal photo albums are full of them. Here the specific person represented DOES matter.

Example-Image subtype 1+3	1=Form by	1=Similarity to...	2=Object Indicative of...
 <p>Image found at www.commons.wikimedia.org.</p>	<p>1+3</p> <p>Construction and Comparison</p> <p>(implied comparison of this figure with the corresponding "male" figure.)</p>	<p>Abstraction of relational patterns from a physical object</p>	<p>concept</p>


Explanation of Image subtype 1+3: Concept images are the very opposite of candid, realistic photographs. The concept image looks little or not at all like any of the actual women it indicates (A-line jumpers have been out of style for decades, etc). The concept image is not a direct reflection of any specific object and so of course it does not matter which specific object it represents; rather it represents a whole class or category.

Example-Image subtype 1+2+3	1=Form by	1=Similarity to...	2=Object Indicative of...
 <p>Image found at</p>	<p>1+2+3</p> <p>Construction and Reflection and Comparison</p>	<p>Array of related physical objects</p>	<p>menu option/choice index</p>

Explanation of Image subtype 1+2+3: If we construct an array of distinct images that are nevertheless similar reflections of each other in size and style, this inevitably creates a “catalog” effect; in other words, the images are interpreted as indicating an array of options, choices, or menu items.

Example-Image subtype 2+3	1=Form by	1=Similarity to...	2=Object Indicative of...
 <p data-bbox="188 1100 521 1163">Image found at www.commonswikimedia.org.</p>	<p data-bbox="555 688 802 844">2+3 Reflection and Comparison</p>	<p data-bbox="815 688 1075 781">Mental or physical object that triggers a sequence of events</p>	<p data-bbox="1088 688 1328 751">story character</p>

Explanation of Image subtype 2+3: If, on the other hand, we place one image (the woman) in direct contrast with another image (the man) against a common background, a sense of story is typically created. In this example the woman is a figure from Norse folklore, the “hulda” or female troll. (Look out Mr. Woodsman! What’s she got behind her back?) Notice that even though the hulda character is a general mental construct, in the specific context of the story, she/it becomes a very specific character with a fixed identity that is reflected/reproduced from scene to scene in the story.

Example-Image subtype 3	1=Form by	1=Similarity to...	2=Object Indicative of...
 <p data-bbox="185 642 597 703">Image found at www.commonswikimedia.org.</p>	3=Comparison	3=Pattern of Physical Object(s)	pattern/ principle/ regularity

Explanation of Image subtype 3: Finally, we can compare a group of distinct images that have a general relational quality in common: a waist measurement that is extraordinarily small. With this kind of image comparison we can come very close to communicating specific information but the exact interpretation of the image comparisons could still vary and have a variety of captions:

- *Ideal female proportions haven't changed that much OR*
- *Distorted body images have been very persistent for decades OR*
- *There are various ways to achieve that sought-after waist slimming look: a corset, diagonal stripes above and below, and of course Photoshop!*

Grammaticality

As with decoratives (or any visual type), if there is a significant level **drop** in the movement from form to reference to interpretation the visual will necessarily be problematic or “ill-formed” or, in other words, “ungrammatical”:

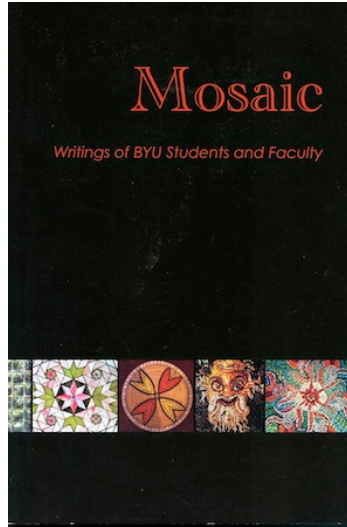


Figure 6.2: The two book covers are examples of images being deployed for purposes not shared by the primary purpose of the document. Images found at <http://www.google.com/imgres> and <http://commons.wikimedia.org/w/index.php?title=Special%3ASearch&profile=default&search=mosaic&fulltext=Search&uselang=en> respectively.

Consider the book cover (from a student project) entitled *Cream*, which featured an image of cream being poured from a picture (Figure 6.2 left). This was a book of essays presumably selected for their high quality: the “cream of the crop” so to speak. In general terms, the problem with this cover design was that an image of cream being poured did not well match the metaphorical concept of these essays being like cream that had floated to the top of the milk.

In Peircean terms we would say that the image was a constructed reflection of a prototype (pouring cream) that did not have the right formal qualities (construction + comparison) to evoke the intended concept. Had we been involved in this project, we might have proposed (at least) a more comparative image, say some slices of cake in background *without* whipped cream, and one piece of cake in foreground *with* whipped cream.

This image would then be more like the implied comparison between the female concept figure above (*with* metaphorical A-line skirt) as opposed to the male figure (*without* the skirt). A more radical approach, even more likely to succeed at conveying the metaphor, would be an

image of a book cut in a wedge and colored like a cake, and then topped with whipped cream. These kinds of constructed comparisons between simplified images, overt or implied, are what enable conceptual interpretation of those images.

A similar problem occurred with a book project called *Mosaic* (Figure 6.2 right). The book cover images were a series of actual mosaics, but again these were prototype images rather than effective indicators of the concept: an assembled pattern of ideas rather than literal tiles. A more effective cover image might have constructed metaphorical comparisons, rather than literal mosaics, out of images more indicative of the content of the essays. Image mosaics comparable to the actual essays would do a better job of evoking the intended concept of a mosaic of ideas.

In both cases, the Peircean analysis of the similar image failures looks like this:

- *Form*: Title (Mosaic or Cream) + image (and the content of the book) suggests a concept-level image: 1+3
- *Reference*: The image evokes a prototype: 1+2
- *Interpretation*: The image suggests the book is about actual cream or actual tile work: 1+2 or 2

This constitutes a drop between the forms of the book covers, their intended effects (1+3), and their actual effects (1+2 or 2).

Summing Up

- Images (1-1-2) are reflections of physical objects; because of their accessibility and evocative power, they are easily used and misused.
- Images have no propositional content inherent in their form, so interpretation is typically dependent on the viewer's own experiences, which is why they need text to guide the viewer to the purpose the designer intends.
- There are six subcategories of images whose properties suit them for specific jobs.

Exercise Sample—Images

Model Exercise 1

Based on the *Images* chapter reading, categorize these images AND also identify each visual by image subtype (1, 2, 3, 1+2, 1+3, 1+2+3, 2+3). Review Tables 6.2 in the chapter reading. Include a brief explanation of why you categorized each element the way you did.

i)



Image found at
www.commonswikimedia.org.

Student Response:

This graphic is an image, with a Peircean category of 1. Its wide range of possible interpretations and inclusion of extra details mean it is an image rather than a diagram. Within the image categories, the graphic is construction of a possible person (it is not reflecting a specific person, or comparing several people). We are unable to see details of the person's face or body, or the location he (she?) is sitting in – instead, the primary purpose of the picture seems to be the feelings or emotions one can take away from it. This is again representative of a 1 image.

iii)

NOTE:
evaluate the
statue
rather than
the photo of
the statue



Image found at
www.commonswikimedia.org.

Student Response:

Image, type 2+3. This is a reflection of the idea of Mary and Jesus after the Crucifixion, but there is a lot of comparison between Mary and Jesus-- one is alive/one was alive, female/male, mourning/dead, etc.--and that comparison elevates the mere reflection into a story-type image.

vi)



Image found at
www.commonswikimedia.org.

Student Response:

This “candid photo” is an image, not a diagram, and represents a Peircean form 2. The candid nature of the photo means it is completely unconstructed, and the people in this photo would mean something to the viewer. The image directly reflects the reality of specific individuals. (Note: The fact that some individuals are smiling and posing in the photo gives the image a tinge of 1+2ness; however, the unposed nature

of the individuals in the background gives the impression that the photo would not have been hugely constructed - more just a "smile for the camera!" moment, to which people automatically smile and pose. I believe the image is more candid than constructed, as it is unlikely that the photo-taker had much time to construct the pose and it is unlikely that they would have selected that image out of several for viewing. Although it has elements of 1+2ness, I believe it is closer to 2 on the continuum, and have classified it as such).

Analysis

These student responses allow classification of each type of image according to its primary purpose. What is consistent in each of these responses is the student's ability to identify that primary purpose, which allows them to select an image for a specific purpose or to know why an image goes wrong. Furthermore, the students were able to evaluate more complex images that could have more than one purpose (either prototype or candid, or a mixture of both).

Model Exercise 2

Review Table 6.3 and then do the following:

i) From the internet or other sources, collect one instance of each of the seven Peircean image subtypes. All examples should relate to a common theme and follow the model shown here. Assemble all of your examples as a single visual, following principles of **controlled** variety, alignment, etc.



Include in the body of your email a brief

explanation of why you categorized each element as you did.

Student Response

1=A drawing/construction of batman.

1+2=A constructed and reflected image of batman. The form is idealized and put on a poster.

2=A candid/reflective picture of someone dressed up like batman.

1+3=A construction of the bat symbol that invokes its comparison to the person and other ideas.

1+2+3=A construction, reflection, and comparison of different kinds of batman costumes.

2+3=Reflection and comparison of batman jumping off a roof. That image can tell a story.

3=A comparison of different kinds of batman figures next to each other.

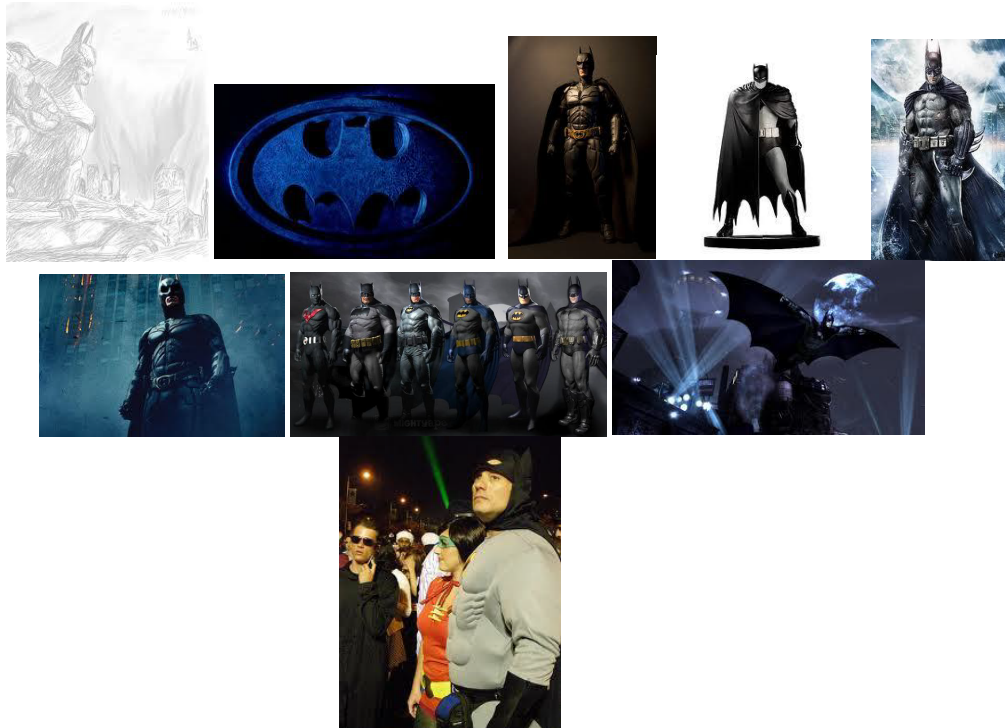


Image found at www.commonswikimedia.org.

Analysis

This model response is a good indication that the student can identify image types and create a visual that shows each image in comparison with the other images. The student is also able to explain why the image chosen fits the definition of the image subcategory type using consistent language that describes characteristics of the image's subcategory definition.

Chapter 7

Module Four—Diagrams

What the Evans and Thomas (2008) text refers to as “reduced images” (86) are typically concept-level images. We need to note that concept-level images (main type 1-1-2, subtype 1+3) are very similar to diagrams (main type 1-1-3):

Table 7.1: Definition of Diagrams by Peircean Category

	Form of...	Reference by...	Interpretation as...
Level 1	Unified Variety	Similarity	Feeling
Level 2	Dual Sequence	Physical Adjacency	Indicative Action
Level 3	Setting-Conflict-Resolution	Coded System	Informative Pattern

Note: Peircean definition of diagram category, Level 1 form, Level 1 reference, and Level 3 interpretation.

Both concept images and diagrams are quite distinct from the physical appearance of objects. They are comparatively simple in detail compared to images that reflect objects physically. Even so, concept images and diagrams are not quite the same. Images that indicate a concept still do not assert specific information unless they are framed by a specific context (like putting the female concept-image on a dressing-room door).

In order for visual forms to qualify as *images*, they must only clearly indicate *some kind of object* EVEN IF viewers can't recognize the object right away.

In order for visual forms to qualify as *diagrams*, they must also distinctly represent to the viewer *a set of informative assertions* EVEN IF those assertions are not immediately apparent to the viewer.

A map is a kind of diagram that illustrates this point fairly well (see Figure 7.1). Even without textual labels, or with labels only in a foreign language, a map of an island is only going to effectively correspond to one island, one unique combination of hills, bays, and shoreline. Even if a viewer doesn't know which island the map corresponds with, the viewer knows that the map corresponds to a specific island, and no other, and conveys a specific set of information about that island and no other.

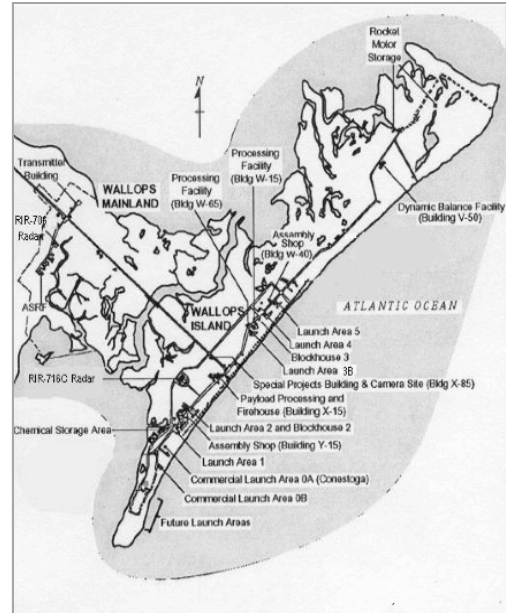


Figure 7.1: Maps are a kind of diagram with a specific set of assertions as their meaning: *X is north of Y, Y is east of Z*, etc. Image found at www.commonswiki.org.

In contrast, as shown in the previous chapter, a photograph of an island can be taken as indicating a prototype rather than one specific island, and the prototype can convey a wide and indeterminate range of possible ideas (Figure 7.2).

And again, in contrast, a very complex diagram of a complex machine, even if the viewer doesn't understand and can't interpret the diagram personally, the viewer would



"The Lamb" in the North Sea.



Our oceans:
A valuable natural resource.



Great. Just a mile to go.



Who knows what danger
lurks under the water...

Figure 7.2: Prototype images can change what they are referring to based on accompanying text; diagrams, however, typically refer to only one thing regardless of labeling. Image found at www.commonswiki.org.

not think (and only a deliberate liar would dare) to arbitrarily impose the same range of creative captions/interpretations on a diagram (presented as a truthful diagram).

Of course the same diagrams can have different captions, but any one of those captions would have to be consistent with information that is already expressed the diagram *regardless* of the caption. The diagram in Figure 7.3 is of a particular kind of load sensor, and nothing else. This narrowness of propositional interpretation does not apply to images.

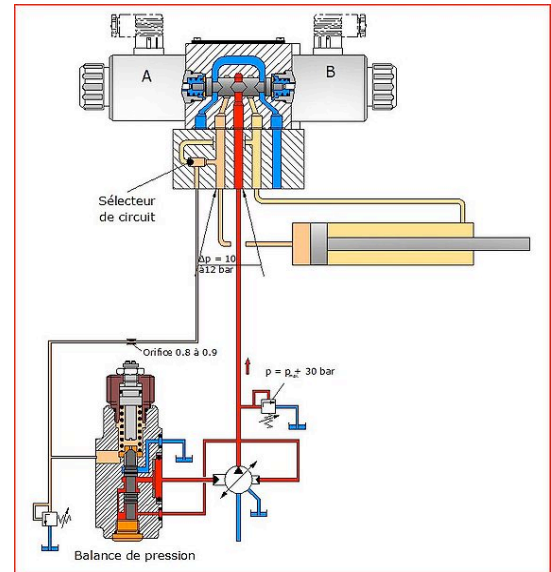


Figure 7.3: The inherent characteristics of diagrams tend to focus the viewer on one specific item, and different labels do not change that aspect of a diagram. Image found at www.commonswikimedia.org.

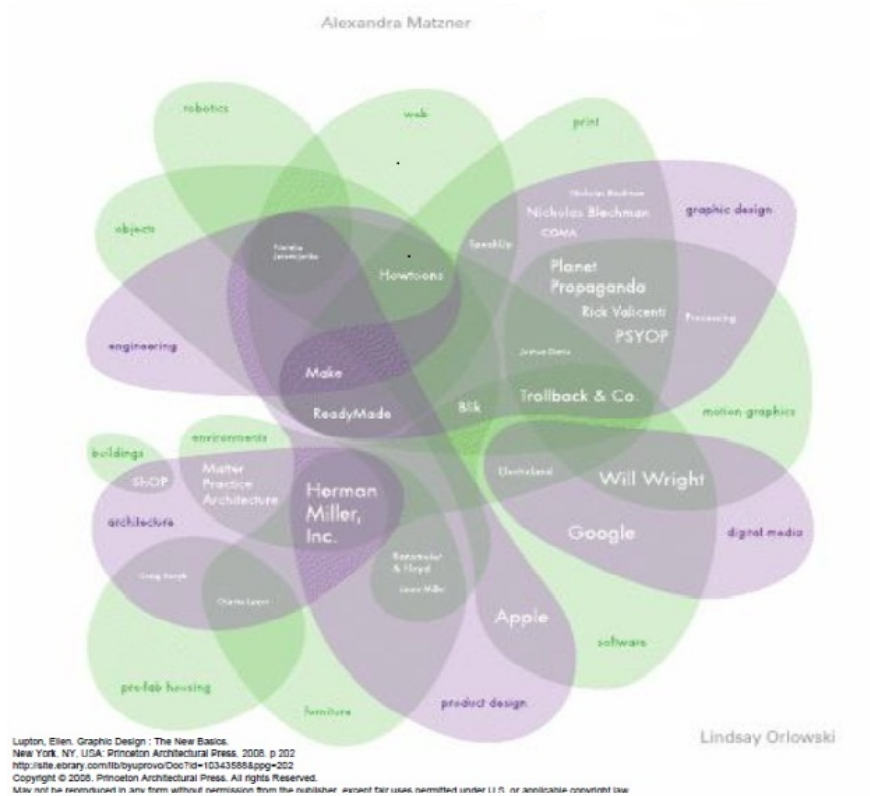
REMEMBER!

This narrower range of interpretation is the **key** way to tell the difference between an image (1-1-2) and a diagram (1-1-3).

The other **major** differences between a diagram and an image are that a valid diagram

- emphasizes contrasts* that make up a larger pattern,
- eliminates detail* extraneous to the information asserted, and
- asserts "general" information*, information that applies to a large set of objects.

There is *rarely* any purpose in displaying a diagram that viewers recognize as information but which they can't personally interpret. Effective diagrams are, by and large, interpretable diagrams, just as effective images generally must indicate objects that viewers can recognize, at least in general terms. Recall the diagram from chapter 2 that contained information more effectively presented in a table (Figure 2.5 reproduced here as Figure 7.4):



	Graphic design	Product Design	Digital media	Architecture	Engineering
Motion graphics	Trollback & Co. PYSOP Rick Valenti Planet Propaganda		Google Will Wright		
Software		Apple	Google Will Wright		
Furniture		Herman Miller		Herman Miller	
Pre-fab housing					
Buildings				SHOP	
Environments					M P Architecture
Objects					
Robotics					
Web					Readymade Make B&K Howtoons
Print	B&K Trollback & Co. PYSOP Rick Valenti Planet Propaganda COMA Nicholas Blochman				

Figure 7.4: A diagram that viewers recognize as informative, but which they cannot interpret is not effective. This diagram was created to show which companies do a specific type of work, along with any overlap in the type of work product they produce; however, due to distracting decorative elements, and a lack of attention to the informative aspect of this diagram, most of that information is lost. Diagram attributed to Lindsay Orlovski, in Ellen Philips Lupton, and Jennifer Cole’s book *Graphic Design: The New Basics*, (New York: Princeton Architectural Press, 2008), 202.

As discussed previously, the diagram attempts to show relational information about what specific companies produce. But because of the emphasis on the decorative elements, and the obscuring of the actual information, the viewer cannot interpret the information at all.

Graphs and Charts

It follows, then that all well-formed informative visuals (those visual types with 3 in the last place of the numerical definitions) must have form that supports their own primary purpose of conveying. Furthermore,

consider the following:

- Charts and graphs are kinds of diagrams.
- Charts and graphs abstract a single quality (usually amount, degree, or relative percentage) from physical objects.
- Charts and graphs use geometric forms (wedges, squares, bars, etc. that would otherwise be merely decorative) to express some relationship between relative amounts, degrees, or percentages.
- Charts and graphs represent only-hypothetically-possible objects.

IF we gathered all the steel produced by all these countries and made piles for each country side-by-side, it would look like the bar graph comparing steel production in various countries (Figure 7.5).

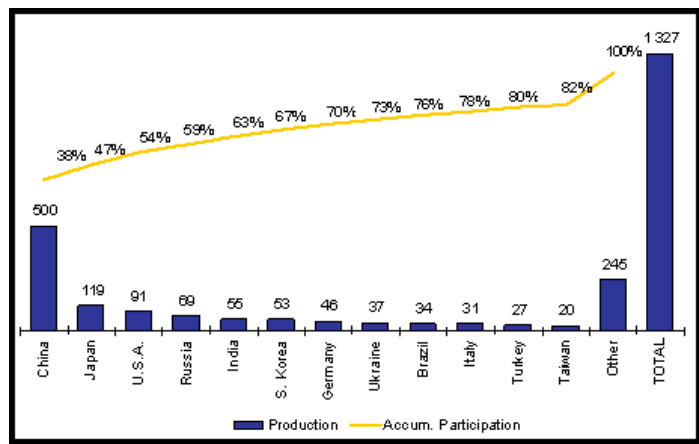


Figure 7.5: Bar chart of steel production by country. If actual steel beams were laid out on a large field to show actual amounts of steel produced per country, it would resemble this chart. Used solely for the purpose of criticism under U.S. Code. Accessed 3-30-2012. Found at www.commons.wikimedia.com.

IF we made giant pie out of all the people of the world, distributing people by their religion or lack of it, and coloring people brightly based on their religion or lack of it, the pie would look like the pie chart comparing religious affiliations (or lack) of all the people in the world.

The exact nature of the object quality being compared in a chart or graph depends on how the chart or graph is labeled, but the relative amounts, degrees, or proportions expressed by the chart or graph are likewise fixed in a way that image meaning is not.

Diagrams have specific, correct interpretations, even when the interpretation is not known to the viewer, just as photographic images reflect specific objects even if that object is not known to the viewer, but the relevance of those objects or the precise information to be extracted from the image is not

wholly determined by the image itself.

Scientist learn much from images, of course, just as they learn from the physical world,

but the scientist has to search out and find relationships in the image (or the physical world)

which the image (or the physical world) itself does not assert by itself. Rather, it is the scientist who finds object relationships and constructs propositional assertions about those relationships and probably the scientist will construct a diagram (a map, a chart, or a graph) to express those constructed assertions (See Figure 7.6). Of course, in order for diagrams to be useful, they should only convey information that viewers can easily extract (with the aid of labels and captions), and

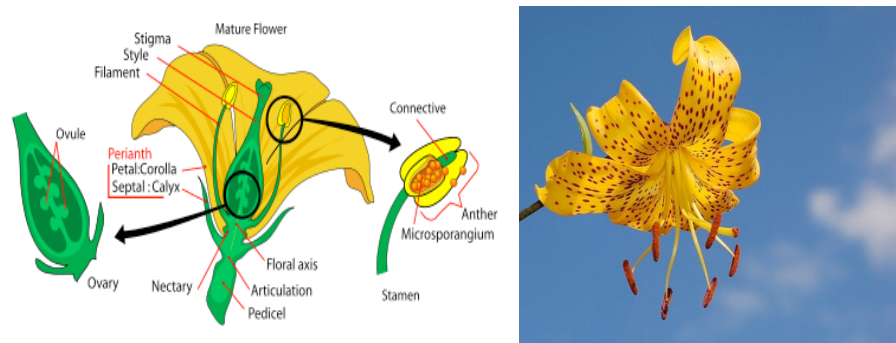


Figure 7.6: Text from the diagram informs the viewer of the parts of a flower. The same kind of information is not available from an image, which has too much detail for the specific parts to be as easily distinguished. Both images found at www.commonswikimedia.org.

information that is relevant to the viewers' needs. Diagrams should not convey much (or any) extra, distracting information which viewers either cannot interpret or need not interpret. This is the main role of editors in the assessment and revision of diagrams: to identify extraneous detail in a diagram that fails to contribute to the essential information that viewers of the visual are likely to need.

The first task of diagram editors is to remove visual elements that serve image-related purposes (decoration and object reflection, i.e. "chartjunk") that are likely to distract or detract from the diagram's overall informative purpose (Figure 7.7).

The next task of diagram editors is to remove visual elements that are legitimately diagrammatic, but which express information viewers are not likely to need.

The final task of diagram editors is to make sure the diagrams in a document altogether express necessary information. It's usually better to have a sequence of relatively simple diagrams rather than just one overly complex diagram.

Peircean Definition

Like the other visual elements, diagrams have seven different types of subcategories that it is possible to "zoom" into. Each category represents a specific type of chart or graph depending on its inherent characteristics.

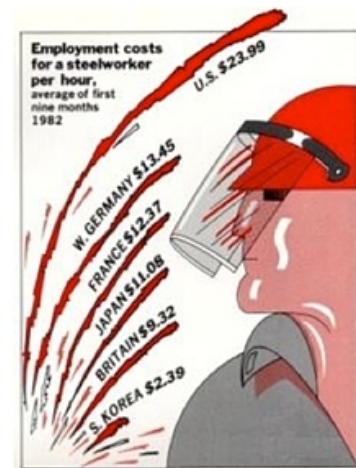


Figure 7.7: An example of "chartjunk"; this is an overly decorative poster that is attempting to convey information using elements of a graph. But the data is obscured by the decoratives. Found at www.commons.wikimedia.org.

Table 7.2: Parameters of Diagrams

Example	1=Form by...	1=Similarity to...	3=Information about...
pie chart	1=Abstract Quality	1=Objects Hypothetically Imaginable	proportions of one whole thing
bar/line graph	1+2		degrees of one quality in different things
informative illustration	2=Object Comparison	2=Types of Physical Object(s)	relations abstracted from several images
map	1+3		relative grid position of objects
family tree	1+2+3		relative hierarchies of objects
flow chart	2+3		relative action steps
conceptual chart	3=Abstract Relation	3=Pattern of Relations	relative relationships

Note: Expansion of the 1-1-3 Diagram Category: =”Zoom in” on Level-1/Level-3 Form/Reference/Interpretation Subcategories

Table 7.2 will be our main reference and design-assessment tool for diagrams, so take a few moments to study and internalize it.

As with the other visual types, diagrams can be broken into subcategories (Table 7.3):

Table 7.3: Diagram Subtypes by Pericean Category

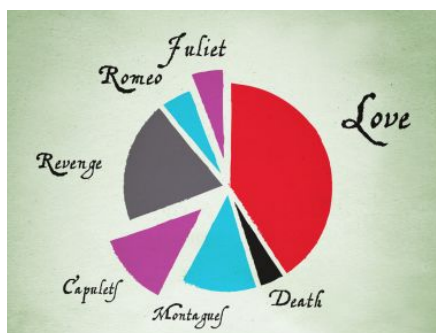
	1=Form by	1=Similarity to...	3=Object Indicative of...
Diagram subtype 1	1=Abstract Quality	1= Object (singular) Hypothetically Imaginable	proportions of 1 whole thing
Diagram subtype 1+2	1=Abstract Quality + 2=Object(s) Compared	2= Objects (plural) Hypothetically Imaginable	degrees of 1 quality in 2+ things
Diagram subtype 2	2=Object Comparison	2=Types of Physical Object(s)	relations abstracted from 2+ objects/images
Diagram subtype 1+3	1=Abstract Quality + 3=Abstract Relation	3= Pattern of Relationships Imagined as Position	relative grid position of parts (1 whole with 3+ internal relations)
Diagram subtype 1+2+3	1=Abstract Quality + 2=Object Comparison + 3=Abstract Relation	2=Types of Physical Object(s) 3= Pattern of Relationships Imagined as Position	relative grid position of objects (1 whole with 2+ parts with 3+ abstract relations)

55 Diagram subtype 2+3	2=Object Comparison + 3=Abstract Relation	2=Types of Physical Object(s) 3= Pattern of Relationship Sequence	relative sequence of 2+ objects with 3+ abstract relations
Diagram subtype 3	3=Abstract Relation	3=Pattern of relationship sequence	relative relationships

These subcategories work the same way the other visual element subcategories do. In other words, it follows naturally that particular subcategories of diagram form are better suited to purposefully evoke particular subcategories of object indication.

Let's break down Table 7.2 with examples for each diagram subcategory:

Example-Diagram subtype 1



Found at www.wikimedia.org.

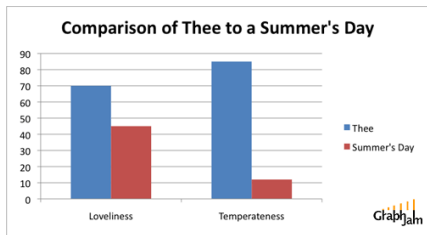
1=Form by	1=Similarity to...	3=Object Indicative of...
1=Abstract Quality	1= Object (singular) Hypothetically Imaginable	proportions of 1 whole thing

Explanation of Diagram subtype 1: Pie charts are something of a bad habit in current visual-design culture. They show relatively little information relative to the amount of visual effort it takes to process them.

However, pie charts are the most familiar kind of subtype 1 diagram, used to show a single quality as it is distributed over a whole, hypothetical object. These are widely used, but highly suspect because of how easy it is to use decorative elements to skew the visual representation of the data. Recall Figure 2.3, where the use of color and 3D shaping skews the data of the pie chart so that the sum of the smaller rice producers does not look like it is more

than the entire production of the largest rice producer. In fact, the Shakespeare example shown is **purely** decorative, asserting no real propositional information at all. Note that decorative subtype 3 (pattern, focus) is directly adjacent to diagram subtype 1 in the larger system of visual types (see Figure 1.4), which explains why this diagram subtype is particularly prone to over-decoration or decorative substitution for actual information.

Example-Diagram subtype 1+2

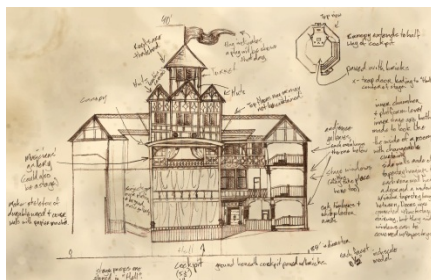


1=Form by	1=Similarity to...	3=Object Indicative of...
1=Abstract Quality + 2=Object(s) Compared	2= Objects (plural) Hypothetically Imaginable	degrees of 1 quality in 2+ things

Found at www.wikimedia.org.

Explanation of Diagram subtype 1+2: The bar chart shows the relationship of one quality as it occurs in two or more things. As in a pie chart, the objects depicted are hypothetically possible (e.g. if we actually put all our budget dollars in a large pie pan, or if we stacked up all the steel produced by different countries in side-by-side piles). This 1+2 subtype partners level 1 physical-quality abstraction with level 2 comparison, but is only ever good for a single quality of comparison. More than one quality comparison requires a different type of diagram.

Example-Diagram subtype 2



1=Form by	1=Similarity to...	3=Object Indicative of...
2=Object Comparison	2=Types of Physical Object(s)	relations abstracted from 2+ objects/images

Found at www.wikimedia.org.

Explanation of Diagram subtype 2: Diagram level 2 is just removed from Image level 1+3, or concept images. It is the kind of diagram that shows the relationship of several images (as shown in the cutaway aspect of the Globe Theater drawing) as those relationships compare with an actual object.

Example-Diagram subtype 1+3



Found at www.wikimedia.org.

1=Form by

1=Abstract
Quality +
3=Abstract Relation

1=Similarity to...

3= Pattern of
Relationships
Imagined as Position

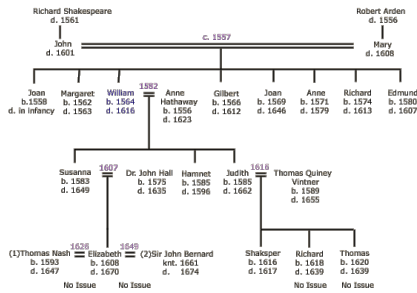
3=Object Indicative of...

relative grid position
of parts
(1 whole with 3+
internal relations)

Explanation of Diagram subtype 1+3: Maps are the most familiar kind of diagram subtype. Like subtype 1 (e.g. pie charts), maps show parts of a whole, but where pie charts show distribution of a single physical quality (like dollars spent on a budget item), maps show a pattern of **abstract relationships** (like diagram subtype 3 discussed below) that never fully reduce to direct physical reflection or perception. In a railway line map, for example, various points of interest are shown relative to other points of interest, but the relationships shown are NOT direct reflections of actual physical features or actual physical locations, what would actually be seen in an a real photograph for example.

In this sense, diagram subtype 1+3 is the direct opposite of diagram subtype 2. In subtype 2, discussed above, the physical relationships within some object are the focus of attention, and the diagram still distinctly resembles the object represented. Maps, in contrast, usually have many features completely distinct from direct physical perception (like the color of states on a map, or the border lines which rarely if ever correspond to mile-wide black stripes painted on the actual terrain).

Example-Diagram subtype 1+2+3

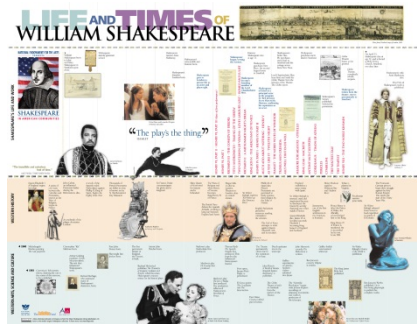


Found at www.wikimedia.org.

Explanation of Diagram subtype 1+2+3: This kind of diagram shows static hierarchical relationships, like family trees or office flow charts. It is essentially similar to subtype 1+3 discussed above, with added emphasis, like subtype 2, on component parts of one whole (a family, a company, etc.) as separate objects with distinct X vs. Y hierarchical relationships.

1=Form by	1=Similarity to...	3=Object Indicative of...
1=Abstract Quality + 2=Object Comparison + 3=Abstract Relation	2=Types of Physical Object(s) 3= Pattern of Relationships Imagined as Position	relative grid position of objects (1 whole with 2+ parts with 3+ abstract relations)

Example-Diagram subtype 2+3



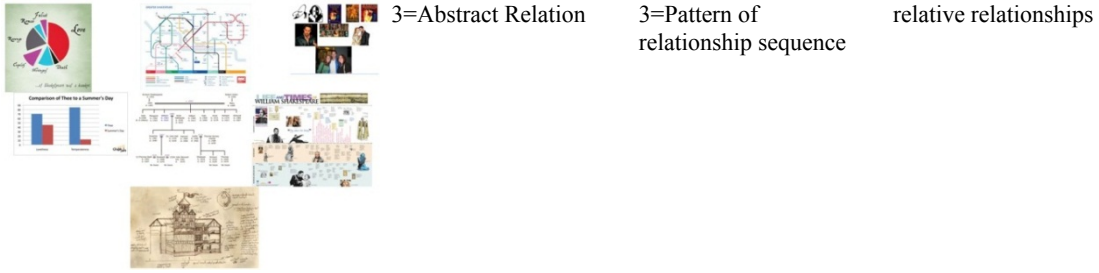
Found at www.wikimedia.org.

Explanation of Diagram subtype 2+3: This kind of diagram shows timelines or procedural steps. It is essentially similar to subtype 1+2+3 discussed above but shows abstract relations (3) between a distinct series of physical states (2) rather than parts of a static, larger whole.

1=Form by	1=Similarity to...	3=Object Indicative of...
2=Object Comparison + 3=Abstract Relation	2=Types of Physical Object(s) 3= Pattern of Relationship Sequence	relative sequence of 2+ objects with 3+ abstract relations

Example-Diagram subtype 3

1=Form by	1=Similarity to...	3=Object Indicative of...
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Found at www.wikimedia.org.

Explanation of Diagram subtype 3: Any of the triangular Peircean-category diagrams exemplifies diagram subtype 3, which we generically describe as conceptual diagrams (in contrast with conceptual images). The conceptual diagram given here shows one example of each of the diagram subtypes discussed above in their relative Peircean-category positions (1 vs. 2 vs. 3). It is only after viewers have absorbed information in small doses that they want and need a summary conceptual diagram that contains at a glance all relevant aspects of a given information set.

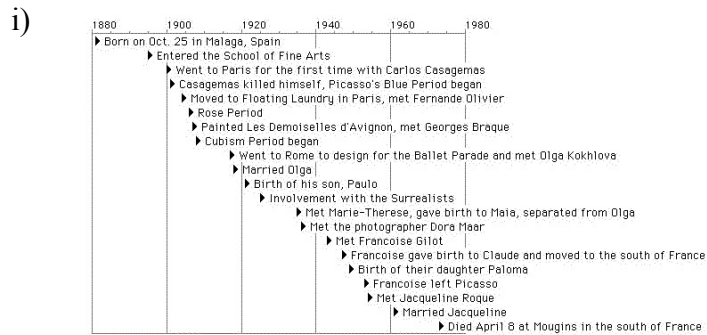
Summing Up:

- Diagrams are abstract representations of physical objects that convey propositional information.
- Diagrams are different from images in that they
 - Show clear contrasts
 - Omit needless detail
 - Represent general, not specific objects
- There are six subtypes of diagrams that are represented by certain kinds of charts, graphs, maps, or other information-carrying documents.

Exercise Sample—Diagrams

Model Exercise 1

Based on the *Diagrams* unit reading, categorize these visuals AND also identify each visual by diagram subtype (1, 2, 3, 1+2, 1+3, 1+2+3, 2+3). Review Tables 7.4 in the unit reading. Include a brief explanation of why you categorized each element the way you did.



Found at www.wikimedia.org.

Student Response:

This graphic is a diagram, not an image, because it takes out extraneous details and has a narrow interpretation. Its Peircean classification would be 2+3, displaying the relative action steps of the life of Picasso. Like the 'ritual' images in the 2+3 position on the more zoomed-out Peircean triangle, in this 2+3 diagram, the order in which the graph and bullet points are in does have relevance to the interpretation of the diagram (highlighting the importance of *secondness*, or physical adjacency), but the interpretation is information (*thirdness*).

ii)



Found at www.wikimedia.org.

Student Response:

This graphic is a diagram, not an image, because it has taken out all extraneous details and has the narrow interpretation of very clearly representing the skull of a cat in relation to the rest of the cat's head. It would be classified as 2, because it is comparing two different objects (the skull and the head silhouette), and the information is dependent on the comparison.

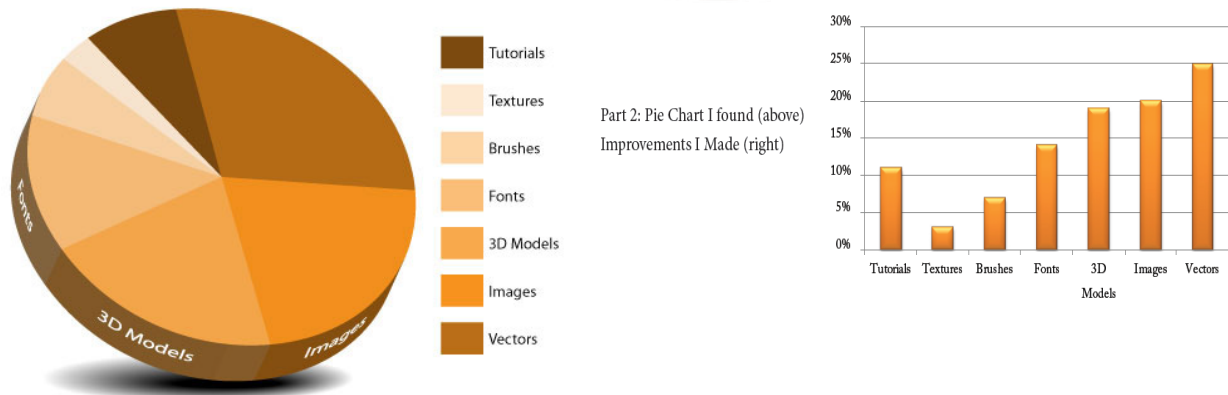
Analysis

Student response describes each of these diagrams in relation to purpose. The student explains their categorization choice as "relative action steps," a comment on the purpose of a timeline diagram: to show major events in a person's life relative to the year they happened in the order that they happened. The explanation of diagram 2 talks about how the information about the cat's skull is only possible to understand in terms of comparison because the diagram's purpose is to show how the skull fits into the silhouetted skull of the cat.

Exercise Model 2

Search the web. Find a problematic pie chart with at least seven wedges; recreate it as a more readable table. Show both the original pie, explain its problematic qualities, and show your revision.

Student Response



Part 2: Pie graph and revision. I'm not sure exactly what the pie graph was of, but the 3D of it made it nearly impossible to tell what was going on. All you see is "3D Models" which is ironic considering what the graph is. You can't tell percentages, you can't tell what is important, because of the legend and the slight color differences, you can hardly tell which section is which--except again, 3d models. I revised the graph, maintaining their color and slight 3d to maintain design look, but went to a bar graph to better show percentages, ratios, and direct labeling to avoid making your eyes go back and forth.

Graph found on www.commons.wikimedia.org.

Analysis

This response is both an identification of problem process and a practical implementation of revision. It shows that the students can find the problems and suggest possible solutions, both important skills for our editing minors. The main focus of the response is first, how the pie graph ineffectively meets its primary purpose; and second, how the revisions help clarify that purpose.

Results

Student experience with Peircean theory has historically had mixed results. This project's online text was used in a Fall 2011 421r (Studies in Language or Editing) class, and a 410r (Genre and Substantive Editing) course in Winter 2012, and results are similarly mixed (See Table 8.1). The average midterm score increased in the classes with this project's online text, but the test score ranges are wider. I found, however, that the number of students receiving 80% or above on their midterms did increase by 6% for the initial pilot (2011) and 8% for the second class (2012), so it appears that the lower scores are outliers.

Midterm Exam Data

In the 2009 410r class where these modules were not used, students maintained a high C average. As the table (1) shows, the average midterm grade for undergraduates was 78.5%:

The initial test run of the project online text shows a 1.5% increase in the

Table 8.1: Midterm results by course:

Course	Mean	Range	79 % or lower
2009 410r	.7856	.7500 – .9333	33%
2011 421r	.8025	.6900 – .9300	27%
2012 410r	.8300	.6000 – .9500	25 %

average midterm score, with a 6% increase in the number of students who receive a B- grade or higher. The second course shows a 5% increase in the average score, with an 8% increase in the number of students who received a B- grade or higher. The text appears to have helped the undergraduate students grasp the material; they also appear to have applied the theory better.

Furthermore, the data for the 2011 class is more significant when you understand that the information on Peirce was only presented in half the time that it was in either of the 410r classes. The goal of the 421r class was to compare traditional graphic design analysis with Peircean

visual information design analysis, so half the instruction time was devoted to each method. To have the students understand and become able to apply the Peircean principles with only half the instruction could be attributed to a refined instruction approach, course material that better fit the undergraduate level, and exercises that were specifically tailored for the instructional goals.

Midterm Evaluation Data

The students' overall satisfaction with the course at midterm evaluations also shows an increase when comparing the 2009 410r course with the other two. Overall satisfaction with the course for all three classes is listed in table 8.2. Overall satisfaction with the course materials is listed in Table 8.3 (numbers based on an 8 point Likert scale):

From the tables, it is clear that, although the students felt they were learning a lot from the course, they had some reservations about the effectiveness of the course texts. This occurred because the Manning and Amare text was not created for an undergraduate audience, and there were no visual information design-related exercises, so all homework for the 2009 class had to be created from different texts, none of which were specifically designed to meet the instructional goals of the lessons. Students were better able to understand how to apply Peircean theory when they got to practice with exercises tailored to Peircean theory. The course material approval rating went up 1.1 points, or 15%.

Table 8.2: Satisfaction with the course

Course	Rating
2009 410r (Manning/Amare text)	6.1
2011 421r (Rosenquist project text)	6.7
2012 410r (Rosenquist project text)	6.6

Table 8.3: Satisfaction with the course materials

Course	Rating
2009 410r (Manning/Amare text)	5.6
2011 421r (Rosenquist project text)	6.7
2012 410r (Rosenquist project text)	6.3

The 2009 students' response listed in Table 8.3 showed that they were having a difficult time with the Visual Rhetoric text with the average being a rating of 5.6 out of 8.0. One sample student comment from the 2009 class discussed his or her frustration with the Manning and Amare text:

- The Visual Rhetoric text is really dense and hard to get through. I feel like if I read, I don't retain anything and we just discuss it more understandably in class anyway.

The student seemed to find that the textbook was less helpful than discussion, and that there were better ways to present the information than was offered by the texts. However, in spite of the difficulty with the course material, 70 percent did feel that the class was beneficial to them.

In contrast, the texts chosen for 421r and 410r in 2012 were considered more helpful by students, and both classes were satisfied with what they were learning (refer back to Tables 8.2 and 8.3). In all cases, the evaluations were higher than the first class. Students in these classes approved of the course content, the text, and online instruction, even when the course was difficult to get an A grade in.

Student comments from both of these courses were complimentary in general, and effusive in one specific instance:

- This is by far the best course I have taken at BYU, and I don't say that lightly. The course information is very practical for anyone considering work in graphic design or layout editing; even the theoretical aspects such as Peircean theory provide a practical way to define why a visual design is working or why it isn't. The weekly exercises are highly relevant and provide a chance for students to use the skills they are developing. It is very exciting to get actual practice in visual design from early in the semester.

As is usual in an undergraduate course, students did comment on the complexity of the Peircean theory. However, more students did well in this class when using the online text, in spite of the difficulty of the theory, because the application of the framework is systematic, once the basic principles are understood. These principles appear to have been more easily understood with this project's online text.

Student Learning Outcomes

The 410r and 421r courses are intended to teach students skills that will make them better evaluators and revisers of visual elements in the documents they encounter as editors. Our students learned several valuable skills:

1. They have tools, a vocabulary, and goals that allow them to focus their analyses.
2. They are able to identify communication breakdowns.
3. They are able to suggest revisions based on the document's primary purpose.

These skills are demonstrated in the sample student responses given at the ends of chapters 4–7.

The first skill acquired is that of having vocabulary and a framework with which to guide their evaluations. Every student who uses this method has a place to start, a list of things to look for, and a method for talking about what they see. For example, when faced with the example (Figure 9.1), an average student may only realize that it isn't clear what the design is doing.

Their initial reaction (a feeling) might be that it is kind of jumbled; that they don't know what words belong to which space. They would know that something about the design is not

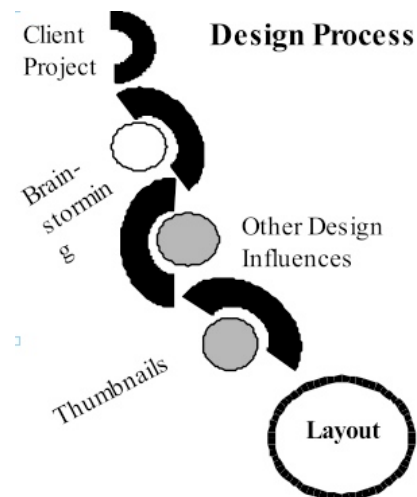


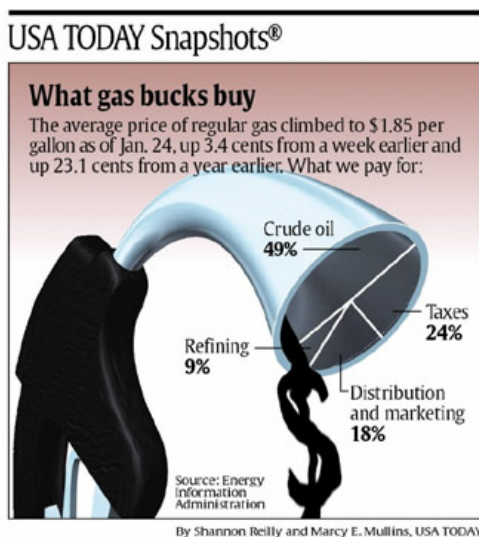
Figure 8.1: Diagram from Signals module.

communicating effectively, but could only guess what that is. In contrast, a student with training in Peircean visual information design theory knows where to begin:

The major problem with this design is that it is extremely hard to work out which aspects of the (confusing) diagram the text boxes are relating to, due to issues of physical adjacency.

This student understands that diagrams need to be clear in their associations, and that where the information (labels) are placed (physical adjacency) is crucial to the viewer's understanding of what the design is communicating.

The second skill focuses on the student's ability to analyze visual information in terms of what traditional graphic designers agree to be the reason for the discipline's existence: effective communication (Evans and Thomas, 2008, p.2). Peircean theory focuses on communicative purpose. Students are taught to analyze where communication breakdowns occur, and what is causing the breakdown. For example, one exercise was for the students to find their own examples of a breakdown in a diagram's communicative purpose. This student discusses the obvious breakdown, but also takes it further, to a less obvious but still threatening issue:



This pie chart is so image heavy you hardly notice the chart, which makes it fall from being a 1-1-3 element (diagram) to being a 1-1-2 element (image). Also, if the rest of the diagram were eliminated, the elliptical nature of the pie chart itself skews the information and makes the information hard to pull accurately, so that would make it fall to a 1-1-1 anyway, even though it wants to be 1-1-3.

Image found at www.usatoday.com.

Not only can the student recognize the primary purpose (to inform readers), but he/she is able to define what is causing the major breakdown, and what may be problematic, even when the major issue is fixed.

Finally, students are taught how to revise communication issues so that the design supports the primary purpose of the document. For one of the extra assignments, a student revised a table to better convey the information. As shown below, while maintaining both the informational purpose, and the basic format that showed the hierarchy, this student was able to clean up the table simply by deleting most of the hard lines. This is a standard practice for table revision in Peircean theory based on the idea that hard lines are signals, and too many of them cause viewer visual fatigue.

Table 8.4: Student revision of an exercise in the Fall 2009 class and second revision by student in Winter 2011 class.

Steps		Participant Responsibility		
		Programmer	Reviewer	Recording Secretary
Before the meeting:				
1	Schedule time and place for review.	✓		
2	Compile and copy design or code for each participant.	✓		
During the meeting:				
1	Appoint recording secretary	✓	✓	
2	Review design/code (for completeness, accuracy, and quality)		✓	
3	Give feedback (on identified issues)		✓	
4	Create action list (errors, discrepancies, inconsistencies)		✓	✓
After the meeting:				
1	Distribute actions list			✓
2	Resolve points of concern	✓		
3	Notify reviewers of actions taken	✓		

Table with more unified elements.

The relationship among cells is more evident when list headings and indicative marks have unified forms defining clear lines.

Steps	Participant Responsibility		
	Programmer	Reviewer	Recording Secretary
Before the meeting:			
1	Schedule time and place for review.	x	
2	Compile and copy design or code for each participant.	x	
During the meeting:			
1	Appoint recording secretary	x	x
2	Review design/code (for completeness, accuracy, and quality)		x
3	Give feedback (on identified issues)		x
4	Create action list (errors, discrepancies, inconsistencies)		x
After the meeting:			
1	Distribute actions list		x
2	Resolve points of concern	x	
3	Notify reviewers of actions taken	x	

We find that most of the 410 and 421 students leave the class better prepared for practical analysis of visual information, which, as editing minors, will be constantly required in their work after they leave school. They have a place to begin their analysis with vocabulary to explain consistently what is wrong with the visual; they can recognize communication breakdowns and understand why they are occurring; and they can suggest revisions, based on the document's communicative purpose, that will solve the communication problems. All of these skills make them better prepared to work outside of the university setting.

Conclusion

Graphic design has been defined as “the art of arranging pictographic and typographic elements to create effective communication” (Evans and Thomas, 2008, p. 2). In other words, for most graphic designers, their major purpose for using visual elements is to communicate effectively. This focus is echoed by communicators of all kinds. In fact, traditional graphic design is the current lodestone for teaching people from many disciplines how to communicate effectively using visual elements (Agrawala, Li, and Berhouzoz, 2011; Brumberger, 2005; Forsyth and Waller, 1995; Hocks, 2003; McQuarrie & Mick, 1999; Phillips & McQuarrie, 2004; Scott, 1994). For example, Forsyth and Waller suggest that “visual ‘literacy’ is an important skill for medical professionals to acquire if they are to communicate effectively with audiences of ever increasing visual sophistication” (1995, p. 80). Effective visual communication is the goal shared by writers and visual information designers alike.

However, though teachers from many different disciplines have been addressing the need to find better ways to teach their students how to incorporate visual elements, traditional graphic design is poorly equipped to teach effective communication for several reasons:

First, as we have seen, excessive emphasis is placed on decorative forms and purposes. Typically, teachers focus on getting the viewer’s attention, but don’t give any instruction on why or how to use visual elements. If whatever the student uses gets the viewer’s attention, then it is considered an acceptable use of that element. An example of this is the Stallworth Williams sales letter revision (see Figure 1.1). When the student was only given instruction on formal elements of design, with the main objective being to get the reader’s attention, many indicative elements

were used, but the design itself was less effective at actually communicating the purpose of the document.

Second, trial and error is the main method of design creation: students are taught to play with the main formal elements of design—color, space, line, shape, size, and placement—but there is little systematic understanding of how these elements combine differently in different types of visuals (images vs. tables for instance), and little systematic discussion of the purposes that these elements will and won't effectively serve. In fact, teachers of traditional graphic design typically reject formulas or frameworks that they fear might limit creativity and expression.

The result of this approach is that communicators from various disciplines find it difficult to understand or apply what is being taught and they don't know why their work is not successful. For example, in an editorial for *Research Technology Management*, James Euchner quotes Scott Stevenson from University of California Davis who says that “visual design is often the polar opposite of engineering: trading hard edges for subjective decisions based on gut feelings and personal experiences” (11). Furthermore, most communicators know that they need more guidance: Forsyth and Waller (1995) state that “full mastery of the techniques involved [in visual design] requires a long apprenticeship in graphic and print design, yet today's desktop publishing and presentation software put great design power into inexperienced hands” (80). Without any real framework, they conclude that there is no “right” answer; consequently, they still are unable to explain how to get to “effective.”

A systematic understanding of both distinct visual types and their effective purposes is found in the Peircean theory of visual information design developed by Manning and Amare. Their approach maps specific visual elements to consistent definitions based on their formal characteristics and useful functions, as predicted by their analysis in terms of primary Peircean

categories. These definitions provide a consistent and predictable framework for selecting the appropriate visual elements that have the desired communicative effects.

Although this new approach has application in any discipline that uses visuals, Manning and Amare's work was written for an academic audience. Their explanation of Peircean categories is presented in technical language with the understanding that the target audience is familiar with conceptually dense text. However, when we began teaching this method to undergraduate students with a minor in editing, the need to recast the text became evident.

This project is a simplified version of Manning and Amare's theory, designed to help editing minor undergraduates analyze and correct problems in communication related to the visual elements in documents. It was created for an undergraduate audience, primarily using analogy and examples that are familiar to them and that help to translate the dense theory into more understandable language. It also simplifies the theory and abbreviates it to basic concepts, with exercises for each chapter designed to help students practice what they had just read. This project was pilot-tested in two undergraduate Linguistics classes for students who are pursuing an editing minor.

Implications

A surprising outcome relative to students' ability to analyze and revise visuals became evident when analyzing student responses. We found that, once the student's learned how to use Peircean analysis, they ended up discussing all of their work using this method, even when asked to discuss using only traditional design principles. For example, one student who was discussing typeface from a traditional perspective stated,

The designers could have improved the design by choosing typefaces that contrasted more. This improvement would be most noticeable between the body text and the titles.

This lack of contrast will be discussed further later.

This student went on to specify why this lack of contrast was problematic using Peircean analysis:

While the title typeface does contrast with the typeface used for the body text, it doesn't contrast enough. The difference between the two typefaces isn't enough to create an action trigger, to catch the eye. Article titles should be categorized as 2-2-3, but these ones are probably currently better categorized as 1-2-3. The 1 in the new categorization points to the lack of contrast, the form of the titles is not much of a trigger, it is more unified with the surrounding text than it should be.

It appears that the student was better able to explain why the lack of contrast was problematic (that it didn't provoke action strongly enough in the viewer) based on the Peircean typology definitions of the visual elements.

Another student described the excessive use of web links in a web site using traditional analysis:

There is no particular order to how the links in the vertical columns are presented (although the designer has made some attempt to organize by topic in the left hand column). Rather, the links are presented one after the other, with the viewer forced to read through up to 30 different links under a topic heading to choose which one to click. There is no use of dominance, hierarchy, or alignment to group the different links according to popularity, best information, or any such other useful heading. This makes viewing of the page, particularly the links, particularly effortful for the viewer.

It is interesting to note that this student discussed what was difficult for the viewer using terms that had been discussed in the units on Peircean analysis. The idea of many signals (links) requiring some sort of order came from Peircean analysis, as did the idea of too many signals being fatiguing to the viewer.

This convergence of discussion was typical of many of the students as they brought vocabulary from traditional design, and both vocabulary and analysis skill from Peircean design together so they could analyze the visuals they were assigned to discuss. The students found that understanding of traditional visual design concepts and the ability to analyze visuals according to Peircean design theory was helpful overall. However, I found that once the students were taught how to analyze using Peircean theory, all of their analysis was grounded there.

Future work

This project has had a strong impact on the way students who worked to integrate the theory into their practice of visual design analysis developed their ability to analyze and revise visuals even with the more contracted version of the textbook. There is, however, more work that can be done on this subject. Most of the major design elements are included in the five categories covered in this project, but there are still several categories that need to be completely analyzed.

Action triggers (type 2-2-2 visuals) and their controlling element, Ritual (type 2-2-3 visuals), are very important for understanding how to quickly help viewers come to a common understanding of a document. Both of these visual elements are used frequently in document design, but are not well understood. Ritual, especially, is not discussed in traditional graphic design at all, but is the governing force for all document creation. The basic concept is discussed under the idea of “script” in one text (Riley and Mackiewicz, 2011, p. 29), but it is not developed fully. Peircean analysis allows a fuller discussion of these elements, but classroom materials are still under development.

Also, printed words, sentences, and different kinds of texts (poetry, story, sales pitches, etc.) always have distinctive visual components, but a useful discussion of these last three Peircean visual types (1-3-3, 2-3-3, and 3-3-3) would embrace the entire field of linguistics, which is obviously beyond the scope of this or any other single thesis project.

Furthermore, the concepts of parameters and subcategories was formalized during the process of creating my project, but was not explained as well using analogy. It would be helpful to add an analogy to explain these information-dense concepts, but this has not been developed yet. This need became evident as I worked with students to clarify the body of terms needed for their midterm and final exams. I found that in addition to the exposition modules given here, students also need to be led through an orderly advance of the Peircean vocabulary, probably in the form of memory drills: 3 overall categories>>9 form-reference-interpretation levels>>10-visual-type labels>>30 subtype parameters>>70 subtype labels.

The terminology is ultimately indispensable because it allows students to keep track of what level of analysis they are using. Therefore, an analogy example or mnemonic device that can be used to assist students with the vocabulary would be helpful.

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