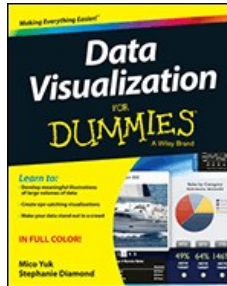


# Chapters *To Go*



## Data Visualization for Dummies

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## Chapter 6: Paying Attention to Detail

### In This Chapter

- Knowing how people see design
- Communicating with pattern layouts
- Selecting a template
- Designing for different devices

This chapter examines the way that people see and digest information. If you familiarize yourself with the common design conventions described in this chapter, you'll find it easier to create powerful visualizations that contain intelligent (actionable) data. In this chapter we look at principles that make up what is called "Gestalt" theory. It defines how what we see is translated into meaning. All the actions required to make meaning of things happens in our brains when we view things based on size and position.

This chapter also discusses the specific patterns that people use when viewing information. If you are aware of these patterns, you can more effectively structure your information. In addition, you see how to use a template to build on the knowledge of designers who have already thought through the issues you are facing as you build your data viz. Finally you look at the issues involved in designing for mobile devices and how that relates to the creation of your data viz.



### Uncovering How People Digest Data

Recent advances in cognitive science have made it possible to scan the human brain and understand what happens when people view something. Researchers have learned more about the brain in the past ten years than they did in the previous hundred, which has made it possible to analyze brain function in exciting new ways.

Think about how we see. Our eyes gather information in small chunks, for example, even though we think we're seeing everything as a whole. When you're reading, your eyes take in several words, your brain makes mental pictures, and then your eyes move on to the next chunk of text. This process happens so quickly that you're unaware of it.

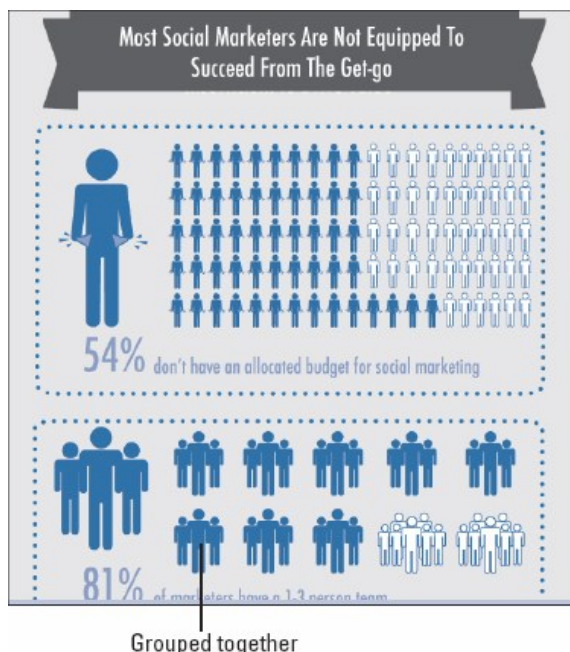
You may think that web designers create user experiences based solely on intuition and imagination. But believe it or not, today's designers adhere to Gestalt theory, which are principles uncovered by German psychologists in the early 20th century.

*Gestalt* means *unified whole* in English and is generally associated with the idea that the whole is greater than the sum of its parts. Gestalt theory is made up of several principles — including the concepts of proximity, similarity, closure, continuation, and figure/ground — that describe how the human brain sees visual information. Designers who understand this theory can develop visuals that communicate information in the most effective ways. We discuss each of these principles in turn.

**Tip** Gestalt theory guides good designers when they create visualizations. You should also use the theory when you design your own data viz. You'll probably be surprised to find that you intuitively know the principles of Gestalt theory, which makes them even more powerful.

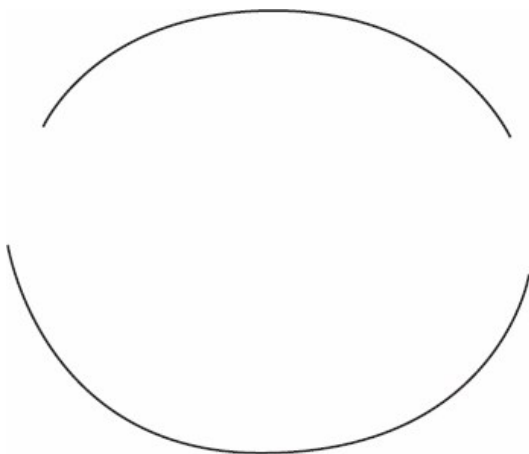
Here's how each principle influences what people see:

- **Proximity:** When items are placed in close proximity, people assume that they're in the same group because they're close to one another and apart from other groups. [Figure 6-1](http://www.socialnomics.net/2012/10/16/state-of-social-marketing-survey-infographic) shows a visualization that includes grouped items. You can see the original image at [www.socialnomics.net/2012/10/16/state-of-social-marketing-survey-infographic](http://www.socialnomics.net/2012/10/16/state-of-social-marketing-survey-infographic).



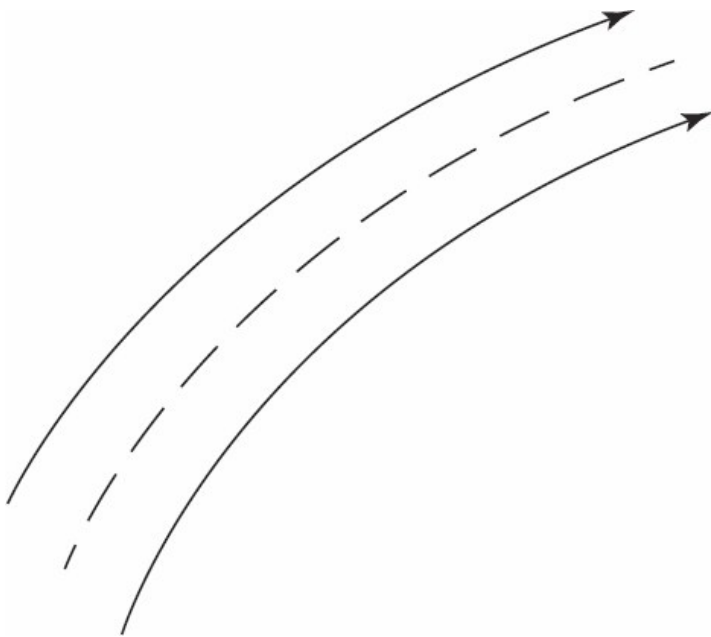
**Figure 6-1:** Items placed close together form a group.

- **Similarity:** When items look the same, people perceive them to be of the same type. We naturally assume that shapes that look the same are related. When you create a data viz and you keep items together that look the same, you make it easy for someone to understand that those items represent a group.
- **Closure:** Our eyes tend to add any missing pieces of a familiar shape. If two sections are taken out of a circle, as shown in [Figure 6-2](#), people still perceive the whole circle.



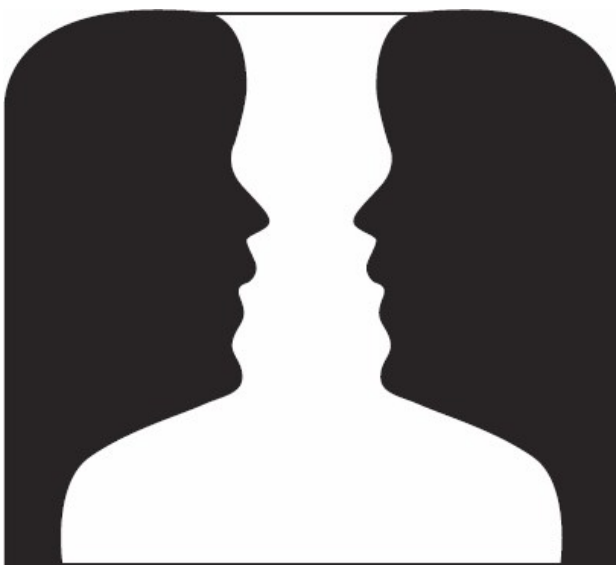
**Figure 6-2:** Even with pieces missing, you can still tell that this image is a circle.

- **Continuation:** If people perceive objects as moving in a certain direction, they see them as continuing to move that way. [Figure 6-3](#) shows an example.



**Figure 6-3:** Items stay in the same path of movement.

- **Figure/ground:** Depending on how people look at a picture, they see either the *figure* (foreground) or the *ground* (background) as standing out, as shown in [Figure 6-4](#).



**Figure 6-4:** Both the figure and the ground form shapes.

## Presenting Common Visual Patterns

When you begin to create visualizations, you may be concerned about the placement of your charts, graphs, and other key data. Because you are new to data visualization, you may feel that you don't have accumulated knowledge about what works and what doesn't. Some reasons you may feel concerned include the following:

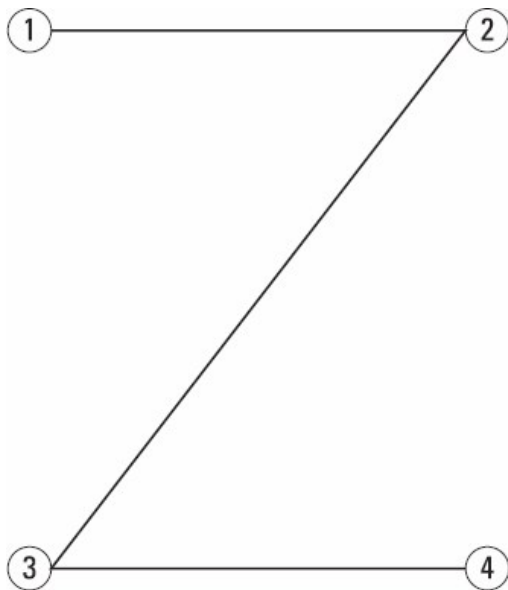
- You aren't sure about the placement of each element in the chart.
- You aren't clear about who your users will be for the data viz.
- You don't know where to put your menu items so they will be seen.

Fortunately, cognitive scientists have determined that people read text and images in certain specific patterns. As you organize the information in your visualization, using these standard patterns helps your users to scan the information quickly and easily.

## Z and F patterns

Here are the two most common visual patterns:

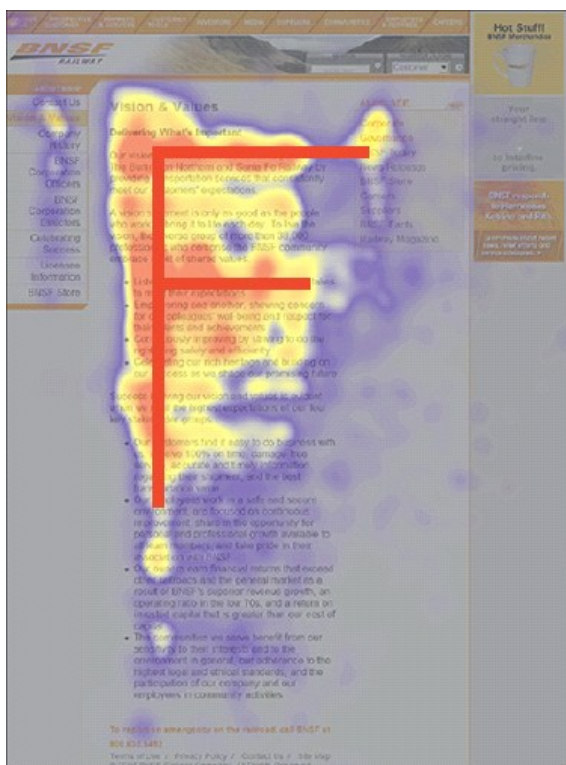
- **Z pattern:** The Z pattern is often used for text and visual layouts. As you would expect, when a person's eyes follow the Z pattern, his eyes track from left to right across the top, down to the left, and then across the page at the bottom. **Figure 6-5** shows the points of the Z numbered in the order in which the reader's eyes track across information on a page.



**Figure 6-5:** The Z pattern.

How does this pattern affect the layout of your content in a visualization? Your reader will scan the content along the path of the Z, so you should place the title at the top of the Z, along with any key content. Position more visual content in the middle and along the bottom.

- **F pattern:** Cognitive scientists have created heat maps to determine where the human eye goes when it looks at a web page. As shown in **Figure 6-6**, heat maps are composed of concentrations of colors that show where readers scanned the page. The most intense colors (red and yellow) show where readers' eyes lingered longest; readers spent less time looking at the blue areas. As you can see, the red and yellow areas resemble an F. You can see the original image at [http://doughayassoc.com/wp-content/uploads/2010/10/eyetracking\\_F-page.png](http://doughayassoc.com/wp-content/uploads/2010/10/eyetracking_F-page.png).



**Figure 6-6:** The F pattern on a heat map.

**Remember** If you stick to these two layout patterns at the beginning, you can't go too far afield when designing your data viz.

## Pattern design

**Tip** Here are a few guidelines for using your knowledge of visual patterns to create a well-designed visualization:

- **Balance:** When you place items in your visualization, be sure to maintain balance. When too many items are clustered together, it's difficult for people to see how those items are related.
- **Color:** Random use of colors such as red can be misleading, causing the viewer to see an alert when there's no cause for alarm. Read Chapter 10 for more about using color in your visualizations.
- **Hierarchy:** You're familiar with the use of hierarchy as it pertains to a text outline. The top level of the outline may have a Roman numeral, the next level may have a capital letter, and then the third level may have a number. In a visualization, you can tell based on size or position which items are higher or lower on the hierarchy. You don't need to use numbering as you do in a written outline.
- **Repetition:** Repetition helps people become familiar with the items in a design. If you use the same elements throughout, people see a unified whole and don't have to guess what certain elements mean because they've seen those elements before.
- **White space:** The use of white space has been championed for decades. White space allows content to "breathe" — that is, your image benefits from ample space around the objects in the visualization. Too much clutter makes it hard for people to take in the image at a glance.

## Deciding to Use a Template

Templates have become popular because they help novice designers use the expertise of more experienced designers. A template is a guide that helps you to create something using a model designed by others.

Many people feel that templates are confining because you have to place the objects in the spot that's been designated for them. In reality, though, templates are freeing, because they ensure that you create a balanced layout but still allow you to add your own look and feel. Here are some other benefits of templates:

- **Quick start:** Rather than sitting and puzzling over where to place your charts, numbers, and objects, you can begin to place those objects as designated by your template.
- **Expert design:** A template lets you draw on the skills of trained experts, which is a benefit if you're not a designer (and sometimes even if you are). There's clearly no downside to following the advice of people who are more skilled in an area than you are.
- **Cost savings:** Using a template enables you to forgo the services of a designer (although you may want to use a designer for complex projects).

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### Where less is more

Throughout this chapter, we talk about ways to incorporate design to make visualizations better. Restrictions can be good ways to improve your design. Think about how you're limited by space, for example. When you know that you can put only a few items in a data viz, you're forced to think harder about what is necessary. Other design concepts follow the idea that less is more. Too many colors or typefaces are distracting, for example. Many designers like to limit the use of typefaces to two. Being familiar with design guidelines can help you avoid having a design that closely resembles a ransom note.

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**Tip** You can find templates for infographics and data viz wireframes in online tools such as Piktochart (<http://piktochart.com>) and Balsamiq Mockups (<http://balsamiq.com>).

See Chapter 8 for more information about using templates.

## Achieving Consistency across Devices

As the popularity of mobile devices has increased, designers have had to face two new design issues:

- Design of mobile device interfaces
- Creation of apps for mobile devices

Until a few years ago, when a designer created a paper-based ad or brochure, she could plan exactly how it would look after it was printed. The designer knew the format and how customers would view it.

With the advent of the Internet, online designers used the few web browsers that were available to plan how their designs would look onscreen. The available tools were somewhat crude, but design was pretty straightforward. If he tested each web browser, a designer could determine what he needed to fix so the design would look right online.

Now designers have to design for a host of mobile devices, each of which has its own quirky needs. Consequently, the complexities of designing visualizations have grown.



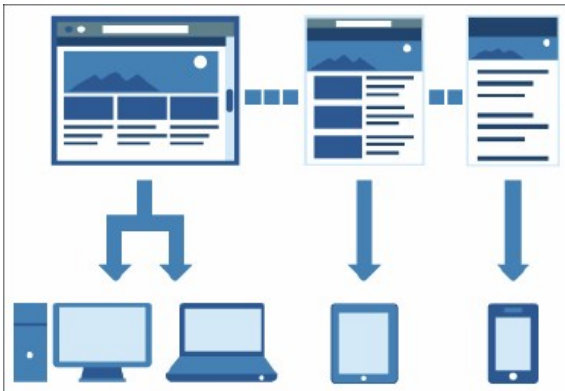
## Embracing responsive design

To deal with the issue of multiple screen sizes and operating systems, designers use the principle of *responsive design* (RD). RD refers to an interface or layout that can reconfigure itself based on where it's being viewed. The term was coined by Ethan Marcotte in a 2010 article (<http://alistapart.com/article/responsive-web-design>) that recognized the need for designers to address the issue of multiple screen requirements.

A website design that's responsive still looks good whether you view it on your desktop computer or on your smartphone. The rounded edges and icons that are common on smaller devices automatically fall into place.

In his article, Marcotte cited the three areas where RD can have the most effect in web design:

- **Fluid grids:** The grid is the tool that designers use to lay out their designs, regardless of whether those designs will be viewed online or offline. In [Figure 6-7](#), a grid design has been transformed for three screen shapes. (You can find the original image at <http://searchengineland.com/figz/wp-content/seloads/2012/06/responsive-design-alone-not-mobile-seo.png>.)



**Figure 6-7:** Grid design translated to different screens.

- **Flexible images:** When you have images in a blog post or on your website, you want to ensure that they're not cut off or distorted. Making sure that your images can reformat themselves is important.
- **Media queries:** When you enter a search term in a search engine such as Google or Bing, you want to be able to view the results on any of your screens. This is a key principle of RD. The content needs to be viewed on any mobile device a user might have. What makes viewing it on a variety of devices a challenge is that the designer has no way to know what the returned result will be.

These ideas apply to data visualizations as well. You want to make sure that your grid isn't distorted when the data viz is viewed on a mobile device. The images must be clear, and the aspect ratio (length to width) should be aligned regardless of the device the user is working with.

## Following app design standards

Designers not only want an interface to look good but also want it to do all sorts of tricks. As a result, app design has become a discipline unto itself.

You may wonder why you should care about app design. Everyone who has to visualize anything online is subject to the same standards as any app designer.

In his article "Apple's 6 Simple Rules for Designing a Killer iOS App" (<http://mashable.com/2012/12/20/spun-ios-design>), Pete Pachal describes what he had to do to get his news app Spun certified for Apple's App Store. (At this writing, the app isn't available in the U.S. App Store.) Pachal's team had to work with Apple for five months to get everything perfected. During that time, Pachal codified six rules for his team. We've singled out four of these rules that apply to data viz design:

- **Simplicity is strength.** This rule is probably the most important rule for data visualizations. The goal is to explain or uncover new information that can be used to develop insights. If you focus on too many data points, the story will be lost. If you're creating a dashboard, this rule is particularly important because each piece of data needs to support the whole. (As Gestalt theory says, the whole is greater than the sum of its parts. See "Uncovering How People Digest Data," earlier in this chapter, for more about this theory.)
- **Don't sacrifice quality for time.** This rule is important for data visualization. If you slap together a visualization that's hard to decipher or just plain sloppy, no one will want to use it. Take the time to develop something great, and continue to refine it over time.
- **Reward the user with every touch.** Every menu item should do something useful. The print link should work, for example. Also, every click should provide information.
- **Details matter.** Before the user clicks a link in a data visualization, it should be apparent where that link will take her or what type of data she'll see.