100 THINGS
EVERY DESIGNER NEEDS TO KNOW ABOUT PEOPLE

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ACKNOWLEDGEMENTS

Many thanks to my great editing team at Peachpit, especially the late night email exchanges with Jeff Riley my development editor. Thanks to Michael Nolan (acquisitions editor) for encouraging me in writing this one and sheparding it through the process. Thanks to Guthrie Weinschenk for his photos, Maisie Weinschenk for her great ideas, and Peter Weinschenk for his support and patience. And a thank you to all those who follow my blog, come to my presentations, and in general listen to me talk about psychology. You give me valuable ideas, opinions, and are the reason I keep searching out and writing about psychology and design.
DEDICATION

Dedicated to the memory of Miles and Jeanette Schwartz. Wish you were here to share the book with.
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Whether you’re designing a Web site or a medical device—or something somewhere in between—your audience is comprised of the people who will benefit from that design. And the totality of your audience’s experience is profoundly impacted by what you know—or don’t know—about them.

How do they think? How do they decide? What motivates them to click or purchase or whatever it is you want them to do?

You’ll learn those things in this book.

You’ll also learn what grabs their attention, what errors they will make and why, as well as other things that will help you design better.

And you’ll design better because I’ve already done most of the heavy lifting for you. I’m one of those strange people who likes to read research. Lots and lots of research. So I read—or in some cases, re-read—dozens of books and hundreds of research articles. I picked my favorite theories, concepts, and research studies.

Then I combined them with experience I’ve gained throughout the many years I’ve been designing technology interfaces.

And you’re holding the result: 100 things I think you need to know about people.
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Vision trumps all the senses. Half of the brain’s resources are dedicated to seeing and interpreting what we see. What our eyes physically perceive is only one part of the story. The images coming in to our brains are changed and interpreted. It’s really our brains that are “seeing.”
WHAT YOU SEE ISN’T WHAT YOUR BRAIN GETS

You think that as you’re walking around looking at the world, your eyes are sending information to your brain, which processes it and gives you a realistic experience of “what’s out there.” But the truth is that what your brain comes up with isn’t exactly what your eyes are seeing. Your brain is constantly interpreting everything you see. Take a look at Figure 1.1, for example.

What do you see? At first you probably see a triangle with a black border in the background, and an upside-down, white triangle on top of it. Of course, that’s not really what’s there, is it? In reality there are merely lines and partial circles. Your brain creates the shape of an upside-down triangle out of empty space, because that’s what it expects to see. This particular illusion is called a Kanizsa triangle, named for the Italian psychologist Gaetano Kanizsa, who developed it in 1955. Now look at Figure 1.2, which creates a similar illusion with a rectangle.

THE BRAIN CREATES SHORTCUTS

Your brain creates these shortcuts in order to quickly make sense out of the world around you. Your brain receives millions of sensory inputs every second (the estimate is 40 million) and it’s trying to make sense of all of that input. It uses rules of thumb, based on past experience, to make guesses about what you see. Most of the time that works, but sometimes it causes errors.

FIGURE 1.1 You see triangles, but they are not really there

FIGURE 1.2 An example of a Kanizsa rectangle
You can influence what people see, or think they see, by the use of shapes and colors. Figure 1.3 shows how color can draw attention to one message over another.

**FIGURE 1.3** Color and shapes can influence what people see

If you need to see in the dark, don’t look straight ahead.

The eye has 7 million cones that are sensitive to bright light and 125 million rods that are sensitive to low light. The cones are in the fovea (central area of vision) and rods are less central. So if you’re in low light, you’ll see better if you don’t look right at the area you’re trying to see.

Optical illusions show us the errors

Optical illusions are examples of how the brain misinterprets what the eyes see. For example, in Figure 1.4 the line on the left looks longer than the line on the right, but they’re actually the same length. Named for Franz Müller-Lyer, who created it in 1889, this is one of the oldest optical illusions.

**FIGURE 1.4** These lines are actually the same length
We see in 2D, not 3D

Light rays enter the eye through the cornea and lens. The lens focuses an image on the retina. On the retina it is always a two-dimensional representation, even if it is a three-dimensional object. This image is sent to the visual cortex in the brain, and that’s where recognition of patterns takes place, for example, “Oh, I recognize that as a door.” The visual cortex turns the 2D image into a 3D representation.

The visual cortex puts all the information together

According to John Medina (2009), the retina receives electrical patterns from what we look at and creates several tracks from the patterns. Some tracks contain information about shadows, others about movement, and so on. As many as 12 tracks of information are then sent to the brain’s visual cortex. There, different regions respond to and process the information. For example, one area responds only to lines that are tilted to 40 degrees, another only to color, another only to motion, and another only to edges. Eventually all of these data get combined into just two tracks: one for movement (is the object moving?) and another for location (where is this object in relation to me?).

Takeaways

🌟 What you think people are going to see on your Web page may not be what they do see. It might depend on their background, knowledge, familiarity with what they are looking at, and expectations.

🌟 You might be able to persuade people to see things in a certain way, depending on how they are presented.
You have two types of vision: central and peripheral. Central vision is what you use to look at things directly and to see details. Peripheral vision encompasses the rest of the visual field—areas that are visible, but that you’re not looking at directly. Being able to see things out of the corner of your eye is certainly useful, but new research from Kansas State University shows that peripheral vision is more important in understanding the world around us than most people realize. It seems that we get information on what type of scene we’re looking at from our peripheral vision.

Adam Larson and Lester Loschky (2009) showed people photographs of common scenes, such as a kitchen or a living room. In some of the photographs the outside of the image was obscured, and in others the central part of the image was obscured. The images were shown for very short amounts of time, and were purposely shown with a gray filter so they were somewhat hard to see (see Figure 2.1 and Figure 2.2). Then they asked the research participants to identify what they were looking at.

Larson and Loschky found that if the central part of the photo was missing, people could still identify what they were looking at. But when the peripheral part of the image was missing, then they couldn’t say whether the scene was a living room or a kitchen. They tried obscuring different amounts of the photo. They concluded that central vision is the most critical for specific object recognition, but peripheral vision is used for getting the gist of a scene.
Peripheral vision kept our ancestors alive on the savannah

The theory, from an evolutionary standpoint, is that early humans who were sharpening their flint, or looking up at the clouds, and yet still noticed that a lion was coming at them in their peripheral vision survived to pass on their genes. Those with poor peripheral vision didn’t survive to pass on genes.

Recent research confirms this idea. Dimitri Bayle (2009) placed pictures of fearful objects in subjects’ peripheral vision or central vision. Then he measured how long it took for the amygdala (the emotional part of the brain that responds to fearful images) to react. When the fearful object was shown in the central vision, it took between 140 to 190 milliseconds for the amygdala to react. But when objects were shown in peripheral vision, it only took 80 milliseconds for the amygdala to react.

Takeaways

- People use peripheral vision when they look at a computer screen, and usually decide what a page is about based on a quick glimpse of what is in their peripheral vision.
- Although the middle of the screen is important for central vision, don’t ignore what is in the viewers’ peripheral vision. Make sure the information in the periphery communicates clearly the purpose of the page and the site.
- If you want users to concentrate on a certain part of the screen, don’t put animation or blinking elements in their peripheral vision.
Recognizing patterns helps you make quick sense of the sensory input that comes to you every second. Your eyes and brain want to create patterns, even if there are no real patterns there. In Figure 3.1, you probably see four sets of two dots each rather than eight individual dots. You interpret the white space, or lack of it, as a pattern.

![Figure 3.1](image)

**FIGURE 3.1** Your brain wants to see patterns

**Individual cells respond to certain shapes**

In 1959 David Hubel and Torsten Wiesel showed that some cells in the visual cortex respond only to horizontal lines, others respond only to vertical lines, others respond only to edges, and still others respond only to certain angles.

**THE GEON THEORY OF OBJECT RECOGNITION**

There have been many theories over the years about how we see and recognize objects. An early theory was that the brain has a memory bank that stores millions of objects, and when you see an object, you compare it with all the items in your memory bank until you find the one that matches. But research now suggests that you recognize basic shapes in what you are looking at, and use these basic shapes, called geometric icons (or geons), to identify objects. Irving Biederman came up with the idea of geons in 1985 (Figure 3.2). It’s thought that there are 24 basic shapes that we recognize; they form the building blocks of all the objects we see and identify.

**The visual cortex is more active when you are imagining**

The visual cortex is more active when you are imagining something than when you are actually perceiving it (Solso, 2005). Activity occurs in the same location in the visual cortex, but there is more activity when we imagine. The theory is that the visual cortex has to work harder since the stimulus is not actually present.
### Takeaways

- Use patterns as much as possible, since people will automatically be looking for them. Use grouping and white space to create patterns.

- If you want people to recognize an object (for example, an icon), use a simple geometric drawing of the object. This will make it easier to recognize the underlying geons, and thus make the object easier and faster to recognize.

- Favor 2D elements over 3D ones. The eyes communicate what they see to the brain as a 2D object. 3D representations on the screen may actually slow down recognition and comprehension.
Imagine that you’re walking down a busy street in a large city when you suddenly see the face of a family member. Even if you were not expecting to see this person, and even if there are dozens, or even hundreds, of people in your visual field, you will immediately recognize him or her as your relative. You’ll also have an accompanying emotional response, be it love, hate, fear, or otherwise.

Although the visual cortex is huge and takes up significant brain resources, there is a special part of the brain outside the visual cortex whose sole purpose is to recognize faces. Identified by Nancy Kanwisher (1997), the fusiform face area (FFA) allows faces to bypass the brain’s usual interpretive channels and helps us identify them more quickly than objects. The FFA is also near the amygdala, the brain’s emotional center.

People with autism don’t view faces with the FFA

Research by Karen Pierce (2001) showed that people with autism don’t use the FFA when looking at faces. Instead, they use other, regular pathways in the brain and visual cortex that are normally used to recognize and interpret objects but not faces.

We look where the face looks

Eye-tracking research shows that if a picture of a face looks away from us and toward a product on a Web page (see Figure 4.1), then we tend to also look at the product.

But remember, just because people look at something doesn’t mean they’re paying attention. As you consider your Web approach, you’ll have to decide whether you want to establish an emotional connection (the face looking right at the user) or direct attention (the face looking directly at a product).
People are born with a preference for faces

Research by Catherine Mondloch et al. (1999) shows that newborns less than an hour old prefer looking at something that has facial features.

The eyes have it: people decide who and what is alive by looking at the eyes

Christine Looser and T. Wheatley (2010) takes pictures of people and then morphs them in stages into inanimate mannequin faces. She shows the stages and has research subjects decide when the picture is no longer a human and alive. Figure 4.2 shows examples of her pictures. Looser’s research found that subjects say the pictures no longer show someone who is alive at about the 75 percent mark. She also found that people primarily use the eyes to decide if a picture shows someone who is human and alive.

FIGURE 4.2 An example of Looser’s and Wheatley’s people to mannequin faces

Takeaways

* People recognize and react to faces on Web pages faster than anything else on the page (at least by those who are not autistic).
* Faces looking right at people will have the greatest emotional impact on a Web page, probably because the eyes are the most important part of the face.
* If a face on a Web page looks at another spot or product on the page, people will also tend to look at that product. This doesn’t necessarily mean that they paid attention to it, just that they physically looked at it.
If you ask someone to draw a picture of a coffee cup, chances are they’ll draw something that looks something like Figure 5.1.

**FIGURE 5.1** How we “see” objects in our heads

In fact, Stephen Palmer (1981) traveled around the world and asked people to draw a coffee cup. **Figure 5.2** shows examples of what they drew.

**FIGURE 5.2** What most people drew when asked to draw a coffee cup
What’s interesting about these drawings is the angle and perspective. A few of the cups are sketched straight on, but most are drawn from a perspective slightly above the cup looking down, and offset a little to the right or left. This has been dubbed the *canonical perspective*. Very few people would draw a coffee cup as in Figure 5.3, which is what you’d see if you were looking at a coffee cup from above.

Of course not, you say, but... *why not*? You might argue that the first perspective is the one that you actually see most of the time when you look at a coffee cup, but I will tell you that this research has been done on many objects, and people most quickly recognized them all at this same canonical perspective, even though they don’t look at all of these objects from above most of the time. The research asked people to identify various animals, such as a very small dog or cat. The canonical perspective still won out, even though we most often see cats or very small dogs from high above, not just slightly above (unless you crawl around on the ground a lot). It seems to be a universal trait that we think about, remember, imagine, and recognize objects from this canonical perspective.

**FIGURE 5.3** Most people don’t draw a coffee cup like this

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**Takeaways**

- People recognize a drawing or object faster and remember it better if it’s shown in the canonical perspective.
- If you have icons at your Web site or in your Web or software application, draw them from a canonical perspective.
Where do people look first on a computer screen? Where do they look next? It depends partially on what they’re doing and expecting. If they read in a language that moves from left to right, then they tend to look at the screen from left to right. If they read from right to left, it is the opposite. However, they don’t start in the topmost corner. Because people have gotten used to the idea that there are things on computer screens that are less relevant to the task at hand, such as logos, blank space, and navigation bars (see Figure 6.1), they tend to look at the center of the screen and avoid the edges.

![Figure 6.1 We skip the edges of a screen and move to meaningful information](image)

After a first glance at a screen, people move in their culture’s normal reading pattern (left to right, right to left, top to bottom). If something grabs their attention, for example, a large photo (especially one with someone’s face) or movement (an animated banner or video) somewhere else on the screen, then you can pull them away from this normal tendency.
PEOPLE HAVE A MENTAL MODEL OF WHAT THEY WANT TO SEE AND WHERE THEY WANT TO SEE IT

People have a mental model of where things tend to be on computer screens, and a mental model for particular applications or Web sites that they use. They tend to look at a screen based on these mental models. For example, if they shop at Amazon a lot and use the search field, they’ll likely look right at the search field when the screen loads.

IF THERE IS A PROBLEM, PEOPLE NARROW THEIR VIEW

If there is an error or unexpected problem with the task people are trying to accomplish, then they stop looking at other parts of the screen and focus on the problem area. We’ll discuss this more in the “People Make Mistakes” chapter.

Takeaways

🌟 Put the most important information (or things you want people to focus on) in the top third of the screen or in the middle.

🌟 Avoid putting anything important at the edges, since people tend not to look there.

🌟 Design the screen or page so that people can move in their normal reading pattern. Avoid a pattern where people have to bounce back and forth to many parts of the screen to accomplish a task.
PEOPLE SEE CUES THAT TELL THEM WHAT TO DO WITH AN OBJECT

You’ve probably had the experience of encountering a door handle that doesn’t work the way it should: the handle looks like you should pull, but in fact you need to push. In the real world, objects communicate to you about how you can, and should, interact with them. For example, by their size and shape, doorknobs invite you to grab and turn them. The handle on a coffee mug tells you to curl a few fingers through it and lift it up. A pair of scissors invites you to put fingers through the circles and move your thumb up and down to open and close. If the item, like the door handle, gives you cues that don’t work, you get annoyed and frustrated. These cues are called affordances.

James Gibson wrote about the idea of affordance in 1979. He described affordances as action possibilities in the environment. In 1988 Don Norman modified the idea of affordances in his book The Design of Everyday Things. He referred to the idea of perceived affordances: if you want people to take action on an object, whether in real life or on a computer screen, you need to make sure that they can easily perceive, figure out, and interpret what the object is and what they can and should do with it.

When you try to accomplish a task, such as opening a door to a room or ordering a book at a Web site, you automatically, and largely unconsciously, look around you to find objects and tools to help you. If you are the one designing the environment for the task, make sure that the objects in the environment are easy to see, easy to find, and have clear affordances.

Take a look at the door handle in Figure 7.1. Because of its shape, you’ll tend to grab it and pull down. If that’s the way it works, then you’d say that the door handle is well designed and that it has a clear perceived affordance.

FIGURE 7.1 This door handle invites you to grab and pull down
**Figure 7.2** shows a handle shaped in a way that invites you to grab and pull, but the PUSH sign indicates the door simply doesn’t work that way. That’s known as *incorrect affordance*.

**PERCEIVED AFFORDANCES ON COMPUTER SCREENS**

When you’re designing an application or Web site, think about the affordances of objects on the screen. For example, have you ever wondered what makes people want to click on a button? Cues in the button’s shadow tell people that it can be pushed in, the way a button on an actual device can be pushed in.

**Figure 7.3** shows a button on a remote control. The shape and shadows give you cues that encourage you to press the button to activate it.
You can simulate these shadows online, too. In Figure 7.4, shadows of different colors around the edges make the button look pushed in. Try turning the book upside down and looking at the same button. Now it will look like it’s not pushed in, and the shadows will give cues to push the button.

![Figure 7.4 This button looks pushed in, but turn the book upside down and see what happens](image)

These visual cues are subtle, but they are important. Many buttons on Web sites have some of these visual cues, such as the button in Figure 7.5, but lately Web sites are losing the cues. In Figure 7.6, the button is just text in a colored square.

![Figure 7.5 The use of shading makes this look like a button](image)  ![Figure 7.6 Online buttons are losing their cues](image)

**HYPERLINKS ARE LOSING THEIR AFFORDANCE CUES**

Most people have figured out the affordance cue that blue, underlined text means that the text is hyperlinked, and if you click on it you will go to a different page. But lately many hyperlinks are more subtle, with the only cue that they are clickable showing up when you hover. Figure 7.7 shows what the New York Times Reader page looks like before you hover, and Figure 7.8 shows what it looks like when you hover. It takes an extra step to see the cues. And if you are reading on your iPad, all of these cues are missing. You can’t hover with your finger on an iPad. By the time you’ve touched the screen with your finger, you’ve clicked on the link.