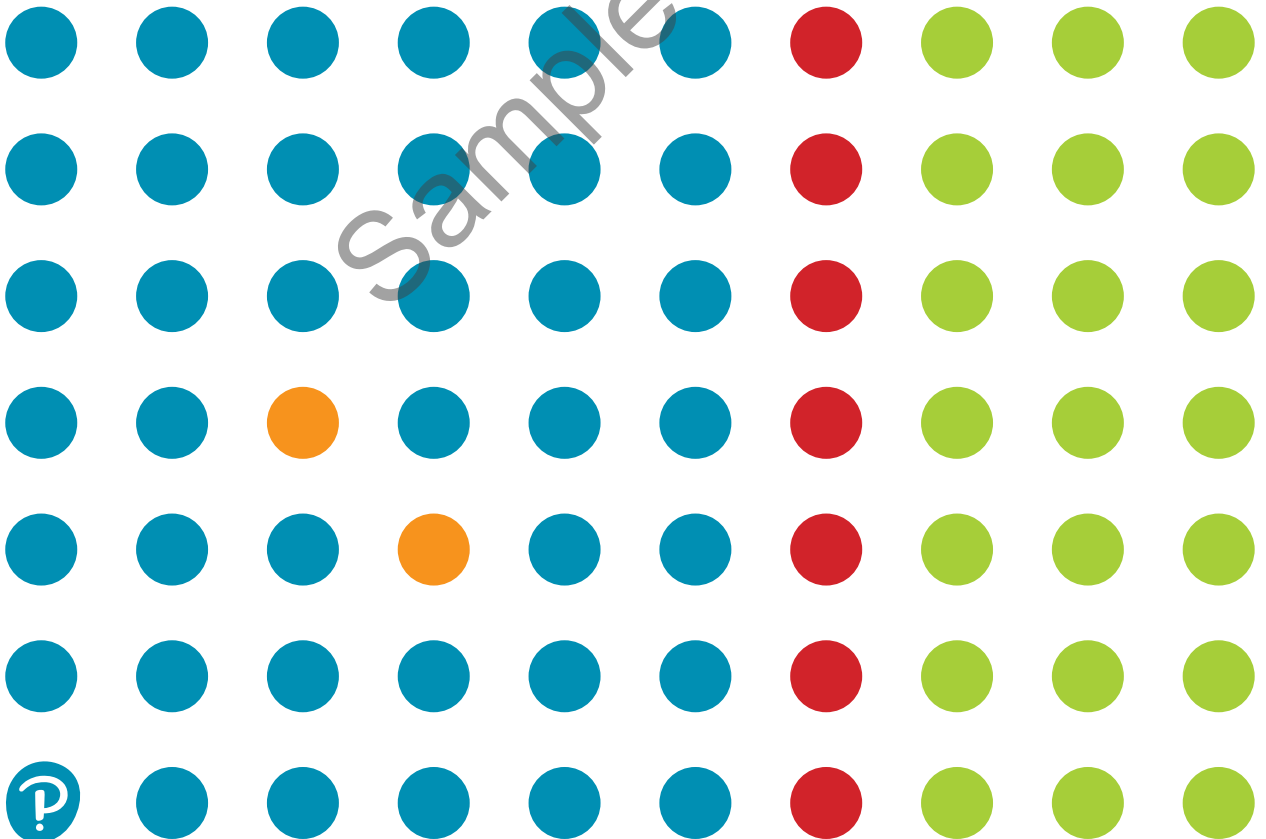


SECOND EDITION

# 100 THINGS

EVERY DESIGNER NEEDS TO KNOW ABOUT **PEOPLE**

SUSAN M. WEINSCHENK, Ph.D.



# CONTENTS

THE PSYCHOLOGY OF DESIGN

xv

## HOW PEOPLE SEE

- 1 WHAT YOU SEE ISN'T WHAT YOUR BRAIN GETS 2
- 2 PERIPHERAL VISION IS USED MORE THAN CENTRAL VISION TO GET THE GIST OF WHAT YOU SEE 5
- 3 PEOPLE IDENTIFY OBJECTS BY RECOGNIZING PATTERNS 8
- 4 THERE'S A SPECIAL PART OF THE BRAIN JUST FOR RECOGNIZING FACES 10
- 5 THERE'S A SPECIAL PART OF THE BRAIN FOR PROCESSING SIMPLE VISUAL FEATURES 13
- 6 PEOPLE SCAN SCREENS BASED ON PAST EXPERIENCE AND EXPECTATIONS 15
- 7 PEOPLE SEE CUES THAT TELL THEM WHAT TO DO WITH AN OBJECT 17
- 8 PEOPLE CAN MISS CHANGES IN THEIR VISUAL FIELDS 21
- 9 PEOPLE BELIEVE THAT THINGS THAT ARE CLOSE TOGETHER BELONG TOGETHER 23
- 10 RED AND BLUE TOGETHER ARE HARD ON THE EYES 24
- 11 NINE PERCENT OF MEN AND ONE-HALF PERCENT OF WOMEN ARE COLOR-BLIND 25
- 12 COLORS MEAN DIFFERENT THINGS TO DIFFERENT CULTURES 29

## HOW PEOPLE READ

- 13 IT'S A MYTH THAT WORDS IN ALL CAPS ARE INHERENTLY HARD TO READ 32
- 14 READING AND COMPREHENDING ARE TWO DIFFERENT THINGS 35

<b>15</b>	<b>PATTERN RECOGNITION HELPS PEOPLE IDENTIFY LETTERS IN DIFFERENT FONTS</b>	<b>40</b>
<b>16</b>	<b>FONT SIZE MATTERS</b>	<b>43</b>
<b>17</b>	<b>READING A SCREEN IS HARDER THAN READING PAPER</b>	<b>45</b>
<b>18</b>	<b>PEOPLE READ FASTER WITH A LONGER LINE LENGTH, BUT THEY PREFER A SHORTER LINE LENGTH</b>	<b>46</b>

## **HOW PEOPLE REMEMBER**

<b>19</b>	<b>SHORT-TERM MEMORY IS LIMITED</b>	<b>50</b>
<b>20</b>	<b>PEOPLE REMEMBER ONLY FOUR ITEMS AT ONCE</b>	<b>52</b>
<b>21</b>	<b>PEOPLE HAVE TO USE INFORMATION TO MAKE IT STICK</b>	<b>55</b>
<b>22</b>	<b>IT'S EASIER TO RECOGNIZE INFORMATION THAN RECALL IT</b>	<b>57</b>
<b>23</b>	<b>MEMORY TAKES A LOT OF MENTAL RESOURCES</b>	<b>59</b>
<b>24</b>	<b>PEOPLE RECONSTRUCT MEMORIES EACH TIME THEY REMEMBER THEM</b>	<b>61</b>
<b>25</b>	<b>IT'S A GOOD THING THAT PEOPLE FORGET</b>	<b>63</b>
<b>26</b>	<b>THE MOST VIVID MEMORIES ARE WRONG</b>	<b>65</b>

## **HOW PEOPLE THINK**

<b>27</b>	<b>PEOPLE PROCESS INFORMATION BETTER IN BITE-SIZED CHUNKS</b>	<b>68</b>
<b>28</b>	<b>SOME TYPES OF MENTAL PROCESSING ARE MORE CHALLENGING THAN OTHERS</b>	<b>71</b>
<b>29</b>	<b>MINDS WANDER 30 PERCENT OF THE TIME</b>	<b>74</b>
<b>30</b>	<b>THE MORE UNCERTAIN PEOPLE ARE, THE MORE THEY DEFEND THEIR IDEAS</b>	<b>76</b>
<b>31</b>	<b>PEOPLE CREATE MENTAL MODELS</b>	<b>78</b>
<b>32</b>	<b>PEOPLE INTERACT WITH CONCEPTUAL MODELS</b>	<b>80</b>
<b>33</b>	<b>PEOPLE PROCESS INFORMATION BEST IN STORY FORM</b>	<b>82</b>
<b>34</b>	<b>PEOPLE LEARN BEST FROM EXAMPLES</b>	<b>85</b>
<b>35</b>	<b>PEOPLE ARE DRIVEN TO CREATE CATEGORIES</b>	<b>87</b>

<b>36</b>	TIME IS RELATIVE	89
<b>37</b>	PEOPLE SCREEN OUT INFORMATION THAT DOESN'T FIT THEIR BELIEFS	91
<b>38</b>	PEOPLE CAN BE IN A FLOW STATE	93
<b>39</b>	CULTURE AFFECTS HOW PEOPLE THINK	95

## HOW PEOPLE FOCUS THEIR ATTENTION

<b>40</b>	ATTENTION IS SELECTIVE	98
<b>41</b>	PEOPLE HABITUATE TO INFORMATION	100
<b>42</b>	WELL-PRACTICED SKILLS DON'T REQUIRE CONSCIOUS ATTENTION	101
<b>43</b>	EXPECTATIONS OF FREQUENCY AFFECT ATTENTION	103
<b>44</b>	SUSTAINED ATTENTION LASTS ABOUT 10 MINUTES	105
<b>45</b>	PEOPLE PAY ATTENTION ONLY TO SALIENT CUES	106
<b>46</b>	PEOPLE ARE WORSE AT MULTITASKING THAN THEY THINK	107
<b>47</b>	DANGER, FOOD, SEX, MOVEMENT, FACES, AND STORIES GET THE MOST ATTENTION	110
<b>48</b>	LOUD NOISES STARTLE AND GET ATTENTION	112
<b>49</b>	FOR PEOPLE TO PAY ATTENTION TO SOMETHING, THEY MUST FIRST PERCEIVE IT	114

## WHAT MOTIVATES PEOPLE

<b>50</b>	PEOPLE ARE MORE MOTIVATED AS THEY GET CLOSER TO A GOAL	118
<b>51</b>	VARIABLE REWARDS ARE POWERFUL	120
<b>52</b>	DOPAMINE STIMULATES THE SEEKING OF INFORMATION	123
<b>53</b>	UNPREDICTABILITY KEEPS PEOPLE SEARCHING	125
<b>54</b>	PEOPLE ARE MORE MOTIVATED BY INTRINSIC REWARDS THAN BY EXTRINSIC REWARDS	127
<b>55</b>	PEOPLE ARE MOTIVATED BY PROGRESS, MASTERY, AND CONTROL	129
<b>56</b>	PEOPLE ARE MOTIVATED BY SOCIAL NORMS	131

<b>57</b>	PEOPLE ARE INHERENTLY LAZY	132
<b>58</b>	PEOPLE WILL LOOK FOR SHORTCUTS ONLY IF THE SHORTCUTS ARE EASY	135
<b>59</b>	PEOPLE ASSUME IT'S YOU, NOT THE SITUATION	136
<b>60</b>	FORMING OR CHANGING A HABIT IS EASIER THAN YOU THINK	138
<b>61</b>	PEOPLE ARE MORE MOTIVATED TO COMPETE WHEN THERE ARE FEWER COMPETITORS	140
<b>62</b>	PEOPLE ARE MOTIVATED BY AUTONOMY	142

## PEOPLE ARE SOCIAL ANIMALS

<b>63</b>	THE "STRONG TIE" GROUP SIZE LIMIT IS 150 PEOPLE	144
<b>64</b>	PEOPLE ARE HARD WIRED FOR IMITATION AND EMPATHY	147
<b>65</b>	DOING THINGS TOGETHER BONDS PEOPLE TOGETHER	149
<b>66</b>	PEOPLE EXPECT ONLINE INTERACTIONS TO FOLLOW SOCIAL RULES	151
<b>67</b>	PEOPLE LIE TO DIFFERING DEGREES DEPENDING ON THE MEDIUM	153
<b>68</b>	SPEAKERS' BRAINS AND LISTENERS' BRAINS SYNC UP DURING COMMUNICATION	156
<b>69</b>	THE BRAIN RESPONDS UNIQUELY TO PEOPLE YOU KNOW PERSONALLY	157
<b>70</b>	LAUGHTER BONDS PEOPLE TOGETHER	159
<b>71</b>	PEOPLE CAN TELL WHEN A SMILE IS REAL OR FAKE MORE ACCURATELY WITH VIDEO	162

## HOW PEOPLE FEEL

<b>72</b>	SOME EMOTIONS MAY BE UNIVERSAL	166
<b>73</b>	POSITIVE FEELINGS ABOUT A GROUP CAN LEAD TO GROUPTHINK	169
<b>74</b>	STORIES AND ANECDOTES PERSUADE MORE THAN DATA ALONE	170
<b>75</b>	IF PEOPLE CAN'T FEEL, THEN THEY CAN'T DECIDE	171
<b>76</b>	PEOPLE ARE PROGRAMMED TO ENJOY SURPRISES	173
<b>77</b>	PEOPLE ARE HAPPIER WHEN THEY'RE BUSY	175

<b>78</b>	PASTORAL SCENES MAKE PEOPLE HAPPY	177
<b>79</b>	PEOPLE USE “LOOK AND FEEL” AS THEIR FIRST INDICATOR OF TRUST	179
<b>80</b>	LISTENING TO MUSIC RELEASES DOPAMINE IN THE BRAIN	181
<b>81</b>	THE MORE DIFFICULT SOMETHING IS TO ACHIEVE, THE MORE PEOPLE LIKE IT	182
<b>82</b>	PEOPLE OVERESTIMATE REACTIONS TO FUTURE EVENTS	184
<b>83</b>	PEOPLE FEEL MORE POSITIVE BEFORE AND AFTER AN EVENT THAN DURING IT	185
<b>84</b>	PEOPLE WANT WHAT IS FAMILIAR WHEN THEY’RE SAD OR SCARED	187

## PEOPLE MAKE MISTAKES

<b>85</b>	PEOPLE WILL ALWAYS MAKE MISTAKES; THERE IS NO FAIL-SAFE PRODUCT	190
<b>86</b>	PEOPLE MAKE ERRORS WHEN THEY ARE UNDER STRESS	192
<b>87</b>	NOT ALL MISTAKES ARE BAD	196
<b>88</b>	PEOPLE MAKE PREDICTABLE TYPES OF ERRORS	197
<b>89</b>	PEOPLE USE DIFFERENT ERROR STRATEGIES	200

## HOW PEOPLE DECIDE

<b>90</b>	PEOPLE MAKE MOST DECISIONS UNCONSCIOUSLY	204
<b>91</b>	THE UNCONSCIOUS KNOWS FIRST	206
<b>92</b>	PEOPLE WANT MORE CHOICES AND INFORMATION THAN THEY CAN PROCESS	208
<b>93</b>	PEOPLE THINK CHOICE EQUALS CONTROL	210
<b>94</b>	PEOPLE MAY CARE ABOUT TIME MORE THAN THEY CARE ABOUT MONEY	212
<b>95</b>	MOOD INFLUENCES THE DECISION- MAKING PROCESS	214
<b>96</b>	YOU CAN ENGINEER BETTER GROUP DECISIONS	216
<b>97</b>	PEOPLE MAKE HABIT-BASED DECISIONS OR VALUE-BASED DECISIONS, BUT NOT BOTH AT THE SAME TIME	218

<b>98</b>	<b>WHEN PEOPLE ARE UNCERTAIN, THEY LET OTHERS DECIDE WHAT TO DO</b>	<b>220</b>
<b>99</b>	<b>PEOPLE THINK OTHERS ARE MORE EASILY INFLUENCED THAN THEY ARE THEMSELVES</b>	<b>222</b>
<b>100</b>	<b>PEOPLE VALUE A PRODUCT MORE HIGHLY WHEN IT'S PHYSICALLY IN FRONT OF THEM</b>	<b>224</b>
	<b>REFERENCES</b>	<b>227</b>
	<b>INDEX</b>	<b>237</b>

Sample pages

# HOW PEOPLE SEE

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."



# 1

## 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.



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

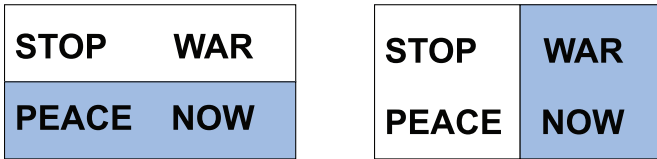
**FIGURE 1.2** An example of a Kanizsa rectangle

### 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.

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.



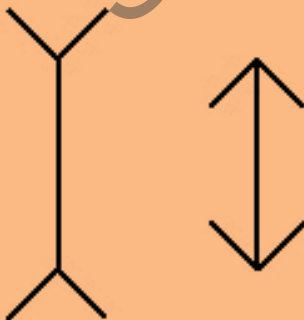
**FIGURE 1.3** Color and shapes can influence what people see

### ★ 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 the 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.

### Takeaways

- \* What you think people are going to see when you design a product may or may not be what they actually see. What people see 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 you present information and visual elements. You can use shading or colors to make it look like some things go together and others don't.

Sample pages

## 2

# PERIPHERAL VISION IS USED MORE THAN CENTRAL VISION TO GET THE GIST OF WHAT YOU SEE

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 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.

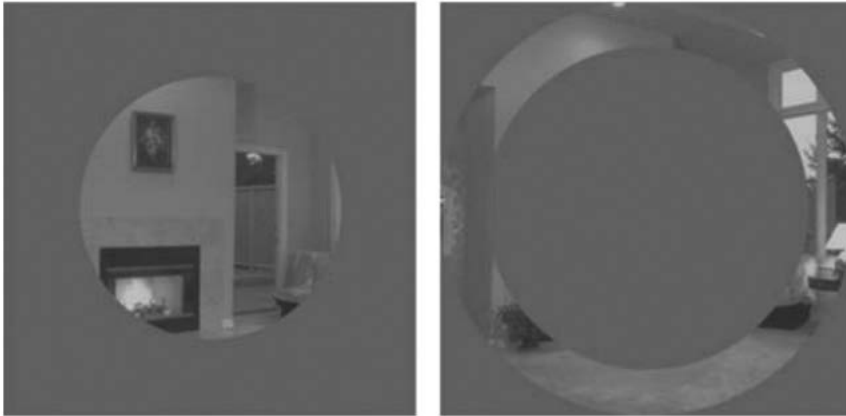


### Why movement on a screen is so annoying

People can't help but notice movement in their peripheral vision. For example, if you're reading text on a screen and there's a video that starts to play off to the side, you can't help but look at it. This can be quite annoying if you're trying to concentrate on reading the text in front of you. This is peripheral vision at work! This is why advertisers use blinking and flashing in the ads that are at the periphery of web pages. Even though we may find it annoying, it does get our attention.

Adam Larson and Lester Loschky (2009) conducted research on central and peripheral vision in 2009, and Loschky conducted even more research in 2019. In the research they showed people photographs of common scenes, such as a kitchen or a living room, or outdoor scenes of cities and mountains. In some of the photographs the outside of the image was obscured, and in others the central part of the image was obscured (**Figure 2.1**). Then they asked the research participants to identify what they were looking at.

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, they had a much harder time identifying what they were looking at. Loschky concluded that central vision is critical for specific object recognition, but peripheral vision is used for getting the gist of a scene.



**FIGURE 2.1** A photo used in the original Larson and Loschky research

If someone is looking at a desktop screen, you can assume that they are using both peripheral and central vision. The same is true if they are looking at a laptop screen or a large tablet. With mobile screens, depending on the size of the device, it is possible that there is no peripheral vision available on the screen.



### **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.

Additional 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 from 140 to 190 milliseconds for the amygdala to react. But when objects were shown in peripheral vision, it took only 80 milliseconds for the amygdala to react.

## Takeaways

- \* If you are designing for a desktop or laptop screen, you should assume that people are using both peripheral and central vision.
- \* Although the middle of the screen is important for central vision, don't ignore what is in viewers' peripheral vision. Make sure the information in the periphery communicates clearly the purpose of the page or information they are viewing.
- \* If you have images of an emotional nature, put them in the periphery instead of in the middle.
- \* If you want users to concentrate on a certain part of the screen, don't put animation or blinking elements in their peripheral vision.

Sample pages

# 3

## PEOPLE IDENTIFY OBJECTS BY RECOGNIZING PATTERNS

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.

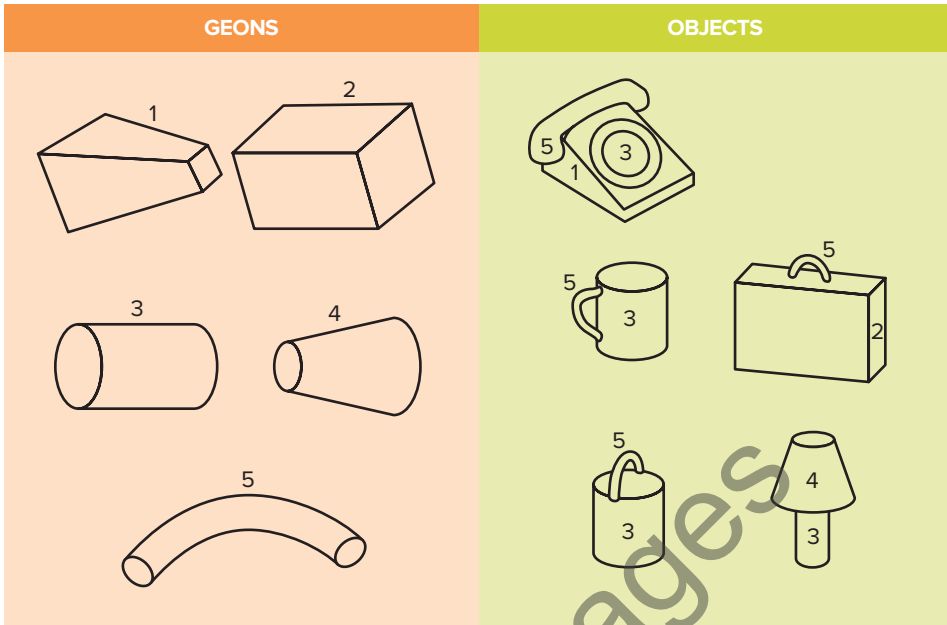


**FIGURE 3.1** Your brain wants to see patterns

### 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 1987 (**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.

If you want people to quickly recognize what an object is, you should make use of simple shapes. This makes it easier to recognize the basic geons that make up the shape. The smaller the object to recognize (for example, a small icon of a printer or a document), the more important it is to use simple geons without a lot of embellishment.



**FIGURE 3.2** Some samples of Biederman's geons

### 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.



# 4

## THERE'S A SPECIAL PART OF THE BRAIN JUST FOR RECOGNIZING FACES

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.

This means that faces grab our attention and also evoke an emotional response. If you show faces in your design, on a page or screen, it will grab attention immediately and convey emotional information.

If you want to use faces to grab attention and evoke an emotional response, make sure that the face is facing forward (not in profile), large enough to be easily seen, and showing the emotion you want to convey.



### 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 face in a picture looks away from us and toward a product on a web page (**Figure 4.1**), we tend to also look at the product.

But remember, just because people look at something, it doesn't mean they're paying attention. You'll have to decide whether you want to establish an emotional connection (the face looking right at the viewer) or to direct attention (the face looking directly at a product).



**FIGURE 4.1** We look where the person looks

## ★ 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 FFA's sensitivity to faces appears to be something we are born with.

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

Christine Looser and T. Wheatley (2010) took pictures of people and then morphed them in stages into inanimate mannequin faces. In the research, subjects are shown the stages and asked to decide when the picture is no longer a human and alive. **Figure 4.2** shows examples of the pictures. Their research found that subjects say the pictures no longer show someone who is alive at about the 75 percent mark. They also found that people primarily use the eyes to decide whether a picture shows someone who is human and alive.



**FIGURE 4.2** An example of Looser and Wheatley's people-to-mannequin faces