Anatomy and Legibility: Is the Font Easy to Read?

Text is meant to be read. If it feels difficult to read, people won't want to read it. How easily text can be read on the web depends on how type is used on the screen. One factor that affects readability, and a great place to start, is choosing a legible font.

What Makes a Font Legible?

When we read, we don't see individual letters; we see (and read) the shapes of the words. These shapes are created primarily by two elements: the strokes of the letters and the spaces in and around the letters. If we lose either of these elements, legibility is compromised.

Did you ever try to read a poor photocopy of a photocopy of a photocopy? Experience tells you that type becomes harder to read with each generation of copying. Why does this happen? Sometimes, multiple-generation photocopies make the text lighter. Thinner strokes start to disappear, leaving only parts of letters and compromising the word shapes. At other times, multiple-generation photocopies make the strokes in the text thicker. The spaces in and around the letters start to disappear. Either way, when strokes

or spaces get lost, the legibility of the font changes, and reading becomes more difficult.

Web typographers need to pay particular attention to the strokes and spaces in a font because of screen resolution. Macintosh screens are 72 pixels per inch, or *ppi,* and Windows screens are 96 ppi. A font set at 12*px* (pixels) will appear approximately ⅙ inch tall on a Mac screen and less than ⅛ inch tall on a Windows screen. In either case, the screen will have (at most) 12px by 12px to render a letter. Thin strokes and small spaces in letterforms start to disappear, and as in the photocopy example, the text will be harder to read.

You'll often hear that "simple" fonts are better for the screen because of the resolution issues. That's a good rule of thumb, but it's not quite enough.

Comparing Georgia and Helvetica

Helvetica is simpler and cleaner than Georgia, but Georgia is easier to read (Figure 1.1). Text set in Helvetica 12/18 (12px text with an 18px line height) is readable onscreen. Text set in Georgia 12/18, however, is more readable, even though it

looks slightly smaller than Helvetica and is a more complex font. So why is it more readable?

Georgia, designed by type designer Matthew Carter, was designed for the screen. In typographical terms, it has a healthy x-height without sacrificing the ascenders and descenders. It also has open apertures, discernible terminals, and slightly looser letter spacing than Helvetica. I define all these terms in the following paragraphs.

Figure 1.2 shows that *descenders* [1] are the strokes of the letters that extend below the baseline. The *baseline* [2] is an invisible line that the letters appear to sit on. The descenders in Georgia and Helvetica are almost the same length [3], but Georgia's serifs give the descenders more presence.

Serifs [4] are little horizontal strokes, usually coming off the top and/or bottom of a *stem* [5], which is a vertical stroke in a letter. Georgia (Figure 1.2, top) is a *serif* font (it has serifs), whereas Helvetica (Figure 1.2, bottom) is a *sans serif* font (without serifs).

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FIGURE 1.1 Text on the screen is not as clear as text printed on paper. Text may appear blurry or "jagged" depending on the reader's monitor. *Top:* Helvetica 12/18 on a 1440x900 Macintosh screen. *Bottom:* Georgia 12/18 on a 1440x900 Macintosh screen is more readable.

Figure 1.3 shows that *ascenders* [6] are the strokes of the letters that extend above the *meanline* [7]—an invisible line that would run along the top of a lowercase *x*. The meanline marks the font's *x-height* [8], which is the height of the lowercase letters between the baseline and the meanline.

Georgia has larger ascenders than Helvetica [9]. The generous ascenders make Georgia more legible. (Notice that the *f* and *t* in Helvetica look almost alike.) To compensate for the larger ascenders, Georgia's x-height is smaller. Unfortunately, this smaller x-height makes the text look smaller (even when it's set at the same size as Helvetica), but the larger ascenders are worth the sacrifice.

Figure 1.4 shows the *aperture* [10], which is the opening in letters such as *a* and *e. Terminals* [11] are the ends of strokes not terminated with a serif. Georgia's larger aperture and discernible terminals help with legibility. Helvetica's *e* and *a* look similar. They have a smaller aperture and lack distinctive terminals.

Overall, the letters in Georgia have more visual space around them. This space increases readability because it keeps letters in the text from blending together.
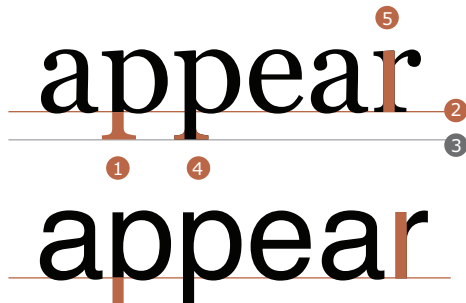

FIGURE 1.2 *Top:* Georgia. *Bottom:* Helvetica. 1 descender; 2 baseline; 3 length of baseline; 4 serifs; 5 stem.

It may seem odd that I've chosen to compare the web-safe font Georgia with Helvetica, which isn't web safe. Helvetica is famous for its simplicity and clarity, which makes it the perfect font to show that clean and simple aren't enough to guarantee legibility onscreen.

FIGURE 1.3 *Left:* Georgia. *Right:* Helvetica. 6 ascender; 7 meanline; 8 x-height; 9 height of the ascenders.

FIGURE 1.4 *Top:* Georgia. *Bottom:* Helvetica. 10 aperture; 11 terminal.

Elements of Legibility

To summarize, reading text type (12 to 16px) is easier if the font has the following characteristics:

- A generous x-height
- Open apertures
- Prominent ascenders and descenders
- Slightly loose letter spacing
- Discernible terminals

Comparing More Fonts

What makes Georgia, Times New Roman, Verdana, and Arial good choices for comparison? All four are web-safe fonts that are extremely likely to be on most computers, regardless of platform.

Georgia and Verdana are superior fonts for legibility of text on the web. They were designed for the screen and are easy to read. I use Georgia and Verdana in examples and lessons throughout this book—but they aren't the only acceptable fonts.

The number of fonts available to web typographers is increasing. Thus, an objective of this chapter is to show you how to look at and think about the parts of letters so that you can identify other legible fonts for text on the web.

Times New Roman is a visually smaller font than Georgia. In Figure 1.5, I've set Georgia at 63px and Times New Roman at 68px. The fonts' x-heights appear to be equal at these sizes, allowing you to see the differences clearly.

Times New Roman has narrower *bowls* (round shapes in the lowercase letters) [12] than Georgia does. A narrower bowl often results in smaller *counterforms* (spaces within a letterform) [13]. Smaller counterforms in text onscreen tend to get lost.
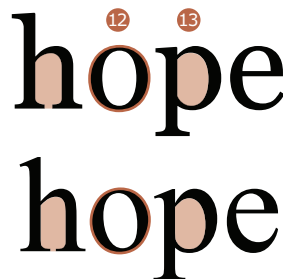

FIGURE 1.5 *Top:* Georgia. *Bottom:* Times New Roman. 12 bowl; 13 counterform.

Times New Roman also has thicker thick strokes and thinner thin strokes than Georgia does. The thin strokes have a tendency to get lost onscreen when the font is used for text. This tendency, combined with the narrower bowl, makes the text look more like a series of vertical strokes (Figure 1.6). The reader needs to work harder to read the word shapes in Times New Roman.

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FIGURE 1.6 *Top:* Georgia 12/18 on a 1440x900 Macintosh screen is highly readable. *Bottom:* Times New Roman 12/18 on a 1440x900 Macintosh screen looks more like a series of vertical strokes and is hard to read.

Arial is a visually smaller font than Verdana. In Figure 1.7, I've set Verdana at 59px and Arial at 62px. The two fonts' x-heights appear to be equal at these sizes, allowing you to see the differences clearly.

hope

hope

FIGURE 1.7 Verdana (*top*) has more visual space than Arial (*bottom*) does.

Arial and Verdana both have generous bowls— neither is particularly narrow—but Verdana's bowl has a bit more visual space. Verdana's *shoulder* (the part of the bowl that connects to the stem) [14] connects to the stem differently. Notice that the counterforms in Arial's *h* and *p* are rounded, whereas Verdana's counterforms [15] have a corner, so Verdana's counterforms are more spacious. Verdana also has more space between letters.

Verdana's *a, c,* and *e* all have a larger aperture, giving the letters even more visual space (Figure 1.8). All these design decisions keep Verdana more legible at typical text sizes (Figure 1.9).
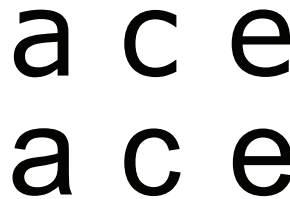
ace

ace

FIGURE 1.8 The larger apertures in Verdana (*top*) create more visual space than those in Arial (*bottom*), thus improving legibility.

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FIGURE 1.9 *Top:* Verdana 12/18 on a 1440x900 Macintosh screen is very readable. *Bottom:* Arial 12/18 on a 1440x900 Macintosh screen has less visual space than Verdana and is a bit harder to read.

Recommended Reading

To learn more about legibility, try the following resources:

• "It's About Legibility" by Allan Haley:
www.fonts.com/aboutfonts/articles/
typography/legibility.htm

• "Georgia & Verdana: Typefaces designed for the screen (finally)" by Daniel Will-Harris:
www.will-harris.com/verdana-georgia.
htm

• "Matthew Carter"
en.wikipedia.org/wiki/Matthew_Carter

Lesson 1: Compare and Contrast Fonts Online

This lesson helps you achieve the following objectives:

• Practice seeing and articulating the differences among fonts—what makes one font more legible than another.

• Build your vocabulary for describing fonts and defending font choices.

• Build your confidence in recognizing what makes a font more legible. As you discover new font options, you can analyze their legibility.

Comparing Fonts on Typetester

The number of fonts available to web typographers has increased. Thus, an objective of this lesson is to practice analyzing parts of letters, articulating how the parts promote legibility on the web.

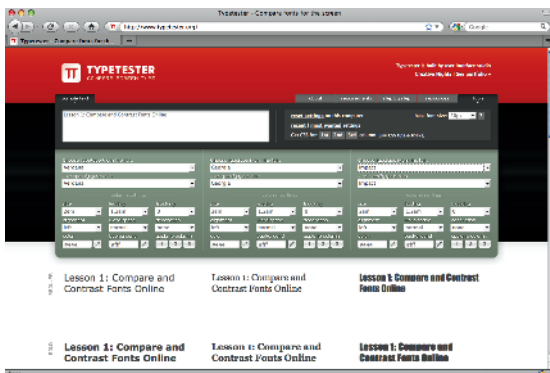1   Open your browser, and go to the Typetester website at `www.typetester.org` (Figure 1.10).

FIGURE 1.10 Typetester, created by Marko Dugonjić.

2   A paragraph of sample text loads automatically. Type your own text, if you prefer.

3   At the top of the left column, choose Georgia from the Choose Typeface from the List drop-down menu; at the top of the middle and right columns, choose Courier New and Times New Roman from the Choose Typeface from the List drop-down menus.

4   Compare these fonts with and contrast them to Georgia, writing about what you see (as I describe in the following section).

5   Repeat Steps 3 and 4, this time comparing and contrasting Impact, Arial, and Verdana, and writing about what you see.

6   Finally, compare and contrast two other fonts with Georgia or Verdana, writing about what you see.

You can choose Windows Default, Mac Default, or Windows Vista fonts, or any other fonts you have installed on your computer. Choose fonts that interest you—fonts you'd like to spend time analyzing.

A few popular fonts to try (not web safe, but good for this exercise) are Bodoni, Adobe Garamond, and Futura. Typetester may not list these fonts if you don't have them on your computer, however.

Writing about What You See

When it comes to the anatomy and legibility of fonts, a great way to build your analytical skills is to notice carefully what you see and write down your observations. Writing forces you to slow down, notice details, and practice your vocabulary.

For each font pair you compare, ask yourself, "Which font is less legible? Why?" Use the following terms to explain your answers:

- Ascenders and descenders
- x-heights
- Bowls
- Apertures
- Terminals
- Counterforms
- Spaces between letters
- Thick and thin strokes

Other terms you may need to use are

- Baselines
- Meanlines
- Serifs
- Stems
- Shoulders

Setting Font Sizes on Typetester

Typetester uses a base font size method of setting font size and line height. This method is different from the one I recommend in this book.

On Typetester you will use *ems* to set the size and "leading" (or line height). In web design, ems are multipliers of the document's base font size. Typetester automatically uses a default base font size of 10px, so setting text on Typetester to 1.2 em means your font size = 12px. Line height is a multiple of font size. So in this example, 1.5 em line height = 18px (150 percent of the font size).

If this makes your head swim, don't worry. My method (pixels) is fine. In fact, I recommend using pixels when you start with web typography.

You can read a simple breakdown of the pros and cons of each font size method at `http://webdesign.about.com/cs/ typemeasurements/a/aa042803a.htm`. For a more in-depth look at em spaces, read "How to Size Text in CSS," by Richard Rutter, at `www.alistapart.com/articles/ howtosizetextincss`.

Understanding How HTML, CSS, Web Servers, Browsers, and Personal Computers Work Together

HTML, CSS, web servers, browsers, and personal computers work together as a system. When building a website, you'll spend most of your time focusing on the HTML-and-CSS relationship, but fonts are controlled by servers and personal computers—and readers can't see your layouts without a browser—so you need to see how the system works as a whole.

HTML

HTML stands for *Hypertext Markup Language.* You can use this markup language to structure content for a web page because it tells the browser what content is on the page and how each element has been defined. You could use HTML to tell a browser, "This is my main headline." In HTML, you'd write that information like this:

```
<h1>This is my main headline.</h1>
```

CSS

CSS stands for *Cascading Style Sheets.* This style-sheet language describes how elements defined in HTML should look. You could use CSS, for example, to tell a browser, "All text between <h1>

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and `</h1>` tags should be 24/32 Georgia," and you'd write it like this:

```
h1{
    font-family:Georgia;
    font-weight:normal;
    font-size:24px;
    line-height:32px;
    }
```

You start writing HTML and CSS in the next lesson.

Browsers

Browsers are translators. They translate written HTML and CSS into something you can see (and understand) on your screen. Browsers follow a set of standards, but even standards contain gray areas, so Mozilla Firefox, Internet Explorer, Safari, and other browsers (even different versions of the same browser) don't necessarily display content the same way. It's best to test your pages in different browsers and operating systems to see how each one translates your HTML and CSS instructions.

Personal Computers and Fonts

The individual web visitor has a lot of control of how he or she views web pages. A reader can have her screen resolution set higher or lower than yours, her browser window can be bigger or smaller than yours, and she can increase or decrease the font size you set in CSS.

Web typographers have to understand that fonts live in the operating system, not in the CSS or the web browser. Therefore, a font that you specify in CSS can be viewed only if the visitor has it on his computer (see Figure 1.11). If you have an unusual font installed on your system, it's easy to design a web page that includes the font; you can see it because the font is installed on your computer. But if your visitors don't have it installed too, their browsers will display a default font instead (see Figure 1.12).
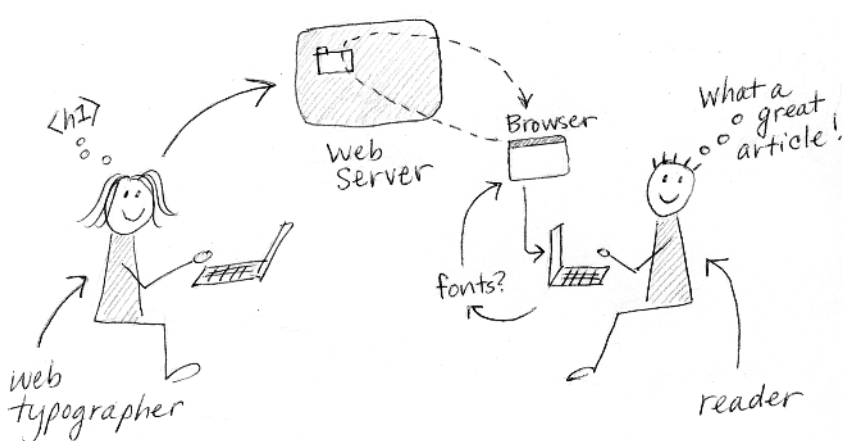

FIGURE 1.11 The web typographer writes code files in HTML and CSS. These files are put on a web server. Browsers download and translate the HTML and CSS so that readers see the designed content (instead of the markup and style-sheet languages). Fonts must be on the reader's computer—or linked from another source—to display correctly in the browser.
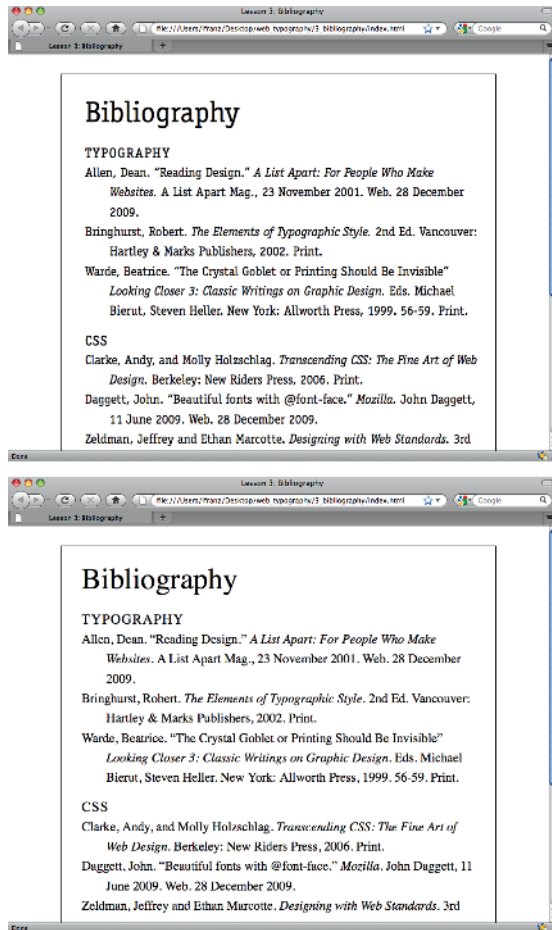
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Most browsers now recognize the `@font-face` property in CSS. This property links to fonts, retrieves them from a web server, and displays them on a website. I cover this property in Chapter 4.

Moving Forward

This chapter showed you how to choose a font based on legibility. It also introduced the system behind a web page.

In the next chapter, you read about choosing a font based on aesthetics and emotions. You also see how to write simple HTML and CSS files.

FIGURE 1.12 *Top:* If you use an unusual font that's installed on your computer, the font will appear to work fine. *Bottom:* Readers who don't have the font installed on their computers will see a default font— usually, Times New Roman.