Lesson 1: What is multimedia?

What is multimedia?

Multimedia is a woven combination of digitally manipulated text, photographs, graphic art, sound, animation, and video elements. When you allow an end user—also known as the viewer of a multimedia project—to control what and when the elements are delivered, it is called interactive multimedia. When you provide a structure of linked elements through which the user can navigate, interactive multimedia becomes hypermedia.

Although the definition of multimedia is a simple one, making it work can be complicated. Not only do you need to understand how to make each multimedia element stand up and dance, but you also need to know how to use multimedia computer tools and technologies to weave them together. The people who weave multimedia into meaningful tapestries are called multimedia developers.

The software vehicle, the messages, and the content presented on a computer, television screen, PDA (personal digital assistant), or mobile phone together constitute a multimedia project. If the project is to be shipped or sold to consumers or end users, typically delivered as a download on the Internet but also on a CD-ROM or DVD in a box or sleeve, with or without instructions, it is a multimedia title. Your project may also be a page or site on the World Wide Web, where you can weave the elements of multimedia into documents with HTML (Hypertext Markup Language) or DHTML (Dynamic Hypertext Markup Language) or XML (eXtensible Markup Language) and play rich media files created in such programs as Adobe’s Flash, LiveMotion, or Apple’s QuickTime by installing plug-ins into a browser application such as Internet Explorer, Safari, Google Chrome, or Firefox. Browsers are software programs or tools for viewing content on the Web.

A multimedia project need not be interactive to be called multimedia: users can sit back and watch it just as they do a movie or the television. In such cases a project is linear, or starting at the beginning and running through to the end. When users are given navigational control and can wander through the content at will, multimedia becomes nonlinear and user interactive, and is a powerful personal gateway to information.

Determining how a user will interact with and navigate through the content of a project requires great attention to the message, the scripting or storyboarding, the artwork, and the programming. You can break an entire project with a badly designed interface. You can also lose the message in a project with inadequate or inaccurate content.

Multimedia elements are typically sewn together into a project using authoring tools. These software tools are designed to manage individual multimedia elements and provide user interaction. Integrated multimedia is the “weaving” part of the multimedia definition, where source documents such as montages, graphics, video cuts, and sounds merge into a final presentation. In addition to providing a method for users to interact with the project, most authoring tools also offer facilities for creating and editing text and images and controls for playing back separate audio and video files that have been created with editing tools designed for these media. The sum of what gets played back and how it is presented to the viewer on a monitor is the graphical user interface, or GUI (pronounced “gooey”). The GUI is more than just the actual graphics on the screen—it also often provides the rules or structure for the user’s input. The hardware and software that govern the limits of what can happen here are the multimedia platform or environment.
Lesson 2: Where to use multimedia?

Where to use multimedia?
Multimedia is appropriate whenever a human user is connected to electronic information of any kind, at the “human interface.” Multimedia enhances minimalist, text-only computer interfaces and yields measurable benefit by gaining and holding attention and interest; in short, multimedia improves information retention. When it’s properly constructed, multimedia can also be profoundly entertaining as well as useful.

Multimedia in business
Business applications for multimedia include presentations, training, marketing, advertising, product demos, simulations, databases, catalogs, instant messaging, and networked communications. Voice mail and video conferencing are provided on many local and wide area networks (LANs and WANs) using distributed networks and Internet protocols.

After a morning of mind-numbing overhead presentations delivered from the podium of a national sales conference, a multimedia presentation can make an audience come alive. Most presentation software packages let you make pretty text and add audio and video clips to the usual slide show of graphics and text material.

Multimedia is enjoying widespread use in training programs. Flight attendants learn to manage international terrorism and security through simulation. Drug enforcement agencies of the UN are trained using interactive videos and photographs to recognize likely hiding places on airplanes and ships. Medical doctors and veterinarians can practice surgery methods via simulation prior to actual surgery. Mechanics learn to repair engines. Salespeople learn about product lines and leave behind software to train their customers. Fighter pilots practice full-terrain sorties before spooling up for the real thing. Increasingly easy-to-use authoring programs and media production tools even let workers on assembly lines create their own training programs for use by their peers.

Multimedia around the office has also become more commonplace. Image capture hardware is used for building employee ID and badging databases, scanning medical insurance cards, for video annotation, and for real-time teleconferencing. Presentation documents attached to e-mail and video conferencing are widely available. Laptop computers and high-resolution projectors are commonplace for multimedia presentations on the road. Mobile phones and personal digital assistants (PDAs) utilizing Bluetooth and Wi-Fi communications technology make communication and the pursuit of business more efficient.

As companies and businesses catch on to the power of multimedia, the cost of installing multimedia capability decreases, meaning that more applications can be developed both in-house and by third parties, which allow businesses to run more smoothly and effectively. These advances are changing the very way business is transacted by affirming that the use of multimedia offers a significant contribution to the bottom line while also advertising the public image of the business as an investor in technology.

Multimedia in schools
Schools are perhaps the destination most in need of multimedia. Many schools in the United States today are chronically underfunded and occasionally slow to adopt new technologies, and it is here that the power of multimedia can be maximized for the greatest long-term benefit to all.

Multimedia will provoke radical changes in the teaching process during the coming decades, particularly as smart students discover they can go beyond the limits of traditional teaching
methods. There is, indeed, a move away from the transmission or passive-learner model of learning to the experiential learning or active-learner model. In some instances, teachers may become more like guides and mentors, or facilitators of learning, leading students along a learning path, rather than the more traditional role of being the primary providers of information and understanding. The students, not teachers, become the core of the teaching and learning process. E-learning is a sensitive and highly politicized subject among educators, so educational software is often positioned as “enriching” the learning process, not as a potential substitute for traditional teacher-based methods.

Figure 1-1 shows a selection of instructional videos used for training emergency medicine specialists. Such online e-learning provides a cost-effective vehicle to learn clinical techniques outside of the hospital setting. From real-time echocardiographic images to explanations of the chemistry of synaptic transmission, multimedia is used as an effective teaching medium in medicine and other disciplines.

![Figure 1-1](multimedia.png)

An interesting use of multimedia in schools involves the students themselves. Students can put together interactive magazines and newsletters, make original art using image-manipulation software tools, and interview students, townspeople, coaches, and teachers. They can even make video clips with cameras and mobile phones for local use or uploading to YouTube. They can also design and run web sites. As schools become more a part of the Internet, multimedia arrives by glass fiber and over a network.
Multimedia at home
From gardening, cooking, home design, remodelling, and repair to genealogy software, multimedia has entered the home. Eventually, most multimedia projects will reach the home via television sets or monitors with built-in interactive user inputs—either on old-fashioned color TVs or on new high-definition sets. The multimedia viewed on these sets will likely arrive on a pay-for-use basis along the data highway.

Today, home consumers of multimedia own either a computer with an attached CD-ROM or DVD drive or a set-top player that hooks up to the television, such as a Nintendo Wii, X-box, or Sony PlayStation machine. There is increasing convergence or melding of computer-based multimedia with entertainment and games-based media traditionally described as “shoot-em-up.” Nintendo alone has sold over 118 million game players worldwide along with more than 750 million games. Users with TiVo technology (www.tivo.com) can store 80 hours of television viewing and gaming on a stand-alone hard disk.

Multimedia in Public Places
In hotels, train stations, shopping malls, museums, libraries, and grocery stores, multimedia is already available at stand-alone terminals or kiosks, providing information and help for customers. Multimedia is piped to wireless devices such as cell phones and PDAs. Such installations reduce demand on traditional information booths and personnel, add value, and are available around the clock, even in the middle of the night, when live help is off duty. The way we live is changing as multimedia penetrates our day-to-day experience and our culture. Imagine a friend’s bout of maudlin drunk dialling (DD) on a new iPhone, with the camera accidentally enabled.

Figure 1-3 shows a menu screen from a supermarket kiosk that provides services ranging from meal planning to coupons. Hotel kiosks list nearby restaurants, maps of the city, airline schedules, and provide guest services such as automated checkout. Printers are often attached so that users can walk away with a printed copy of the information. Museum kiosks are not only used to guide patrons through the exhibits, but when installed at each exhibit, provide great added depth, allowing visitors to browse through richly detailed information specific to that display.

Virtual Reality
At the convergence of technology and creative invention in multimedia is virtual reality, or VR. Goggles, helmets, special gloves, and bizarre human interfaces attempt to place you “inside” a lifelike experience. Take a step forward, and the view gets closer; turn your head, and the view rotates. Reach out and grab an object; your hand moves in front of you. Maybe the object explodes in a 90-decibel crescendo as you wrap your fingers around it. Or it slips out from your grip, falls to the floor, and hurriedly escapes through a mouse hole at the bottom of the wall.
VR requires terrific computing horsepower to be realistic. In VR, your cyberspace is made up of many thousands of geometric objects plotted in three-dimensional space: the more objects and the more points that describe the objects, the higher the resolution and the more realistic your view. As you move about, each motion or action requires the computer to recalculate the position, angle, size, and shape of all the objects that make up your view, and many thousands of computations must occur as fast as 30 times per second to seem smooth.

On the World Wide Web, standards for transmitting virtual reality worlds or scenes in VRML (Virtual Reality Modeling Language) documents (with the filename extension .wrl) have been developed. Intel and software makers such as Adobe have announced support for new 3-D technologies.

Using high-speed dedicated computers, multi-million-dollar flight simulators built by Singer, RediFusion, and others have led the way in commercial application of VR. Pilots of F-16s, Boeing 777s, and Rock-well space shuttles have made many simulated dry runs before doing the real thing. At the Maine Maritime Academy and other merchant marine officer training schools, computer-controlled simulators teach the intricate loading and unloading of oil tankers and container ships.

Virtual reality (VR) is an extension of multimedia—and it uses the basic multimedia elements of imagery, sound, and animation. Because it requires instrumented feedback from a wired-up person, VR is perhaps interactive multimedia at its fullest extension.
Delivering Multimedia

Multimedia requires large amounts of digital memory when stored in an end user’s library, or large amounts of bandwidth when distributed over wires, glass fiber, or airwaves on a network. The greater the bandwidth, the bigger the pipeline, so more content can be delivered to end users quickly.

CD-ROM, DVD, Flash Drives

CD-ROM (compact disc read-only memory, see Chapter 7) discs can be mass-produced for pennies and can contain up to 80 minutes of full-screen video, images, or sound. The disc can also contain unique mixes of images, sounds, text, video, and animations controlled by an authoring system to provide unlimited user interaction.

Discs can be stamped out of polycarbonate plastic as fast as cookies on a baker’s production line and just as cheaply. Virtually all personal computers sold today include at least a CD-ROM player, and the software that drives these computers is commonly delivered on a CD-ROM disc. Many systems also come with a DVD player combination that can read and burn CD-ROMs as well. Multilayered Digital Versatile Disc (DVD) technology increases the capacity and multimedia capability of CDs to 4.7GB on a single-sided, single-layered disc to as much as 17.08GB of storage on a double-sided, double-layered disc. CD and DVD burners are used for reading discs and for making them, too, in audio, video, and data formats. DVD authoring and integration software allows the creation of interactive front-end menus for both films and games.

In the very long term, however, CD-ROM and DVD discs are but interim memory technologies that will be replaced by new devices such as flash drives and thumb drives that do not require moving parts. As highspeed connections become more and more pervasive and users become better connected, copper wire, glass fiber, and radio/cellular technologies may prevail as the most common delivery means for interactive multimedia files, served across the broadband Internet or from dedicated computer farms and storage facilities.

The Broadband Internet

These days telecommunications networks are global, so when information providers and content owners determine the worth of their products and how to charge money for them, information elements will ultimately link up online as distributed resources on a data highway (actually more like a toll road), where you will pay to acquire and use multimedia-based information.

Curiously, the actual glass fiber cables that make up much of the physical backbone of the data highway are, in many cases, owned by railroads and pipeline companies who simply buried the cable on existing rights of way, where no special permits and environmental studies are necessary.

Full-text content from books and magazines is downloadable; feature movies are played at home; real-time news feeds from anywhere on earth are available; lectures from participating universities are monitored for education credits; street maps of cities are viewable—with recommendations for restaurants, in any language—and online travelogues include testimonials and video tracks. Just think—each of these inter-faces or gateways to information is a multimedia project waiting to be developed!
Using text and symbols for communication is a very recent human development that began about 6,000 years ago in the Mediterranean Fertile Crescent—Mesopotamia, Egypt, Sumeria, and Babylonia—when the first meaningful marks were scraped onto mud tablets and left to harden in the sun. Only members of the ruling classes and the priesthood were allowed to read and write the pictographic signs and cuneiforms. The earliest messages delivered in written words typically contained information vital to the management of people, politics, and taxes. Because this new medium did not require rote memorization by frail human gray matter, written messages became popular among the elite. Unlike their human counter-parts, these new messages were less likely to perish due to dysentery or acts of God, or suffer from amnesia. Even if a message were intercepted by foes or competitors, it would still be indecipherable—except by those few who had acquired reading skills.

In fact, because those who could read probably attended the same private school or shared the same tutors, in those days reading, writing, and power politics were naturally intertwined. In some former eras it was a capital offense to read unless you belonged to the proper social class or possessed a patent granted to you by your rulers.

Today, text and the ability to read it are doorways to power and knowledge. Reading and writing are expected and necessary skills within most modern cultures. Now, depending upon your proficiency with words, you may be awarded a doctorate instead of the death penalty. And, as has been the case throughout history, text still delivers information that can have potent meaning.

Since the explosion of the Internet and the World Wide Web, text has become more important than ever. Indeed, the native language of the Web is HTML (Hypertext Markup Language), originally designed to display simple text documents on computer screens, with occasional graphic images thrown in as illustrations (see Chapter 12 for more history of the Internet). Academic papers, magazine articles, complex instruction manuals, and even the contents of entire books are now available for reading with a web browser. Add a built-in function that links, with a click of the mouse, selected words and phrases to other related and perhaps more-detailed material (the “hypertext” part of HTML, discussed later in this chapter), and you can surf the Net in a medium much richer than the paper pages of a book.

**The Power of Meaning**

Even a single word may be cloaked in many meanings, so as you begin working with text, it is important to cultivate accuracy and conciseness in the specific words you choose. In multimedia, these are the words that will appear in your titles, menus, and navigation aids as well as in your narrative or content.

Today’s poets and songwriters concentrate text by distilling lengthy prose into few words heavy with meaning. Advertising wordsmiths render the meaning of entire product lines into an evocative single word, logo, or tag line. Multimedia authors weave words, symbols, sounds, and images, and then blend text into the mix to create integrated tools and interfaces for acquiring, displaying, and disseminating messages and data.

The words “Barbie,” “green,” and “lite” may each easily trigger a rush of different meanings. A piercing cry in the night, the sight of fire engines leaving your street as you steer your car into your neighborhood, the scent of drying kelp along the seashore, the feel of rough pine bark against your chest as you climb, fingernails on a chalkboard—all these raw sensory mes-sages are important only because of what they mean to you. Indeed, you alone know the words that will stop you dead in your tracks with anger, or, better, soothe you seductively over a quiet dinner for two. Those words have meaning.
All of these examples demonstrate the following multimedia principle: it’s important to design labels for title screens, menus, and buttons or tabs using words that have the most precise and powerful meanings to express what you need to say. Understand the subtle shadings. GO BACK! is more powerful than Previous; Quit is more powerful than Close. TERRIFIC! may work better than Answer Was Correct. Experiment with the words you plan to use by letting others try them. If you have the budget, set up a focus group to have potential users experience your words. Watch them work. See if users flinch, balk, or click the Help button in confusion. See if they can even find the Help button.

Words and symbols in any form, spoken or written, are the most common system of communication. ey deliver the most widely understood meaning to the greatest number of people—accurately and in detail. Because of this, they are vital elements of multimedia menus, navigation systems, keyword lists, and content. You will reward yourself and your users if you take the time to use excellent words. Let your poet loose!

The Power and Irregularity of English
If you are reading this book in English, you might consider yourself lucky. A study by the British Council estimated that one billion people spoke English by the beginning of the second millennium as a first, second, or “foreign” language. English is the official or joint official language of more than 75 countries, and Algeria, when it dumped French in favor of English as the second language in schools, irritated a great many Parisian intellectuals. More than two-thirds of the world’s scientists read English, and three-quarters of the world’s mail is written in English. It is estimated that 80 percent of the world’s information that is stored on computers is written in English. As Dutch-born Professor Boeree of Shippensburg University has said, “Unfortunately for learners of English, it still has several irregular verbs (e.g., to be and to have) and a large number of strong verbs (e.g. sing-sang-sung), plus a few irregular plurals (e.g. child-children, man-men...). Nevertheless, people around the world find English relatively easy, with one huge exception: English has the worst spelling of any language using the Latin alphabet!”

The most recent changes in English spelling have been driven by technology limits as SMS (Short Message Service) text messages commonly used by social networking sites such as Twitter and Facebook to communicate and “tweet” allow only about 160 characters per message (140 bytes). As today’s most pervasive method of human-to-human data communication (more than three billion texters worldwide sending trillions of short text messages from phone to phone each year), users speaking many languages quickly developed word shortcuts to pack the most meaning into the fewest characters. NetLingo (www.netlingo.com) maintains a list of almost two thousand English acronyms and instant messaging jargon words such as XOXO (hugs & kisses), U (you), and NME (enemy). When assembled into a message, you might discover “were I a tear in ur eye i wood roll down onto ur lips. but if u were a tear in my eye i wood never cry as i wood be afraid 2 lose u!” With the arrival of MMS (Multimedia Messaging Service), which allows for 350,000-byte transmissions, perhaps these shortcut spellings will fade away. But perhaps not.
About Fonts and Faces

A typeface is a family of graphic characters that usually includes many type sizes and styles. A font is a collection of characters of a single size and style belonging to a particular typeface family. Typical font styles are boldface and italic. Your computer software may add other style attributes, such as underlining and outlining of characters. Type sizes are usually expressed in points; one point is 0.0138 inch, or about 1/72 of an inch. The font’s size is the distance from the top of the capital letters to the bottom of the descenders in letters such as g and y. Helvetica, Times, and Courier are typefaces; Times 12-point italic is a font. In the computer world, the term font is commonly used when typeface or face would be more correct.

A font’s size does not exactly describe the height or width of its characters. This is because the x-height (the height of the lowercase letter x) of two fonts may vary, while the height of the capital letters of those fonts may be the same (see Figure 2-1). Computer fonts automatically add space below the descender (and sometimes above) to provide appropriate line spacing, or leading (pronounced “ledding,” named for the thin strips of lead inserted between the lines by traditional typesetters).

![Figure 2-1](image.png) The measurement of type

Leading can be adjusted in most programs on both the Macintosh and the PC. Typically you will find this fine-tuning adjustment in the Text menu of image-editing programs or the Paragraph menu of word processing programs, though this is not an official standard. No matter where your application has placed the controls for leading, you will need to experiment with them to achieve the best result for your font. With a font editing program like Fontographer from Fontlab, Ltd. at [www.fontlab.com](http://www.fontlab.com) (you’ll see an example of it later in the chapter), adjustments can also be made along the horizontal axis of text. In this program the character metrics of each character and the kerning of character pairs can be altered. Character metrics are the general measurements applied to individual characters; kerning is the spacing between character pairs. When working with PostScript, TrueType, and Master fonts—but not bitmapped fonts—, the metrics of a font can be altered to create interesting effects. For example, you can adjust the body width of each character from regular to condensed to expanded, as displayed in this example using the Sabon font:

Regular
Condensed
Expanded
Or you can adjust the spacing between characters (tracking) and the kerning between pairs of characters:

Tighter Track  Av  Av
Looser Track  Kerned  Un kerned

When it converts the letter A from a mathematical representation to a recognizable symbol displayed on the screen or in printed output (a process called rasterizing), the computer must know how to represent the letter using tiny square pixels (picture elements), or dots. It does this according to the hardware available and your specification, from a choice of available typefaces and fonts. Search for “free fonts.” High-resolution monitors and printers can make more attractive-looking and varied characters because there are more fine little squares or dots per inch (dpi). And today’s broad selection of software fonts makes it easier to find the right typeface and font for your needs. The same letter can look very different when you use different fonts and faces:

Cases

In centuries when type was set by hand, the type for a single font was always stored in two trays, or cases; the upper tray held capital letters, and the lower tray held the small letters. Today, a capital letter is called uppercase, and a small letter is called lowercase.

In some situations, such as for passwords, a computer is case sensitive, meaning that the text’s upper- and lowercase letters must match exactly to be recognized. But nowadays, in most situations requiring keyboard input, all computers recognize both the upper- and lowercase forms of a character to be the same. In that manner, the computer is said to be case insensitive.

Company and product names such as WordPerfect, OmniPage, PhotoDisc, FileMaker, and WebStar have become popular. Placing an uppercase letter in the middle of a word, called an intercap, is a trend that emerged from the computer programming community, where coders discovered they could better recognize the words they used for variables and commands when the words were lowercase but intercapped.

Serif vs. Sans Serif

Typefaces can be described in many ways, just as a home advertised by a realtor, a wine described by a food critic, or a political candidate’s platform can all be described in many ways. Type has been characterized as feminine, masculine, delicate, formal, capricious, witty, comic, happy, technical, newsy—you name it. But one approach for categorizing typefaces is universally understood, and it has less to do with the reader’s response to the type than it does with the type’s mechanical and historical properties. This approach uses the terms serif and sans serif.

Serif versus sans serif is the simplest way to categorize a typeface; the type either has a serif or it doesn’t (sans is French for “without”). The serif is the little decoration at the end of a
letter stroke. Times, New Century Schoolbook, Bookman, and Palatino are examples of serif fonts. Helvetica, Verdana, Arial, Optima, and Avant Garde are sans serif. Notice the difference between serif (on the left) and sans serif:

![Serif vs Sans Serif](image)

On the printed page, serif fonts are traditionally used for body text because the serifs are said to help guide the reader's eye along the line of text. Sans serif fonts, on the other hand, are used for headlines and bold statements. But the computer world of standard, 72 dpi monitor resolution is not the same as the print world, and it can be argued that sans serif fonts are far more legible and attractive when used in the small sizes of a text field on a screen. Indeed, careful selection of a sans serif font designed to be legible in the small sizes (such as Tahoma or Verdana) makes more sense when you are presenting a substantial amount of text on the screen. The Times font at 9-point size may look too busy and actually be difficult and tiring to read. And a large, bold serif font for a title or headline can deliver a message of elegance and character in your graphic layout. Use what is right for your delivery system, which may not necessarily be the same as what is right when you’re printing the material to paper. This is because when you’re printing out what you create on a computer monitor, **WYSIWYG** (What You See Is What You Get) is more of a goal than an absolute fact.
Using Text in Multimedia

Imagine designing a project that used no text at all. Its content could not be at all complex, and you would need to use many pictures and symbols to train your audience how to navigate through the project. Certainly voice and sound could guide the audience, but users would quickly tire of this because greater effort is required to pay attention to spoken words than to browse text with the eye.

A single item of menu text accompanied by a single action (a mouse click, keystroke, or finger pressed to the monitor) requires little training and is clean and immediate. Use text for titles and headlines (what it’s all about), for menus (where to go), for navigation (how to get there), and for content (what you see when you get there).

Designing with Text

Computer screens provide a very small workspace for developing complex ideas. At some time or another, you will need to deliver high-impact or concise text messages on the computer screen in as condensed a form as possible. From a design perspective, your choice of font size and the number of headlines you place on a particular screen must be related both to the complexity of your message and to its venue.

If your messages are part of an interactive project or web site where you know the user is seeking information, you can pack a great deal of text information onto the screen before it becomes overwhelmingly busy. Seekers want dense material, and while they travel along your navigational pathways, they will scroll through relevant text and study the details. Here is where you must strike a balance, however. Too little text on a screen requires annoying page turns and unnecessary mouse clicks and waits; too much text can make the screen seem overcrowded and unpleasant.

On the other hand, if you are creating presentation slides for public-speaking support, the text will be keyed to a live presentation where the text accents the main message. In this case, use bulleted points in large fonts and few words with lots of white space. Let the audience focus on the speaker at the podium, rather than spend its time reading fine points and subpoints projected on a screen.

Choosing Text Fonts

Picking the fonts to use in your multimedia presentation may be somewhat difficult from a design standpoint. Here again, you must be a poet, an advertising psychologist, and also a graphic designer. Try to intuit the potential reaction of the user to what is on the screen. Here are a few design suggestions that may help:

- For small type, use the most legible font available. Decorative fonts that cannot be read are useless, as shown at right.

- Use as few different faces as possible in the same work, but vary the weight and size of your typeface using italic and bold styles where they look good. Using too many fonts on the same page is called ransom-note typography. Visit http://lifehacker.com/software/writing/faster-ransom-notes-for-busy-kidnappers-248692.php to make your own ransom notes.
○ In text blocks, adjust the leading for the most pleasing line spacing. Lines too tightly packed are difficult to read.

○ Vary the size of a font in proportion to the importance of the message you are delivering.

○ In large-size headlines, adjust the spacing between letters (kerning) so that the spacing feels right. Big gaps between large letters can turn your title into a toothless waif. You may need to kern by hand, using a bitmapped version of your text.

○ To make your type stand out or be more legible, explore the effects of different colors and of placing the text on various backgrounds. Try reverse type for a stark, white-on-black message.

○ Use anti-aliased text where you want a gentle and blended look for titles and headlines. This can give a more professional appearance. Anti-aliasing blends the colors along the edges of the letters (called dithering) to create a soft transition between the letter and its background.

○ Try drop caps and initial caps to accent your words. Most word processors and text editors will let you create drop caps and small caps in your text. Adobe and others make initial caps (such as the one shown to the right from Adobe, called Gothic). The letters are actually carefully drawn artwork and are available in special libraries as encapsulated PostScript files (EPSF).

○ Coding an initial cap for a web page is simple. Use CSS attributes:
  ```
  p:first-letter { font-size: 200%; }
  p:first-line { line-height: 100%; }
  ```

○ If you are using centered type in a text block, keep the number of lines and their width to a minimum.

○ For attention-grabbing results with single words or short phrases, try graphically altering and distorting your text and delivering the result as an image. Wrap your word onto a sphere, bend it into a wave, or splash it with rainbow colors.

○ Experiment with drop shadows. Place a copy of the word on top of the original, and offset the original up and over a few pixels. Then color the original gray (or any other color). The word may become more legible and provide much greater impact. With web sites, shadowed text and graphics on a plain white background add depth to a page. Surround headlines with plenty of white space. White space is a designer’s term for roomy blank areas, while programmers call the invisible character made by a space (ASCII 32) or a tab (ASCII 9) white space. Web designers use a nonbreaking space entity (&nbsp;) to force spaces into lines of text in HTML documents.

○ Pick the fonts that seem right to you for getting your message across, then double-check your choice against other opinions. Learn to accept criticism.

○ Use meaningful words or phrases for links and menu items.

○ Text links on web pages can accent your message: they normally stand out by color and underlining. Use link colors consistently throughout a site, and avoid iridescent green on red or purple on puce.
Bold or emphasize text to highlight ideas or concepts, but do not make text look like a link or a button when it is not.

On a web page, put vital text elements and menus in the top 320 pixels. Studies of surfer habits have discovered that only 10 to 15 percent of surfers ever scroll any page.

Characters identified in a particular font (say, Garamond 10-point) do not always look the same on a Macintosh as they do on Windows display monitors. Typically, what is called 12-point on a Macintosh will be a 10- or 9-point size in Windows. And the actual shape of the characters may be different (see Figure 2-2). Take care to visually test the flow of your text on all platforms

![Uppercase 10 pt Garamond T on a Macintosh](image)

![Uppercase 10 pt Garamond T in Windows](image)

**Figure 2-2** Examples of Garamond typeface displayed on a Macintosh (top) and in Windows

**Installed Fonts**
Before you can use a font, it must be recognized by the computer’s operating system. If you want to use fonts other than those installed with your basic operating system, you will need to install them. When you install applications, fonts are often added to your collection.

Philip Shaw at [www.codestyle.org](http://www.codestyle.org) maintains a useful list of the most commonly installed fonts for both Mac and Windows. The most commonly reported fonts available on Windows computers are Tahoma, Microsoft Sans Serif, Verdana, and Courier New. On Macs expect Helvetica, Lucida Grande, and Courier.

**Animating Text**
There are plenty of ways to retain a viewer’s attention when displaying text. For example, you can animate bulleted text and have it “fly” onto the screen. You can “grow” a headline a character at a time. For public speakers, simply highlighting the important text works well as a pointing device. When there are several points to be made, you can stack keywords and flash them past the viewer in a timed automated sequence (as in the roadside Burma Shave ads—signs placed every half mile or so along the highway, each offering the motorist just a few more words toward a complete slogan). You might fly in some keywords, dissolve others, rotate or spin others, and so forth, until you have a dynamic bulleted list of words that is interesting to watch. But be careful—don’t overdo the special effects, or they will become boring. For simple presentations, PowerPoint (see the custom Animation Palette at left) has bells and whistles to reveal a line of text one word or one letter at a time, or to animate an entire line.

**Symbols and Icons**
Symbols are concentrated text in the form of stand-alone graphic constructs. Symbols convey meaningful messages. The trash can symbol, for instance, tells you where to throw away old files;
the hourglass cursor tells you to wait while the computer is processing. Though you may think of symbols as belonging strictly to the realm of graphic art, in multimedia you should treat them as text—or visual words—because they carry meaning. Symbols such as the familiar trash can and hourglass are more properly called icons: these are symbolic representations of objects and processes common to the graphical user interfaces of many computer operating systems.

Certainly text is more efficient than imagery and pictures for delivering a precise message to users. On the other hand, pictures, icons, moving images, and sounds are more easily recalled and remembered by viewers. With multimedia, you have the power to blend both text and icons (as well as colors, sounds, images, and motion video) to enhance the overall impact and value of your message.

Word meanings are shared by millions of people, but the special symbols you design for a multimedia project are not; these symbols must be learned before they can be useful message carriers. Some symbols are more widely used and understood than others, but readers of even these common symbols had to grow accustomed to their meanings. Learning a system of symbols can be as difficult as lessons in any foreign language.

![Symbols](Image)

**Figure 2-4** Some symbols, like Play, Pause, and Fast Forward, are easily recognized but may still be more precise with text titles. "Smiley" symbols, or emoticons, used in Internet conversation to express mood, once were made up entirely of text and punctuation characters. These have been replaced by both custom-made graphic symbols and official type characters as part of the international Unicode Library (Block 1F600-1F64F). Indeed, sometimes it's difficult to know what a smiley really means! 😊

**Fields for Reading**

You are already working uphill when you design text to be read on the screen. Experiments have shown that reading text on a computer screen is slower and more difficult than reading the same text in hard-copy or book form. Indeed, many users, it seems, would rather print out their reports and e-mail messages and read them on paper than page through screens of text. Reading hard copy is still more comfortable.

Unless the very purpose of your multimedia project or web site is to display large blocks of text, try to present to the user only a few paragraphs of text per page. Use a font that is easy to read rather than a prettier font that is illegible. Try to display whole paragraphs on the screen, and avoid breaks where users must go back and forth between pages to read an entire paragraph.

**Portraits vs. Landscape**

Traditional hard-copy and printed documents in the taller-than-wide orientation are simply not readable on a typical monitor with a wider-than-tall aspect ratio. The taller-than-wide orientation used for printed documents is called portrait; this is the 8.5-by-11-inch size unique to
the United States or the internationally designated standard A4 size, 8.27 by 11.69 inches. The wider-than-tall orientation normal to monitors is called landscape. Shrinking an 11-inch-tall portrait page of text into your available monitor height usually yields illegible chicken tracks. Here are four possible solutions if you are working with a block of text that is taller than what will fit:

○ Put the text into a scrolling field. This is the solution used by web browsers.

○ Put the text into a single field or graphic image in a project window, and let the user move the whole window up or down upon command. This is most appropriate when you need to present text with page breaks and formatting identical to the printed document. This is used by Adobe’s popular Acrobat Reader for displaying PDF files.

○ Break the text into fields that fit on monitor-sized pages, and design control buttons to flip through these pages.

○ Design your multimedia project for a special monitor that is taller than it is wide (portrait) or a normal monitor rotated onto its side. Dedicated “page view” monitors are expensive; they are used for commercial print-based typesetting and layout. Video controllers can rotate the text display for you:

<table>
<thead>
<tr>
<th>eBooks, E-readers, and Tablet Computers</th>
</tr>
</thead>
<tbody>
<tr>
<td>eBooks are books digitized and formatted to be read using an eReader. eReaders display text, graphics, and multimedia—most using E Ink screens between five and ten inches diagonal, some with touch screens, some with wi-fi and 3G connectivity, and all with varying and sometimes non-standard input formats (see Table 2-2). Among eBook devices are the Apple iPad, Arrow, Astak EZ Reader, Barnes &amp; Noble Nook, BeBook Neo, COOL-ER, Cybook, Foxit eSlick, iLiad, iRex Digital Reader, Jetbook, Kindle, and the Sony Reader.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Format</th>
<th>Filename Extension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plain text</td>
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</tr>
<tr>
<td>HTML</td>
<td>html</td>
</tr>
<tr>
<td>PostScript</td>
<td>ps</td>
</tr>
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</tr>
<tr>
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<td>djvu</td>
</tr>
<tr>
<td>EPUB</td>
<td>epub</td>
</tr>
<tr>
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<td>fb2</td>
</tr>
<tr>
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<td>prc, .mobi</td>
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<td>azw</td>
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<td>pdb</td>
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</tr>
<tr>
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<td>wol</td>
</tr>
<tr>
<td>Tome Raider</td>
<td>.tr2, .tr3</td>
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<td>ArghosReader</td>
<td>aeh</td>
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<tr>
<td>Microsoft Reader</td>
<td>.lit</td>
</tr>
<tr>
<td>Multimedia EBook</td>
<td>.exe</td>
</tr>
</tbody>
</table>

Table 2-2  E-Readers Can Read Many File Formats, Some Proprietary

The e-ink screen is a technology for “electronic paper,” designed to imitate the appearance of
ordinary ink on paper. e-Ink displays can be used in direct sunlight and boast a long battery life. But e-Ink is not required to read eBooks, which can be viewed on most computers and many Personal Digital Assistants (PDAs) and mobile phones using format converting/reading software such as Adobe Digital Editions.

**HTML Documents**

The standard document format used for displaying text pages on the Web is called Hypertext Markup Language (HTML). In an HTML document you can specify typefaces, sizes, colors, and other properties by “marking up” the text in the document with tags. The process of marking up documents or “styling” them is simple: Where you want text to be bold, surround it with the tags `<B>` and `</B>` or `<STRONG>` and `</STRONG>`; the text between the tags will then be displayed by your browser application in bold type. Where you have a header, surround it with `<H1>` and `</H1>`; for an ordered list of things (1, 2, 3, … or a, b, c, …, etc.), surround your list with `<OL>` and `</OL>`. There are many tags you can use to lay out a page. Cascading Style Sheets (CSS) work in conjunction with HTML and provide fine tuning and control of text and layout.

HTML Version 5 is a redesign that stretches into a multimedia delivery tool, making HTML no longer just a text display tool with assorted attachments and plugged-in objects. A new `<canvas>` element allows a box to be defined on a web page in which 2-D graphics can be drawn under program control. Video and audio (timed media) playback is supported.
Computers and Text

Very early in the development of the Macintosh computer’s monitor hardware, Apple chose to use a resolution of 72 pixels per inch. This matches the standard measurement of the printing industry (72 points per inch) and allows desktop publishers and designers to see on the monitor what their printed output will look like (WYSIWYG). In addition, Apple made each pixel square-shaped, providing even measurements in all directions. Until the Macintosh was invented, and the VGA video standard set for the PC (at 96 pixels per inch), pixels were typically taller than they were wide. The aspect ratio for a pixel on older EGA monitors, for example, is 1.33:1, taller than it is wide. VGA and SVGA monitor resolutions for both Macintosh and Windows display pixels at an aspect ratio of 1:1 (square).

The Font Wars are Over

In 1985, the desktop publishing revolution was spearheaded by Apple and the Macintosh computer, in combination with word processing and page layout software products that enabled a high-resolution 300 dpi laser printer using special software to “draw” the shapes of characters as a cluster of square pixels computed from the geometry of the character. This special software was the Adobe PostScript page description and outline font language. It was licensed by Apple and included in the firmware of Apple’s LaserWriter laser printer.

PostScript is really a method of describing an image in terms of mathematical constructs (Bézier curves), so it is used not only to describe the individual characters of a font but also to describe entire illustrations and whole pages of text. Because each PostScript character is a mathematical formula, it can be easily scaled bigger or smaller so it looks right whether drawn at 24 points or 96 points, whether the printer is a 300 dpi LaserWriter or a high-resolution 1200, 2400, or even 3600 dpi image setter suitable for the finest print jobs. And the PostScript characters can be drawn much faster than in the old-fashioned way. Before PostScript, the printing software looked up the character’s shape in a bitmap table containing a representation of the pixels of every character in every size. PostScript quickly became the de facto industry font and printing standard for desktop publishing and played a significant role in the early success of Apple’s Macintosh computer.

There are two kinds of PostScript fonts: Type 3 and Type 1. Type 3 font technology is older than Type 1 and was developed for output to printers; it is rarely used by multimedia developers. There are currently over 6,000 different Type 1 typefaces available. Type 1 fonts also contain hints, which are special instructions for grid-fitting to help improve resolution. Hints can apply to a font in general or to specific characters at a particular resolution.

Other companies followed Adobe into the desktop publishing arena with their own proprietary and competitive systems for scalable outline fonts. In 1989, Apple and Microsoft announced a joint effort to develop a “better and faster” quadratic curves outline font methodology, called TrueType. In addition to printing smooth characters on printers, TrueType would draw characters to a low-resolution (72 dpi or 96 dpi) monitor. Furthermore, Apple and Microsoft would no longer need to license the PostScript technology from Adobe for their operating systems. Because TrueType was based on Apple technology, it was licensed to Microsoft. Adobe and Microsoft then developed a new and improved font management system incorporating the best features of both PostScript and TrueType, and by 2007, OpenType became a free, publicly available inter-national standard. The font wars were over.

Character Sets and Alphabets
Knowing that there is a wide selection of characters available to you on your computer and understanding how you can create and use special and custom-made characters will broaden your creative range when you design and build multimedia projects.

**The ASCII Character Set**

The American Standard Code for Information Interchange (ASCII) is the 7-bit character coding system most commonly used by computer systems in the United States and abroad. ASCII assigns a number or value to 128 characters, including both lower- and uppercase letters, punctuation marks, Arabic numbers, and math symbols. Also included are 32 control characters used for device control messages, such as carriage return, line feed, tab, and form feed.

ASCII code numbers always represent a letter or symbol of the English alphabet, so that a computer or printer can work with the number that represents the letter, regardless of what the letter might actually look like on the screen or printout. To a computer working with the ASCII character set, the number 65, for example, always represents an uppercase letter A. Later, when displayed on a monitor or printed, the number is turned into the letter.

**The Extended Character Set**

A byte, which consists of eight bits, is the most commonly used building block for computer processing. ASCII uses only seven bits to code its 128 characters; the eighth bit of the byte is unused. This extra bit allows another 128 characters to be encoded before the byte is used up, and computer systems today use these extra 128 values for an extended character set. The extended character set is most commonly filled with ANSI (American National Standards Institute) standard characters, including often-used symbols, such as ¢ or ∞, and international diacritics or alphabet characters, such as ä or ñ. This fuller set of 255 characters is also known as the ISO-Latin-1 character set; it is used when programming the text of HTML web pages.

**Unicode**

As the computer market has become more international, one of the resulting problems has been handling the various international language alphabets. It was at best difficult, and at times impossible, to translate the text portions of programs from one script to another. For example, the differences between the Latin script (also known as “Roman”) used by western European writers and the kanji script used by Japanese writers made it particularly challenging to transfer innovative programs from one market to another.

Since 1989, a concerted effort on the part of linguists, engineers, and information professionals from many well-known computer companies has been focused on a 16-bit architecture for multilingual text and character encoding. Called Unicode, the original standard accommodated up to about 65,000 characters to include the characters from all known languages and alphabets in the world.

**Mapping Text Across Platforms**

If you build your multimedia project on a Windows platform and play it back on a Macintosh platform (or vice versa), there will be subtle (and sometimes not-so-subtle) differences. Fonts are perhaps the greatest cross-platform concern, because they must be mapped to the other machine. If a specified font doesn’t exist on the target machine, a substitute must be provided that does exist on the target. This is font substitution. In many cross-platform-savvy applications, you can explicitly define the font mapping. Table 2-3 shows some typical mappings when crossing platforms.
<table>
<thead>
<tr>
<th>Mac→Win</th>
<th>Win→Mac</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mac:Chicago→Win:System</td>
<td>Win:Arial→Mac:Helvetica</td>
</tr>
<tr>
<td>Mac:Courier→Win:Courier New</td>
<td>Win:Courier→Mac:Courier</td>
</tr>
<tr>
<td>Mac:Geneva→Win:MS Sans Serif</td>
<td>Win:Courier New→Mac:Courier</td>
</tr>
<tr>
<td>Mac:Monaco→Win:Terminal</td>
<td>Win:MS Sans Serif→Mac:Geneva</td>
</tr>
<tr>
<td>Mac:New York→Win:MS Serif</td>
<td>Win:Symbol→Mac:Symbol Map None</td>
</tr>
<tr>
<td>Mac:Symbol→Win:Symbol Map None</td>
<td>Win:System→Mac:Chicago</td>
</tr>
<tr>
<td>Mac:Times→Win:Times New Roman (sizes: 14→12, 18→14, 24→18, 30→24)</td>
<td>Win:Terminal→Mac:Monaco</td>
</tr>
</tbody>
</table>

**Table 2-3**  Typical Mappings for Common Macintosh and Windows Fonts
Font Editing and Design Tools
Special font editing tools can be used to make your own type, so you can communicate an idea or graphic feeling exactly. With these tools, professional typographers create distinct text and display faces. Graphic designers, publishers, and ad agencies can design instant variations of existing typefaces.

Fontlab
Fontlab, Ltd., located at www.fontlab.com, specializes in font editors for both Macintosh and Windows platforms. You can use this software to develop PostScript, TrueType, and OpenType fonts for Macintosh, Windows, and Sun workstations. Designers can also modify existing typefaces, incorporate PostScript artwork, automatically trace scanned images, and create designs from scratch.