Show Bookmarks

Excerpt from

Introduction to Computer Art

By

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Preview

The following is a sample excerpt from a study unit converted into the Adobe Acrobat format. A sample online exam is available for this excerpt.

The sample text, which is from the Computer Graphic Artist program, explores the use of a computer as an artistic tool.

Incredible opportunities exist for creative, enterprising computer artists. Today's technology enables just about any properly trained individual to create highly sophisticated images using a personal computer. At the same time, the demand for trained computer artists has increased dramatically. This program is designed to give you the training you'll need to meet all the challenges and opportunities available to today's computer artist.

After reading through the following material, feel free to take the sample exam based on this excerpt.

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Introduction to Computer Art

THE COMPUTER AS AN ARTISTIC MEDIUM

Artists throughout history have understood the power of images to enhance or communicate ideas. Modern technological advances have expanded the field of visual communication in astonishing ways. You don't have to look very far for proof of this expansion. It's all around you in the form of movies, magazine covers, catalogs, brochures, television commercials, newspaper ads, books, posters—even the "junk mail" you find in your mailbox (Figure 1). Chances are, many of these images were either created or enhanced through the use of a computer.

Why Use a Computer?

Not very long ago, the ability to create richly illustrated materials required expensive, highly specialized equipment and years of technical training. Creating even simple animated sequences meant hours of planning and labor, using literally hundreds of sheets of transparent plastic. Today's computer hardware and software make it possible to build images far more quickly and efficiently than traditional methods. They also make it easier to manipulate images and integrate them with text and other design elements.

In addition, the growing appeal of multimedia and network communications has contributed to the development of a wide range of "paperless documents," which are intended primarily for on-screen viewing. Computers not only offer a timesaving means to create and store images for electronic media; in many instances, the very methods of creating and editing paperless documents were designed by computers!

Finally, many people simply enjoy the ease and simplicity of creating images on a computer. Instead of having to grope around for glue, paint, or drawing pencils, all the tools you need are represented by small on-screen pictures called *icons.* Using a full-featured graphic design program like *CorelDraw,* you can choose an electric paint brush, pick a color, and start designing right away. Depending on the capabilities of the computer and the sophistication of the software, images generated by computers are sometimes indistinguishable from art created in a more traditional fashion.

Because computers improve the speed and efficiency of many artistic processes, they provide a cost-effective alternative to traditional methods. Therefore, they make it possible for individuals and small businesses to compete in the marketplace. With the aid of a sophisticated graphics software package, a printer, and perhaps a few other hardware devices, virtually any trained computer artist can create truly captivating designs. Let's take a look at some of the ways in which computers enhance the creative process.

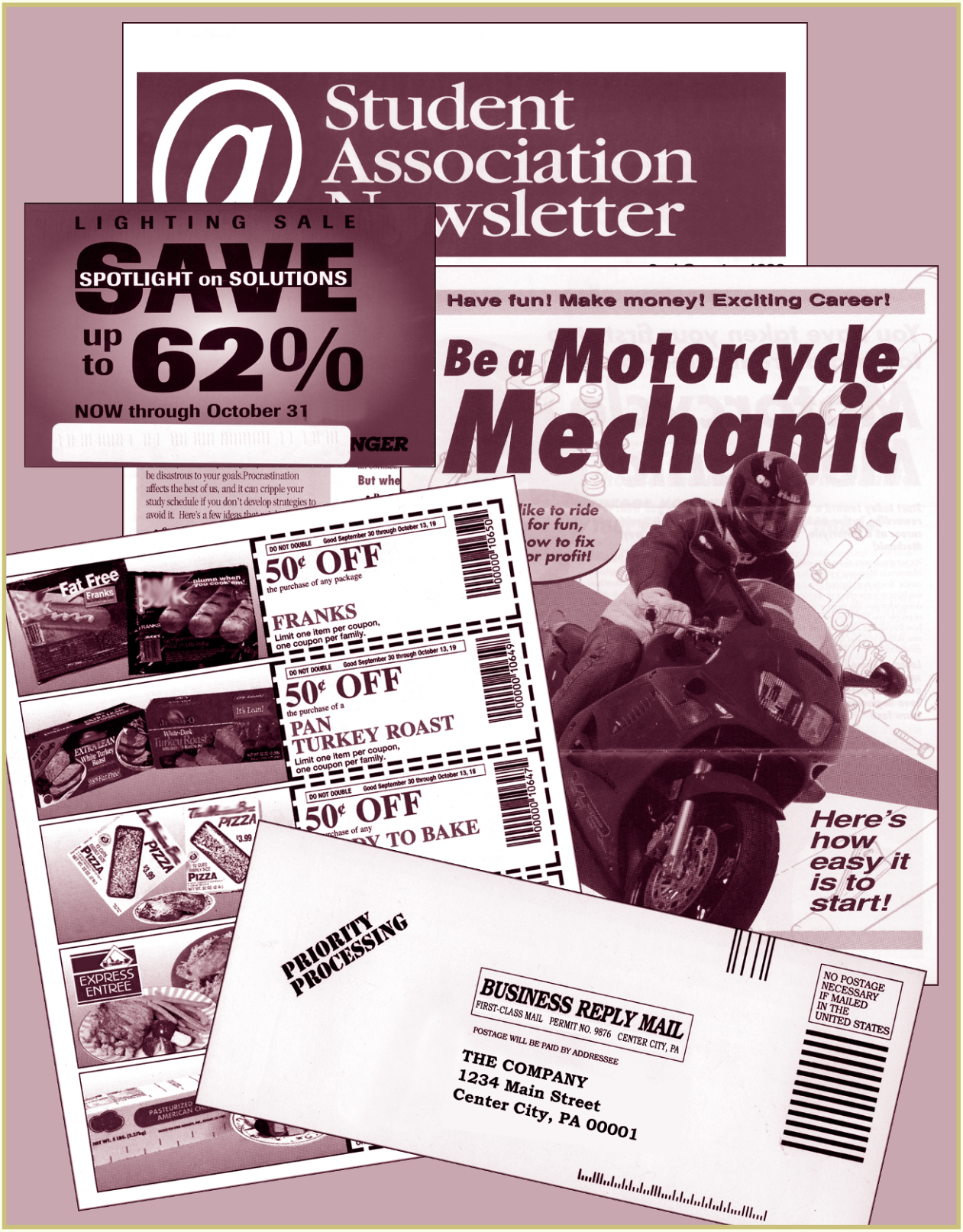

FIGURE 1—Every day, the average person sees a wide variety of materials that were either created or edited on a computer.

Manipulation of Photographs

Designing publications that contain a large number of photographs, such as magazines or catalogs, once meant hours of cutting and pasting photographs onto heavy paper or cardboard, called a *pasteup board*. Modifying colors and adding text, lines, or other graphic elements typically involved taping layers of clear plastic or acetate, called *overlays*, over the basic photographic elements. The finished board was known as a *mechanical* (Figure 2). When the proper equipment isn't available, designers must resort to the same painstaking process.

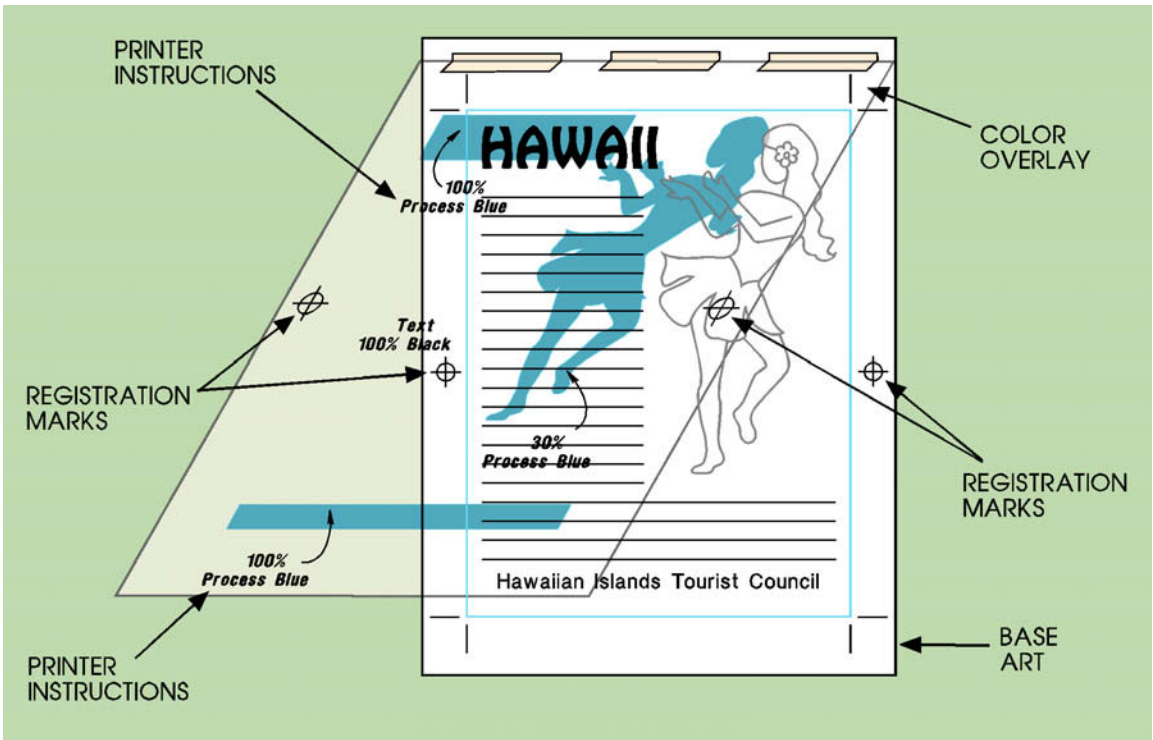

FIGURE 2—The traditional method of working with images involved cutting and pasting elements onto heavy paper or cardboard.

The next step of the traditional process involved photographing the mechanical using a specialized graphics art camera. Early cameras produced negatives that were used to etch patterns onto specially coated printing plates with the aid of chemicals or lasers. More advanced cameras were capable of transferring photographic images directly onto printing plates, thus bypassing the middle steps.

As personal computers gained popularity, however, software developers began designing programs that enable artists to perform a number of time-consuming tasks directly on-screen. Simply pointing, clicking, or dragging the mouse cursor can erase the wrinkles from a fashion model's cheek, brighten a dark or cloudy sky, or make trees appear as though

they're bending in the wind. Drop-down menus provide tools for rotating, flipping, or inverting photographs in less than a second. Graphics programs have given designers the power to freely experiment with transforming dull, flat photos into sparkling images that virtually leap off the page. Some of the basic tools and options are described below.

Cutting and pasting. Many software packages provide tools for isolating image areas, so that you can copy or cut only the portions you need and paste them into a new document or work space. Most programs allow you to create oval, rectangular, or free-form selections, which usually appear on-screen as a series of blinking or broken lines (Figure 3). The selected portion of an image can be copied directly into a brochure, catalog, or magazine story. Individual elements can also be inserted into another photograph to create what's known as a *composite image*, or simply a *composite.* Composite images may be realistic, as shown in Figure 4, or far-fetched, as in Figure 5.

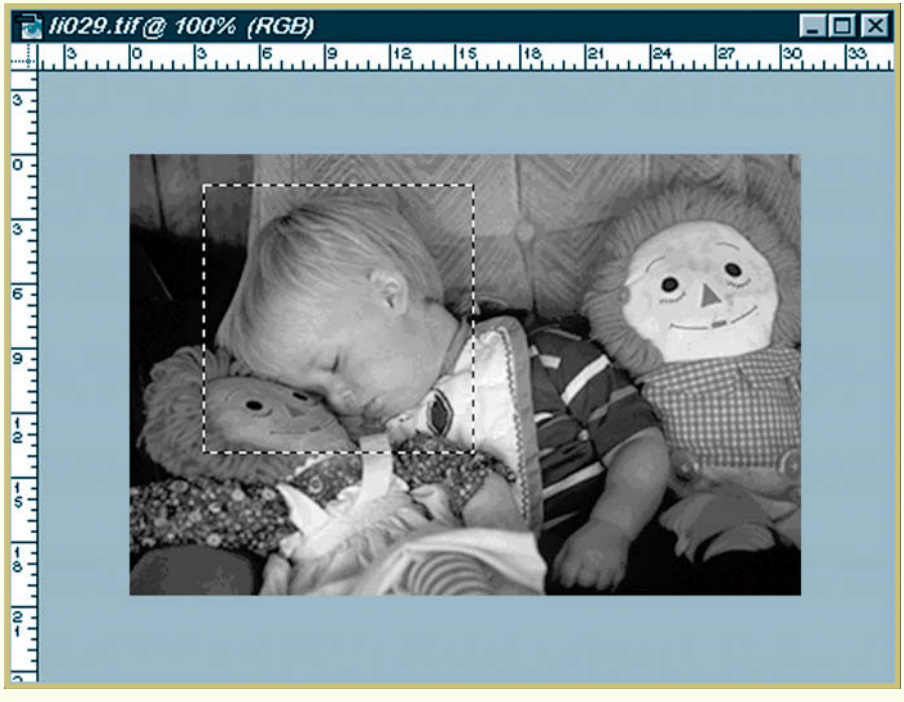

FIGURE 3—Using a selection tool, you can define an area of an image with a blinking or broken line.

Cropping and sizing. A photograph can evoke a very powerful, emotional impact. Unfortunately, if the image is cluttered, too small, or overwhelmingly large, it can detract from the overall effect of a design. The same selection tools used for cutting and pasting can also be used to crop, or trim away, uninteresting or unnecessary sections of a picture, so that only the portion that serves to underscore the message remains (Figure 6). A designer can use the same tools to *size* an image, shrinking or enlarging it to balance other elements on a page (Figure 7).

FIGURE 4—Using a computer, you can copy an element from Photo A and insert it into Photo B to create a very realistic composite (Photo C).

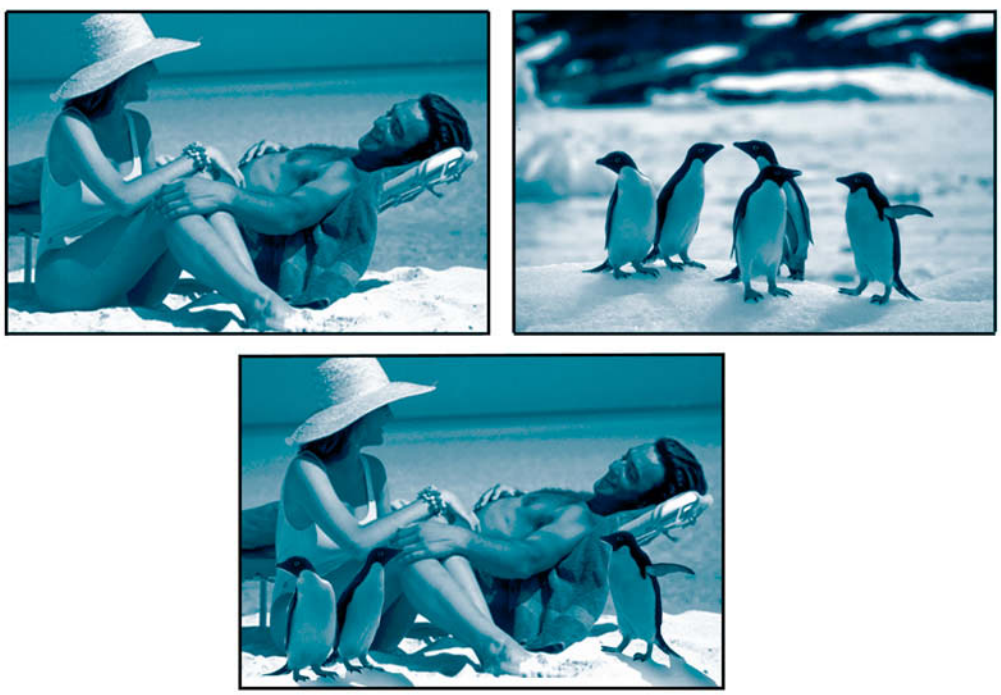

FIGURE 5—You can use the same technique to create improbable or unusual images.

FIGURE 6—The cropped photo on the left is more effective than the unaltered one on the right, which contains too many distracting elements.

FIGURE 7—The photograph on the left, which is too small to make much of an impact, can be easily enlarged for the sake of clarity.

Image correction. Most image-editing programs provide simple-to-use features that allow users to make subtle or detailed adjustments to photographs. Fine-tuning of this sort is commonly referred to as *image correction.* Certain corrections can affect the entire image. These corrections include adjustments for the following:

- *Brightness*—The overall darkness or lightness of an image
- *Contrast*—The distinction between light and dark image elements
- *Color/Tone*—The intensity of different pigments or, in the case of black and white photographs, gray tones

Other corrections affect only portions of a photograph. These include the following:

- *Retouching*—Often required to erase flaws and unwanted details
- *Sharpening*—Makes the edges of image elements look more precise
- *Blurring*—Often used to soften the appearance of background or foreground objects
- *Spot color adjustments*—Can be used to enhance or modify the color of an object or detail

When a specific object or portion of a photograph has been selected for retouching or some other type of correction, the blinking lines that surround the selected area function as a type of stencil, known as a *mask.* Using a mask ensures that only the selected area will be affected by your editing choices.

Special effects. The powerful features offered by most computer design programs grant artists nearly unlimited flexibility in manipulating photographs and other types of images. Many programs provide special commands, known as *filters,* that can be used to radically alter the appearance of almost any photograph. For example, a *wind filter* can create the illusion of a sudden gust rushing through a scene. A *wave filter* can simulate the appearance of an image reflected in choppy water. An *embossing filter* can make the image appear as though it had been engraved in metal or stone (Figure 8).

Another popular special effect involves blending two distinct images to create a third. This effect is known as *morphing,* a term derived from the word *metamorphosis,* which means a change of form. Morphing tools can be used to create a single new image or a series of images (Figure 9). Certain programs can even be used to create animated morphing sequences. Nearly all of the chilling or hilarious transformations seen in movies and television shows are created using computer morphing programs.

FIGURE 8—Filters manipulate an original photograph (A) to simulate a variety of effects, including wind (B), waves (C), and embossing (D).

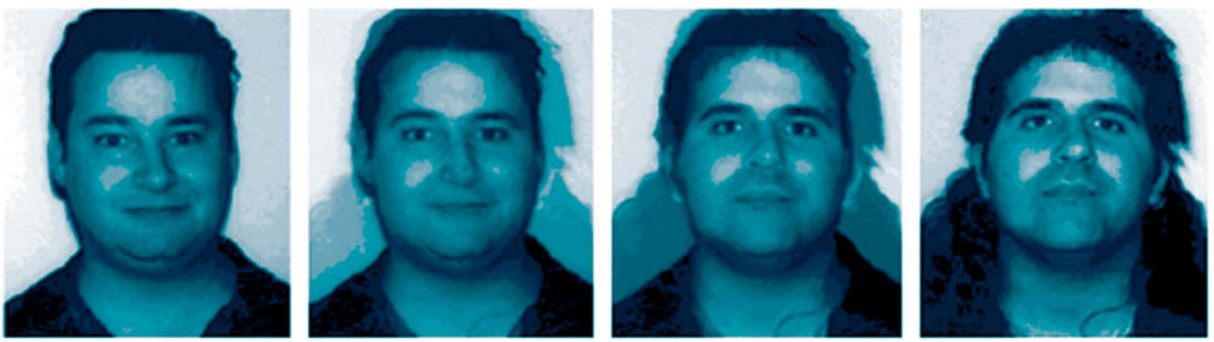

FIGURE 9—Through a process known as morphing, a computer artist can transform one image into another.

Manipulation of Text

The traditional method of handling text involved the work of several different specialists. An art director specified the style of the lettering, commonly known as the *font,* as well as special effects such as bolding, italicizing, or changes in size. The text was then sent to a word processing center for typesetting and printing, and afterwards to a copy editor for proofreading. If any mistakes were found, it was sent back to the typesetter for corrections. Finally, the corrected text was sent to a layout artist, who cut and pasted it to a pasteup board, along with photos, illustrations, and other graphical elements. Typically, if a mistake was made at any stage—or if a client decided on a last-minute change—each part of the document had to be revised by the specialist who created it.

Computers allow designers much more freedom in the process of setting and editing text. Font specifications, typographical effects, and layout design can all be configured at the same time (Figure 10). Corrections can

FIGURE 10—Using a computer, a designer can revise text directly on-screen with very little trouble.

be made with a few simple keystrokes, and clients can even provide prewritten, preformatted text on floppy disk in order to avoid any problems with typos or punctuation errors. Because most editing programs allow users to make document-wide changes, a designer can test variations in type style and layout quickly and effortlessly without having to send the document back and forth among different departments.

Special effects that may have required hours at the pasteup board can be accomplished relatively quickly and easily on the computer screen. For example, designers can arrange text and graphics with great specificity. They can even wrap text around graphic images or use text to create shapes, such as circles or squares (Figure 11). Such effects can handily capture and hold a reader's attention. These effects can be especially useful if a lot of information needs to be communicated, or if the message demands a powerful delivery.

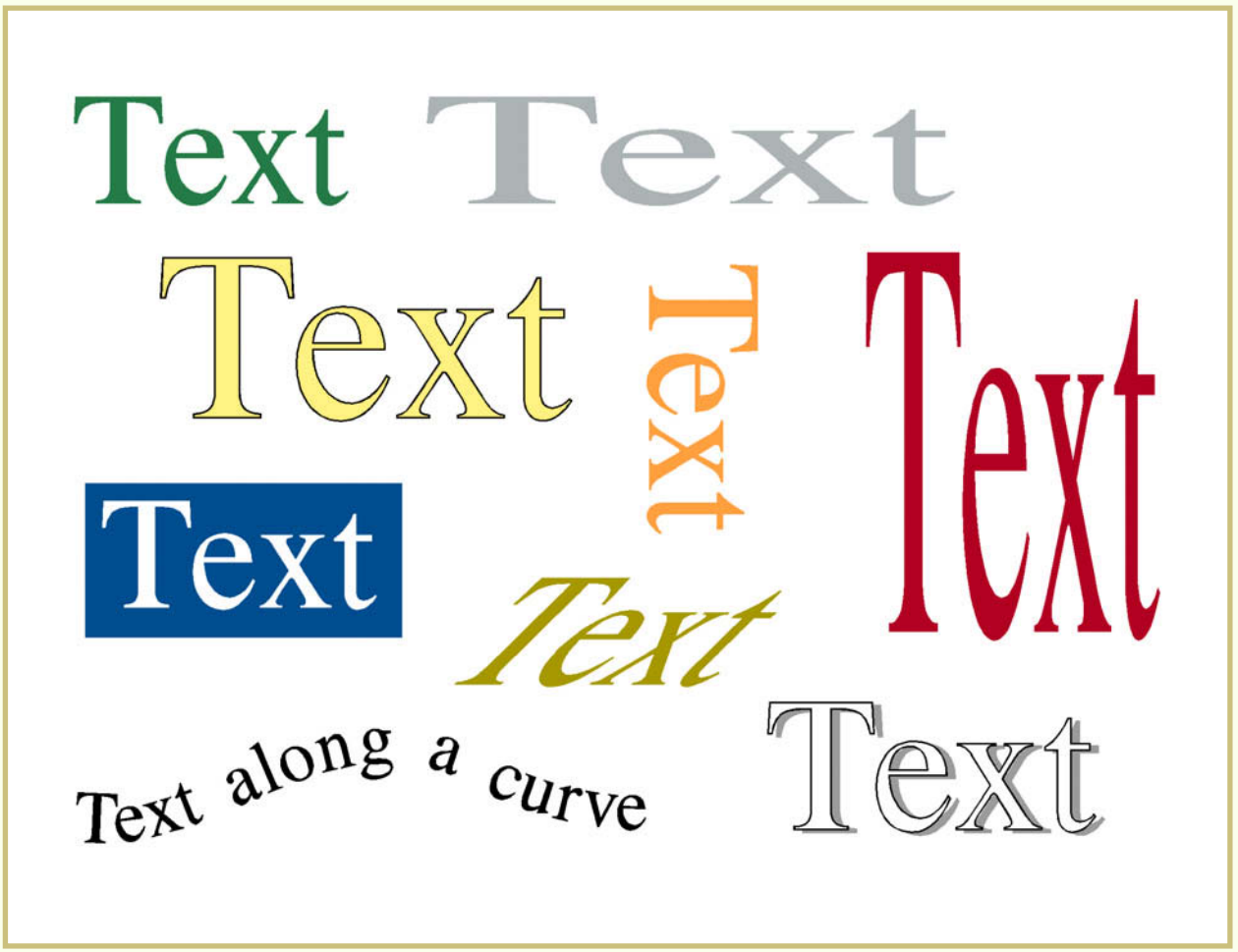

FIGURE 11—Creative manipulation of text elements can significantly influence the reader's response.

Using a computer, it's also possible to experiment with different ways to integrate text and graphics. For example, you can insert text directly into a photographic image to create a postcard effect. An elegant impression can be produced by overlaying text on a faded graphic, commonly referred to as a *watermark.* You might even try reversing the procedure by

overlaying an image on a watermark composed of enlarged text. Figure 12 shows several effects that can be achieved fairly simply while lending a degree of sophistication to the final product.

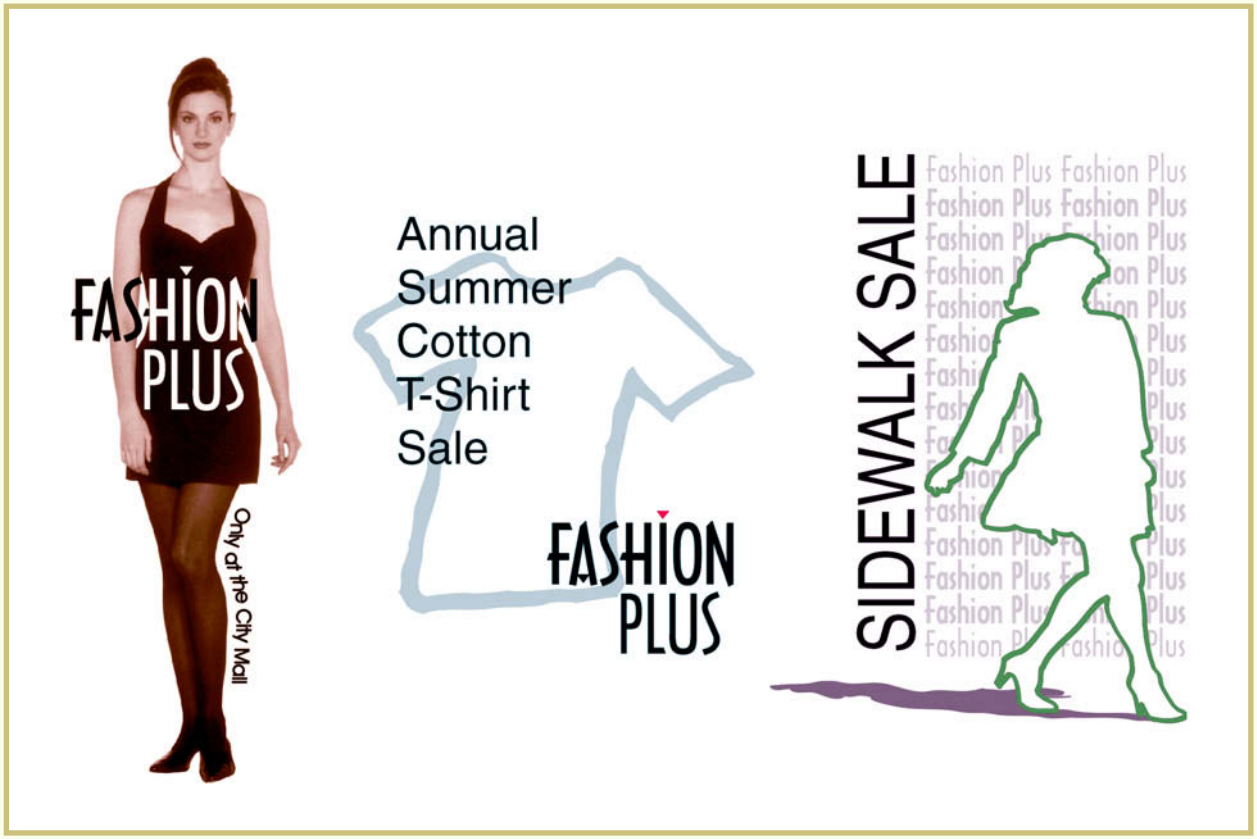

FIGURE 12—The computer opens a world of possibilities for seamless integration of text and graphics.

Three-dimensional Rendering

The potential of computer graphics software is perhaps best seen in the creation of three-dimensional images, commonly referred to as *3-D rendering*. You've probably seen examples of 3-D rendering on television or in Hollywood movies. In recent years, computer artists have created a dazzling array of special effects, including mobile dinosaurs, natural disasters, and extraterrestrial phenomena.

Three-dimensional rendering has more serious applications as well. For example, 3-D graphics programs are used to design new products and create technical illustrations. Medical technologists have also begun to use 3-D images of organs and other structures as diagnostic aids. Architects and interior design strategists can also create 3-D models to test the feasibility of their designs.

Until relatively recently, the ability to create 3-D images exceeded the power of most personal computers—and the budget of most PC users. With the development of faster, less expensive hardware and software, however, 3-D rendering capabilities have migrated to the desktop.

The essential process of creating a 3-D image unfolds in three stages, as shown in Figure 13.

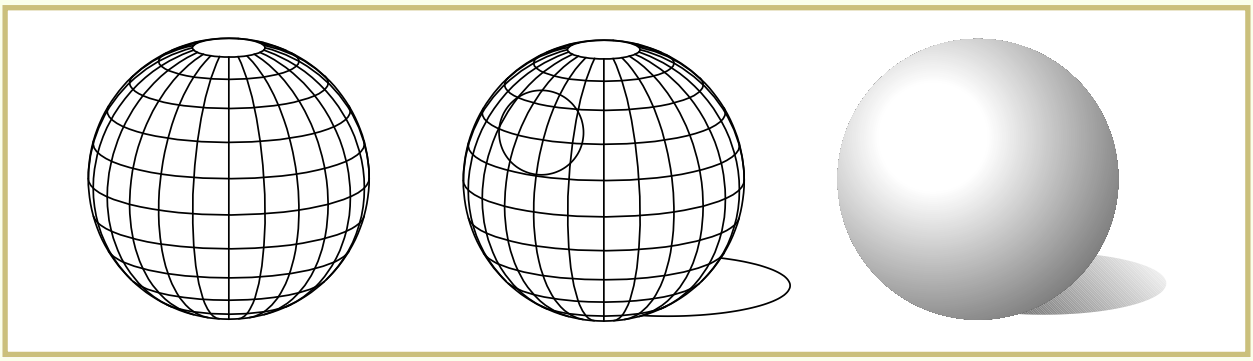

FIGURE 13—Creating a 3-D image involves three stages: modeling, lighting, and rendering.

1. Through a process known as *modeling*, the artist first draws a 3-D model or frame on the screen.
2. The artist then applies lights and shadows in order to create a sense of the object's position and orientation in space.
3. Finally, through a process known as *rendering*, color and texture are added to the frame to give the appearance of solidity.

Calculating the size, shape, and orientation of 3-D objects requires powerful hardware and sophisticated graphics tools. With the proper equipment and software, a trained computer artist can create stunningly realistic images and eye-catching special effects.

A number of 3-D rendering programs enable users to create animated images. Very simply, animation involves creating the illusion of movement by rapidly displaying a series of images that show extremely slight changes in the position of an object. Each image is called a *frame.* A display of 12 to 15 frames per second, or *fps,* will produce a rather jerky illusion of movement. Motion appears to be much more fluid and naturalistic at 24 to 30 fps.

One of the principal methods of simulating movement in three dimensions is known as *key-frame animation.* The start and end positions of a given animated object are known as *key frames.* To create a 3-D animation project, an animator selects key frames and instructs the computer to calculate and draw all the intervening stages. Certain animation software packages create time lines, which track the movement of several objects at once. Others create links between objects, so that the movement of one object will automatically affect other objects in the scene.

Computers give animators the power to create spellbinding environments and characters, which can be seamlessly integrated into movies, videos, or computer games. Live-action sequences, filmed against a blue backdrop, can be pasted into 3-D animation sequences to create the illusion of actors being chased by dinosaurs, dragons, and a host of other improbable creatures. Three-dimensional computer game animations, often referred to as *virtual worlds,* typically allow players to interact with objects and other characters by using a keyboard, mouse, or other input device.

Electronic Publishing

Recent years have witnessed a dramatic growth in the field of *electronic publishing,* which aims at creating documents intended for viewing on a computer screen rather than a printed page. Technically speaking, any document created on a personal computer is an electronic document. However, paperless documents frequently combine text and graphics with video, sound, and various types of animation. For this reason, electronic documents are usually referred to as *multimedia documents.*

A good example of a multimedia document is an encyclopedia stored on CD-ROM. *CD-ROM,* which stands for *Compact Disk Read Only Memory,* is a type of portable storage media. You might think of a CD-ROM as a cross between an audio CD and a floppy disk. However, whereas audio CDs only store music, CD-ROMs can also store text, graphics, and computer codes that enable users to work with a specific program in a variety of ways. In the case of a CD-ROM encyclopedia, for example, users can look up articles by typing in key words or concepts. They can also look at photographs, watch film clips, and listen to audio recordings.

Many corporations have begun to consider the advantage of using multimedia documents as a means of promoting products and services, or to communicate with employees. Traditionally, corporate presentations have required bulky props such as flip charts, overhead projectors, and VCRs, as well as printed handouts and brochures. Advances in electronic publishing now make it possible for presentations to be prerecorded on computer disk. In addition to text, charts, and tables, multimedia computer presentations may contain a variety of special effects, such as music, fade-ins, dissolves, and images that literally "jump" around the screen!

Meanwhile, the increasing popularity of the *Internet* has opened a new frontier for computer artists. The Internet can best be described as a loosely organized, international computer network. In order to access the Internet, typical users need a computer and a modem. A *modem* is a device that encodes data from one computer and sends it via telephone line or some other transmission medium to another computer. Once connected, users can distribute and view a wide range of publications—some of which include multimedia elements—and send messages of various kinds to an audience of millions!

One of the main factors contributing to the rapid expansion of the Internet has been the growth of the *World Wide Web,* often referred to simply as the *Web,* or *WWW.* The Web is a specialized segment of the Internet that employs (like *Windows 95*) a *graphical user interface,* or *GUI.* A *GUI* makes it possible to communicate with a computer program by pointing to icons and menus with a mouse, which is far easier for most users than typing hard-to-remember commands. The graphical nature of the World Wide Web makes it very easy, and often quite entertaining, to search for information and communicate with other users.

The Web is made up of electronically designed documents called *pages.* Unlike a printed page, however, a Web page isn't limited to a particular length or width. Each page is actually a computer file that may contain several screens' worth of text, graphics, multimedia elements, and hypertext links (Figure 14). *Hypertext links* are specially coded words or pictures,

much like those used in *Windows* help files. Clicking on a hypertext link can automatically transfer a user to another part of the same document, or to another Web page stored on a computer halfway around the world.

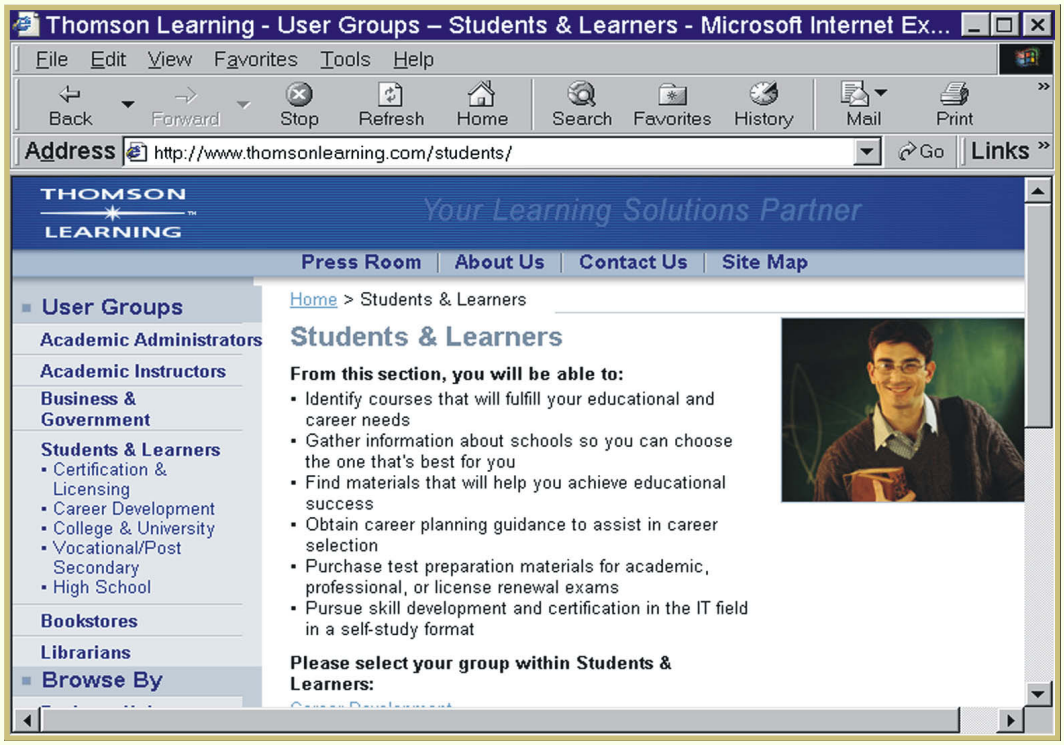

FIGURE 14—A Web page contains text, graphics, and other multimedia elements.

Web pages can display both still and animated images. Two of the most common image formats used in Web page design are *GIF* and *JPEG*. *GIF* stands for *Graphics Interchange Format*. The format was developed by CompuServe as a means of *compressing*, or shrinking, pictures and translating the information contained in them into a numeric code that could be transmitted by modem over standard telephone lines. *JPEG*, also referred to as *JPG*, is a compression format named after the *Joint Photographic Engineering Group* that designed it. Whereas GIF works more effectively with nonphotographic images, JPEG is used almost exclusively to compress photographic images.

As advances in technology make it possible to rapidly transmit large files over the Internet, many Web pages are beginning to incorporate animated sequences. This is particularly evident in the growing popularity of 3-D virtual worlds, which allow visitors to navigate the solar system or an Italian village square using a mouse and cursor keys.

The GIF format lends itself particularly well to Web page animations. *GIF animator programs* enable artists to string together related images as individual frames in a single GIF file. Each image must change slightly in terms of position, shape, or size. When inserted into a GIF sequence, the image will shift up, down, right, and left with each change in size. The finalized file displays all the images in sequence, much like flip-book animation. Animated GIFs include flashing banners, scrolling marquees, and rotating product advertisements.

Ease of Reproduction

Computer images can be easily transferred to floppy disk—or some other type of removable storage medium—and distributed to other computer users. They can also be transmitted from one computer to another over standard telephone lines or via satellite. Thus, a photograph taken in Southeast Asia can be sent to a thousand different cities in the United States in a matter of minutes. In fact, Reuters, the Associated Press (AP), and other news agencies commonly rely on this method of distribution. If you look directly below a photograph in your local newspaper, you'll probably see a credit for The Associated Press or a similar news agency.

Computers create and store information as long strings of zeros and ones, which are referred to as *digital files.* Just as computer processors translate these strings into words and pictures on the screen, digital printers turn digital code into printed text and images. Nowadays, few magazines—and even fewer newspapers—go through the process of building and photographing mechanicals and transferring the negatives onto printing plates. Instead, photographs and other original images are converted into digital files, manipulated on a computer screen, and sent directly to a digital printing press. The speed and efficiency of digital printing is generally far superior to traditional methods and usually produces cleaner, crisper output (Figure 15).

Original Photograph

Digital Printing Press

Digital Imaging PC

Finished Printed Piece

FIGURE 15—A photograph can be converted into a digital image and sent directly to a digital press for fast, easy reproduction.

As computer graphics applications become more popular, more sophisticated methods of reproducing digital images are constantly being developed. In recent years, animation and multimedia experts have developed formats for storing and reproducing complex animations and detailed

video sequences. These sequences can be transferred directly from computer to videocassette or CD-ROM, or transmitted at high speeds over the Internet. One popular format is *MPEG,* which stands for *Moving Pictures Experts Group. MPEG* is an internationally recognized standard for compressing and encoding video that basically works by filtering out repetitive visual information. MPEG compression can compress video data by almost 200 percent, and the format can support full-screen playback at a realistic speed of 30 fps.

Two other common formats are *Video for Windows*—also known as *Audio Video Interleave,* or *AVI*—and *QuickTime.* AVI files are designed to be played in a Windows-operating environment. QuickTime animation, originally developed by Apple Computing, can be played on both Macintosh and Windows PCs. Both formats compress information much more tightly than MPEG, so storing, reproducing, and transporting is quite simple. Unfortunately, neither format currently supports full-screen playback, and playback speed ranges between 12 and 24 fps.

Depending on the size of the finished file, animation sequences can be recorded to a variety of computer media for easy storage, transfer, and reproduction. For example, a high-density floppy can hold up to 1.4 megabytes (MB) of data, which is suitable for storing small AVI or animated GIF files. CD-ROMs, currently the preferred storage format for complex multimedia projects, can store more than 600MB of data. Several other options are also available.

Tape drives, available as either internal or external devices, are among the most affordable and reliable options for storing extremely large files. However, access can be somewhat slow. *Cartridge drives* are a relatively inexpensive, handy alternative to tape. Available as either internal or external devices, cartridge drives can store anywhere from 100 to 1000MB, depending on the capacity of the drive. Both cartridges and external devices are small enough to offer great portability. They make it easy to shuttle data between your office and your client's office. Unfortunately, most cartridges are designed according to a *proprietary format,* which means they'll only work in drives made by the same manufacturer.

Magneto-optical (MO) drives combine the reliability of tape, the durability of CD-ROMs, and the portability of cartridges. Like cartridge drives, most MO drives are proprietary. However, since many design firms and services bureaus are equipped with MO drives, you may want to consider this option for storing and transporting files.

Whether you begin by using a photograph or an image drawn on the computer screen, today's hardware and software can help you express yourself with startling effectiveness. In the next section, you'll have a chance to explore some of the diverse opportunities available to computer artists.