After finishing this chapter, you should be able to:

- Provide a brief definition of the following terms: billboard, breakpoint, dialog balloon, font, HSB, personification, RGB, tessellation, text, thought bubble, and typeface
- List and describe the different ways to add text to an Alice world
- Use the say and think methods to add text messages to an Alice world
- Place messages in a special zone below Alice's playing world window with the print instruction
- Add 3D text objects to an Alice world
- Create a billboard from a picture file and manipulate it in an Alice world
- Add sound to an Alice world
Chapter 6 • Text and Sound in Alice Worlds

ADDING ELEMENTS OF LANGUAGE TO AN ALICE WORLD

Even in a visually rich, three-dimensional, animated virtual world, it is still important to be able to communicate using words—both visually and verbally. Back in Chapter 1, in Tutorial 1B, the first Alice world you created was a version of the traditional Hello, World! program. As you may recall, this program contained a text message. The word text is used to describe the visual use of words (that is, the written language) in a computer program.

You can show text in an Alice world by:

- Using the say and think methods to show an object’s speech and thoughts.
- Using the print instruction to show messages in a special zone below the playing world window.
- Adding 3D text as an Alice object.
- Placing a picture file with an image of text in an Alice world as a billboard.

The remainder of this chapter includes a brief discussion of each of the items in the preceding list. In addition, you will learn about sound files, which contain verbal messages that can be added to an Alice world and then played using an object’s play sound method.

The discussions in the chapter are then followed by tutorials showing you how to use the respective techniques.

THE say AND think METHODS

Let’s start with a discussion of the say and think methods. Figure 6-1 shows a scene from a playing Alice world with text produced by the say and think methods. The text created by these methods appears in what animators call balloons or bubbles, much like text appears in cartoons in a newspaper or magazine. A dialog balloon shows words that are supposed to have been spoken by an object, and a thought bubble shows words that reflect an object’s thoughts. In Figure 6-1, Alice is shown saying “Simon says ‘Jump!’” in a dialog balloon produced by a say instruction, while the Cheshire cat’s thoughts are shown in a thought bubble.
The say and think methods can be used with every object in Alice, including inanimate objects like rocks, trees, buildings, and vehicles. Figure 6-2 shows a thought balloon associated with a beach chair. Obviously beach chairs can’t think. The process of giving human qualities, such as feelings, thoughts, or human-like movements, to inanimate objects is a form of personification.
Personification has a long tradition in literature, often being used by poets and playwrights. Shakespeare’s *Romeo and Juliet* contains the line “An hour before the worshipped sun peered forth from the golden window of the East.” The sun is portrayed as looking through a window, like a person would do. Shakespeare, like other writers, often used personification when describing things like a smiling moon. In cartoons seen on television, such as Warner Brothers’ *Looney Tunes*, object like trees, hammers, and anvils often walk, run, or speak. The use of the `say` and `think` methods with nonhuman objects in computer animation, such as Alice worlds, is an extension of this tradition.

The Alice `say` and `think` methods work almost identically, with parameters to allow you to change the message itself. You can also change the font used for the text, the size of the text, the color of the text, the color of the bubble in which the text is displayed, and the amount of time that the message stays on the screen. Tutorial 6A will show you more about using the `say` and `think` methods.

**THE `print` INSTRUCTION**

The `print` instruction can be used to display messages or the value of variables and parameters in a special text zone at the bottom of a running Alice world. Figure 6-3 shows an Alice world with a text (or print) zone at the bottom of the window for the playing world.
The print instruction is often used to show someone the value of a variable while a world is playing. For example, in a world with a moving vehicle, such as a car, the object’s location in three-dimensional space and its speed could be displayed.

Sometimes the value of a variable is displayed using the print instruction while debugging a world. The print instruction could then be removed once the program is debugged. For instance, the nervous penguin world from Tutorial 5B is an example of where this could be done. The world contains two penguins, a nervous penguin and a moving penguin. The nervous penguin is supposed to react whenever the moving penguin comes within 2 meters of the nervous penguin. The distance from the moving penguin to the nervous penguin could be displayed using a print command so that the programmer could see how far apart the penguins are from one another when the nervous penguin begins to react to the presence of the other penguin, as shown in Figure 6-4. Tutorial 6B will show you more about the print instruction.
You can also use the `print` instruction when debugging a program to show that a breakpoint has been reached. A breakpoint is a spot in a computer program just before or just after some action occurs. For example, if a printed message shows that a point has been reached where a bunny should jump, but the bunny does not jump, then that information helps to isolate the spot in the code where the problem occurred. This is especially useful in the case where one method calls another method. The person debugging the software can tell if a problem is in the method doing the calling, or in the method being called. As with many things about learning Alice, this use of the `print` instruction is more useful in long, complex programs than in short, simple programs.

### 3D Text in Alice

Unlike the text used with the `say` and `think` methods or the text in a `print` instruction, 3D text is implemented in Alice as its own object. It can be used to communicate with the user or as an integral element in an Alice world. For example, the 3D text could be an object that is used as part of a story. However, most often, 3D text is used for titles, such as the opening title at the beginning of an Alice world, or for the phrase “The End” at the end of a narrative Alice world. Figure 6-5 shows an example of 3D text in an Alice world.
The Alice Local Gallery contains a folder to create 3D text objects. Because 3D text is implemented as an Alice object, methods, such as move, turn, and roll, can be used to animate the text. User-created methods can also be developed to provide special effects for 3D text, just as they can with any other object. 3D text can also be resized like any other object, but it does have several special properties which other objects do not have, such as font and extrusion, which affect the way in which the text is displayed on the screen. The font property works like the font property of any other text, while the extrusion property controls the depth of the text, from front to back.

In Alice, unlike in many other programming languages, you cannot create an instance of an object in a world while the world is running. This means that 3D text in an Alice world must be kept off-camera or made invisible to hide it from the user until it is needed on screen or until it is no longer needed. Each object in Alice has a Boolean isShowing property that can be set to false to make an object invisible. An object’s opacity property, which determines if the object is solid or transparent, can be changed to make an object invisible. Tutorial 6C will provide you with more details about 3D text.
PICTURE FILES AS ALICE BILLBOARDS

A picture file can be added to an Alice world as a billboard. A billboard is a flat two-dimensional object with length and width, but no depth. Once placed in an Alice world, the image from the picture file will be seen on both the front and back of the billboard. Like the 3D text described in the preceding section, billboards are objects that can be manipulated with primitive methods, like move, turn, and roll, as well as with user-created methods. Figure 6-6 shows a photograph of the Mona Lisa that has been added to an Alice world as a billboard.

The current version of Alice easily imports files in the Graphics Interchange Format (GIF) and the Joint Photographic Experts Group format (JPG), but often has difficulty with other common picture file formats, such as the bitmapped file format (BMP) and Tagged Image File Format (TIF). Anyone who adds pictures files to an Alice world as billboards should keep in mind that some pictures can be very large and will add significantly to the size of the Alice world. In addition, the pictures will be rerendered (redrawn) by the Alice graphics engine and may lose some of their clarity.

Many graphics manipulation programs, even simple programs like Microsoft Paint, allow the user to create and save text as an image file. Titles, credits, and instructions for users can be presented in an Alice world as a billboard that was created and saved as a picture
file. Figure 6-7 shows a set of instructions for playing a guessing game that have been placed in an Alice world as a billboard. These instructions were first typed in Microsoft word and then cut and pasted into an image in Microsoft paintbrush; then the saved picture file was imported into Alice as a billboard.

FIGURE 6-7: An Alice billboard with instructions for playing a guessing game

I'm thinking of a number between 1 and 100.

Try to guess what it is.

Each time you guess, I will tell you if your guess is too low, too high, or correct.

SOUNDS IN ALICE

Each object in an Alice world has a primitive play sound method that can be used to play a sound file. Sound files are most often used in Alice worlds to add special effects, such as the sound of a doorbell, or to play background music as a scene unfolds. A list of several sound recordings that are included with Alice will appear on a pop-up menu that appears when the play sound method is used, as shown in Figure 6-8.

FIGURE 6-8: A menu showing the prerecorded sounds for the Alice play sound method
Notice that the menu also includes options to import a sound file and to record a new sound. Prerecorded sound files in the WAV or MP3 formats can be imported into Alice, and new sound files can be recorded directly using the Alice interface. Sound files are stored as properties of an Alice object, but a sound file stored as part of one object can be played by any other object in Alice as well.

You can record someone speaking and then use the recording to represent the voice of an object or to provide audio instructions for the user of an Alice world. For example, an event could be created to play a recording of someone speaking to provide directions on how to use the controls for a flight simulator. The directions could be recorded and saved as a property of the airplane, with an event in place to play the recording whenever someone presses the H key for help. The use of the *play sound* method in Alice is covered in Tutorial 6E.

**TUTORIAL 6A—USING THE say AND think METHODS**

In this short tutorial you will revisit the *hello world* program from Chapter 1 to learn more about the *say* and *think* methods. *World.my first method* in the program from Tutorial 1B already contains two *bunny say* tiles, as shown in Figure 6-9. In this tutorial, you will learn how to manipulate the text in these two *say* methods.

**NOTE** The *think* method functions almost identically to the *say* method, except that its text is displayed in a thought bubble instead of in a dialog balloon.

1. Open the *hello world* Alice world created in Tutorial 1C, or a copy of the world from the CD that accompanies this book.
2. If you cannot see the instructions in world.my first method, select the world tile in the Object tree and the methods tab in the Details area, and then click the edit button next to the name of the method on the methods tab. You should see the method displayed in the Editor area.

3. Click the word more following the phrase Hello Dr. Kernighan! in the second say instruction. You should see a short menu, as shown in Figure 6-10, with several additional parameters for the say method. The think method has the same parameters.

4. Select fontSize, and then 30. Note that the choice of 20 is the default size for all say and think text in Alice.

5. Save the world again, and then play it to see the effect of your change.

The duration parameter determines how long, in seconds, the message will remain on the screen. It is used just like the duration parameter in many primitive Alice methods, such as move and turn. The bubbleColor parameter affects the background color, and the textColor parameter affects the font color for the messages displayed by the say and think methods. The default values for all durations in Alice is 1 second; the default for say and think bubbles is black text on a white background, and the default font for all text-based items in Alice is Arial. The number for the fontSize parameter refers to the point size of the text, but the actual size depends on the size of the window in which the world runs, as well as the computer’s screen resolution. The fontName parameter is the name of the chosen font.

Let’s take a look at how to change these values.

1. Click the word more after Hello World in the say Hello World instruction, and then select bubbleColor from the menu that appears.

2. A color menu will appear with 16 different options, including no color at the top, a list of 14 colors, and other at the bottom, as shown in Figure 6-11. Select yellow as the new bubbleColor. Notice that the color of the bubbleColor parameter box in the say tile is now yellow.
3. Now, click the word more after the **bubbleColor** parameter and change the **textColor** to **brown**.

4. Play the world to see the effect of the changes you made.

5. Leave the world open for use in the next set of steps.

The **other** option on the **bubbleColor** and **textColor** menus will take you to a custom color dialog box, which will let you set the color in one of three different ways: by picking a swatch from a predefined palette of colors, by using HSB color values, or by using RGB color values. **HSB** stands for Hue, Saturation, and Brightness. (Brightness is also called Brilliance.) **RGB** stands for Red, Green, and Blue. These are two different color models for describing the color of a pixel on a computer screen, which is determined by blending red, green, and blue light. It can also be described by setting the hue for the pixel’s color, the color saturation, and its brilliance, as shown in the following steps:

1. Click the **bubbleColor** parameter in the say Hello, world! instruction tile and select **other** from the menu that appears. You should see the **Swatches** tab in the Custom Color window, as shown in Figure 6-12.

2. Pick a light green color from those available on the palette, click **OK**, and then play the world again to see the effect.

3. Next, click the **bubbleColor** parameter and select **other** again. This time, click the **RGB** tab. Figure 6-13 shows the RGB tab. You can set the color on this tab by entering values in the input boxes for red, green, and blue, or by using the slider controls. The effect of your changes can be seen in the previews at the bottom of the window. Experiment a bit with the colors before continuing.
4. Select the **HSB** tab, and you will see the HSB color controls as shown in Figure 6-14. You can enter numbers in the input boxes for hue, saturation, and brightness or slide the hue control arrow up and down, and then click.
a spot on the rectangle to set saturation and brightness. The equivalent RGB values will be shown in the information boxes below the HSB input boxes.

5. Click the S (for saturation) radio button, and you will see that the slider control now affects saturation; note that clicking on the rectangle will affect hue and brightness.

6. Click the B (for brightness) radio button, and you will see that the slider control now affects saturation; note that clicking on the rectangle will affect hue and saturation.

7. The textColor parameter is changed the same way that the bubbleColor parameter is. Experiment with setting the colors and playing the world before continuing. Be careful—if the textColor and bubbleColor parameters are the same, the text will be invisible. Select colors that you like or change them back to black and white before continuing.

You can use the fontName parameter to set the typeface for the say and think methods. The default typeface is Arial. The typefaces that will work are determined by the Alice software and how it interacts with the operating system on the computer you are using. Not every typeface that is available on your computer system in programs like Microsoft Word or Internet Explorer will work with the Alice say and think methods. Figure 6-15 shows a few of the typefaces that have worked with the current version of Alice in different environments.
The only way to be sure which typefaces will work on your system is by trial and error. Arial and Times New Roman will almost always work. The following steps will show you how to change the typeface by changing the `fontName` parameter.

1. Click the word `more` after the text in the bunny `say Hello Dr. Kernighan!` tile.
2. Select `fontName` from the menu that appears, and then `other`.
3. You should now see a small window that will allow you to enter a string. This is one of the weakest parts of Alice. You must type the name of the typeface you wish to use, rather than selecting it from a list as with other parameters. Type `Times New Roman` as the new `fontName`, and then click `OK`. Capitalization is not important, but spelling and spacing are.
4. Play the world, and you should see the first message in the Arial typeface and the second in the Times New Roman typeface.
5. Try experimenting with some of the typefaces shown in Figure 6-15 to see if they work on your system before continuing.

The `say` and `think` methods can be used to display information about the world, although they are more commonly used as elements of an Alice world’s story or simulation. Many fonts almost have a personality of their own, and particular fonts can be used for particular characters in a story or for particular situations.

Some special typefaces for characters from languages other than English don’t work, but Arabic, Hebrew, and Cyrillic characters can often be cut from Microsoft Word or from a Web browser and pasted as the text for the `say` and `think` methods. Figure 6-16 shows an example of this. The Greek phrase Γειά σου κόσμε! (translation: Hello World!) has been cut from Microsoft Word and pasted into a `say` method.
TUTORIAL 6B—THE **print** INSTRUCTION

The *print* instruction can be used to display information in a special print zone below the playing world window, as shown in Figure 6-17. The text displayed here is very simple plain text and cannot be formatted. You can print any text string as a message in the print zone, or you may print the names of objects and the values of variables and parameters from a running world.
In this tutorial you will print the distance between two penguins in the nervous penguin world, and you will print a message showing when the point in the program has been reached where the nervous penguin should jump.

1. Open the nervous penguin world that was created as part of Tutorial 5B, or open a copy of the world from the CD that comes with this book.
2. Select the nervousPenguin tile in the Object tree and the methods tab in the Details area.
3. Click the edit button next to the react method button on the methods tab, and the method should be displayed in the Editor area. It contains instructions to make the nervous penguin jump up and to flap its wings.
4. Drag a print instruction tile from the bottom of the Editor area and drop it in the method in front of the instructions that are already there.
5. A short menu will appear with two options, text string and object. Select text string and an Enter Text String widow will appear. Type begin reaction and click the OK button.
6. Now play the world and use the arrow keys to control the moving penguin. When it gets close to the nervous penguin and the react method is called, the `begin reaction` message should be displayed in the world window. In this case, because the code should work, the nervous penguin will start to react at the same time, but you can see how this might be useful if the nervous penguin were not reacting.

7. It is not necessary to save the world before continuing, but if you do so, use the `Save World As` menu option and give the world a new name to preserve the original nervous penguin world.

Another useful debugging technique is to display the value of a variable or parameter while a world is running. Let’s add an instruction to the triple jump while loop world from Tutorial 4D to display the value of the distance variable, which is used as the loop counter and also controls the height of the Cheshire Cat’s jump.

1. Open the `triple jump while loop` world from Tutorial 4D or a copy of the world from the CD that comes with the book.
2. If you cannot see `world.my first method` in the Editor area, select the `world` tile in the Object tree and the `methods` tab in the Details area.
3. `World.myfirst method` contains a while loop to make the characters jump. The `cheshireCat jump` instruction uses distance as the value of its height parameter. Drag the `print` instruction from the bottom of the Editor area and drop it in `world.my first method` just above the `cheshireCat jump` instruction.
4. When the print menu appears, select `object`, then `expressions`, then `distance`. The print instruction tile should now say print distance, as shown in Figure 6-18.

**FIGURE 6-18:** A message displaying the value of distance in the print zone
5. Try playing the world. You should see messages that display the value of the distance variable appearing in the print zone. It is not necessary to save the world, but if you wish to do so, save it with a different name to preserve the copy of the world without the print instruction.

TUTORIAL 6C—THREE-DIMENSIONAL TEXT

In this tutorial you will add opening titles to the generic triple jump world created in Chapter 2. Messages and titles can be added to an Alice world as three-dimensional text. Once in the world they can be animated and manipulated just like any other Alice object by using primitive methods or creating new methods of your own.

You can add 3D text to a world through the object gallery or by using the Add 3D Text option on the File menu. Both ways of starting the process take you to the same place and produce the same results. In the first part of this exercise, you will add an opening title using the object gallery.

1. Open the generic triple jump world created in Tutorial 2C, or open a copy of the world from the CD that comes with this book.
2. Click the ADD OBJECTS button to enter Scene Editor mode and see the object galleries. Scroll through the Local Gallery until you find the Create 3D Text tile. It’s on the far right side of the Local Gallery.
3. Click the Create 3D Text tile, and you should see the Add 3D Text window, as shown in Figure 6-19. It has a place to enter your text, a button with a pull-down menu to select a font for the text, and buttons for bold-face and italicized text effects.

![Figure 6-19: The Add 3D Text window](image)
4. Type the camelCase name `openingTitle` as the text for the new object. You’ll come back to the other controls in just a minute.

5. Click the **OK** button, and you will see the text appear in the Alice world. In addition, a tile for the text object will appear in the Object tree. The tile will have the name that you just typed: `openingTitle`.

6. Now that the object has been created using the text you typed as its name, you can change the text to be what the opening title should say. Click the `openingTitle` tile in the Object tree and then the **properties** tab in the Details area.

7. Click the words `openingTitle` next to the **text** property on the properties tab and change the text from `openingTitle` to **Triple Jump**. Press the **Enter** key after you have finished changing the text. Notice that the text has changed in the Alice world window, but the object retains its original name, `openingTitle`, in the Object tree.

You can get back to a window similar to the Add 3D Text window through the **font** property on the properties tab at any time to change the typeface of the 3D text. However, there is no property for size. Because 3D text is an object in Alice, it is resized like other objects, by using the primitive `resize` method. Let’s take a look at the **font** property.

1. Click the button next to the **font** tile on the **properties** tab in the Details area. The button is labeled with the name of the font, which will probably be **Arial**, but could be something different, depending on your computer system and how it has been used. This will open the Choose a Font window, as shown in Figure 6-20. Notice that it looks very much like the Add 3D Text window shown in Figure 6-19. You can see the text in the Choose a Font window, but unlike the Add 3D Text window, you cannot change the text. You can make changes to the text by using the buttons near the bottom of the window.
2. Click the **typeface** button, and a scrolling menu with the names of all the typefaces currently available will appear. This is much more convenient than the way in which the **fontName** parameter is changed for the text for the **say** and **think** methods, which you saw back in Tutorial 6A.

3. Take a moment to try a few of the typefaces from the list. You will notice that several of the more uncommon typefaces won’t work because Alice has not been programmed to render 3D text using them. More common fonts, such as Arial, Times New Roman, and Courier New, should work.

4. Before continuing, select a typeface and color for your title by changing the **font** property and the **color** property on the **properties** tab.

Next you will position the **openingTitle** title in the Alice world. This can be done in Scene Editor mode or by running primitive methods directly. In the next several steps you will use the primitive methods approach.

1. Right-click the **openingTitle** tile in the Object tree, select the **openingTitle move** method, select **up**, and then select **2 meters**. If 2 meters is not an available option, then select **other** and type **2** in the Custom Number dialog box, then press **Enter**.

2. Right-click again **openingTitle** in the Object tree, select **methods**, and run the **openingTitle turn to face** method to make the text face **the camera**.

3. If the entire title does not fit in the world window, right-click **openingTitle** in the Object tree, select **methods**, and run the **openingTitle move** method to move the title backward a few meters. If you go too far back, or not far enough, you can use the **move** method again to move it a little more forward or backward. Don’t forget that you can also use the **Undo** button.
It may take a few minutes to line it up in a way that looks just right. Position the text so that you think it looks good in relation to the three characters. Figure 6-21 shows one possibility. Keep in mind that when you play the world, the text will disappear before the three characters begin to jump, so it’s okay if the text overlaps the characters.

A 3D text title looks nice, but normally we don’t want the text to remain on the screen for the entire time a world is running. The text can be made to turn, roll, move, etc, including moving off-camera, by creating methods and events as desired. In addition, if you so choose, the text can also be left in place but made invisible. In the next few steps, you will add instructions to make the title disappear a few seconds after the world starts playing. There are two ways to make the title invisible: by changing the `isShowing` property or by changing the `opacity` property. You will try both.

1. Select the `world` tile in the object tree and the `methods` tab in the Details area. Click the `edit` button next to `my first method` and `world.my first method` should appear in the Editor area.
2. Drag a copy of the `Wait` instruction tile from the bottom of the Editor area and drop it into `world.my first method` as the first instruction in the method. When the menu appears, set the duration to 2 seconds.
3. Next, click the properties tab and drag a copy of the isShowing property tile into the method below the Wait instruction. Select false from the menu that appears. Dragging a property tile into a method will create an instruction to change that property’s value. The method should now look something like Figure 6-22.

4. Now play the world and watch what happens. If you have followed the steps correctly, then the title should disappear after two seconds.

If you played the world again, you would notice that the title disappears very abruptly. In film and video production, this abrupt change is called a cut. A director may cut from one scene to another or cut a title from a scene. The term fade applies to a more subtle transition in which an object or a scene slowly disappears. In Alice, you can cause a fade to occur by using the opacity property.

1. First, right-click the openingTitle set isShowing to False instruction tile in the Editor area and select delete from the menu that appears. The tile should disappear from world.my first method.
2. Select the openingTitle tile in the object tree and the properties tab in the Details area.
3. Drag a copy of the opacity property tile into the method below the Wait instruction. Select 0%: invisible from the menu that appears.
4. Now play the world again, and you should see the title fade away instead of disappearing abruptly.

This world will not be used further in this book, but you may want to experiment with it a little on your own. You can experiment with the font and with the bold and italics effects. You can resize the text in the Scene Editor mode, just as you would any other object. In fact, you may want to add a second title that says “created by <your name>”, and then have the text fade or move on screen and then off from the side, from above, or even from below.

TUTORIAL 6D—PICTURE FILES AS ALICE BILLBOARDS

Picture files containing text and diagrams can be added as billboards in an Alice world. In this tutorial, you will add a picture file to a new Alice world to see how this is done. To aid you in this tutorial, you will find that the disk that comes with this book contains a file named Mona Lisa.jpg. This is an image of Leonardo DaVinci’s Mona Lisa from the Louvre in Paris. The image is a photograph of the painting in its frame.

1. Before trying to import the picture file into Alice, copy it from the CD to the computer you are using. You need to put the picture file someplace where it can easily be found from inside Alice, such as in the root directory on the primary hard disk drive of the computer you are using, which will probably be the C: drive. If you are doing this as part of a course, check with your instructor to see where you should place the file. The most important thing is to use a directory that you will be able to find in Step 4.

2. Start a new Alice world with a grass template.

3. Click File on the menu bar, and then click Make Billboard. Your screen should resemble Figure 6-23.
4. Find the directory where you stored the file Mona Lisa.jpg. Click the name of the file, and then click the Import button. The picture should appear in the world, as shown in Figure 6-6 earlier in this chapter.

The picture file may now be manipulated like any other object, using the tools in the Scene Editor mode, primitive methods, or any user-created methods that you write for the object. You may want to experiment with the Scene Editor tools and perhaps use a few methods to make the picture move around a bit. You can also use the opacity property to make the picture opaque or invisible, as was shown with 3D text in the previous tutorial. If you rotate the object, you will notice that it has no depth, that it is flat like a sheet of paper, and that the original image appears on both sides.

A curious side effect of adding a picture file to an Alice world as a billboard is that the image is now available as a texture map that can be used for other objects. To see how this works, you may want to try the following:

1. Click the ground tile in the Object tree, and then the properties tab in the Details area.
2. Click ground.GrassTexture next to the skin texture tile.
3. A small menu will appear, and you will notice that *Mona Lisa*Mona Lisa_texture appears as an item on the menu. This is the image from the original *Mona Lisa.jpg* picture file. Select this as the skin texture for the ground, and the Mona Lisa with its frame will now be used as the image file for the surface of the ground.

4. Save the world as **tessellation sample** before continuing.

A repeated pattern of an image on a surface is called a **tessellation** of the surface. The Mona Lisa is now being used to form a tessellation on the ground. You may want to enter Scene Editor mode and move farther above the surface to look down to get a better view of the tessellated ground.

You can use any image as the surface for the ground. Figure 6-24 shows an Alice world tessellated with an image of the White Rabbit. In a similar manner you could use an image file as the surface for any object, such as the shapes found in the Local Gallery’s shapes folder. The image will be distorted to fit the surface of the shape, but in some cases, it may be recognizable.

**FIGURE 6-24:** Alice in a world tessellated with the image of the Mona Lisa
Using image and sound files in Alice raises the issue of copyrights. You must be careful when using copyrighted material, such as text, sound, and images in an Alice world or in other computer programs that you create. Section 107 of the US copyright law (Title 17, US code) describes the doctrine of fair use of copyrighted material, which covers the educational use of such material. It can be found on the Web at: http://www.copyright.gov/title17/92chap1.html#107. The concept of fair use is explained on the Web at: http://www.copyright.gov/fls/fl102.html. The courts have generally agreed that students and teachers may use copyrighted material for instructional use provided that the material is used only for “educational purposes in systematic learning activities at nonprofit educational institutions,” and that the material satisfies certain “portion limitations.” An educational presentation may include the following:

- Up to 10% or 1,000 words, whichever is less, of a copyrighted text work. For example, an entire poem of less than 250 words may be used, but no more than three poems by one poet, or five poems by different poets from any anthology.
- Up to 10%, but in no event more than 30 seconds, of the music and lyrics from an individual musical work.
- Up to 10% or three minutes, whichever is less, of a copyrighted motion media work (for example, an animation, video, or film image).
- A photograph or illustration may be used in its entirety but no more than five images by an artist or photographer may be reproduced. When using photographs and illustrations from a published collective work, no more than 10% or 15 images, whichever is less.
- Up to 10% or 2,500 fields or cell entries, whichever is less, from a copyrighted database or data table may be reproduced. A field entry is defined as a specific item of information, such as a name or Social Security number, in a record of a database file. A cell entry is defined as the intersection where a row and a column meet on a spreadsheet.

One excellent comprehensive source of information about copyright and fair use is the Stanford University Libraries’ Copyright and Fair Use Website at: http://fairuse.stanford.edu/.

TUTORIAL 6E—SOUND IN ALICE WORLDS

In this short tutorial you will add sound to a very simple Alice world using a sound clip that comes with Alice. In addition to using the prerecorded sounds that are supplied as part of the Alice software, you may also import sound clips from an external file or record your own sound clips.

Figure 6-25 shows the portion of an object’s properties tab that deals with sound. You can see that the properties tab has buttons to import sound and to record sound. It also has tiles for sound clips that have been previously imported or recorded. There are three tiles for three sound clips shown in Figure 6-25: one named Pacino, one named sylvester, and one named instructions. Next to each there is a green triangular button that you can use to preview a sound directly before using it in your world.
You can also rename a sound clip by right-clicking on the sound clip tile and then changing the name, and you can delete a sound by dragging it to the trash can.

Of course, to play sounds in Alice you need to have a computer with an active sound card, and to record sounds, you will need to have a properly working microphone connected to your computer. You will need to check with your instructor or the person who maintains the computer you are using to find out about its sound card and microphone. If your computer does not have sound, you should still read through the tutorial to get a feeling for how sound works in Alice. In these steps, you will add a chicken to a new Alice world and set up an event so that the chicken will make a chicken sound whenever the spacebar is pressed.

1. Start a new Alice world with a grass template.
2. Click the ADD OBJECTS button to enter Scene Editor mode and add a Chicken to the world from the Animals folder in the Local Gallery.
3. Click the DONE button after you have added the Chicken to the world. Notice that the Chicken is one of the few objects whose instance name starts with a capital letter. There is no special reason for this other than the fact that the programmer who created the Chicken class of objects did so.
4. Click the create new event button in the Events area and select When a key is typed from the menu that appears.
5. Click the any key box in the tile for the new method and select Space from the menu that appears.
6. Next, make sure that the Chicken is selected in the Object tree, and then click the methods tab.
7. Drag a copy of the Chicken play sound tile from the methods tab and drop it in the new event in place of the word Nothing.
8. A menu of available sounds will appear. Select chicken from the list that appears.
9. Play the world, and whenever you press the spacebar, the chicken sound will be played.

10. Save the world with the name **Chicken sound**.

11. The *play sound* tile has parameters that will let you adjust the duration and volume of the sound, which can be accessed by clicking **more** on the play sound tile. You may want to experiment with the volume level, or add some instructions to your world to animate the Chicken.

12. Save the world with name **sound sample** and close it when you are finished.
CHAPTER SUMMARY

This chapter consisted of a discussion of the various uses of text in an Alice world, followed by a short discussion of sound in an Alice world and five tutorials.

The discussions included the following:

- There are different ways in which you can show text in an Alice world: by using the `say` and `think` primitive methods, by using the `print` instruction, by adding 3D text as an Alice object, and by placing a picture file with an image of text in an Alice world as a billboard.

- In addition to using visual text, sound files containing verbal messages can be added to an Alice world and then played using an object's `play sound` method.

- The text created by the `say` and `think` methods appears in what animators call balloons or bubbles, much like text appears in cartoons in a newspaper or magazine. A dialog balloon shows words that are supposed to have been spoken by an object, and a thought bubble shows words that reflect an object's thoughts.

- The `say` and `think` methods can be used with every object in Alice, including inanimate objects like rocks, trees, buildings, and vehicles. The Alice `say` and `think` methods work almost identically, with parameters to allow you to change the message itself, as well as the font used for the text, the size of the text, the color of the text, the color of the bubble in which the text is displayed, and the amount of time that the message stays on the screen.

- The `print` instruction can be used to display messages or the value of variables and parameters in a special text zone at the bottom of a running Alice world. It is most often used to show someone the value of a variable while a world is playing. Sometimes the value of a variable is displayed using the `print` instruction while debugging a world. You can also use the `print` instruction when debugging a program to show that a breakpoint has been reached.

- 3D text is implemented in Alice as its own object. It can be used to communicate with the user or as an element in an Alice world. The Alice Local Gallery contains a folder to create 3D text objects.

- Pictures files can be added to an Alice world as a billboard. The current version of Alice can easily import GIF and JPG files, but often has difficulty with other common picture file formats, such as BMP and TIF files.

- Each object in an Alice world has a primitive `play sound` method that can be used to play a sound file. Sound files are most often used in Alice worlds to add special effects, such as the sound of a doorbell, or to play background music as a scene unfolds.

- Several sound recordings are included with Alice. Other prerecorded sound files in the WAV or MP3 formats can be imported into Alice, and new sound files can be recorded directly using the Alice interface.

In Tutorial 6A you explored the use of the `say` and `think` methods in Alice and how to manipulate the appearance of the methods' dialog balloons and thought bubbles.

In Tutorial 6B you saw how the `print` instruction can be used to display the value of a variable and to show when a playing Alice world has reached a certain spot. These techniques are often used to debug a program.
In Tutorial 6C you experimented with the creation and manipulation of 3D text as an object in an Alice world.

In Tutorial 6D you imported a picture file into an Alice world as a billboard object that can be manipulated with methods just as other objects are.

In Tutorial 6E you added a sound clip to an Alice world.

REVIEW QUESTIONS

1. Define the following terms:
   - billboard
   - breakpoint
   - dialog balloon
   - font
   - HSB
   - personification
   - RGB
   - text
   - thought bubble
   - typeface
   - tessellation

2. List and briefly describe the different ways that text can be shown in an Alice world.

3. Describe how to change the typeface for each of the following: text in an Alice dialog balloon or thought bubble, Alice 3D text, and text displayed by the Alice `print` instruction.

4. Describe how to change the size of each of the following: text in an Alice dialog balloon or thought bubble, Alice 3D text, and text displayed by the Alice `print` instruction.

5. Describe how the `print` instruction can be useful in debugging methods in an Alice world.

6. Which common picture file formats work best for importing images into Alice as billboards?

7. How can a picture file that has been imported into Alice for use as a billboard be used to tessellate the ground in an Alice world?

8. Describe the notion of “fair use” of copyrighted material for educational purposes. How much of each of the following can probably be used in an Alice world or other student work based on how courts have ruled in the past on this doctrine?
   a. Poems by Langston Hughes
   b. A recording of “Wake Me Up When September Ends” by Green Day
   c. An early recording of Gershwin’s *Rhapsody in Blue*
   d. Beethoven’s *Symphony No. 5* from the 1996 recording by the Vienna Philharmonic
   e. Images of artwork from the Guggenheim Museum’s website
   f. Scanned images of pictures from a recent book about art in the Louvre

9. List the recorded sounds that are supplied as part of Alice for use by the `play sound` method. How can other sounds be used in Alice?

10. Colors in Alice can be described using the RGB (Red, Green, Blue) color model or the HSB (Hue, Saturation, Brightness) color model. The term HSL (Hue, Saturation, Luminance) is also used for the HSB color model. Using the Internet as a research tool, see if you can find the meaning of the terms hue, saturation, and brightness (or luminance), and how these color models are related to the CMYK and Pantone color schemes.
EXERCISES

1. Add text in dialog balloons or thought bubbles to an existing Alice world. Change the bubbleColor, textColor, fontSize, and fontName properties to give the text a look and feel that enhances the world. In addition, it should match the personality of the character with whom the text is associated or the tone of the message itself.

2. The ask user for a string function and the ask user for a number function are often used with string and number variables in a manner similar to the ask user for yes or no function, discussed in Chapter 4. Using these functions and the say method discussed in this chapter, create a simple Alice world with a dialog in which a character asks the user for his or her name, says hello to the person by name, asks how old the person is, then tells the person approximately how many days old he or she will be on his or her next birthday.

3. Create a title sequence for an existing Alice world of your choice. The titles should be added as 3D text objects, with animation sequences for the text. The world should have an entry sequence for when the text appears and an exit sequence for when the text disappears. To get some ideas for entry and exit sequences, you might want to look at Microsoft PowerPoint. The list of effects on the animations schemes or custom animations on the Slide Show menu in PowerPoint might give you some ideas for your title sequences in Alice.

4. Foreign language text can sometimes be cut and pasted from Microsoft Word, from other programs, or from a Website into Alice say and think method tiles or as Alice 3D text. For example, the Greek language phrase “Ἀριστοτέλης ἦταν σπουδαστής Πλάτων” (Aristotle was a student of Plato) can be cut and pasted from Word into Alice as the text for a 3D text object. The Altavista Babel Fish Translation Website (www.babelfish.altavista.com) is one of many sites you can use to translate text from English into another language. Some of the translated text will work in Alice, and some will not, depending on the language and the typeface used to display the language. Create a simple Alice world with text in one or more languages other than English. Start by picking a few simple phrases, enter them into the Babel Fish website, and translate them to see how well they work. You can re-enter them into Babel Fish and cut and paste the translation from Babel Fish into Alice as needed while you develop your world.

5. Images from most digital cameras can be saved as .jpg files that can be imported into Alice as a billboard. Create an Alice world in which an image of yourself or someone you know plays a role.

6. Create an Alice world that is a short tutorial teaching the user about the sound clips built into Alice. Your world should contain keyboard events to allow the user to trigger each sound, along with either a menu of the built-in sounds, or a character who tells the user to press a particular key to hear a sound. The world should have a variety of objects to demonstrate the use of the sounds with matching animations. As always, remember to use good design techniques as you create the world.

7. You can record a dialog or narration for an Alice world using the record sound feature found on the properties tab of an Alice object. You can also import sound into Alice from an existing sound file. Select a segment of a song or other piece of music of your choice, import it into Alice as a sound file, and then create a short music video sequence in Alice with the sound you added as background. Remember to use proper design techniques as you create the world.
8. Create a 15- to 30-second animated commercial advertisement for a product or service of your choice as an Alice world. The world should use some of the features discussed in this chapter. You should begin by selecting the subject of your advertisement, and then create an outline or storyboard for the advertisement. Once you have the outline or storyboard, you can write pseudo-code as refinement of the specifications for the world, and then code the world based on the pseudo-code. Remember to use good modular design as you develop your world.

9. The Television program “Sesame Street” often uses the theme of commercial endorsements to teach young children about the alphabet, such as segments on the program that are supposedly “… brought to you by the letter W...” Create an Alice world that picks up on this theme to teach children about a letter of the alphabet in a world with animation and sound.

10. Fairytales, myths, stories from history, and urban legends are all good subjects for Alice worlds with a voiceover narration. Create an outline or storyboard for such a world, then pseudo-code for the world, then the code itself. You may want to start by looking through both the Alice Local Gallery and the Alice Web Gallery to find characters for your story. There are three different approaches you can use to match the timing of the narration to the world:

   a. You could record the narration first, then make the action in the world match the narration.
   b. You could animate the story first, then record a voiceover to match the action.
   c. You could record the narration in short sound bytes that are played as required while the action is occurring.