

Digital Art Basics

Any experienced artist knows that the composition of the tools they use—the chemistry of the paint, the ingredients of the clay—affects the quality of a finished work of art. When you are learning to become an artist, you spend a great deal of time studying how the tools behave. It is the same with digital art. This chapter reviews the fundamentals of digital art. Just as an oil painter needs to learn how the mixture of pigments and oils works with the canvas, a digital artist needs to learn how color depth, channels, file formats, and other elements factor into the quality of a digital masterpiece.

This chapter includes the following topics:

- An introduction to ZBrush
- Understanding digital images
- Understanding 3D space
- Being a digital artist

An Introduction to ZBrush

Imagine walking into a fully stocked artist's studio. Inside you find cabinets and drawers full of paints and brushes, a large canvas, a closet full of every type of sculpting medium imaginable, a lighting rig, a camera, a light box, a projector, a kiln, armatures for maquettes, and a seemingly infinite array of carving and cutting tools. On top of this everything has been neatly arranged for optimal use while working. This is ZBrush, a self-contained studio where you can digitally create paintings and sculptures—and even combinations of the two. Furthermore, you are not limited to what you find in ZBrush. Digital 3D models and 2D textures can easily be imported from other applications and used as tools within ZBrush. ZBrush can function as a self-contained digital art workspace or as an integral part of a production pipeline for video games, films, or even toy manufacturing.

A few years ago, the most common use of ZBrush was for creating and editing digital models that are then animated and rendered in other 3D packages, such as Autodesk® Maya® and 3ds Max® software, Maxon's Cinema 4D, and Luxology's modo. This is still true, but ZBrush is finding its way into many other industries.

When creating models for film, artists choose to create models in ZBrush because the unique technology behind ZBrush allows them to work with very dense models (literally millions of polygons). ZBrush artists can create a stunningly rich level of detail on organic surfaces in a way that traditional 3D packages just can't. Fine wrinkles, fleshy folds, pores, bumps, scales, scars, and scratches can be easily sculpted into the model and then exported either as part of the geometry or as bump and displacement textures

that can enhance the geometry of a model when the model is rendered in another package. The result is often an amazing level of detail and realism built into a virtual object (see Figure 1.1). Colors can also be painted directly on the model in ZBrush in an intuitive fashion and then exported as texture maps for use in shaders applied to the same model in other 3D packages. Production pipelines at studios such as ILM, Gentle Giant, Weta, and Sony Pictures Imageworks have used ZBrush in this way to create many of the characters, monsters, and set pieces seen in such films as *The Lord of the Rings*, *Pirates of the Caribbean*, and *Sky Captain and the World of Tomorrow*.

More recently, ZBrush has been adapted for use in areas beyond animation and effects. These days artists are using ZBrush as a tool in the production of toys, game characters and environments, medical and scientific visualization; in jewelry design and concept design; and even to help in the creation of physical sculpture.

Figure 1.1
A highly detailed
model created in
ZBrush



Artists are using ZBrush to design models on computers and then translating them into physical versions via 3D printing technology (see Figure 1.2). As the 3D printing process becomes more common and less expensive, one can imagine how ZBrush can easily be integrated into a desktop fabrication pipeline in the near future.

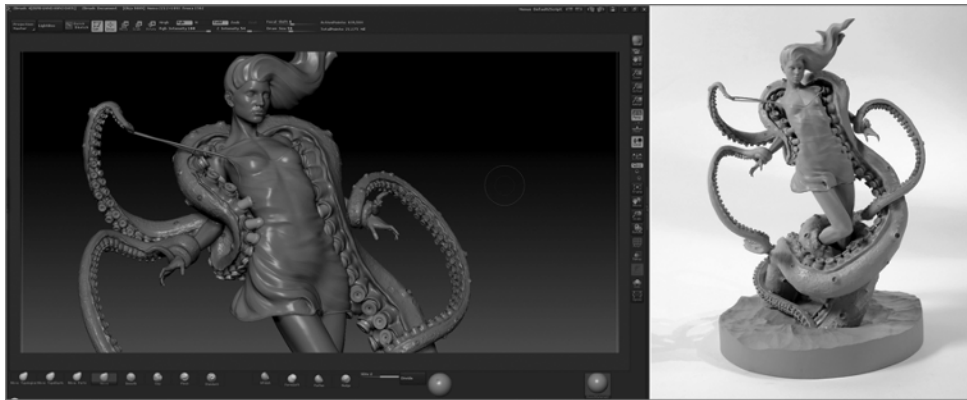


Figure 1.2
A physical model that was sculpted by Chris Bostjanick in ZBrush and printed using a 3D printer.

ZBrush can also be used for the creation of digital illustrations: The program has digital sculpting and painting tools as well as its own unique rendering technology. Within ZBrush, artists can create custom virtual materials, which can simulate very realistic surfaces or create a very stylized look. These materials can be applied to an artistic composition and, when rendered, react to virtual lights and shadows. Many artists have taken advantage of the flexible workspace and powerful tools to create amazing ZBrush compositions. In addition, ZBrush works very well with other 2D paint programs, such as Adobe Photoshop and Corel Painter. Digital 3D models and 2D images can be exported and imported freely between these programs, so there is no limit to what can be achieved when ZBrush is incorporated into the digital artist's toolbox.

Understanding Digital Images

Now let's take a brief look at several ways digital imagery can be created on a computer and displayed on a monitor. Computers display digital images using colored squares known as *pixels*. This section reviews the basics of working with pixels and related issues.

Anatomy of a Pixel

A pixel is a colored square that appears on the screen at a specified position—pretty simple, at least to begin with. A raster graphic is an image made up of thousands of pixels. A pixel is imbued with a certain amount of color and position information that is stored in memory. If you load a rasterized graphic into a digital viewing program and then scale the image up (or zoom in), you can actually see how the image is composed of these pixels (see Figure 1.3).

Figure 1.3

Raster images are composed of tiny colored squares called pixels, which are visible when you enlarge the image.



A digital image file stores the positional information of these pixels in terms of x- and y-coordinates. The y-coordinate is the vertical position and the x-coordinate is the horizontal position. It may seem obvious, but it's important to note that when you zoom in or scroll around on a digital image in the software, the position and size of each pixel change relative to the screen. However, the software still needs to remember the position and size of each pixel relative to the digital image that is being viewed. You should be aware of this fact, but don't spend too much time thinking about it now; that's your computer's job.

Creating Smooth Images with Anti-Aliasing

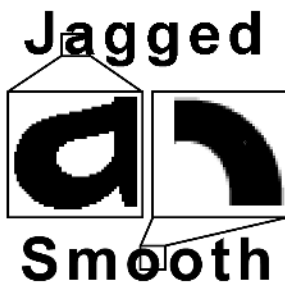
Aliasing refers to the situation in which a curving line or shape displayed on a computer screen appears jagged. This is because the image is composed of tiny squares. To correct this problem, graphic software employs *anti-aliasing*, which smoothes the edges of curving shapes by blending the color of the pixels along the edges with other pixels of similar

hue but varying degrees of lightness. This fools the eye into perceiving the edges as being smooth.

In Figure 1.4, the letters in the word *jagged* appear jagged because the square pixels are visible along the curving edges of the letters; this image is *aliased*. The letters in the word *smooth* appear smooth because of the blending technique that mixes pixels of varying lightness along the curving edges of the letters. The image is *anti-aliased*.

Figure 1.4

The letters in the word *jagged* are aliased. The letters in the word *smooth* are anti-aliased.



Channels and Color Depth

Along with positional data, the pixel stores information about how to display colors. A computer screen creates color by mixing red, green, and blue light. If a pixel is 100 percent red mixed with 0 percent blue and 0 percent green, it looks red. If a pixel is composed of 50 percent red with 50 percent blue and 0 percent green values, the pixel will look purple. When all three values are 0 percent, the pixel is black, and when all three are 100 percent, the pixel is white.

Color depth refers to how much color information is stored for each pixel in the image. A grayscale image discards all color information except for black, white, and the range of gray in between; this usually comes out to 256 shades of gray. The result is a black-and-white image. Since color information is limited to the 256 shades of gray, the image file has less information that needs to be stored.

If you have studied painting, you may have learned that the primary colors are defined as red, yellow, and blue. The secondary color green, for example, is created when blue is mixed with yellow. This is true for paint but not so for colors created by a lighted computer screen. As far as computers are concerned, red, green, and blue are the primary colors. Red and green mixed together produce the secondary color yellow.

An RGB image stores red, green, and blue information. The information is divided into three channels (red, green, and blue) and each channel stores the values (or percentage) of red, green, and blue for each pixel. To see a demonstration of how this works, follow these instructions to view the RGB values of various colors using ZBrush's color chooser:

1. Start ZBrush.
2. Click Color on the menu bar to open the Color palette.
3. Drag your cursor around in the color selector area (see Figure 1.5).
4. Observe the changing R, G, and B numeric values below the color area. These values change depending on the mixture required to create the selected color. Notice that the highest value possible for each channel is 255 and the lowest is 0 (see Figure 1.5).
5. Click the R, G, and B sliders to select them and type in numeric values. Set R to **255**, G to **0**, and B to **255**. The resulting color is a bright fuchsia.

An image in an RGBA format has an additional, fourth channel known as the *alpha channel*. The alpha channel stores information on the opacity of individual pixels. This allows for an image to have regions of transparency. The left side of Figure 1.6 shows a basic scene rendered in a 3D program; the floating spheres are transparent. The right side of Figure 1.6

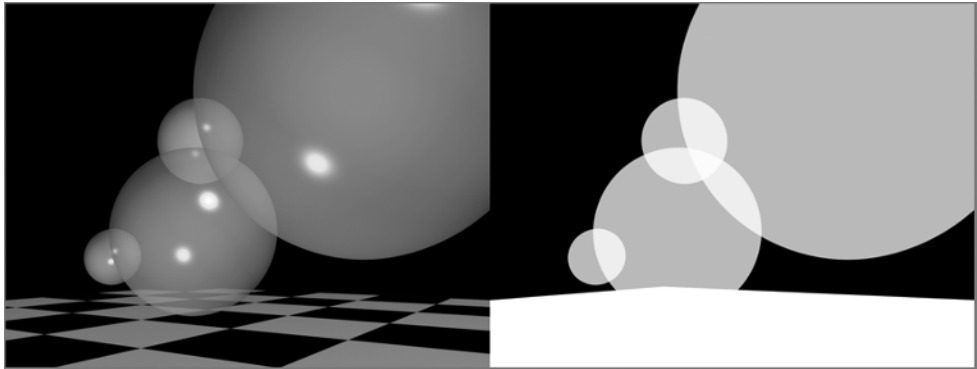


Figure 1.5
The numbers in the R (red), G (green), and B (blue) fields indicate the values for the red, green, and blue channels.

shows the alpha channel. White areas are 100 percent opaque and black areas are 100 percent transparent. The gray areas show the amount of transparency.

Figure 1.6

The left side of the image shows the combined RGB channels; the right side shows the alpha channel.



Color depth refers to how much information is used for each of these color channels. Computers use bits to store information. A bit is a series of 1s and 0s (known as binary because there are only two options, 1 and 0). A 24-bit RGB image uses 8 bits of information for each channel ($3 \times 8 = 24$). Each 8-bit channel stores a range of 256 shades of color, allowing an image to have a total of 16 million colors. A 32-bit RGBA image uses an additional 8 bits for the alpha channel.

The more bits you have, the more information you can store, and with more bits, the image can be displayed using a wider range of color. More memory is required to store and work with higher-bit images. An image that uses 16 bits per channel (48 bits total for an RGB image, 64 bits for RGBA) can be confusingly referred to as a 16-bit image (as in a 16-bit TIFF or 16-bit SGI).

Beware. This is not the same as a 16-bit or high-color image that uses about 5 bits for each channel. Welcome to the confusing world of computer terminology. You will get used to these kinds of terminology conflicts with some experience. Although computers are strictly logical, the humans that create and use them are not always so! If you are working as an artist in television or film production, you will be using 16-bit (per channel) images much more often than 16-bit (5 bits per channel) high-color images.

Image Formats

A digital image can be stored in a number of ways, known as formats. A format is simply the arrangement of information in a file. Typical image formats include Tagged Image File Format (TIFF), Joint Photographic Experts Group (JPEG), and Graphics Interchange Format (GIF).

Many programs have their own native document format. Photoshop can read many file formats but also has its own Photoshop Document (PSD) format. Likewise, Corel's Painter stores special information in a format called Resource Interchange File Format (RIFF). ZBrush has its own ZBR document format.

An image format can be compressed to conserve storage space. Some image formats have compression built in (such as JPEG and GIF), and some can exist with or without compression (such as SGI, or Silicon Graphics Image). Compression usually affects the quality of the image. If you look closely at a JPEG image from a typical website using a browser, you may notice that it is blurry or grainy or that the colors are not quite right. Image quality has been sacrificed to allow faster download for viewing images over the Internet.

When the quality of an image is diminished by the compression, it is said to be a *lossy* compression format. There are also *lossless* compressions that can reduce the size of an image without significantly affecting quality. These formats, such as Portable Network Graphics (PNG), result in file sizes that are larger than those for which lossy compression is used. Compression applied to sequences of images is also used for video.

In Figure 1.7, the image on the left is uncompressed and the image on the right is compressed. Look closely and you can see the distortion, known as *artifacts*, in the image on the right. This distortion is especially apparent in the details on the cactus and the edges of the plants.



Figure 1.7
The image on the left is uncompressed; the image on the right is compressed.

Understanding file formats and compression will become important as you work with computer graphics, not only with respect to images you create and share in ZBrush, but also with textures and alphas created in ZBrush and used on 3D models in other programs. If you use a compressed image as the source for a texture used to color a model or as a tool for sculpting, the resulting model can suffer because of low image quality. In addition, some 3D applications and rendering engines will prefer some formats more than

others, which is important to understand when you export images created in ZBrush for use in other software packages. These aspects of working with images in ZBrush will be covered in more depth later in this book.

Vector Images

As stated earlier, computers can also use vectors to create digital images. A vector graphic is created from formulas and mathematical calculations performed by the computer and its software. The results of these calculations are smooth lines and shapes that are often filled with colors. Vector graphics are continually drawn and updated when the image is scaled, moved, or rotated, so the graphic is always of the same quality no matter what its size and position.

Adobe Illustrator and Adobe Flash are popular vector graphic programs. Vectors are used in a modeling interface to represent 3D objects in 3D packages such as Maya and 3ds Max, and these packages have special rendering engines that can create vector graphics as final output as well. You can't create vector images in ZBrush, so I'll end the discussion of vectors for now.

Understanding Resolution

It is hard to overstate the importance of understanding resolution when working with ZBrush. Unfortunately, computer resolution is kind of a tricky concept. There's a lot of confusing terminology as well as different types of resolution and different ways to measure and calculate resolution. This is a topic that I will revisit often throughout this book, so don't panic if you haven't mastered completely the concept of resolution by the end of this section.

Simply put, *resolution* refers to the density of information within a given area. Most often in computer graphics, resolution is applied to the number of pixels that can be squeezed into a portion of the screen. However, it can also refer to the number of polygons or points squeezed into part of a 3D model. The resolution of your computer screen can determine how the resolution of your images is displayed and created. In addition, when you apply a 2D image texture to a 3D model, the pixel resolution of the 2D image and the polygon resolution of the 3D model must be taken into account or the results achieved may be somewhat disappointing. You do this kind of work a lot in ZBrush, thus resolution is something you must always keep in mind.

Screen Resolution

Let's start with screen resolution. The computer you use to create your ZBrush images and models no doubt has a computer monitor attached to it. The monitor displays text and images on the screen. Screen resolution refers to the number of square-sized pixels that appear on the screen, and this is measured horizontally and vertically. The

physical size of the screen itself is usually described in diagonal terms. A 22-inch monitor refers to a screen size that measures 22 inches from one corner diagonally to the opposite corner.

Your particular screen should be able to display text and images in a number of different resolutions. The current resolution is set in the operating system's control panel or system preferences. Screen resolution is described in the number of pixels available horizontally times the number of pixels available vertically. Some typical resolutions include 640x480, which used to be the common standard in the old days when monitors were smaller; 720x486, which is the standard for broadcast television in the United States; and 1920x1080, which is used for high-definition television (HDTV).

Screen resolution will affect how ZBrush looks on your screen. When you have your screen set to a low resolution, less space is available to display both the ZBrush interface and the documents. This is one reason why computer graphics artists will invest a great deal of money on the largest computer monitor they can afford or even use two monitors connected to the same computer.

Document Resolution

Next, let's look at document resolution. In the earlier discussion on pixels, I mentioned that when you zoom in on a digital image using a graphics program, you can see the individual pixels that make up the image. Now, the actual pixels that display the image on the screen do not get any larger or smaller, and you do not affect the resolution settings in your computer's hardware. Rather, the graphics program allows you to see a visual representation of the image at a higher magnification than the document's native resolution.

If you take a document that is 320x240 in size and set the magnification to 200 percent, the document is now shown at 640x480 and each pixel on the document is using four times as many computer monitor pixels. Thus, it looks blocky. Likewise, when you zoom out, or shrink the document, half the number of pixels is displayed. Zooming in and out of a document is a useful feature for graphics programs. It can allow you to work on the fine details of an image. But of course, here is where things get tricky: Because of the ability of computer software to zoom in and out of an image, document resolution can be different than screen resolution. When working with computer images, you must always keep in mind the resolution of your document regardless of how it appears on the screen.

Dots per inch (dpi) is typically used to describe document resolution (sometimes referred to as ppi, or pixels per inch), even in countries such as France that have long used the metric system. An image that is displayed on a computer monitor at 100 percent of its resolution is usually 72 dpi. An image destined for the printed page needs to be at a higher resolution, at least 300 dpi and often between 600 and 1200 dpi for commercial printing.

Image Resolution

When speaking with 3D texture artists, you'll often hear terms like *2K texture map* thrown around. What they mean is an image that is 2048 pixels×2048 pixels. The term *2K* means two thousand to normal people, but to computer graphics artists, 2K = 2048. This is because most texture images are set to a resolution that is a power of 2. Thus 1K = 1024 (2¹⁰), 4K = 4096 (2¹²), and 512 (2⁹) means, well, 512×512.

Images of these sizes are always square, as long as you're talking to texture artists. However, if you walk into a production facility and they ask you to render an animation at 2K and you give them a square 2048×2048 image sequence, they may quickly toss you out the door. Why? Because to production people, 2K actually means 2048 pixels×1556 pixels, which is not really 2K at all (or even square for that matter). In this context, 2K is shorthand for *2K Academy*, which is a standardized resolution for film. Again, not terribly logical or consistent terminology, but it all comes down to context. Since this book is focused on ZBrush, I'll be talking the language of texture artists. So 2K means 2048×2048. If and when you move to animation software such as Maya, you may need to be aware that 2K means different things to different people, depending on the context. The safest bet is to get the people you're talking with to be specific about what they want. Geeks love jargon, but it's more often a hindrance than a help.

Some computer professionals use K as shorthand for kilobyte, or KB, which refers to the actual storage size of a file on disk—yet another level of confusion.

Aspect Ratio

Aspect ratio refers to the dimensions of the image size as a ratio. When you create an image at 320×240 or 640×480, the aspect ratio is 4:3. If the aspect ratio is 16:9 or 1.85:1, the image size is widescreen. A typical 16:9 resolution is 1280×720. This is something you may be more concerned with when rendering an animation for final output from an animation package such as Maya. In ZBrush, aspect ratio may enter the conversation only when you're creating a composition that could be used as a matte painting in an animation or for another purpose.

Polygon Resolution

Finally, resolution can also be used to describe the number of points or polygons that make up a 3D model. I'll discuss polygons in more detail later on in this chapter, but for now you should understand that the surface of a 3D model is composed of geometric shapes defined by three or more points (polygons in ZBrush are restricted to three or four points, but in other modeling programs polygons can have more points). The polygons of a model can be subdivided, which increases its smooth appearance and allows for a higher level of detail to be sculpted into the surface.

In ZBrush, a model can consist of millions and millions of polygons, as you can see in Figure 1.8. Because of the special way ZBrush handles memory, these high-resolution models can easily be edited with much less of a performance slowdown than would be experienced using other 3D applications. Furthermore, ZBrush stores many levels of subdivision resolution within a single model file, so you can raise and lower the resolution of the 3D geometry while you are working as well as export the same model at several different resolutions for use in another 3D animation package.



Figure 1.8
A high-resolution model in ZBrush. The lines on the surface show how the model consists of thousands of square polygons.

This ends our introduction to the concept of resolution. Rest assured that this topic will be popping up again throughout this book!

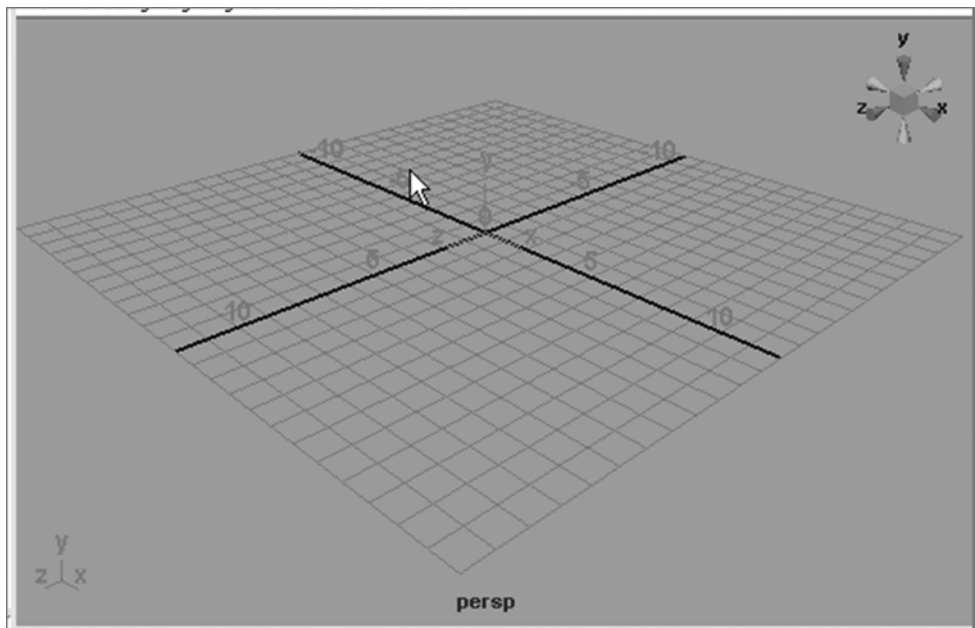
Understanding 3D Space

In a typical 3D software package such as Maya, 3D space is defined in terms of x-, y-, and z-coordinates. The horizontal dimension is usually described by the x-axis, vertical space is usually defined by the y-coordinates, and depth is usually defined by the z-coordinates (some packages reverse the meaning of the y- and z-axes). In Maya, the virtual world contains a grid. It's also crucial to understand that a point in 3D space, such as an individual vertex on a piece of 3D geometry, has an absolute position in the 3D world. The absolute position of a vertex in 3D space is defined using "world space" coordinates. It also has a position relative to the object it is part of; the relative position of a vertex in 3D space is defined using its "local space," or "object space" coordinates.

Think of it this way: You are wearing a pointy party hat. The point at the very tip of the hat exists in the world at the top of your head; the world space y -coordinates of this point are very high relative to the points that make up the rest of you. At the same time, the object space y -coordinates of the tip of the hat are also very high relative to the rest of you. However, if you decided to hang upside down while wearing the party hat, the world space coordinates of the tip of the hat would now be lower than the world space coordinates that make up the rest of you. Yet, in terms of object space, we understand that the tip of the hat is still the very top of the object, even when the hat is upside down. This is based on how we understand the object and its purpose in the world. If you were to model that hat using 3D modeling software, you would understand that the tip of the hat is the top, even when you rotate the hat upside down. The 3D software also keeps track of these ideas using the two sets of coordinates—world and object (see Figure 1.9).

Figure 1.9

A typical 3D modeling environment: The grid and the 3D compass help the artist keep track of x -, y -, and z -coordinates in virtual 3D space.



Anatomy of a Polygon

There really is no such thing as a 3D object in computer graphics. Unless you are working with rapid prototyping machines that can fabricate a physical object based on data stored in a virtual 3D file, you will always be working with two-dimensional representations of three-dimensional objects on a computer screen.

When we speak of 3D, we are using shorthand that assumes we are talking about a 3D virtual object that exists on a 2D screen. A typical digital painting program such as Photoshop plots pixels horizontally and vertically, along the x - and y -axis respectively. A

3D program stores information with additional coordinates along the z-axis, which gives the virtual image depth. A virtual object existing in the 3D space of the software is made of polygons. The polygons give the object a surface that can be deformed, translated, and animated.

A polygon is a geometric shape defined by three or more points (points are also referred to as vertices); examples of polygons are shown in Figure 1.10.

ZBrush restricts the polygons to three or four points, but other software packages can have polygons with any number of vertices. This is important to remember when importing objects from another package into ZBrush. ZBrush will automatically split an n-sided (more than 4-point) polygon into 3- and 4-point polygons (or quadrilaterals) when it is imported.

In other programs you may encounter other types of 3D geometry, such as NURBS (which stands for non-uniform rational basis spline) and subdivision surfaces. These are converted at render time to triangle-shaped polygons by the rendering engine; thus polygons are the standard currency of 3D software. When it comes to 3D models, ZBrush works only with polygon geometry.

As was discussed in the section titled “Understanding Resolution,” the number of polygons an object has will affect how smooth the surface appears and how much detail can be modeled into that surface. The resolution of a 3D object is also referred to as its *density*. ZBrush is programmed in such a way that a 3D object can have millions of polygons and an astonishing level of detail while still maintaining a high level of response on the computer during the sculpting and editing process. This is what allows the ZBrush artist to feel as if they are sculpting digital clay in a very intuitive and artistic fashion.

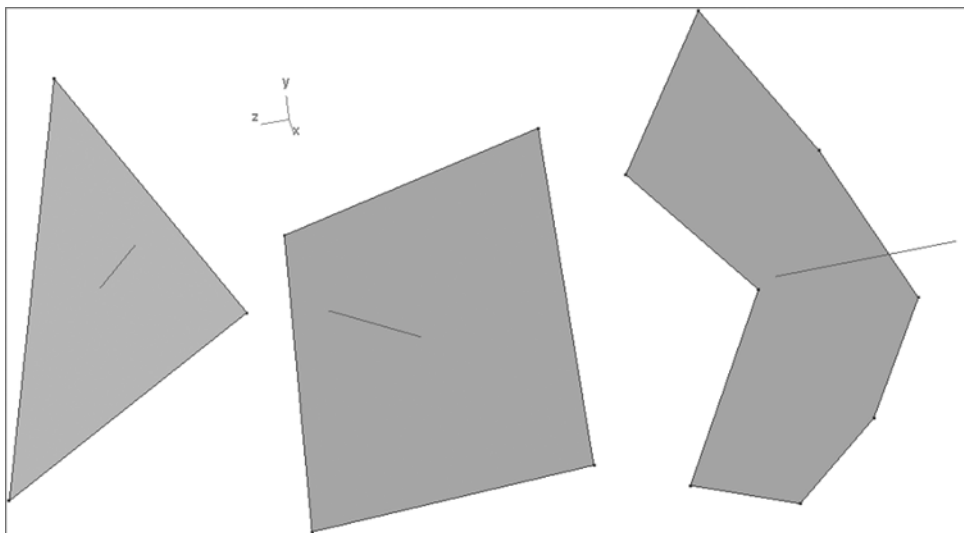


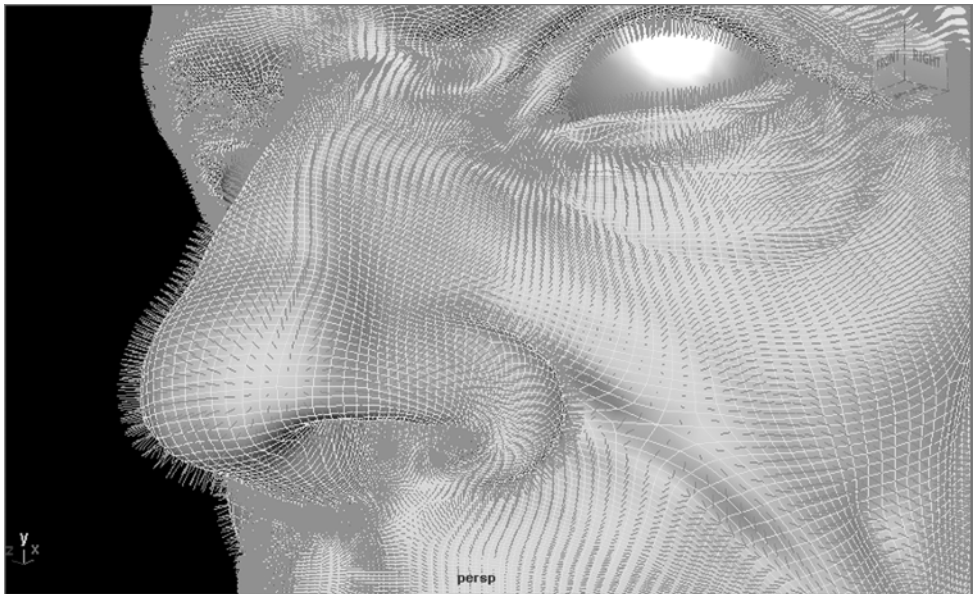
Figure 1.10
An image of 3-point,
4-point, and n-sided
polygons as dis-
played in Autodesk
Maya.

ZBrush does not actually use the Open Graphics Library (OpenGL) specification when it displays 3D objects on the screen. Pixologic has developed its own protocols for 2D and 3D images based on the *pixel*. This means that ZBrush is free from the polygon limits imposed by the OpenGL standard. It also means that ZBrush is not dependent on the power of your machine's graphics card. Instead, ZBrush requires a fair amount of RAM (a gigabyte or more) and lots of free hard disk space. For this reason ZBrush runs quite well even on a decent laptop.

A polygon appears in ZBrush as a shaded shape with three or four vertices. A virtual 3D object is made up of adjacent polygons that form the surface. (In ZBrush, the term *3D tool* is used to refer to a 3D object; the reason for this is explained in Chapter 2, “Understanding the ZBrush Interface.”) The surface of a polygon has an inside and an outside. The information regarding which side of a polygon faces out and which side faces in is known as the polygon's *normal*. A 3D tool made up of millions of polygons has millions of normals that describe how the surface appears when it reacts to virtual light and shadow (see Figure 1.11).

Figure 1.11

An image of a model in ZBrush with its normals visible. The normal is displayed as a line that shows which side of the polygon is pointing “out.”



Normals are an important aspect of working with polygon geometry. Information about the direction of normals on a dense object can be stored in a special texture known as a *normal map*. Rendering engines for 3D software and video games can make a lower-density version of the same model appear to have more detail than its geometry will allow by using a normal map to help shade the object.

Pixels versus Pixols

As was stated earlier, an image created in a typical digital painting program is usually composed of thousands of pixels. A pixel is a square that contains information about color, transparency, and its location along the x- and y-axes. The unique innovation of ZBrush is the pixol, which is like a pixel with added information about its location along the z-axis. In other words, a pixol contains depth information as well as color, transparency, and x and y positional data (see Figure 1.12). Furthermore, the pixol also stores information on the material applied to it. This means each pixol knows how to react to the lighting, shading, and the environment of a ZBrush composition when it is rendered.

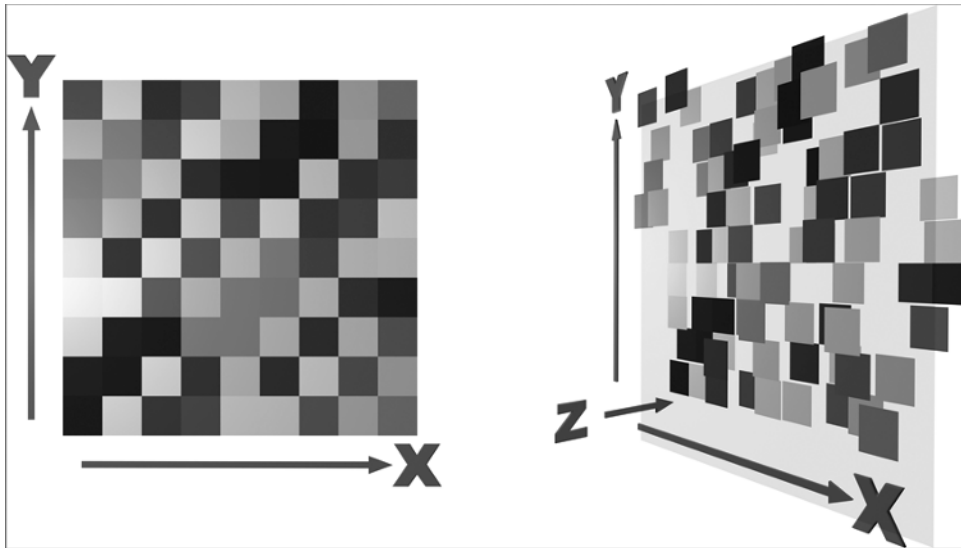


Figure 1.12
The left side of the diagram shows how standard pixels work using x and y information; the right side shows how pixols also store z-depth information.

When Pixologic first introduced ZBrush, it began as a paint program that could create images in two and a half dimensions (known as 2.5D). A brush stroke in ZBrush is painted on the canvas and can then be rotated, scaled, and positioned anywhere on the canvas. This explains why the ZBrush interface does not use the typical 3D world with separate cameras and lights like you'll find in other 3D programs. Everything exists on a canvas. ZBrush added 3D objects that could be incorporated into 2.5 dimensional compositions as well as materials and lights that added shadow and reflections. Subsequent versions of ZBrush refined the sculpting tools and improved the portability of 3D objects with animation projects, which led to the overwhelming popularity of ZBrush as a digital sculpting program.

If you're mostly concerned with sculpting 3D models, you may not worry too much about pixols, but it's good to have an awareness of what this term refers to, and it will help you understand the behavior of a model on the ZBrush canvas. If you'd like to create digital illustrations in ZBrush, then an understanding of pixols can become a powerful tool.

Being a Digital Artist

There is nothing inherent in the computer or the software that will turn you into a great artist. Becoming a good artist still must be achieved the old-fashioned way—through hard work, practice, and study. Nine times out of ten, when you see some jaw-dropping, amazing piece of digital art in an Internet forum or as part of a film, the artist who created it has spent a fair amount of time studying traditional art. Even if the artist has never held a real paintbrush, they still have studied what it takes to make a great work.

This book is concerned with making you feel comfortable using ZBrush. There will not be much discussion on the fundamentals of art or sculpting. That said, you should understand that composition, balance, positive and negative space, lighting, anatomy, form, and silhouette are just a few of the concepts a real artist (digital or traditional) must master. I strongly encourage you step away from the computer monitor, pick up a pencil or a brush, and attend some life drawing classes. Likewise, working with digital clay is much more meaningful if you've spent time sculpting with actual clay. Your digital artwork will reveal much about who you are as well as how much time you have taken to study and explore traditional art techniques and the natural world.

Resources

This book is just the beginning. While working through the exercises in this book on your way to mastering the ZBrush interface and its tools, you should also take the time to explore more using the resources on this list. In addition, *ZBrush Character Creation, Second Edition*, by Scott Spencer (Sybex, 2011) picks up where this book leaves off. His book will incorporate a deep level of understanding of the art of digital sculpture and the concepts behind creating great artwork into more advanced ZBrush topics and lessons.

The two most valuable sources for information regarding ZBrush are Pixologic's website (www.pixologic.com) and ZBrushCentral (www.zbrushcentral.com). You can check out www.pixologic.com for the latest information on updates, plug-ins, and new features for ZBrush as well as artist interviews and free video tutorials in the ZClassroom section (www.pixologic.com/zclassroom/homeroom/).

ZBrush users gather at ZBrushCentral to post their work, critique the work of fellow artists, ask questions, solve problems, and share their enthusiasm for ZBrush. Feel free to visit the site, create a free account, and post examples of your work. The members of ZBrushCentral come from all over the world and represent all ages and skill levels (see Figure 1.13).

Here is a list of useful websites:

www.pixologic.com

www.pixologic.com/zclassroom/homeroom/

The screenshot shows the ZBrushCentral website interface. At the top, there is a navigation bar with the site name 'ZBrushCentral', a search bar, and links for 'User Name', 'Password', 'Log in', 'Help', and 'Register'. Below this is a secondary navigation bar with 'Forum' and 'What's New?' tabs, and a search bar. The main content area features a gallery of 3D models, including a car, a character's face, and a hand. A section titled 'ZBRUSH 4R2 BETA TESTER IMAGES' displays a grid of character models. Below this is a 'RECENTLY UPLOADED' section with more 3D models. The forum section is titled 'Forum: ZBrush Main Forum' and contains a list of threads. The threads are sorted by 'Replies / Views' and 'Last Post By'. The top thread is 'Sticky: ZBrush 4R2 Unleashed!' with 529 replies and 50,869 views. The second thread is 'Sticky: Making Time For Art #4 - "Clay Time"' with 476 replies and 152,596 views.

ZBrushCentral User Name Password Log in Help Register
Remember Me?

Pixologic

Forum What's New?
Today's Posts FAQ Calendar Forum Actions Quick Links

Z4R2
MAKING TIME FOR ART #4 "CLAY TIME"

ZCLASSROOM #10

ZBRUSH 4R2 BETA TESTER IMAGES More ... [M] : For Mature Audiences

RECENTLY UPLOADED More ... [M] : For Mature Audiences

Forum MAIN ZBrush Main Forum

If this is your first visit, be sure to check out the [FAQ](#) by clicking the link above. You may have to [register](#) before you can post: click the register link above to proceed. To start viewing messages, select the forum that you want to visit from the selection below.

+ Post New Thread

Threads 1 to 65 of 47454 Page 1 of 731 1 2 3 4 10 25 50 75 100 ... Last >>

Forum: ZBrush Main Forum
Images, models & work-in-progress (WIP)

Forum Tools Search Forum

Last Post

ZBrush 4R2 BetaTesters Images And Tutorials
Images and tutorials representing a cross section of the development cycle of ZBrush 4R2. Threads: 38 Posts: 832 ZBrush 4R2 Beta Testing By: Frederik Storm by Etcher 32 Minutes Ago

Title / Thread Starter	Replies / Views	Last Post By
Sticky: ZBrush 4R2 Unleashed! Started by Pixolator, 2 Weeks Ago [1 2 3 4 5... 36]	★★★★★ Replies: 529 Views: 50,869	Mahlilus The Black 2 Hours Ago
Sticky: Making Time For Art #4 - "Clay Time" Started by Pixolator, 3 Weeks Ago [1 2 3 4 5... 32]	★★★★★ Replies: 476 Views: 152,596	Ham Sammich 3 Hours Ago

Figure 1.13
ZBrushCentral is an online community for ZBrush users of all skill levels.

www.zbrushcentral.com

www.zbrushworkshops.com

www.cgchannel.com

www.gnomon3d.com

www.scottspencer.com

www.3d.sk

www.conceptart.org

www.figuresandfocus.com

I recommend the following books:

- *ZBrush Character Creation, Second Edition*, by Scott Spencer (Sybex, 2011)
- *ZBrush Digital Sculpting Human Anatomy*, by Scott Spencer (Sybex, 2011)
- *ZBrush Creature Design: Creating Dynamic Concept Imagery for Film and Games* by Scott Spencer (Sybex, 2012)
- *The Artist's Complete Guide to Facial Expressions* by Gary Faigin (Watson-Guptill, 1990)
- *Constructive Anatomy* by George Bridgman (Dover, 1973)
- *Bridgman's Life Drawing* by George Bridgman (Dover, 1971)
- *Artistic Anatomy* by Dr. Paul Richer (Winston-Guptill, 1971)
- *Anatomy for the Artist* by Sarah Simblet (DK Publishing, 2001)

And finally, the Gnomon workshop has a large number of DVDs devoted to ZBrush as well as an excellent series of clay maquette sculpture DVDs by John Brown. These can be ordered online at www.thegnomonworkshop.com.