

Anti-Aliasing

What In The World is Anti-Aliasing?

Well, it has to do with computer graphics and typography. But let's back up and answer an even more fundamental question.

What On Earth is Aliasing?

“Aliasing is what happens when analog data is represented on a digital system” (Clark & GrafX Design, 1997). In other words, suppose you have a curved line drawn on a grid. The curved line is the analog data, and the grid is the digital system. “When the analog data is converted to digital, some problems arise... To convert the analog line to a digital line each point in the grid may either represent a point in the line, by being filled in, or represent an area where the line does not exist, by remaining white. **There cannot be a square that is only partly filled.** Each square must be either filled in or not... To draw the line in digital format we need to completely fill in any square that a portion of the line passes through... [therefore,] we no longer have curves; all we have is a choppy line made up of squares and rectangles ” (Clark & GrafX Design, 1997). Go to <http://www.widearea.co.uk/designer/anti.html> for excellent illustrations of alias and anti-aliased images.

The bad news is—graphics with jagged edges. The good news is—your graphics and typography don't have to look like they've been sheared with shrubbery cutters.

Anti-Aliasing To the Rescue!

“Anti-aliasing is a technique widely used in computer graphics to optimize the look of graphics and typography on the display screen. Anti-aliasing visually ‘smoothes’ the shapes in graphics and type by inserting pixels of intermediate colors along boundary edges between colors” (Lynch & Horton, 1999, p. 96).

In black and white images, the computer system inserts a medium gray color to fill in the adjoining black and white images. Gray squares placed in the grid help soften the jagged edges. Hence, anti-aliased text is often referred to as “grey-scale” text (Type Chimerique, 2000).

How is this illusion of smoother edges created?

Under the Hood/The Mechanics of Anti-Aliasing

According to Cybulski & Valentine (2000), “in order to anti-alias an image when rendering, the computer has to take samples smaller than a pixel [the most basic component of any computer graphic] in order to figure out exactly where to blur and where not to. For example, if the computer finds that one pixel is on the edge of two objects, it then takes sub-pixel samples and checks about how many of them showed the front object and how many showed the back one... the computer then takes the resulting color values from the subsamples and averages them into a resulting blurred pixel...” Is that more than you wanted to know about anti-aliasing?

No? If you are inclined to know even more about how the “coverage values are computed for each fragment by computing the area of the intersection of the rectangle with the fragment square...” and if you desire to peruse the algorithms involved in “rasterizing the antialiased line segment fragments whose squares intersect a rectangle centered on the line segment...”, you’ll definitely want to check out David Blythe’s comprehensive information about antialiasing located at the following URL address: <http://www.pik-net.pl/marekm/glspec1.1/node51.html>.

Why Bother?

You may be asking yourself, “What’s all the fuss about? Why bother? Do I look like someone who cares about anti-aliasing? Who cares about jagged edges?”

Well, people who are serious about the looks of their graphics care about anti-aliasing. “The computer screen is where the action is: it contains much more than your message; it is also the viewer’s primary connection to all of your project’s content...How you blend [your graphic] elements, how you choose your colors and fonts, what tricks you use to catch the eye, how adept you are at using your tools—these are the hallmarks of your skill, talent, knowledge, and creativity coalesced into the all-important visual connection to your viewers” (Vaughan, 1998, p. 286). But if you want graphics that look amateurish or that look like visual mush, read no further. Don’t bother! But if you want “a cheaty way of getting round the low 72 dpi resolution of the computer monitor” and want to make “objects appear as smooth as if they’d just stepped out of a 1200 dpi printer”, then read on! (Smith & Wide Area Communications, 1996)

Do All images Require Anti-Aliasing?

No. But to understand why, you need to have some general knowledge about computer images—bitmaps and vectors. “Whatever their form, still images are generated by the computer in two ways: as *bitmaps* (or paint graphics) and as *vector-drawn* (or just plain drawn) graphics. *Bitmaps* are used for photo-realistic images and for complex drawings requiring fine detail. *Vector-drawn* objects are used for lines, boxes, circles, polygons, and other graphic shapes that can be mathematically expressed in angles, coordinates, and distances” (Vaughan, 1998, p. 288).

Bitmap Images

A bitmap image may require anti-aliasing, because “a bitmap is a simple information matrix describing the individual dots that are the smallest elements of resolution on a computer screen or other display or printing device...Together, the state of all the pixels on a computer screen make up the image seen by the viewer...” (Vaughan, 1998, p. 289).

Adobe Photoshop 4.0 Help (1996) defines bitmap images, also called raster images as “resolution-dependent—that is, they represent a fixed number of pixels. As a result, they can appear jagged and lose detail if they are scaled on-screen, or if they are printed at a higher resolution than they were created for.” Consequently, these situations would require anti-aliasing for the best results.

Vector-Drawn Objects

Vector-drawn objects are different from bitmap images. “Vector-drawn objects are described and drawn to the computer screen using a fraction of the memory space required

to describe and store the same object in bitmap form. A vector is a line that is described by the location of its two endpoints... Vector objects are easily scalable without losing resolution or image quality” (Vaughan, 1998, p. 300).

Adobe Photoshop 4.0 Help (1996) defines vector graphics as “resolution-independent—that is, they are not defined by a fixed number of pixels and so are automatically scaled to appear crisp and sharp on any output device at any resolution.”

Since vector-drawn images are calculated mathematically, anti-aliasing is not possible, except when the vector-drawn images are placed in a bitmap environment—the computer screen (Snider, 2000).

When to Use Anti-Aliasing

So when do you use anti-aliasing? Let’s hear what the experts have to say.

According to Lynch & Horton (1999) in *Web Style Guide: Basic Design Principles for Creating Web Sites*, “the low resolution of the computer screen is insufficient for displaying diagrams that incorporate many curves or angles; lines that do not follow the pixel grid appear jagged. To optimize these kinds of diagrams for Web pages, you’ll need to use antialiasing to smooth the boundaries and make the jagged edges less apparent” (p. 132).

Tay Vaughan (1998) in *Multimedia: Making it Work* recommends using anti-aliased text when “you want a gently and blended look for titles and headlines... giving a more professional appearance. Anti-aliasing blends the colors along the edges of the letters (called dithering) to create a soft transition between the letter and its background” (p. 192).

Roberts & Gross (1999) in *Director 7 Demystified: The Official Guide to Macromedia Director, Lingo, and Shockwave* report that anti-aliasing is more important for text at larger point sizes [larger than 14 points] and may make smaller text less readable.” A Lingo command called `antiAliasThreshold` is available in Director which will “set a point-size threshold for anti-aliasing; all text of equal or greater point size will be anti-aliased” (p. 940).

Jim Smith of Wide Area Communications (1996) urges to “always anti-alias text except when the text is very small... [about 12 points]...and always anti-alias rasterized EPSs...An EPS is a lump of PostScript drawing code, together with bitmaps and information of things like the fonts used to create it.”

When NOT to Use Anti-Aliasing

Lynch & Horton (1999) in *Web Style Guide: Basic Design Principles for Creating Web Sites* report that antialiasing is “not suitable for small type sizes, especially type smaller than 10 points. The antialiasing reduces the legibility of small type, particularly when you import it into Photoshop from a drawing program like Adobe Illustrator. If you need to antialias small type sizes, do it in Photoshop” (p. 98).

Elizabeth Castro (1998) in *HTML 4 the World Wide Web* advises that if a person really wants to stick to Web safe colors, “don’t use any anti-aliased tools, like Text, Selection, Feathering, etc.” (p. 65).

Okay, now that we've looked at the do's and don'ts, are there other important considerations? You betcha!

Important Considerations

Using or not using antialiasing has its cost. Let's look at a few important considerations according to the experts.

“Although anti-aliasing can result in better display quality, it can also put a drain on system resources and slow the animation” (Roberts & Gross, 1999, p. 939).

“Because the process [of antialiasing] adds more intermediate colors, the image becomes much less compressible. To keep the file size down, anti-alias with the fewest number of colors possible” (Siegel, 1996).

“When text is really small the anti-aliasing tends to blur the letters making them hard to read on some monitors” (Clark & GrafX Design, 1997).

Due to the larger file sizes of anti-aliased images and the tendency to blur small text, the decision to use or not to use anti-aliasing has to be examined on an image by image basis.

Creating Anti-Aliased Images/Type in Adobe Photoshop 4.0

According to Lynch & Horton (1999), “sophisticated image editing programs such as Adobe Photoshop will create antialiased type automatically, and these “paint” image editors are where most Web designers create their graphic typography” (p. 97) In Adobe Photoshop, one can “specify anti-aliasing for the lasso tool, polygon lasso tool, elliptical marquee tool and magic wand tool. You must specify this option before using the selection tool; once the selection is made, you cannot add anti-aliasing to it” (Adobe photoshop 4.0 help, 1996).

Wrap Up

Basically, anti-aliasing is a tool found in image-editing software programs and many multimedia authoring systems. It is designed to smooth out the jagged edges of graphics and typography by filling in some of the digital system to create an illusion of straight lines and smooth curves where they do not really exist. The use of anti-aliasing in appropriate situations can optimize the look of your multimedia projects!

References & Related Links

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