

GRAPHICS ON MACINTOSH: THE WEB AND MULTIMEDIA, WHAT SHOULD I KNOW?

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Macintosh's original success is closely related to the design, graphics, and publishing industries. The original Mac shipped with only 128K of Ram, but its (now-copied) graphical user interface and intuitive software, including the original MacPaint and MacDraw, have made Macintosh the premiere graphics and multimedia authoring environment—a disputable claim, but a fair assessment.

Graphics on Macintosh come in two varieties: *bitmapped* and *object oriented*. Each type has certain distinct advantages for web and multimedia content (as well as some disadvantages) that must be considered prior to “making” graphics. Often, the difference between these two graphics varieties is hard to discern.

Bitmapped graphics

Bitmapped graphics, some times referred to as *paint*, are defined in terms of “on” and “off” states. That is, each individual *pixel*, or dot on your screen, has two states: on or off, black and white respectively. With color bitmapped graphics, there are some states in between “on” and “off” for each of the primary colors (red, green, blue). At a minimum there are two states, on and off, and at maximum, there are 2^8 or 256 states (either in greyscale [black and white and shades of grey] or for each primary color [Red Green Blue {RGB} or Cyan Magenta Yellow K Black {CMYK}]). In other words, Macintosh is able to display one of 16.7 million colors for every pixel on the screen.

Once a bitmapped graphic is created, you can no longer resize it, change its color, or adjust it in any way.* With respect to the web and multimedia, bitmapped graphics include most photo images. In other words, bitmapped graphics are “mapped” to the screen and cannot be changed easily. When creating bitmapped graphics you must select all appropriate colors and patterns before “painting” on the screen.

Object oriented graphics

Object oriented graphics, some times referred to as *draw*, are defined in terms of arcs and lines, or Quickdraw instructions to the screen. (Quickdraw is Apple's graphics system). Unlike bitmapped graphics, object oriented graphics can be adjusted (color, size, and fill pattern) after created. (Object oriented graphics can use the same color models as bitmapped graphics [greyscale, RGB, CMYK].) With respect to the web and multimedia, object oriented graphics include buttons, rules, and “cartoons.”)

A word about type in Graphics

Type is subject to the same adjustment rules as bitmapped and object oriented graphics. If you use type in a bitmapped graphic, you will not be able to edit the text, whereas in an object oriented graphic, type remains fully editable text.

Which is better? Bitmapped or Object oriented?

Again, it depends. My personal preference is object oriented graphics for all artwork except photos, which really need to be bitmapped. Sometimes canned artwork is not in the format you would like but conversion tools exist that can help you “make” the graphic in the format you'd like (GraphicConverter, see below, is perfect for this).

* The exception to this rule is that you can adjust each individual pixel, or all 520,00!

Since almost all graphics are destined for either display (CD-ROM or web) or print, all you must really do is optimize the graphic for the final medium in which it will be presented. For display, either bitmapped or object oriented graphics will work equally as well, provided you do not adjust their size.* But if you might also want to resize (adjust) and/or print your graphics consider the difference:



Notice how the graphic on the right was resized (adjusted) with no “jaggies.”

Graphics tools

Graphics tools come in two types: the low end and the high road.

At the low end of the spectrum, and the tool of choice for our workshop, is Claris' ClarisWorks.

ClarisWorks provides support for both bitmapped and object oriented graphics.

Some high road tools include Adobe's Photoshop and GraphicConverter, the poor man's Photoshop (\$35.00 shareware that can be downloaded from <http://members.aol.com/lemkesoft>), both for bitmapped graphics, especially photos. Adobe's Illustrator and Macromedia's Freehand are excellent “high-end” object oriented graphics packages.

How to “make” graphics

- 1) Draw or paint graphics by hand.
- 2) Scan in items (scan photographs, freehand drawn items, slides).
- 3) Purchase an artwork and/or photo CD-ROM. (Artwork may be bitmapped and/or object oriented.)
- 4) “Make” graphics by using numbers 1-3. For example, you could make some money graphics.
 - First, use a graphics software package to make dollar signs. Here you might try two things: draw or paint a graphic, say a ¢ or a \$; or use a funky font (¢ \$ £) and use Illustrator to “Create outlines” of these graphics so that you can free transform these.
 - Scan in some money from abroad (bills and coins, but be careful with the scanner's glass to not scratch it—any scratches involve *expensive* fixes).
 - Use canned art, including the art library in ClarisWorks, or royalty-free and/or non-copyrighted images.° (Dover Press makes an excellent collection of books with copyright-free art.)
- 5) Hire a starving student artist. Chances are they will know how to “make” graphics that are better than yours and that communicate messages more effectively.

What to consider when you make graphics

Bitmapped or object oriented? It depends. Before you begin, make this decision based upon what your final medium will be (display or print). I would recommend that all your graphics be object oriented except for photographs, slides, and “real” objects like the money scanned in the example above.

Key terms and who they relate to web and multimedia content

Pixels, dots per inch (dpi) or resolution; image size; color depth; file format (save); image type (grayscale, halftone, black and white, color).

Pixels, dots per inch (dpi) or resolution—dots on a screen. Macintosh screens have 72 dots /pixelsper inch. Most printers generally output at 300 or 600 dots per inch (dpi).

* Photo images are the only exception to this rule.

° See Copyright information web sites in the *Resources for future reference* section.

Image size—typical Macintosh monitors have a total screen resolution of 640 X 480 or 832 X 624 pixels, or close to 520,000 pixels per screen. Typical Windows displays have screen resolutions of 640 X 480 or 800 X 600 pixels. A graphic doesn't need to exceed these resolutions unless you have very specialized needs.

Color depth—most web browsers can only display 216 colors and require special, “adaptive” color palettes. Lower end computers can only display 256 colors. 256 color or grey scale graphics should be appropriate for all final media outlined above: anything over 256 colors is overkill.

File format—bitmapped and object oriented graphics can be saved in many file formats. With respect to CD-ROM delivered artwork, use the PICT (or EPS, ask your Computing Center) file format setting for all object oriented graphics and use the Photoshop or JPEG file format for bitmapped graphics.

For web delivered artwork, use the GIF (also known as GIF89a) file format for all object oriented and bitmapped artwork except pictures.

For web delivered photographs, use the JPEG or JPEG/JFIF file format and set image quality to “Medium/Normal/50/50%” and set color depth to 256 colors. (Once you've mastered 256 color artwork you may wish to investigate [browser] adaptive color palettes. Check out <http://www.lynda.com/dwg/hex.html> for more information.)

When saving graphics for use on the web, use the .gif and .jpg file extensions just like you've used the .htm extension for HTML documents and limit file names to 8 characters or less plus the “dot three letter” file extension , i.e. button.gif or family.jpg.

Image type—most graphics you may scan or “make” will be RGB/Color graphics unless you are scanning in black and white hand drawn line art or black and white slides or canned art like what is available in Dover Press' titles.

After you've “mastered” the basics outlined above, you may wish to check out animated GIF's and adaptive palettes. Both topics are introduced at Lynda Weinman's web site (reference below).

Resources for future reference

Jim Heid's Macworld New Complete Mac Handbook (4th) from IDG Books, ISBN 1-58684-484-0
Adobe Press' Adobe Photoshop™ Classroom in a Book™ (2nd) from Adobe Press, ISBN 1-56830-118-9
Adobe Press' Adobe Advanced Photoshop™ Classroom in a Book™ (2nd) from Adobe Press, ISBN 1-56830-117-0
Adobe Press' Adobe Illustrator™ Classroom in a Book™ (2nd) from Adobe Press, ISBN 1-56830-234-7
Adobe Press' Design Essentials (2nd) from Adobe Press, ISBN 1-56830-093-X
Kristof and Satran's Interactivity by Design from Adobe Press, ISBN 1-56830-221-5
Adobe Press' Production Essentials from Adobe Press, ISBN 1-56830-124-3
Jim Heid's Web Site: <http://www.heidsite.com>
Lynda Weinman's Web graphics site: <http://www.lynda.com>
Copyright: <http://www.cetus.org/fairindex.html>
<http://nemo.hamilton.edu/html/library/AVpage4.htm>
<http://www.libraries.psu.edu/avs/fairuse/default.html>