GRAPHIC DESIGN SOFTWARE   ART 3331

DIGITAL IMAGES: VECTOR VS. RASTER

Vector Formats

.ai – Illustrator's native format.

.svg – Scalable Vector Graphic, the web-standard format for vectors.

Raster Formats

.bmp – Bitmap. An uncompressed image. Bitmaps also covers images saved as halftones.

.tiff + .tif – Lossless image format. Favorite of designers.

.jpeg + .jpg – Lossy image format.

.gif – Supports transparency and animation. Legacy versions limited to 8 bit color.

.png – Lossless image format for the web that supports transparency. Intended to replace GIFs.

.jp2 –JPEG 2000, a lossless version of JPEG with limited support.

.cr2 + .raw – Raw image formats, extensions will vary with camera. Raw formats are "digital negatives" that contain unprocessed sensor data.

Document Formats

.eps – Encapsulated PostScript

.pdf – Portable Document Format

Computer graphics are created in one of two formats: vector and raster. File formats for images and documents may contain one type or both. Some formats have advantages and disadvantages that we'll go over in later lessons.

Vector

Vector graphics are like sets of instructions for creating an image. They contain mathematical algorithms: formulas that describe where points, lines, and planes exist and how these elements relate to one another.

Vector graphics look smooth and crisp at their edges, and they can be scaled to any size. Logos are nearly always developed as vector graphics, as a logo has to fit easily on a business card, a website, and possibly a billboard or bus wrapping. Vectors are also fundamental to digital type design, making fonts usable at any range of sizes.

Illustrator is most often used to create and modify vector images.

Raster

Bitmap or raster graphics are built from grids of pixels. Each tiny pixel contains a unit of color information. Bitmaps are used for digital photography and scanned images. Scaling-up raster images files results in a noticeable reduction of quality, while scaling down results in a loss of information.

Raster images excel at photorealism. However, uncompressed bitmaps are huge files and most raster formats use "lossy compression"—trading quality for a smaller file size. JPEGs that are edited and re-saved multiple times will exaggerate "compression artifacts." For that reason use a lossless format, like TIFF, whenever possible in your work. Only save to JPEG as the final step.

Comparison

In the left and right images I have "zoomed in" on the same two logos to 600%. This means we are viewing the images at 6 times their actual sizes.

If you enlarge a raster image too much, the pixel grid becomes visible to the human eye. The only possible compensation is to blur the edges.
Either way, enlarging a pixel-based image results in loss of quality.

Vector images don't have this limitation. On the other hand, extremely complex vector images take an excessive amount of computer processing power.

The right-hand column images are raster; it is easy to see the individual pixels that comprise the digital logo as tiny squares of color. In the left column, the type and graphics have been created in the vector-based application, Illustrator. Notice that the edges of the lines, letters, and figure are still rendered as smooth lines.
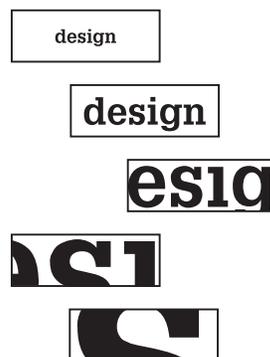
VECTOR

RASTER

SMOOTH CURVES

PIXEL GRID