rasters vs. vectors

images defined, editing strategies explained

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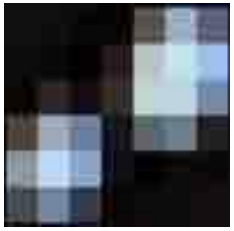
Object type	Characteristics	Examples	Usual file types	Editing & insertion method
Raster objects 	•Pixel based •Described in terms of resolution (dpi) •aka bitmap •Cannot grab object & stretch to resize larger	•Photographs •All images from Scanners Microscopes cameras •All .tif, .jpg, .png & .gif files	•.tif •.jpg •.png •.gif	•Photoshop •Insert >Picture From File
Vector objects 	•No pixels / no resolution •Mathematical algorithm •OK to grab object & stretch to resize larger	•Illustrations •Text objects •Drawing tool objects •Tables, charts & graphs •Never .tif, .jpg, .png or .gif file type	•.eps •.ps •.pdf •.ppt, .ai, .cnv	•Either the application it was created in or Office (ungroup) •Never Photoshop •Paste Special
Rasters that were vectors 	•Pixel based •Described in dpi •aka bitmap •Cannot grab object & stretch to resize larger •Blurry	•Scanned Illustrations •Illustrations that have been 'rasterized' •All .tif, .jpg & .gif files	Often • .tif .jpg • .png .gif Occasionally • .eps	•Photoshop •Insert > Picture From File

JPG

- accessible
- lossy compression
- best for photos, without text or lines
- adjustable compression/file size
- overcompression risk

TIF

- accessible
- lossless compression
- best for photos with text or lines
- supports layers
- larger file size
- better for challenging images

PNG

- accessible
- lossless compression
- best for photos, with text or lines
- supports transparency

GIF

- accessible
- limited to 256 colors
- best for illustrations and web graphics
- can be animated
- supports transparency

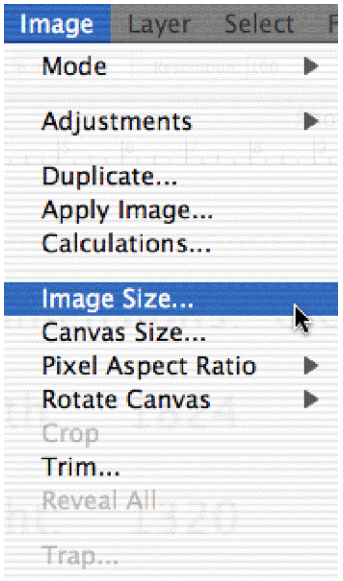
use Photoshop, GIMP, Canvas or other pixel-based image editor

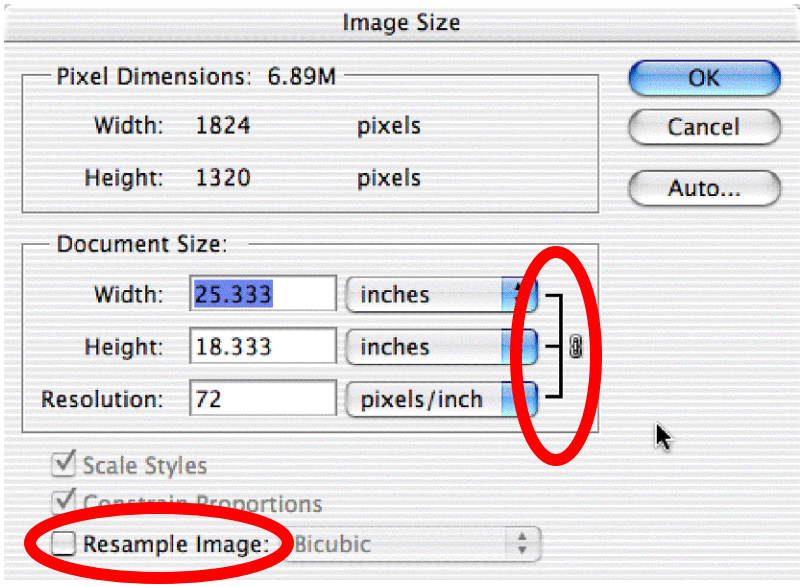
- crop
- adjust brightness & contrast
- physical dimension & resolution
- color mode
- file type

one size does not fit all

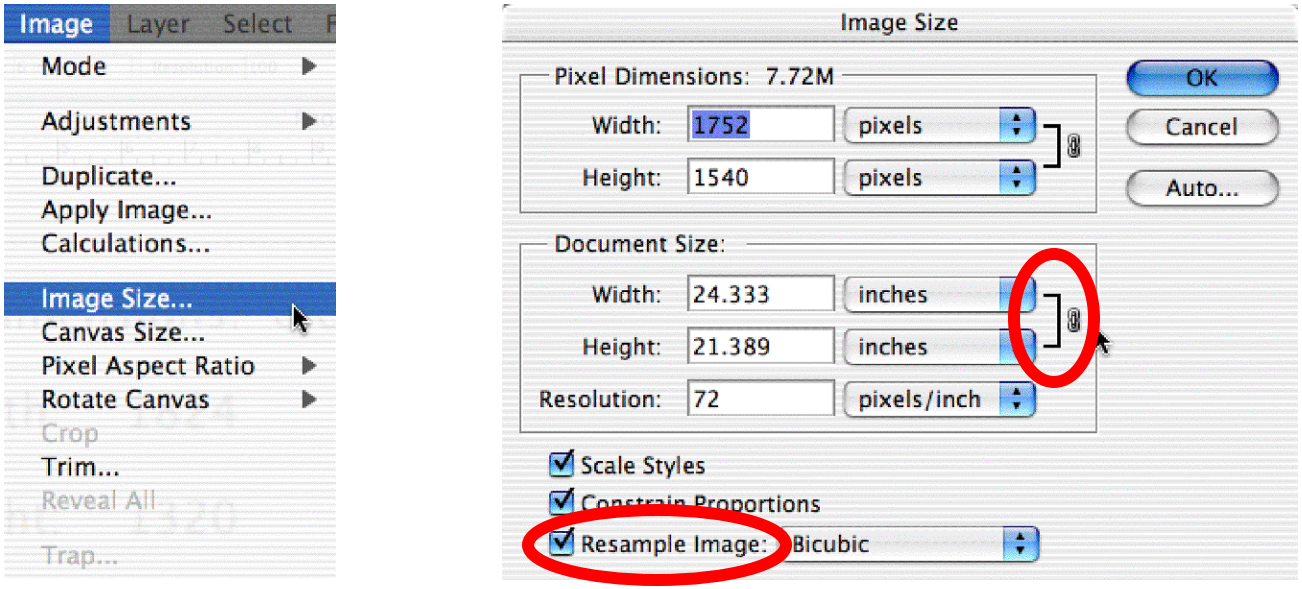
- each output device has different file type, size and resolution requirements
  - see the *Imaging Essentials* resolution chart for printer, poster and projection requirements
  - see submission guidelines for journal and grant figure requirements

Output Device \ Art Work Type	Photo Images Bitmap Images Raster Images (with no text or vector objects within)	Raster images that contain Line Art Illustrations Vector Objects Cartoons Text
PowerPoint On-screen Presentation **LCD Data Projector** **Computer Monitor/Display** **Web Site** *Physical Dimension of PowerPoint On-Screen Presentation: 7.5" x 10" otherwise physical dimension of projector or monitor = pixel dimension of device*	100 dpi	200 dpi
Laser Printer **(LaserJets & LaserWriters)** *Printable Area varies*	125-225 dpi	300-600 dpi
Photo- Quality Inkjet *Printable Area varies*	150 dpi (plain paper) 180 or 240 or 320 dpi (photo paper)	300-600 dpi
Photo-Quality Printer **(i.e.: Fujix, dye sublimation printers)** *Printable Area = 8" x 10.5" or 8" x 5"*	300-400 dpi (usually 320 dpi)	600-1200 dpi
Poster Printer *Printable Area =determined by service bureau*	125-225 dpi start at 125dpi	300 dpi





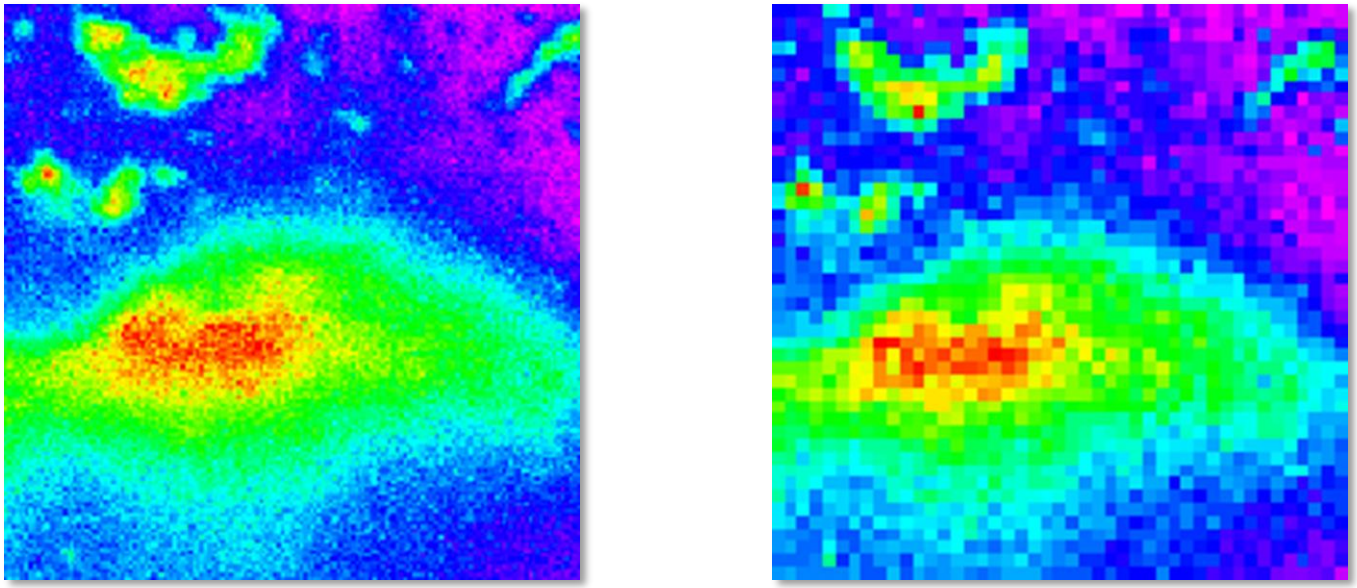
when using Photoshop to resize an image,
DO NOT *Resample Image* when
increasing the physical dimension or resolution



when using Photoshop to resize an image,
DO *Resample Image* when
decreasing the physical dimension or resolution

why can’t I resize my rasters in PowerPoint?

- **you need to control resolution & physical dimension for presentations, poster making & journal submission & PowerPoint isn’t up to the task**
- **it’s unreliable**
- **it looks terrible**



the image on the right demonstrates how low-resolution images make pixels more visible. Improperly resizing raster images can result in this undesirable kind of pixilation

why can't I build my figure using Photoshop?

- **it will rasterize text & any inserted vectors**
- **Photoshop is a needlessly complex tool for building figures (placement and alignment: AAARRRRGH!)**
- **if a figure requires multiple resolutions, psd can only have one resolution per file**
- **Photoshop is all about pixels & if you have any text or annotation & aren't careful, you risk rasterizing your text & other vectors**

use PowerPoint to create figures, presentations & posters

- most users are familiar with tools
- handles both rasters & vectors
- can print small slides & large posters
- can generate any file type, complying with journal submission guidelines

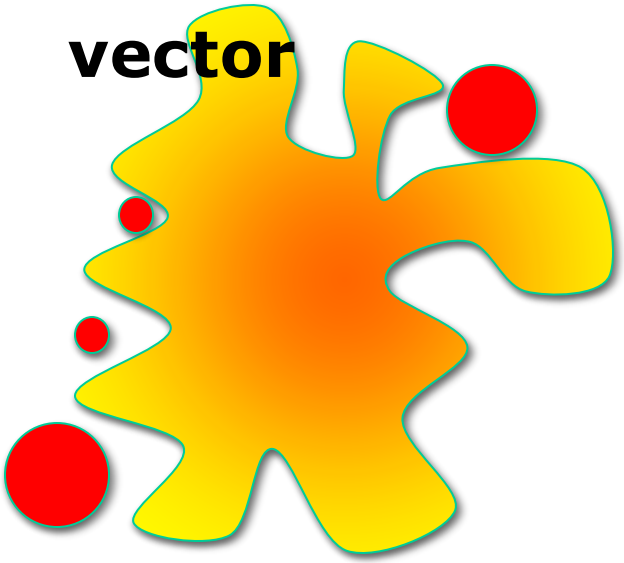
edit vectors with PowerPoint or original application

- **tables, charts, graphs & illustrations from other Microsoft applications**
- **illustrations, graphs & other drawings created by other vector-generating applications**

do not, DO NOT open with Photoshop

why can’t I resize my vectors in Photoshop?

- **Photoshop will turn the vector into a raster, resulting in all high contrast edges becoming blurry & jagged edged**



Recipe for blurry images

Take any vector object

- **text, annotation, table, chart, graph, drawing object**

Do one or both of the following:

- **Open in Photoshop**
- **Save as pixel or raster file format like .jpg, .tif, .png**

- **rasters are pixel-based & show visible blurriness, especially along high-contrast edges of text, annotation & drawn objects**

- **vectors have no pixels & maintain sharp edges of text, annotation & drawn objects**

- **rasters**
  - **for best outcome, don’t use PowerPoint to resize, instead use Photoshop**
- **vectors**
  - **NEVER edit with Photoshop- doing so will rasterize it so high-contrast edges will appear blurry**

comments?

questions?

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find imaging guides at
http://goo.gl/YP8J3c

the end | thank you for coming