Publication Quality Graphics

Biochemistry Boot Camp 2018
Session #6
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Why Quality Graphics?

- Clarity of Presentation
  - Sharp-looking Posters, Presentations, Papers
  - Make your message easier to understand
- Requirement of Many Journals: Print Standards
- Enable Close Inspection in Digital Format
  - Blurry, pixelated graphics are not professional

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Graphics with Bully
(try zooming in)

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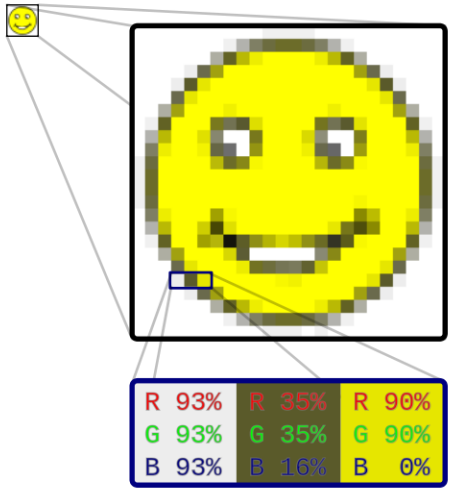
How to Store Graphics

- *Raster* (or bitmap) graphics
- Pixels stored in pre-determined x, y order
- Can be grainy when zoomed
- Color must be stored with each pixel
- **Good for:** photos, artwork, graphs, diagrams
- **Software:** Photoshop, Gimp



http://en.Wikipedia.org/wiki/Raster_graphics

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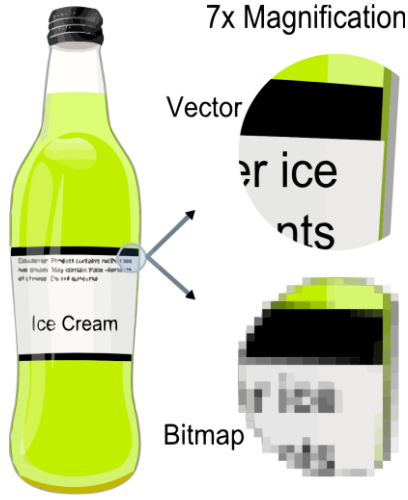
How to Store Graphics

- *Vector* graphics
- Shapes, text drawing effects are stored mathematically
- Arbitrary zoom without graininess
- Color is stored with each shape/line
- **Good for:** graphs, diagrams, but *not* photographs
- **Software:** Illustrator, Inkscape



http://en.Wikipedia.org/wiki/Vector_graphics

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Raster vs. Vector File Formats

Raster Formats

- GIF
- BMP
- PNG – Portable network graphics
- JPEG – Joint photographic experts group
- TIF – Tagged image file

Vector Formats*

- PDF
- SVG – Scalable vector graphics
- WMF – Windows Metafile
- PS – Postscript
- EPS – Encapsulated Postscript
- DOCX, PPTX – Office tools

* Most vector formats can also store rasterized graphics as a subset of artwork.

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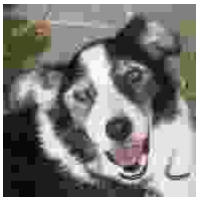
Image Compression

(only applies to raster graphics)





- **Lossy:** Image is made smaller by "losing" data; approximations are made to maintain image
  - — Generally can adjust quality (see above)
- **Lossless:** No image data is lost; quality is the same
  - — File sizes will be bigger than lossy

http://en.Wikipedia.org/wiki/Lossy_compression

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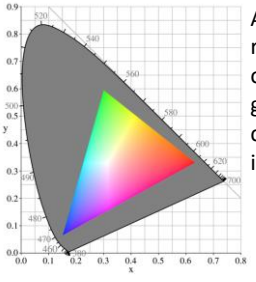
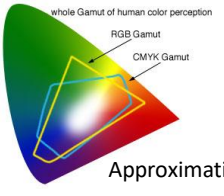
Color: RGB and CMYK

- **Computer monitors:** additive color (red, green, blue)
- **Printed material:** subtractive color (inks; cyan, magenta, yellow, black
- Different technologies are limited to different colors!



Actual representation of RGB color gamut (all visible colors would be in the grey area)



Approximation!

http://en.Wikipedia.org/wiki/Gamut, http://gotprint.net/g/showStaticPage.do?page=rgb-scmyk.html

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Best Practices For Publication

- Size (dimensions)
  - One column is 8 cm wide; two columns are 17 cm
  - Most journal pages are 28-30 cm tall
  - Poster figures can vary widely, but should be bigger
- Resolution
  - 300 dpi minimum, some publishers want 1,200 dpi for graphs and diagrams (overkill)
- Color Mode
  - RGB or CMYK (frequently doesn't matter, but used to be more important; check requirements)

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Best Practices For Publication

(continued)

- Fonts
  - 5 pt minimum, 8-11 pt for most labels
  - Panels (A, B, C) vs (a, b, c) → Check recently published papers
- Always read author guidelines carefully (format, dpi, color requirements)
- **Be Observant!**
  - Pay attention to what is acceptable in papers
  - Notice what works in posters/presentations

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Tips and Tricks

- Think carefully about layout and display: one column or two? How many panels?
- Layout figures in PowerPoint to get a rough estimate, then use other software to make a final version
  - PowerPoint is not a print publication tool!
- Learn your adviser's preferences and model them (read papers, talk to other students)
- Pay attention to good design and effective communication!

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The Software

- **Graphs:** Origin, Grace, Matlab, Gnuplot, Mathematica, Excel (?)
- **Touch-Up:**
  - Raster: Photoshop, GIMP
  - Vector: Illustrator, Inkscape
- Never (EVER) doctor an image or graph to make it look better
  - If there is *any* doubt about image manipulation, ask your adviser
  - An interesting afternoon: https://retractionwatch.com/

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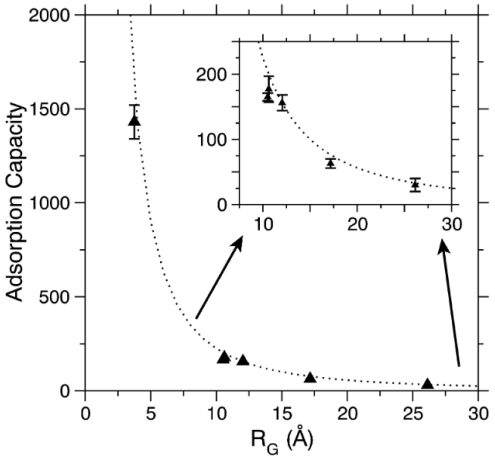
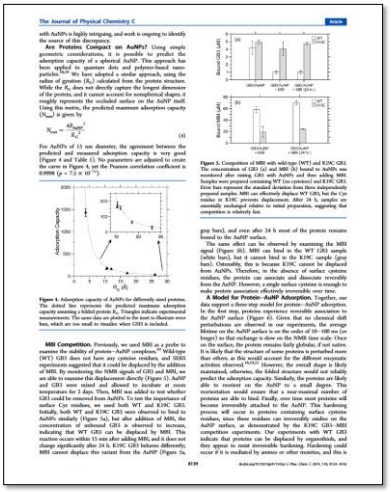
Doing it With Excel: The Target





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Problems With Excel

(these must be overcome)

- Bad font choice
- No labels
- Layout
- Grey text (seriously, why?)
- Extra “chart junk” like gridlines
- Etc., etc., etc…

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Let's Try It…

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Excel Tips

- Save templates (right click on graph) to make changing dumb defaults easier
- Use Excel's own grid to help with alignment (hold down alt while dragging a graph)
  - Take a look at Page Layout → Align for more
  - Panel labels (A, B, C) can go in cells behind graphs
- Use the Print Area to control what is saved to a PDF
  - Photoshop and GIMP can read PDFs and convert to high-resolution TIF/PNG file
  - Illustrator/Inkscape can read PDFs as vector images

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Summary

- Clear, professional images make it easier to communicate your science.
  - Make it easy for your audience to think you're smart!
- As a scientist, you will need to learn not only about science, but about publishing and graphics, too.
- PowerPoint and Excel can be useful tools in the publication repertoire, but some know-how is needed.
- Best skill is observation: What works? What doesn't?