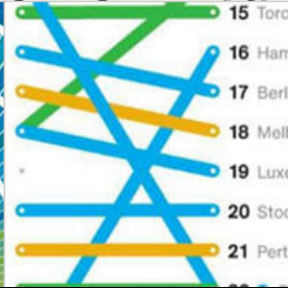
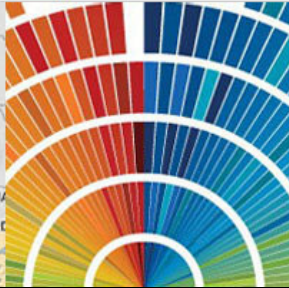
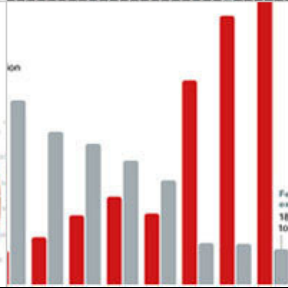
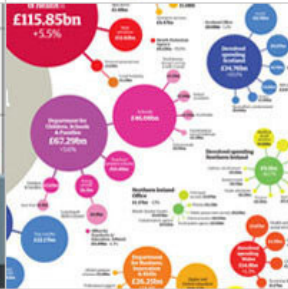
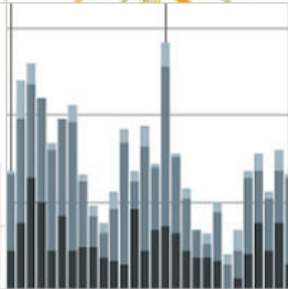
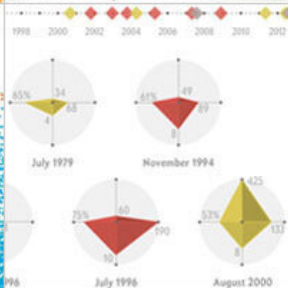
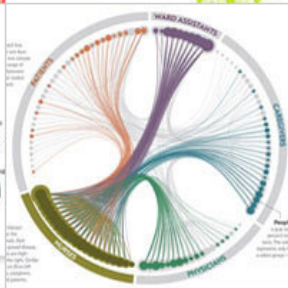
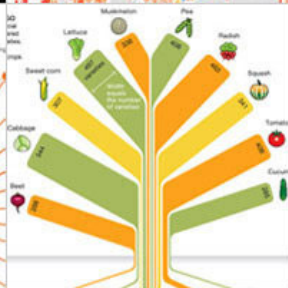
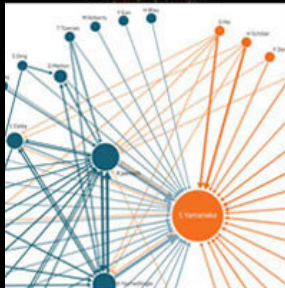
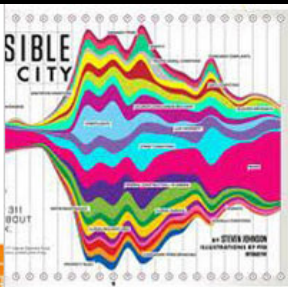
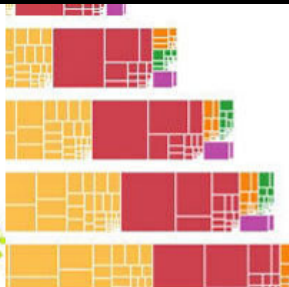
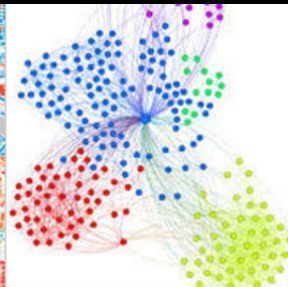


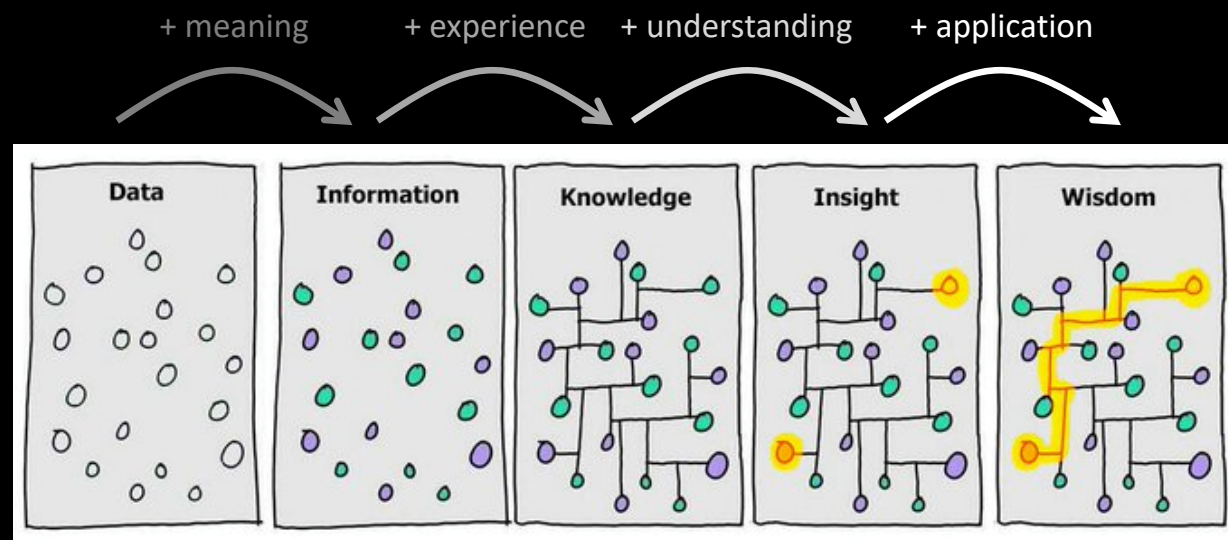
Visualizing Science: A Crash Course in Digital Graphics

Coffee Hour | ARO Education Committee

21st June 2023

Kirupa Suthakar, PhD





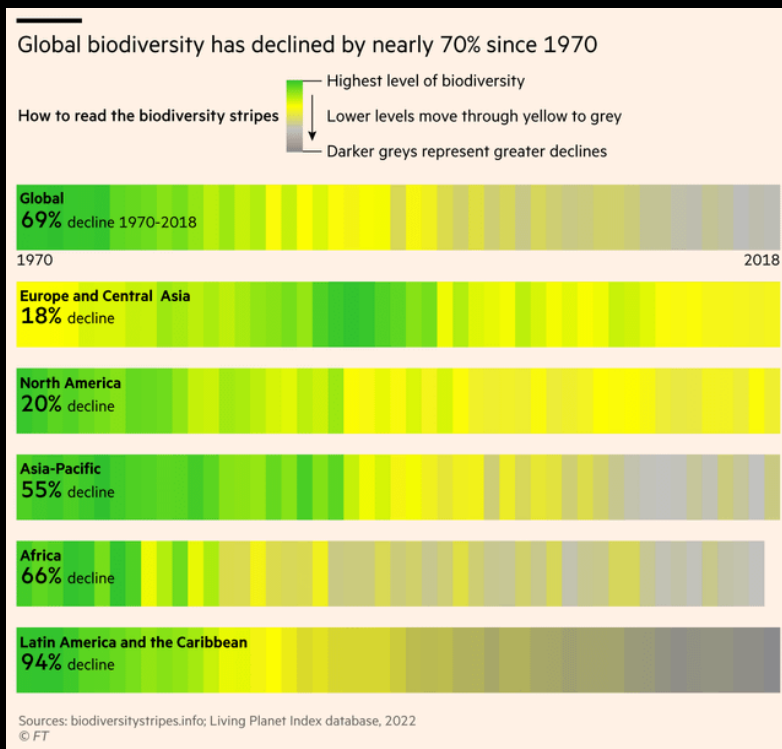
'Here is the data I collected'

'Here is my addition to our field'

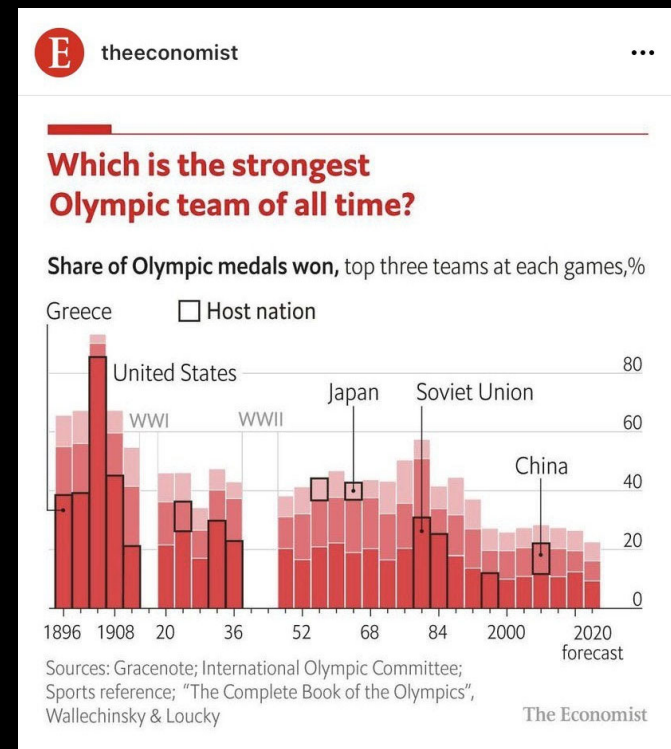
Illustration by David Somerville based on the original by Hugh McLeod

What makes a good figure? (*according to reddit)

r/dataisbeautiful



r/dataisugly



Ten Simple Rules for Better Figures

- Rougier, Droettboom & Bourne, 2014 (PLOS Computational Biology)
 1. Know your audience
 2. Identify your message
 3. Adapt the figure to support medium
 4. Captions are not optional
 5. Do not trust the defaults
 6. Use color effectively
 7. Do not mislead the reader
 8. Avoid 'chartjunk'
 9. Message trumps beauty
 10. Get the right tool

<https://journals.plos.org/ploscompbiol/article?id=10.1371/journal.pcbi.1003833>

Paid* vs Free Software

*extortionate @ \$54.99/mo for individual plans



Photoshop

Raster/bitmap graphics
(pixels i.e. raw image files)



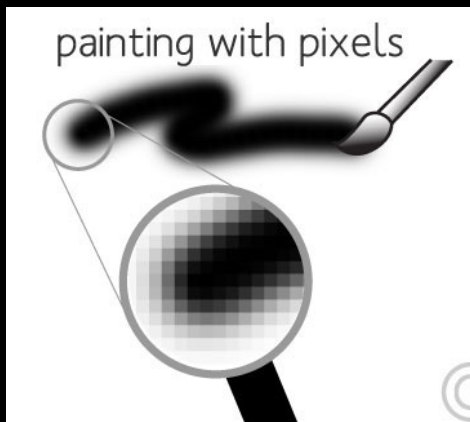
Illustrator

Vector graphics
(paths i.e. graphs & schematics)



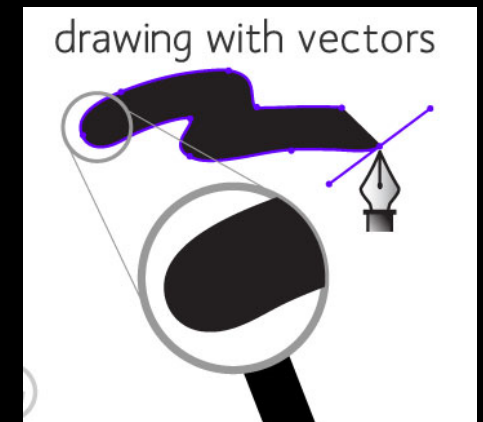
Raster vs Vector Graphics

Used for images
e.g. photographs, micrographs



Raster (aka bitmap) graphics are NOT scalable
(i.e. quality dependent on resolution)

Used for line art
e.g. plots, graphs, flow charts, schematics



Vector graphics are scalable
(i.e. not dependent on resolution)

Raster vs Vector

Common file types:

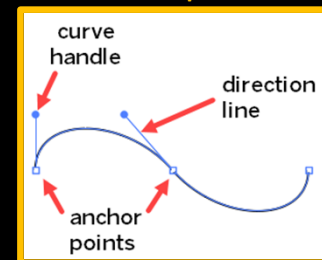
- .jpg
- .gif
- .png
- .tiff
- .raw
- .psd



Common file types:

- .pdf
- .eps
- .ai
- .svg
- .emf

Bezier curves to create paths



<https://pavilion.dinfos.edu/Article/Article/2223089/vector-vs-raster-images-choosing-the-right-format/>

File type considerations

- Compression – am I willing to trade quality of resolution for file size?
 - Lossless compression (larger files): .tiff, .png, .psd, .ai, .pdf, .svg, .emf, .eps
 - Lossy compression (smaller files, lower resolution): .jpeg, .gif
- Readability – what programs can access the file?
 - Typically proprietary: .psd, .ai, .mat, .nd2
 - Many programs: .png, .jpeg, .tiff, .bmp, .pdf, .svg, .emf, .eps
- Editability – do I need to retain editable features?
 - Compressed or uncompressed with layers intact (large files): .psd, .ai, .pdf, .tiff
 - Compressed and ‘flattened’ (small files): .jpeg, .tiff, .png

Working with layers



Elemental Masks

Collaboration b/w
Paul Douard, France
Victor Vergara, Colombia

<https://www.behance.net/gallery/30936877/Vegetal-Mask-Step-by-step-Illustrator-CC>

Concepts to cover:

- Program Workspace
- Window Panes & Toolbars
- Ruler/dimensions
- Layers
- Tools
 - Selection vs Direct Selection
 - Text Boxes vs Area Text Boxes
 - Pencil vs Pen vs Brushes
 - Stroke vs Fill
 - Select > Same
 - Arrows and Arrowheads
- File types
- Importing and exporting (print vs web)

Select		
Selection Tool		V
Direct Selection Tool		A
Group Selection Tool		
Magic Wand Tool		Y
Lasso Tool		Q
Artboard Tool		Shift+Q
Draw		
Pen Tool		P
Add Anchor Point Tool		+
Delete Anchor Point Tool		-
Anchor Point Tool		Shift+C
Curvature Tool		Shift+~
Line Segment Tool		l
Arc Tool		
Spiral Tool		
Rectangular Grid Tool		
Polar Grid Tool		
Rectangle Tool		M
Rounded Rectangle Tool		
Ellipse Tool		L
Polygon Tool		
Star Tool		
Flare Tool		
Paintbrush Tool		B
Blob Tool		Shift+B
Shaper Tool		Shift+N
Pencil Tool		N
Smooth Tool		
Path Eraser Tool		
Join Tool		
Symbol Spayer Tool		Shift+S
Symbol Shifter Tool		
Symbol Scruncher Tool		
Symbol Sizer Tool		
Symbol Spinner Tool		
Symbol Stainer Tool		
Symbol Screener Tool		
Symbol Styler Tool		
Column Graph Tool		J
Stacked Column Graph Tool		
Bar Graph Tool		
Stacked Bar Graph Tool		
Line Graph Tool		
Area Graph Tool		
Scatter Graph Tool		
Pie Graph Tool		
Radar Graph Tool		
Slice Tool		Shift+K
Slice Selection Tool		
Perspective Grid Tool		Shift+P
Perspective Selection Tool		Shift+V
Type		
Type Tool		T
Area Type Tool		
Type on a Path Tool		
Vertical Type Tool		
Vertical Area Type Tool		
Vertical Type on a Path Tool		
Touch Type Tool		Shift+T
Paint		
Gradient Tool		G
Mesh Tool		U
Shape Builder Tool		Shift+M
Live Paint Bucket		K
Live Paint Selection Tool		Shift+L
Modify		
Rotate Tool		R
Reflect Tool		O
Scale Tool		S
Shear Tool		
Reshape Tool		
Width Tool		Shift+W
Warp tool		Shift+R
Twirl Tool		
Pucker Tool		
Bloat Tool		
Scalloped Tool		
Crystallize Tool		
Wrinkle Tool		
Puppet Warp Tool		
Free Transform Tool		E
Eyedropper Tool		I
Measure Tool		
Blend Tool		W
Eraser Tool		Shift+E
Scissors Tool		C
Knife		
Navigate		
Hand Tool		H
Print Tiling Tool		
Zoom Tool		Z

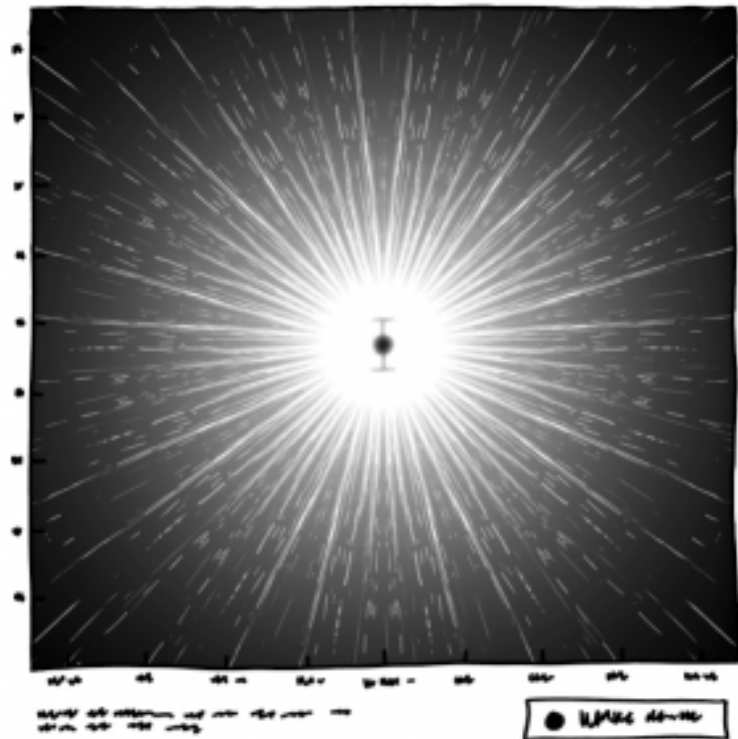
Demonstrations

Useful references and resources

- GOOGLE!!!
- ‘Ten Simple Rules for Better Figures’ - Rougier, Droettboom & Bourne, 2014 (PLOS Computational Biology) - <https://journals.plos.org/ploscompbiol/article?id=10.1371/journal.pcbi.1003833>
- ‘Raj Lab basic Adobe Illustrator (CC) guide’ - Jiang, 2019 (RajLaboratory blog) - <https://docs.google.com/document/d/1TXmbltzBPcApCcuJ9HLOIQgWPqKylrFRWRudrN-5vBE/edit#>
- ‘Image integrity and standards’ - Nature Portfolio - <https://www.nature.com/nature-portfolio/editorial-policies/image-integrity>
- Coblis – Color Blindness Simulator - <https://www.color-blindness.com/coblis-color-blindness-simulator/>

Thanks for joining!

FIGURE 2.



SCIENCE POWER MOVE: WHEN ONE OF YOUR DATA POINTS IS REALLY COOL, DEVOTE A WHOLE FIGURE TO IT.

<https://xkcd.com/2713/>