Creating effective visualisations

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HELLO
my name is

Hadley

Critique

Graphics are like pumpkin pie

The four C's of critiquing a graphic

Content

Construction

Context

Consumption

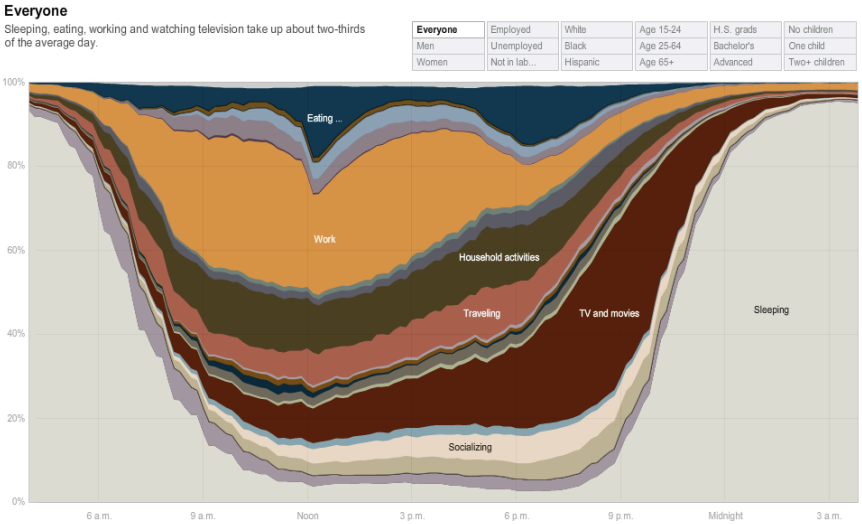
Content

Content

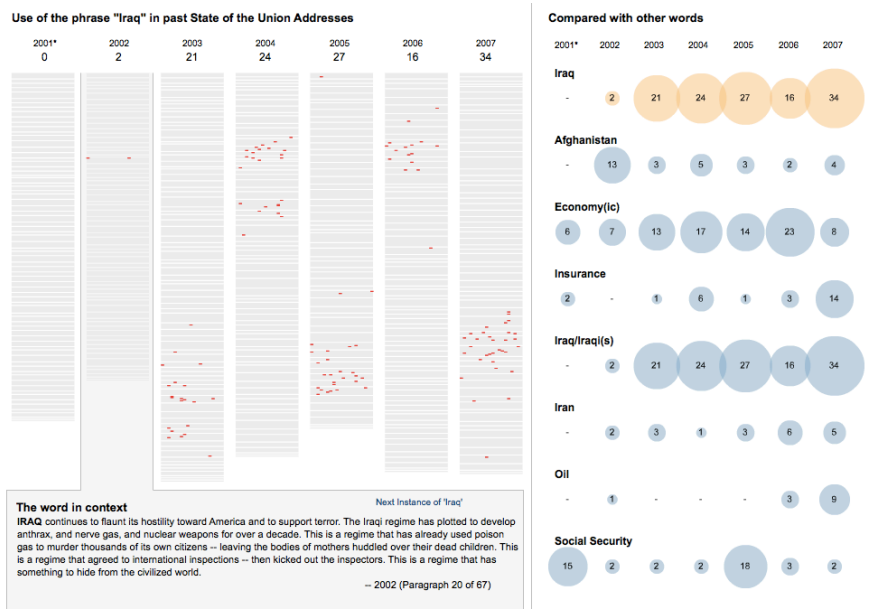
What data (variables) does the graph display?

What non-data is present?

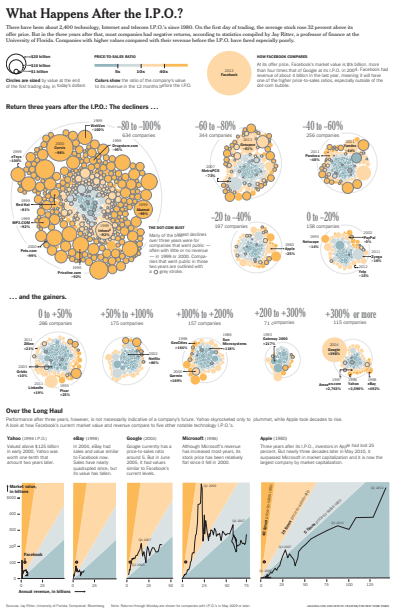
What is **pumpkin** (essence of the graphic) vs what is **spice** (useful additional info)?



http://nyti.ms/np29Yk



http://nyti.ms/r8KdvU



Your turn

In small groups, identify the data and non-data in each of the three plots. Which features are the most important? Which are just useful background information?

Construction

Construction

How many layers are on the plot?

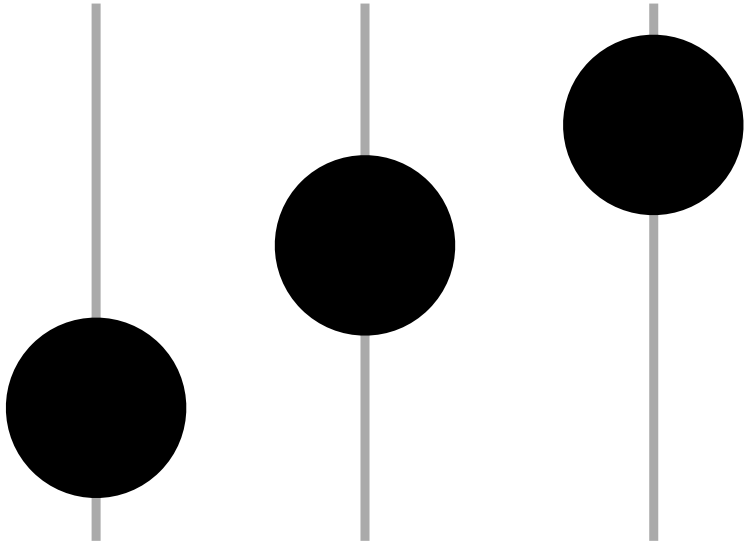
What data does each layer display? What sort of geometric object does it use? Is it a summary of the raw data? How are variables mapped to aesthetics?

http://www.dreamsystemsmedia.com/blog/index.php/social-media-statistics-of-the-day/

1

Match perceptual and data topology

Which represents the larger value?



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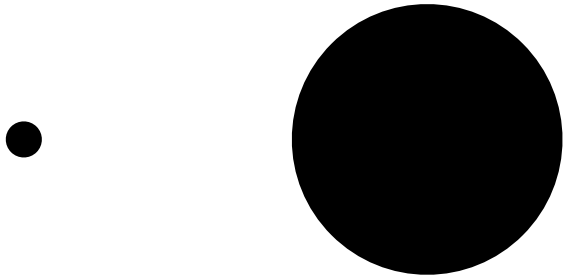

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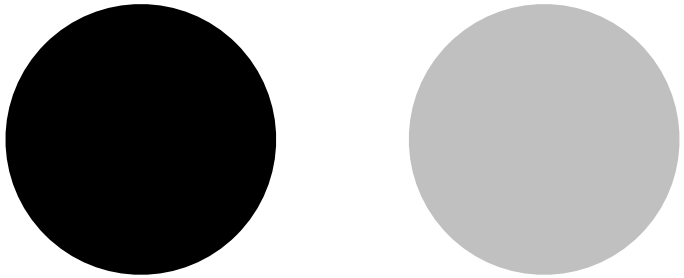

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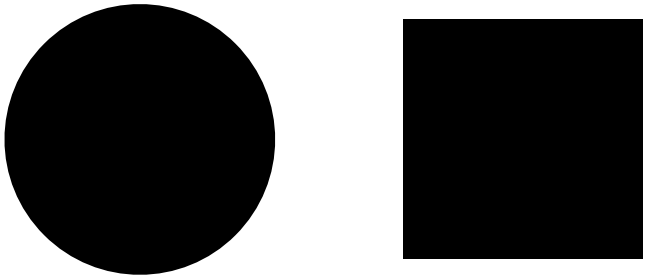

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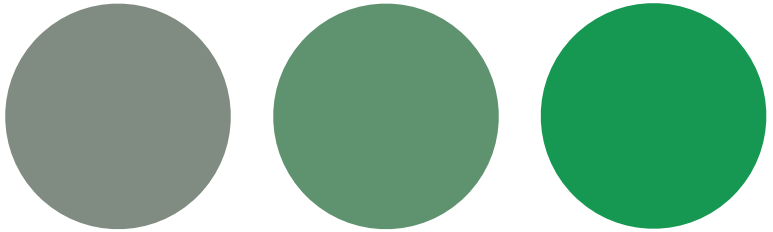

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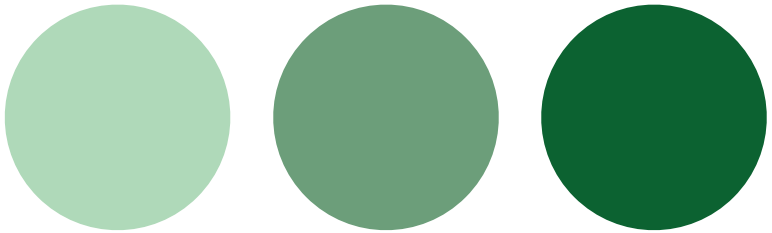

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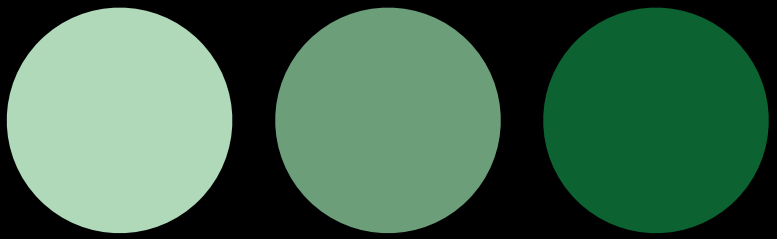
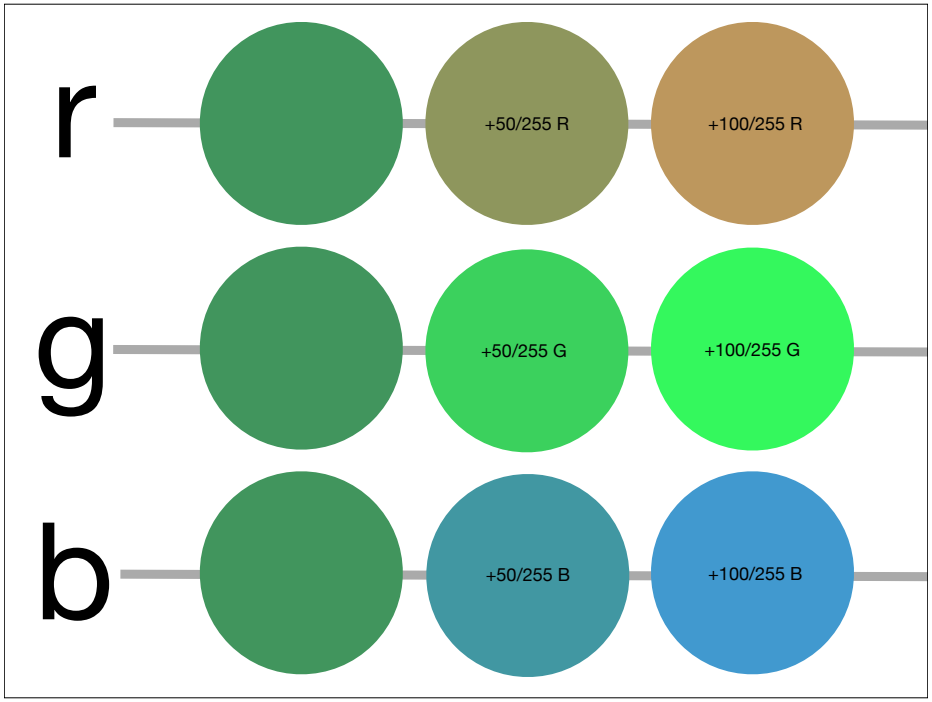


What are the three important components of colour?

RGB

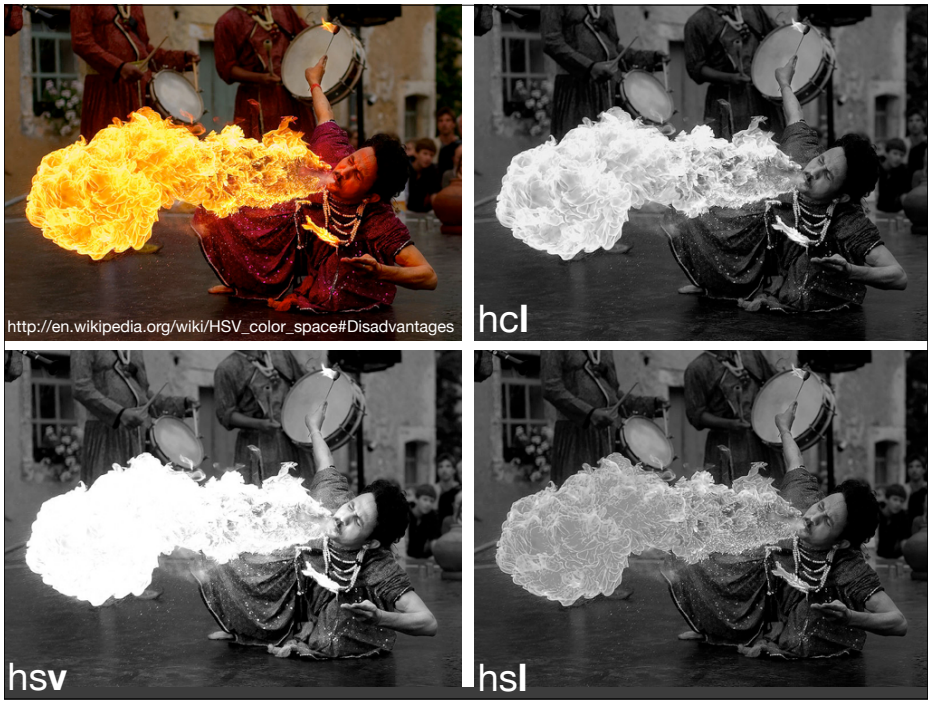


~~RGB~~

HSV HSL

HCL

(aka polar LUV)

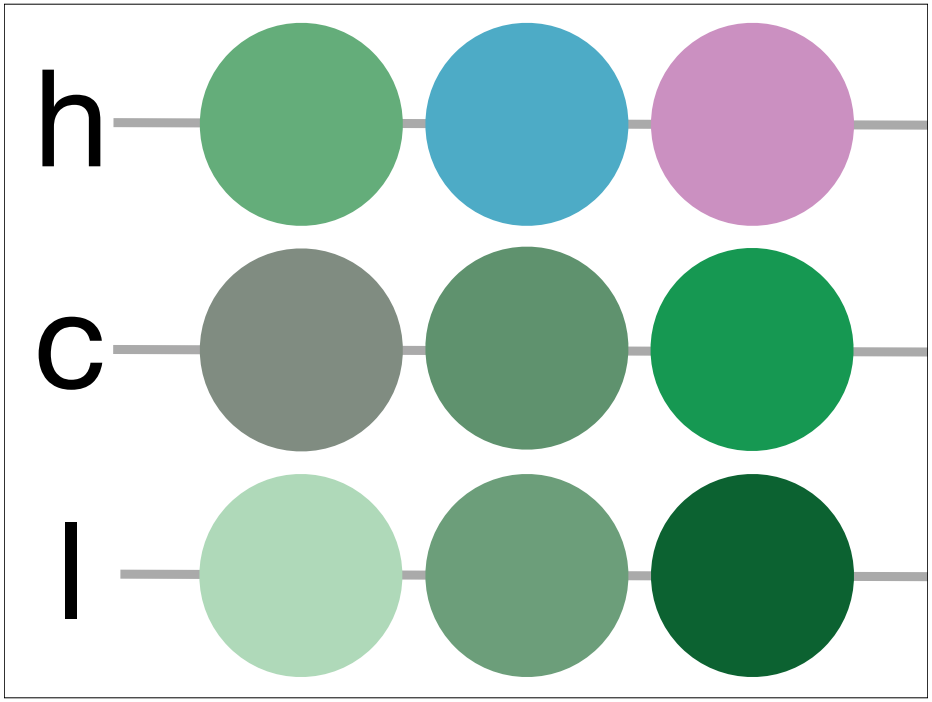


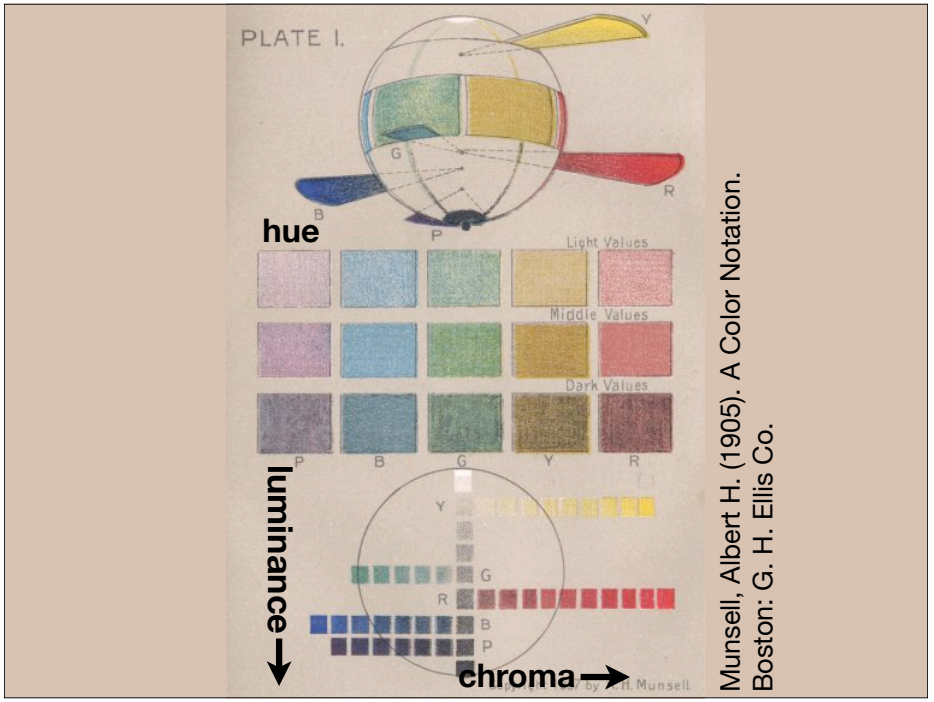
~~RGB~~

~~HSV~~ ~~HSL~~

HCL

(aka polar LUV)





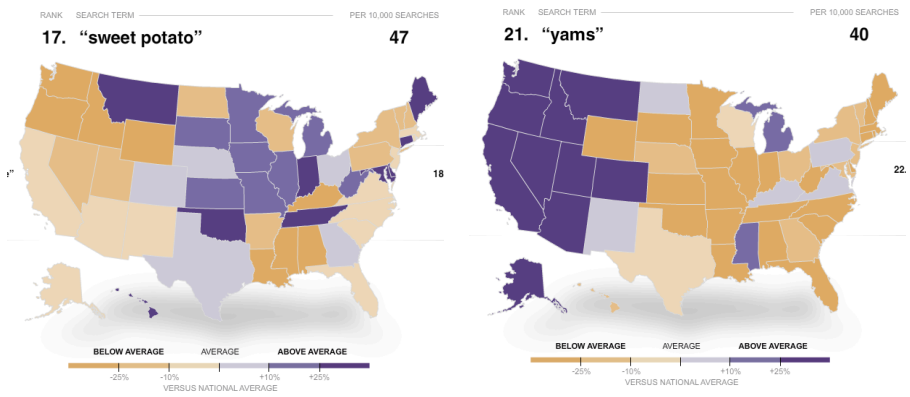
Why care?

Perceptually uniform

Hue is unordered. Use evenly spaced hues with equal chroma and luminance to make aesthetically pleasing discrete palettes.

Chroma and **luminance** are ordered. Easy to make perceptually uniform gradients by varying either (or both). Never use rainbow scales again!

Aesthetic	Topology
Position	Ordered
Size	Ordered
Luminance	Ordered
Chroma	Ordered
Shape	Unordered
Hue	Unordered



http://www.nytimes.com/interactive/2009/11/26/us/20091126-search-graphic.html

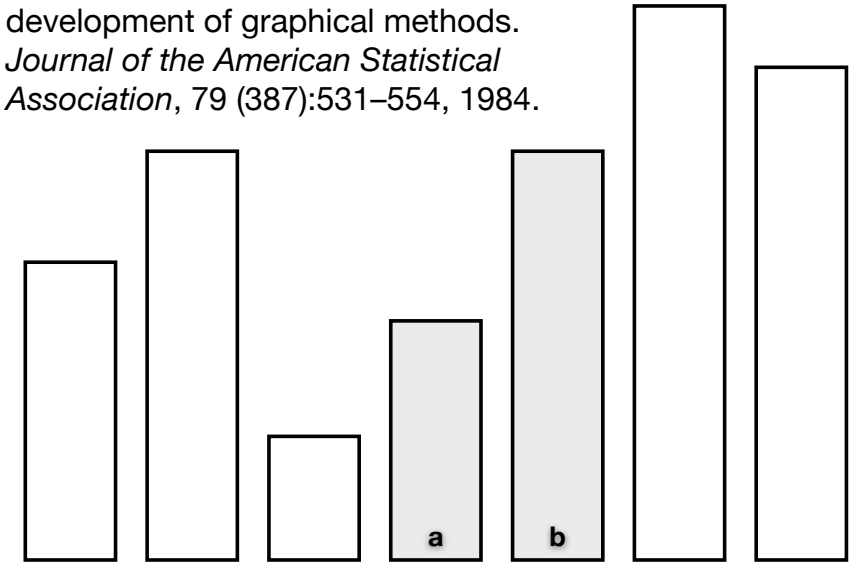
Your turn

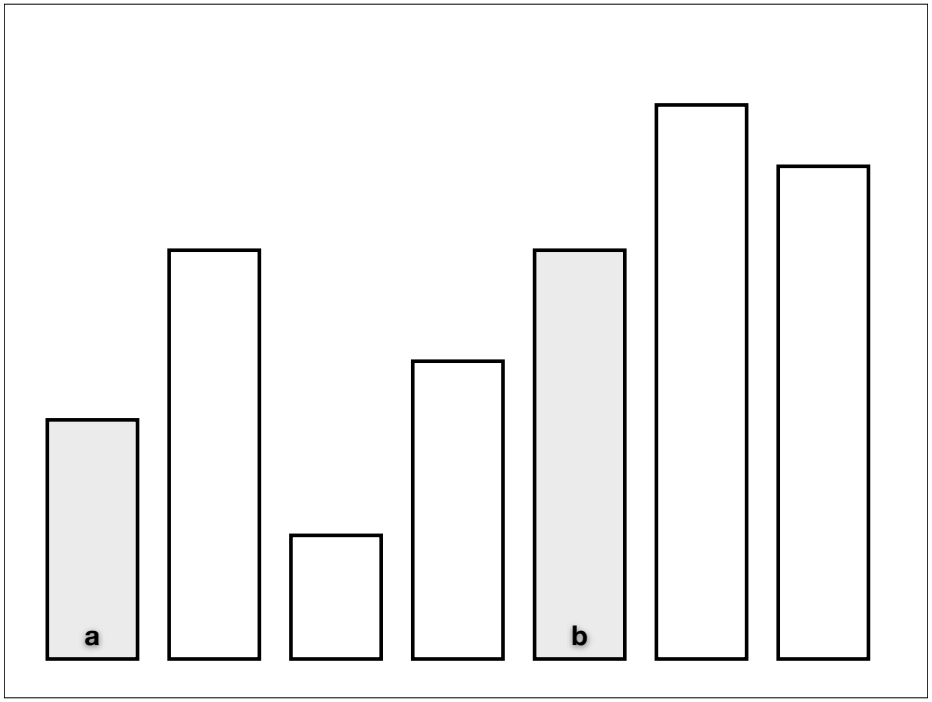
In small groups, work through each of the three graphics. Does the data topology match the perceptual topology?

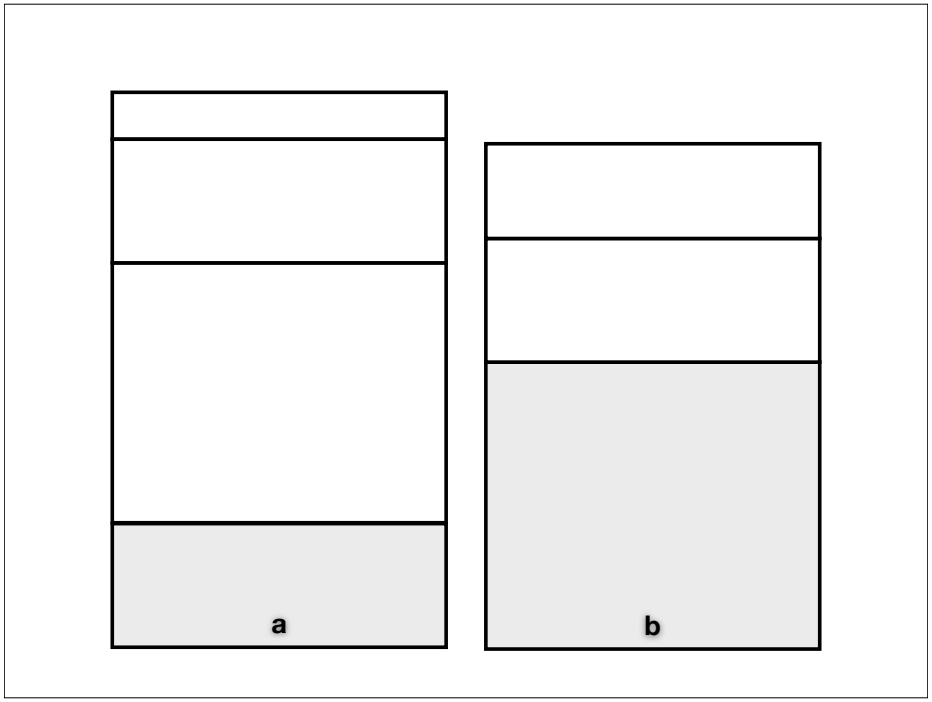
2

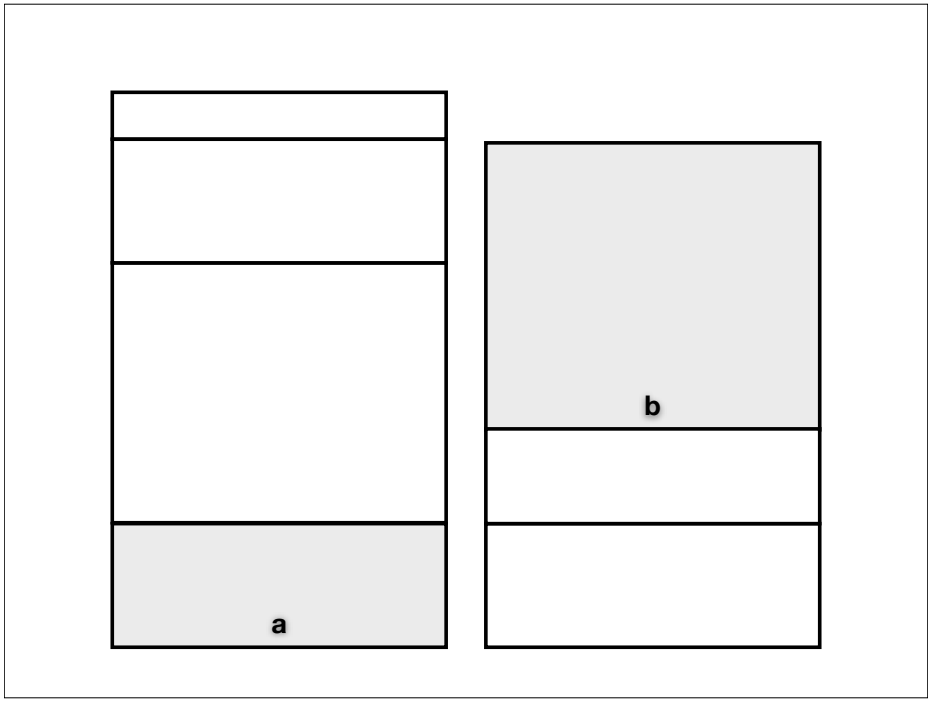
Make important comparisons easy

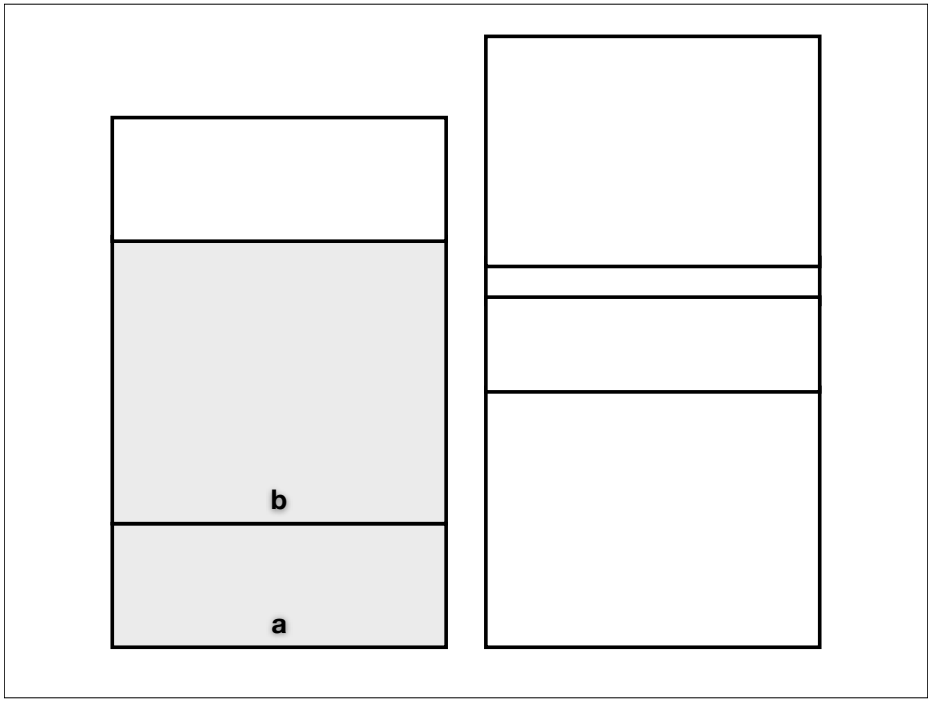
W. S. Cleveland and R. McGill. Graphical perception: Theory, experimentation and application to the development of graphical methods. *Journal of the American Statistical Association*, 79 (387):531–554, 1984.

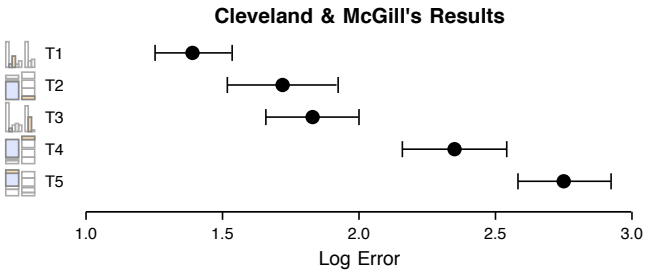


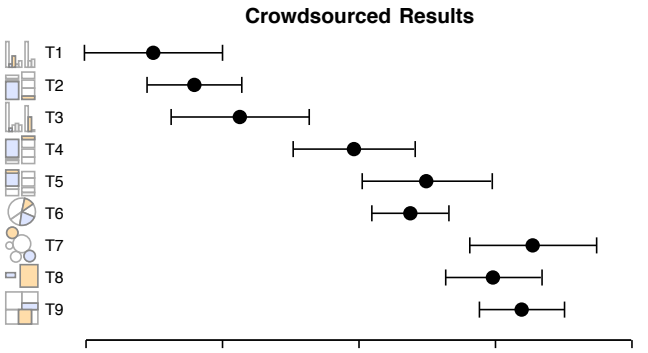

a
b


a
b


b
a

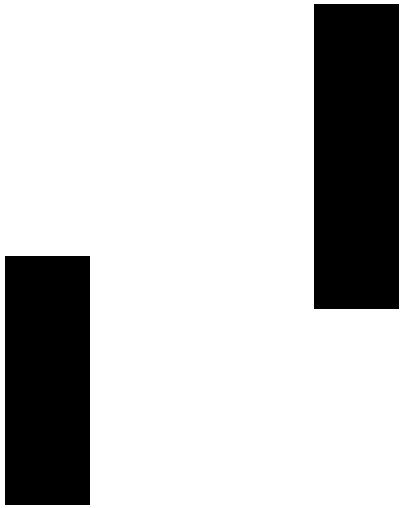

b
a





J. Heer and M. Bostock. Crowdsourcing graphical perception: Using mechanical turk to assess visualization design. In *CHI 2010*, 2010.

We perceive relative differences



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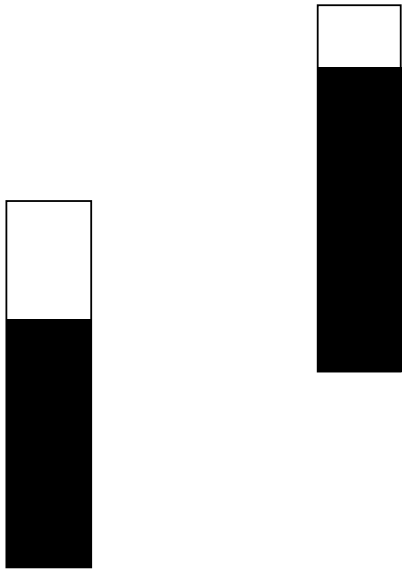


Position

Length / Angle

Area

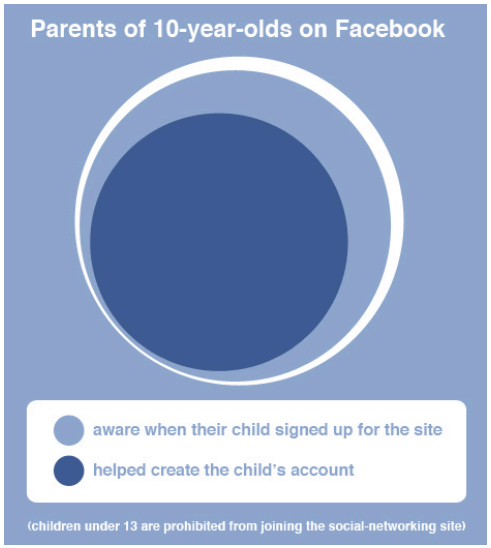
Volume / Chroma / Luminance

×

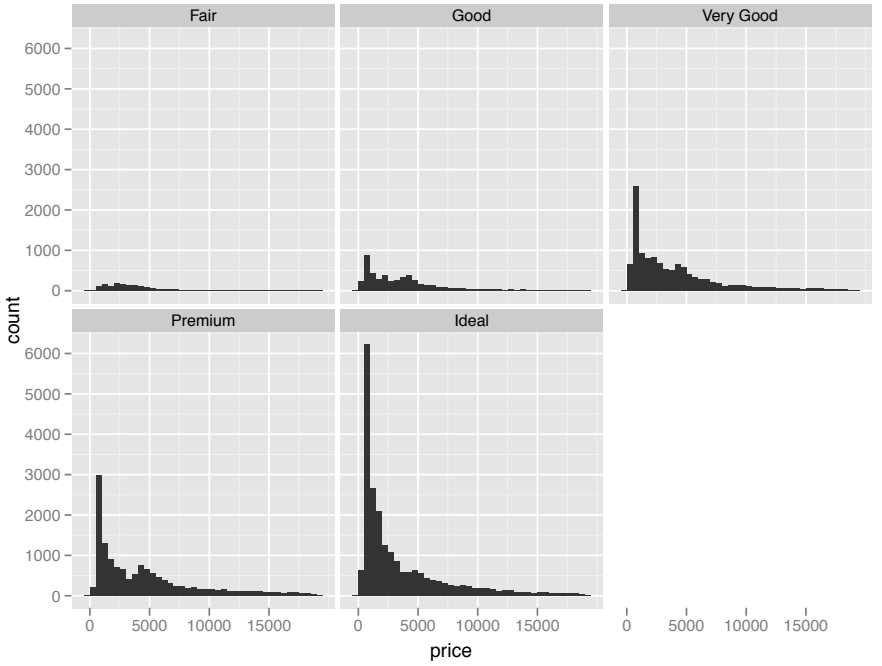
Close objects are easier to compare than distant objects

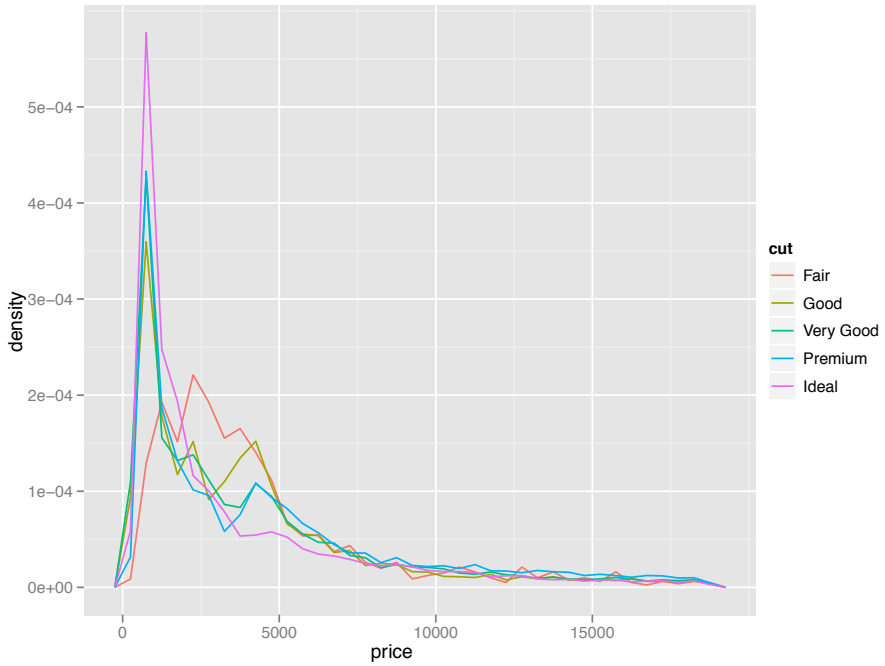
×

Perception is relative



http://www.dreamsystemsmedia.com/blog/index.php/social-media-statistics-of-the-day/





Common misunderstanding

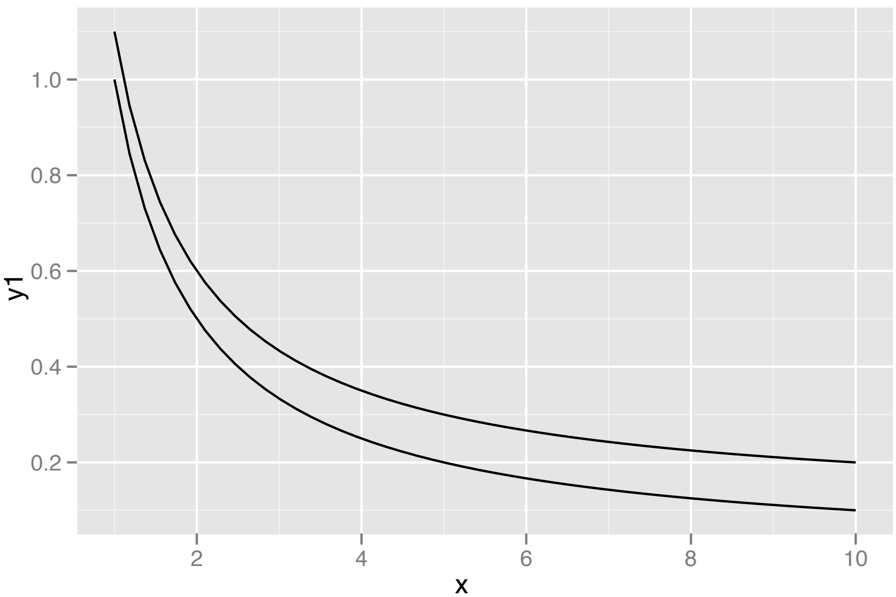
Pie charts are bad! **Die pie chart, DIE**

Pie charts are bad when you want to accurately compare two numbers

But:
As good as bars for estimating percentage of whole.
Better than bars for comparing compound proportions (A + B vs C + D)

I. Spence. No Humble Pie: The Origins and Usage of a Statistical Chart. *Journal of Educational and Behavioral Statistics*, 30:353–368, 2005.

Beware



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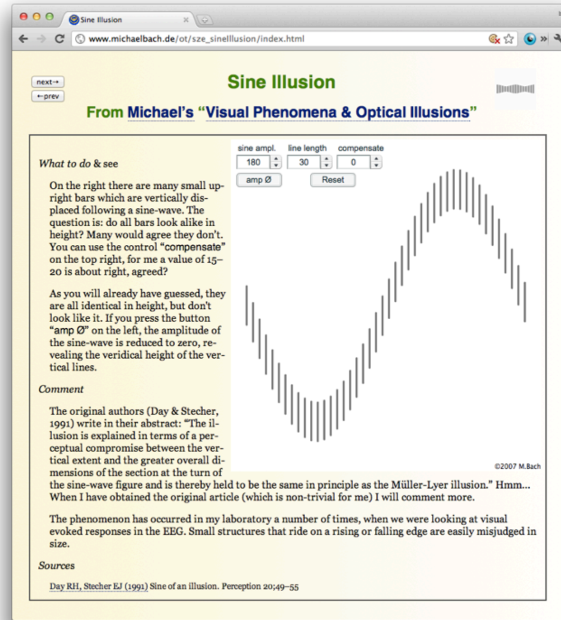
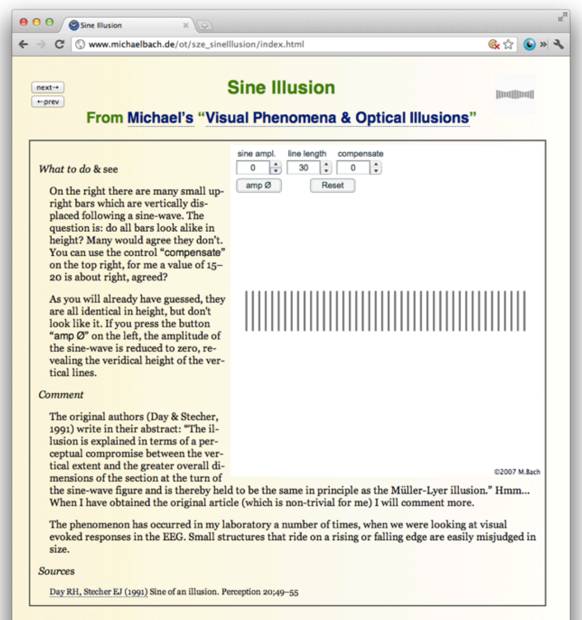


http://www.michaelbach.de/ot/sze_sineIllusion/index.html

Beware



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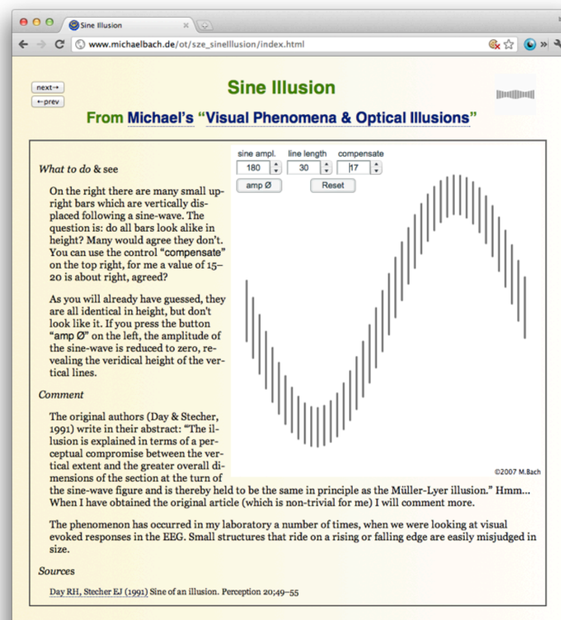

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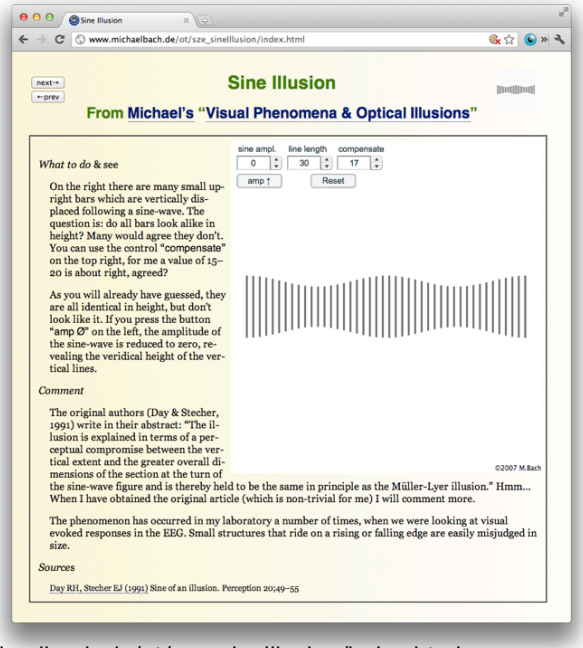
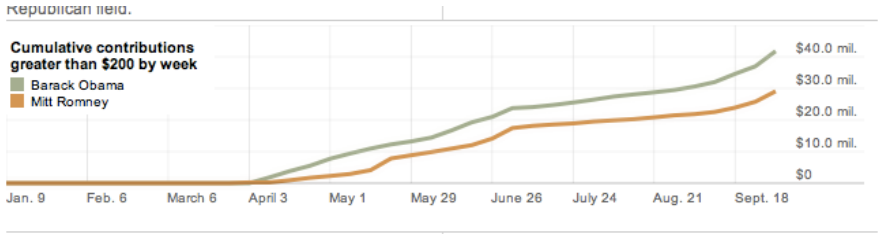


http://www.michaelbach.de/ot/sze_sinelllusion/index.html



http://elections.nytimes.com/2012/campaign-finance

Ensure important comparisons are close

Use position, then length/area, then chroma/luminance

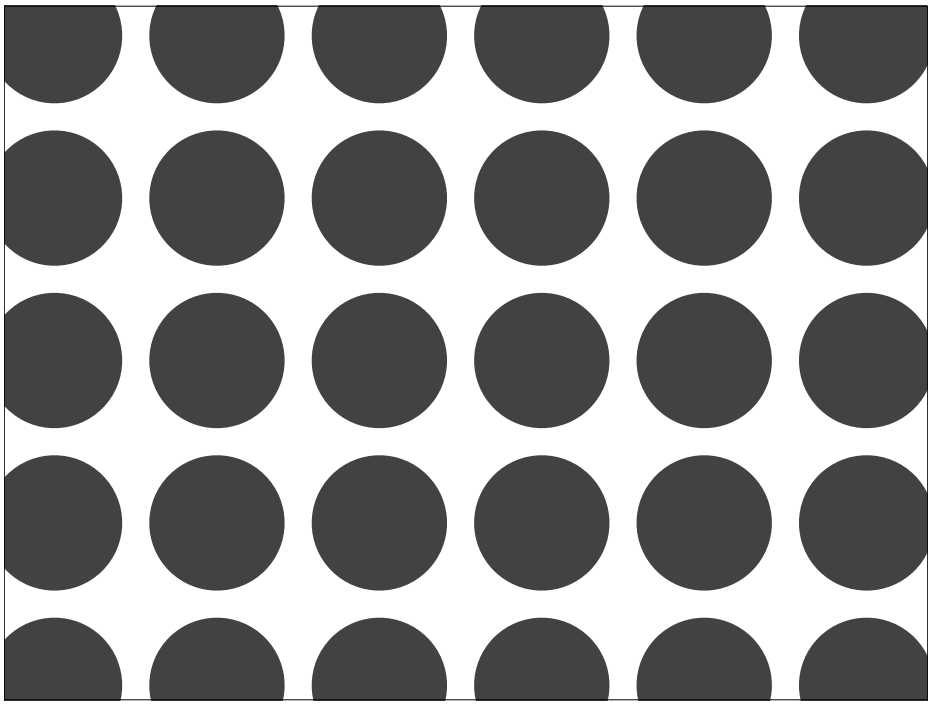
If possible, display comparisons directly

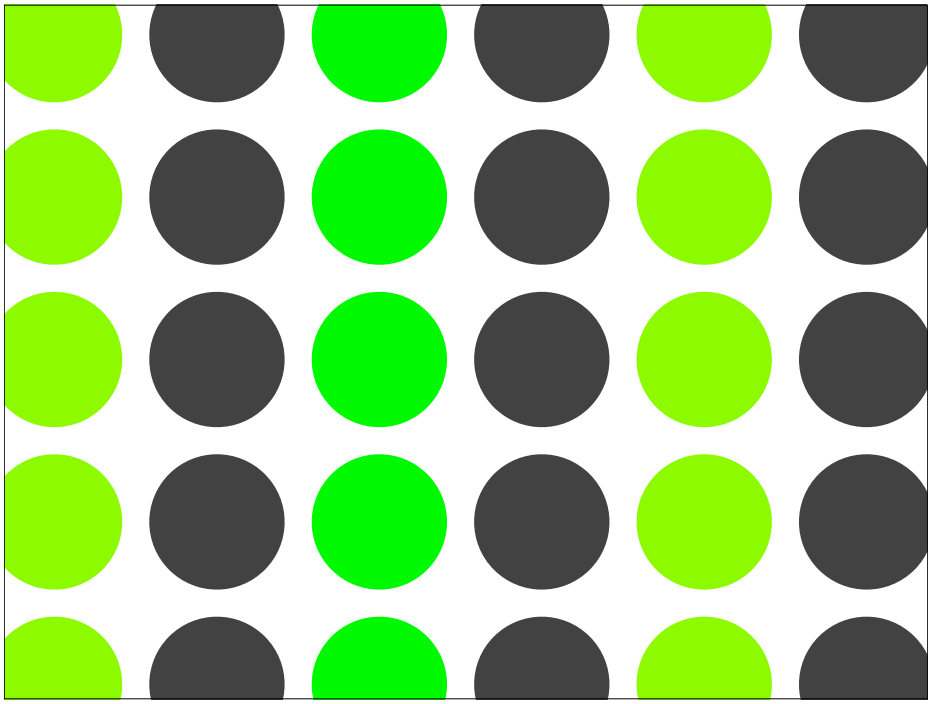
Your turn

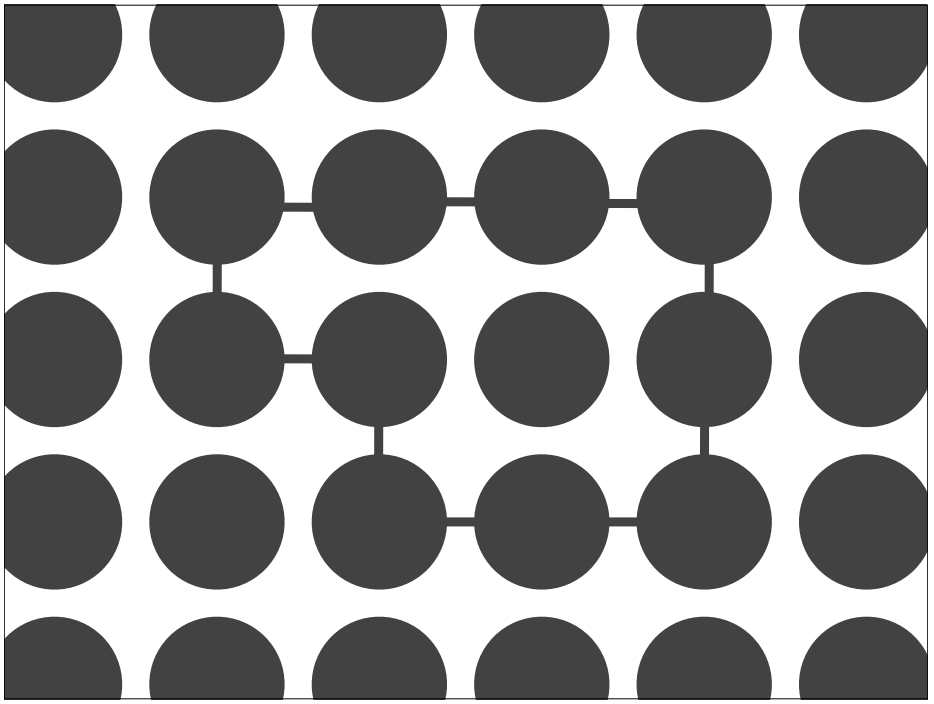
In small groups, work through each of the three graphics. What are the important comparisons? What's easy to do and what's hard to do?

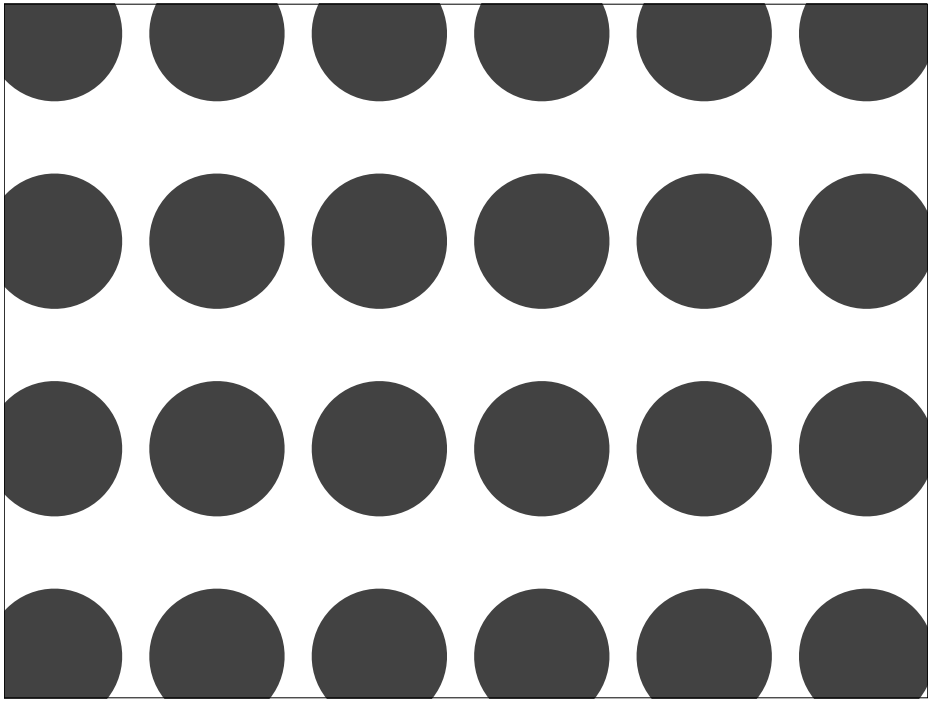
3

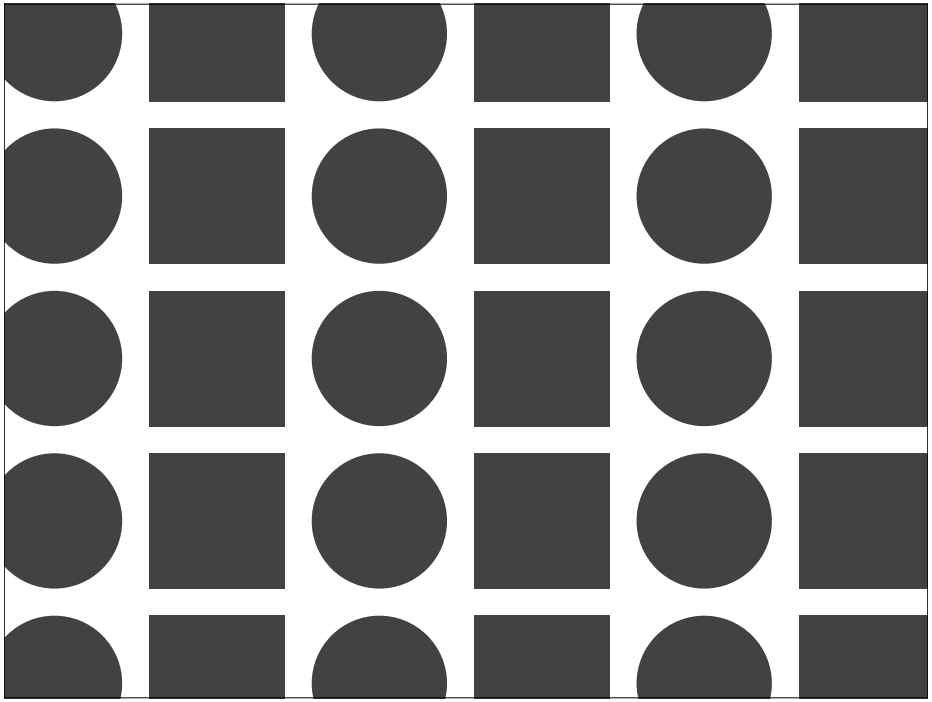
Visual connections should reflect real connections

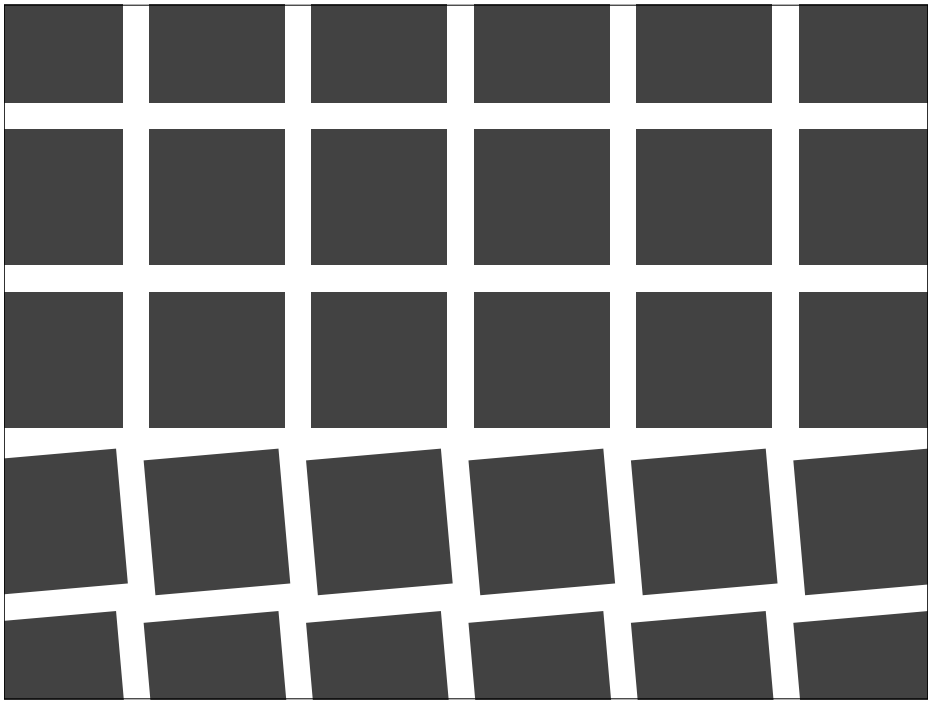


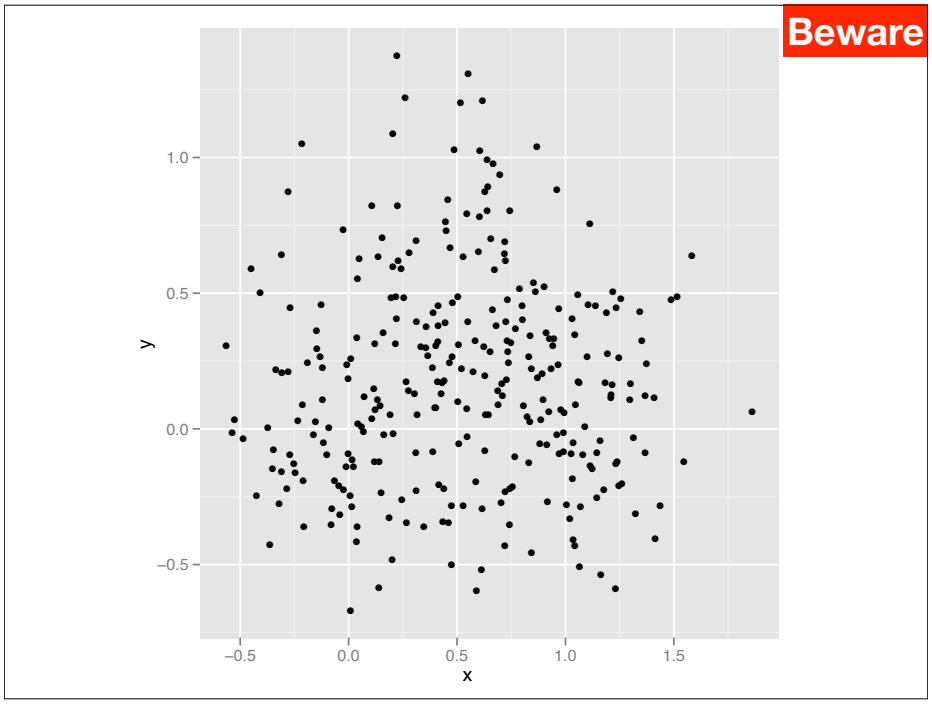


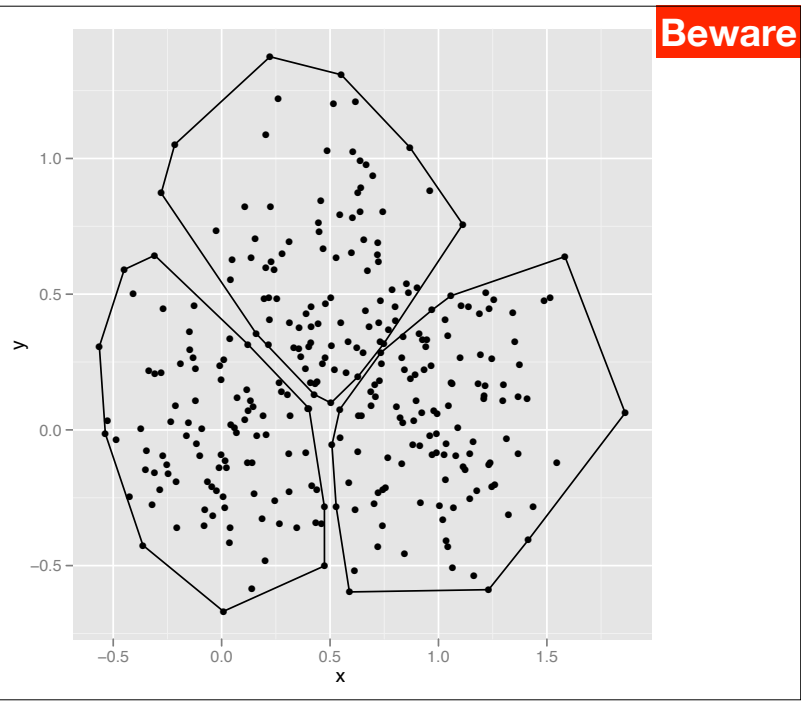









Beware
1.0
0.5
0.0
−0.5
y
−0.5
0.0
0.5
1.0
1.5
x



Your turn

In small groups, work through each of the three graphics. Are components of the graphics appropriately connected?

4

Beware of animation!

(Compare in space, not time)

We often don't notice abrupt changes **http://youtu.be/FWSxSQsspiQ?t=0m12s**

We often miss gradual changes too **http://youtu.be/1nL5ulsWMYc**

And movement makes us miss other changes

http://visionlab.harvard.edu/silencing/

Your turn

In small groups, work through the three graphics. (Use the online version of the facebook graphic at **http://nyti.ms/NEgIDh**) How has animation been used? Is it effective or ineffective?

1 Match perceptual and data topology

2 Make important comparisons easy

3 Visual connections should reflect real connections

4

Beware of animation!

5*

Visualisation is only one part of data analysis

Your turn

Your turn

In your groups, discuss some of the graphics you've bought along. What works well? What could you do better? I'll circulate and help you out.

Other sources

http://projects.nytimes.com/census/2010/map

http://kevinquealy.com/

http://flowingdata.com/category/visualization/infographics/

http://flowingdata.com/category/visualization/statistical-visualization/

More resources

More

http://chartsnthings.tumblr.com/

http://junkcharts.typepad.com/

http://flowingdata.com/2012/04/27/data-and-visualization-blogs-worth-following/