

# L11 Base Graphics

EPID 799B

Mike Dolan Fliss

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# Base Graphics

*Challenge: While I'm talking, go ahead and open `births.csv` or `.tab` now...*

- Why graphics?
- Get meta: visualization theory
- Why R for graphics?
- Why (not) base R graphics?
- Practice: frequently used base graphics flows...and when to move to other packages

# Why Graphics

# High Level

- **Graphics serve a story.**
- **Graphical Integrity**
- **Minimize data-ink ratio**  
Consider data “words”  
small multiples, and ...sentences!

we need to know how to **use**  
**preattentive visual attributes**  
**to grab and direct our readers'**  
**attention** and how to **work**  
**within the limits of working**  
**memory.**

Few (2012, p. 67)

# Graphical Excellence

Graphics serve a story

<http://www.pointerpointer.com/>

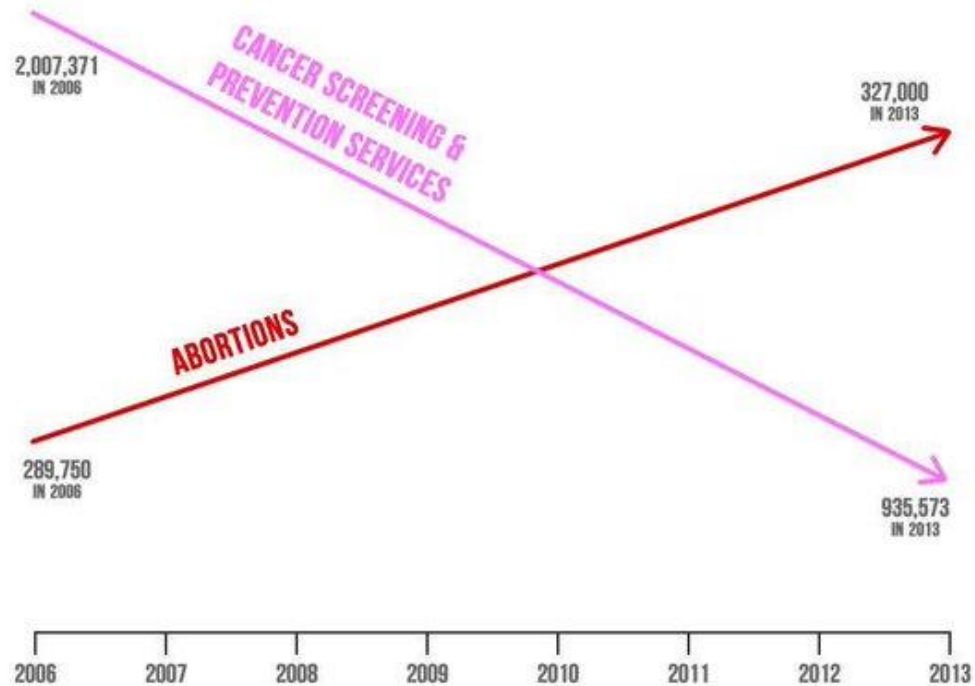
# Graphical Integrity

Avoid:

- Distortion
- Chart-junk
- Dimensionality mixing (3d\*)
- ...

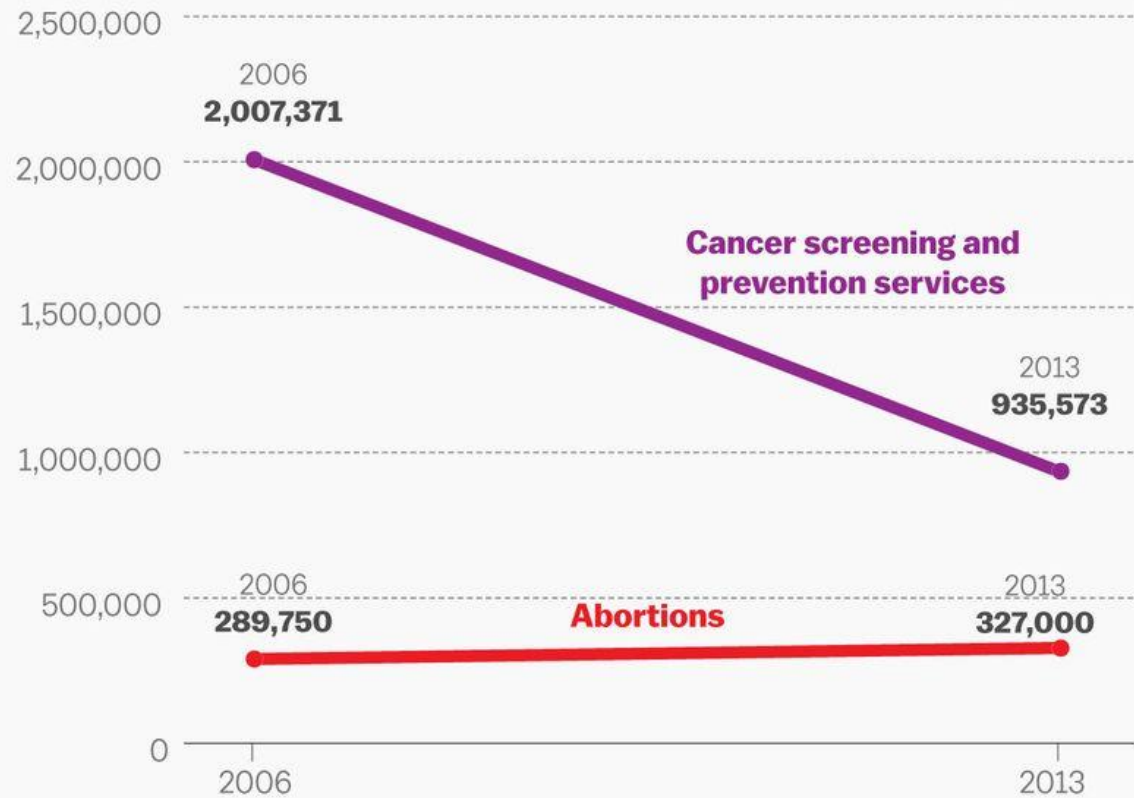
See <http://www.vox.com/2015/9/29/9417845/planned-parenthood-terrible-chart>

## PLANNED PARENTHOOD FEDERATION OF AMERICA: ABORTIONS UP — LIFE-SAVING PROCEDURES DOWN



SOURCE: AMERICANS UNITED FOR LIFE

## Services provided by Planned Parenthood

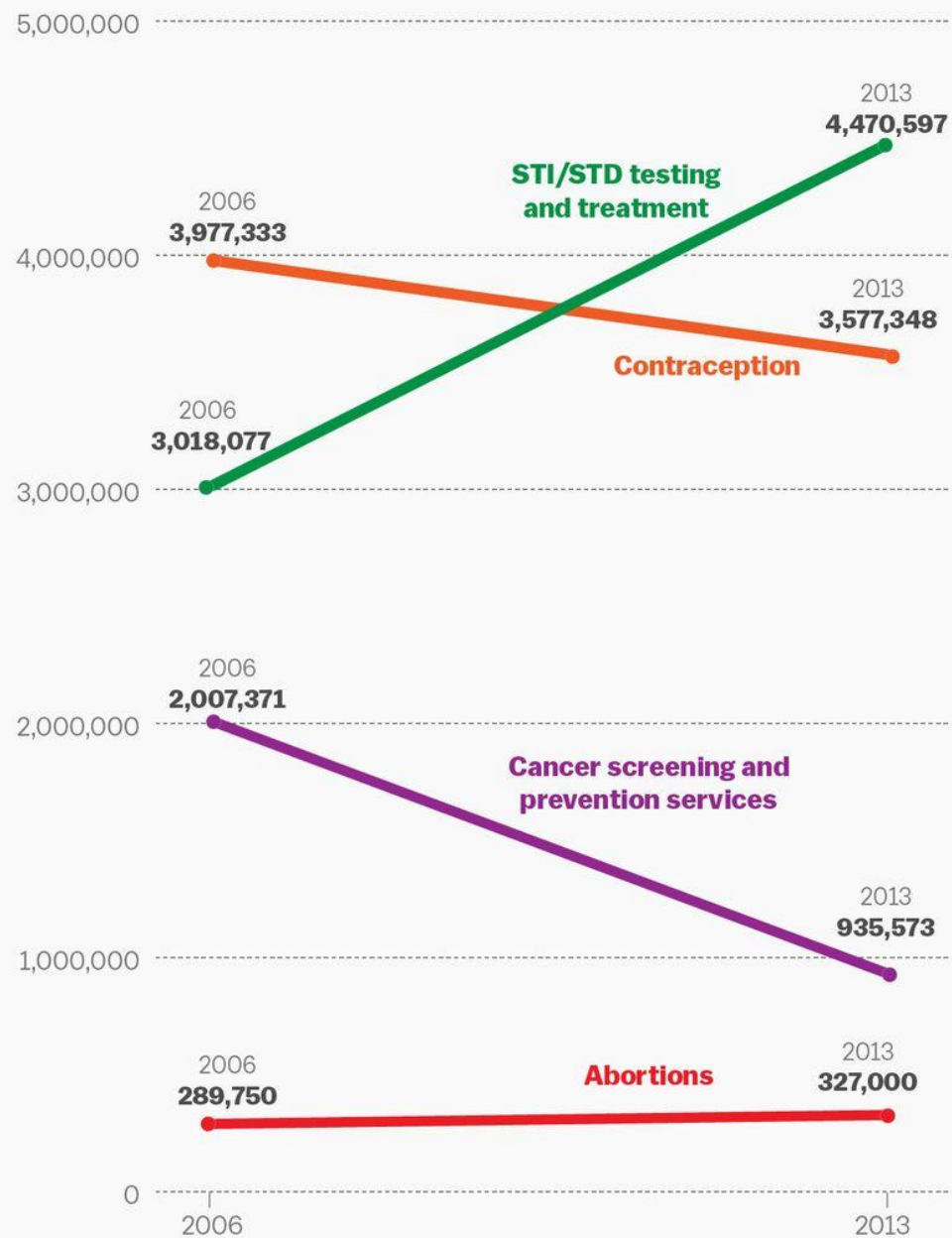


SOURCE: Planned Parenthood

**Vox**



## Services provided by Planned Parenthood



SOURCE: Planned Parenthood

# 5+Vs of good data

- **Volume**

Sufficient for trending, comparisons, county sampling, etc.

- **Velocity**

Recent (2009 to real-time) & frequent (2 years? Monthly? Hourly?)

- **Veracity**

Trustworthy. Data integrity of new/rarely used data is a challenge.

- **Variety**

Diverse. Speak to multiple aspects of PH. Enabled by partnerships!

- **+Voice! / Values. (Also VOIDS)**

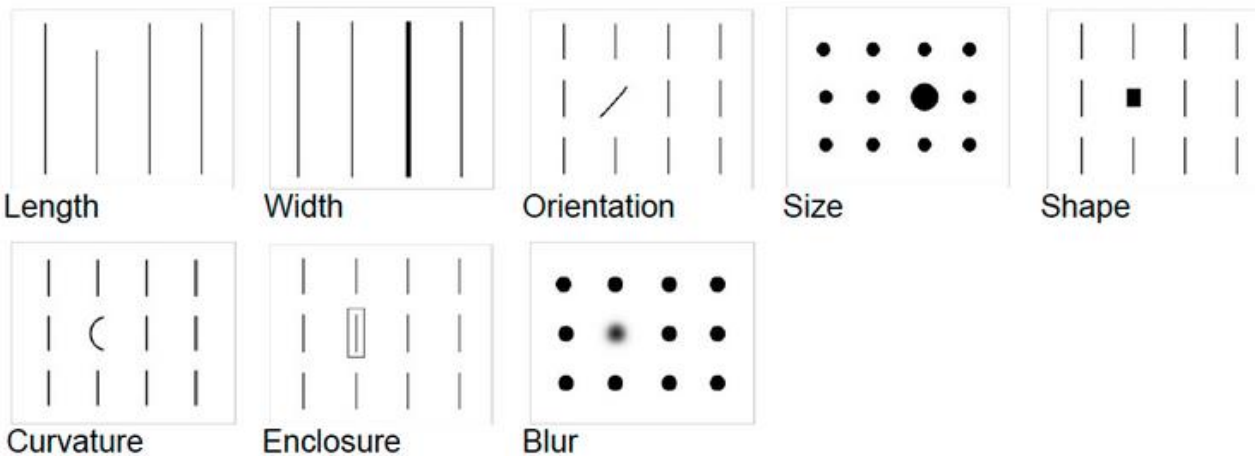
Presentation and audience matter. Present stand-out, value-driven data. Avoid weeds.

# Low Level

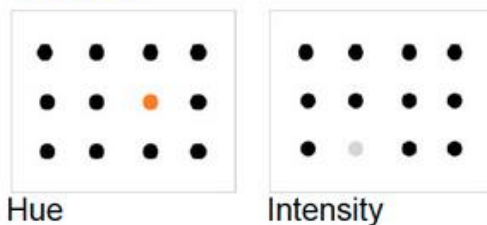
- **Pre-attentive attributes**  
...and a side-note on color
- **Reduce processing demands**  
chiefly through simplicity and gestalt principles

# (Some) Pre-attentive attributes of visual perception

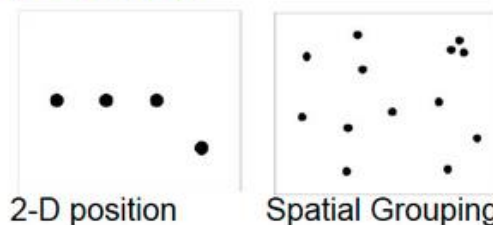
## Form



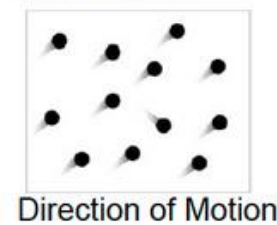
## Color



## Position



## Motion



And two theoretical side-notes on color...

# Language



Alpha



Brewer (is cool)! - <http://colorbrewer2.org/>  
Sequential



Diverging  
Qualitative  
Grey (intensity)  
Qualitative

# Meaning

Remember, color is ...

## Meaning-loaded



EMOTIONAL associations!

Some semi-born out through research.

Also: [LINKS](#) (and visited ones, etc.)

Note how this PPT theme messes w/ this.

## Organization specific



PMS 288



PMS 542

I'm an alumnus of both. Blue tones matter to many people.

("If you prick us, do we not bleed?" [red] – Merchant of Venice )

<http://styleguide.duke.edu/identity/color-palette/>

<http://identity.unc.edu/colors/>

## Culture specific



Heteronormative / dominant culture reinforcing.

Don't do this.

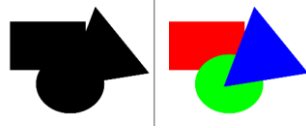
This is a classic example... but ALSO an over-simplification of culture as if it were homogenous and independent!

For more, check out:

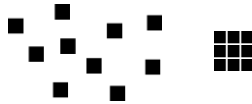
<http://lifehacker.com/learn-the-basics-of-color-theory-to-know-what-looks-goo-1608972072>

# Gestalt Principles of Visual Perception

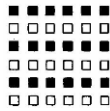
- Simplicity



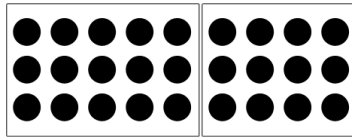
- Proximity



- Similarity



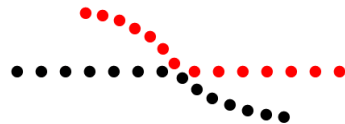
- Enclosure



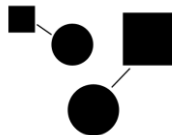
- Closure



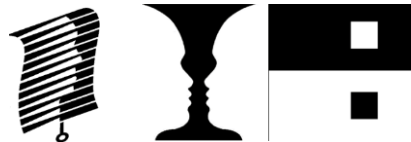
- Continuity



- Connection



- Figure & Ground



<http://graphicdesign.spokanefalls.edu/tutorials/process/gestaltprinciples/gestaltprinc.htm>

<http://www.smashingmagazine.com/2014/03/design-principles-visual-perception-and-the-principles-of-gestalt/>

PS I'm leaving some out!

# Think with a Grammar of Graphics

(R: ggplot2, and other things)

- Data!
- Aesthetic “mappings”
- Geometries
- Statistical transformations
- Scales
- Coordinate Systems
- Positional adjustments (tweaks)
- Facets



# Why R for graphics?

- Replicable
- Eventually / with work...
  - Pretty!
  - Fast!
  - Extensible: maps, 3d, animations
  - Write reports, not just image dumps
  - Grammars help you think

# Let's get in the weeds: base R graphics

1. Send an objects to `plot()`
2. Plot finds the right plotter (e.g. `plot.lm()`)
3. You tweak it, “SAS style”  
(since kinda ugly out of the box.)

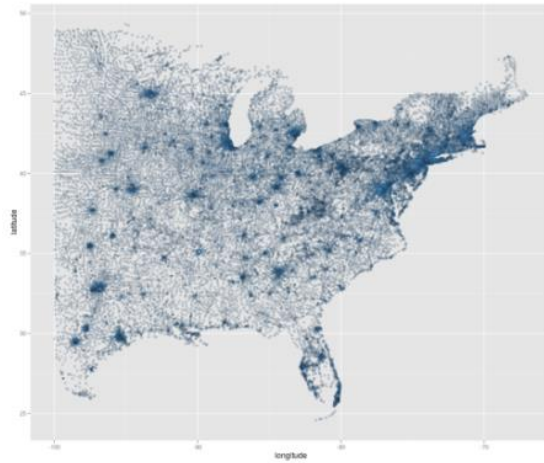
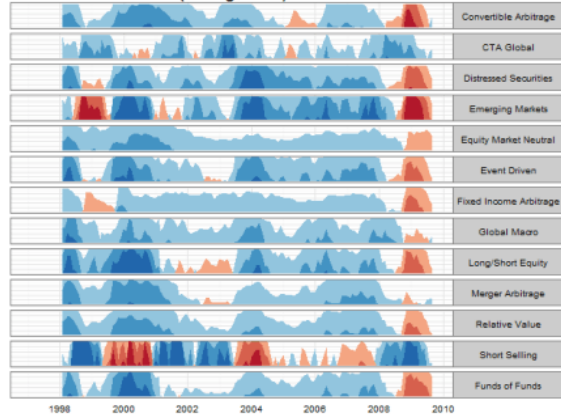
When do I use base R graphics?

# ...Almost never!

- Rarely: glance at data
  - hist(), boxplot(), x-y plots
  - Fast & bare bones spatial viz
- Sometimes
  - model diagnostic plots

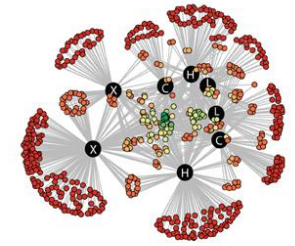
**Let's practice**

EDHEC Indexes Return (Rolling 1 Year)

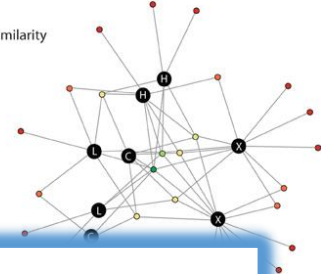


A 88% sequence similarity

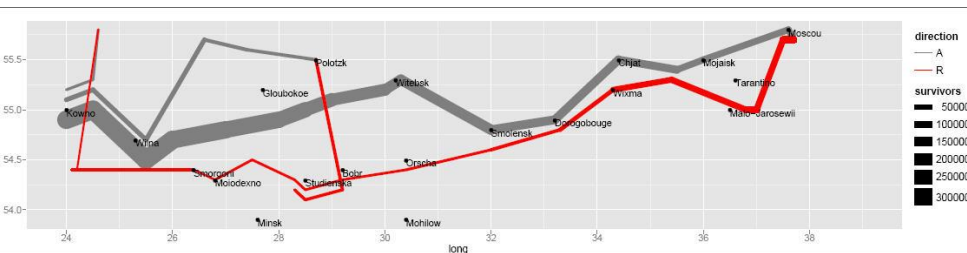
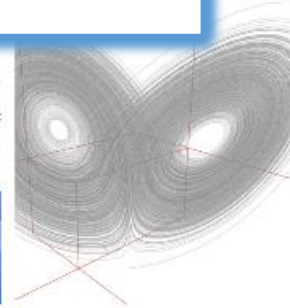
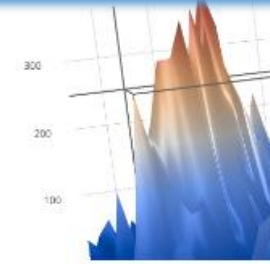
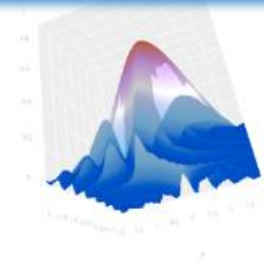
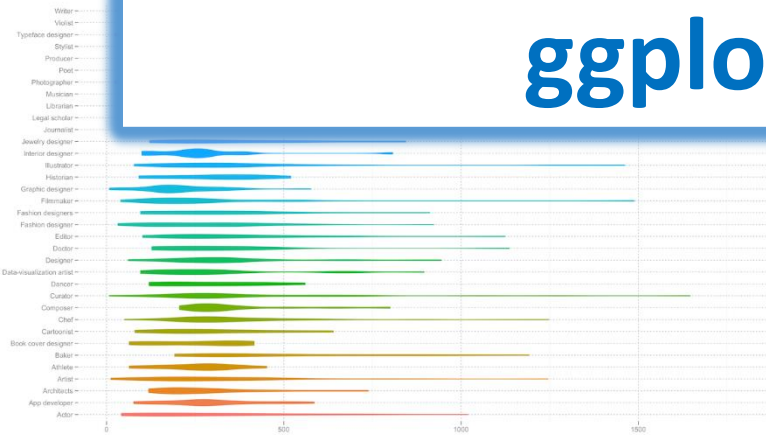
# of plots per OTU



B 76% sequence similarity



# ggplot on Thursday



# Favorite Graphics Resources

- Anything Tufte. Anything Few.
- <http://darkhorseanalytics.com/blog/>
- R specific:
- Ggplot2:
  - <http://zevross.com/blog/2014/08/04/beautiful-plotting-in-r-a-ggplot2-cheatsheet-3/>
- Ggplot2 extension libraries:  
ggrepel, ggthemes, ggAlly.