

Color

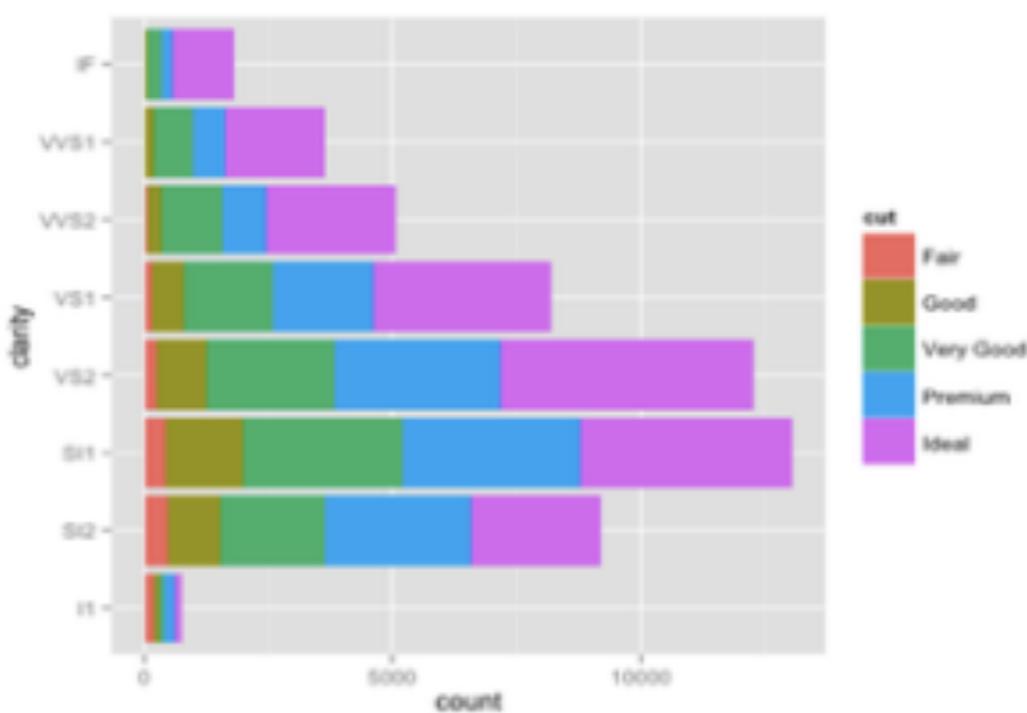
1. link between data and color palette
2. perceptually uniform color spaces
3. important distinctions in data
4. color vision deficiency
5. aesthetics



Myfanwy
@Voovarb



guys. GUYS. I'm diving in Palau this week and I've found the
[#ggplot2](#) fish. [#rstats](#)



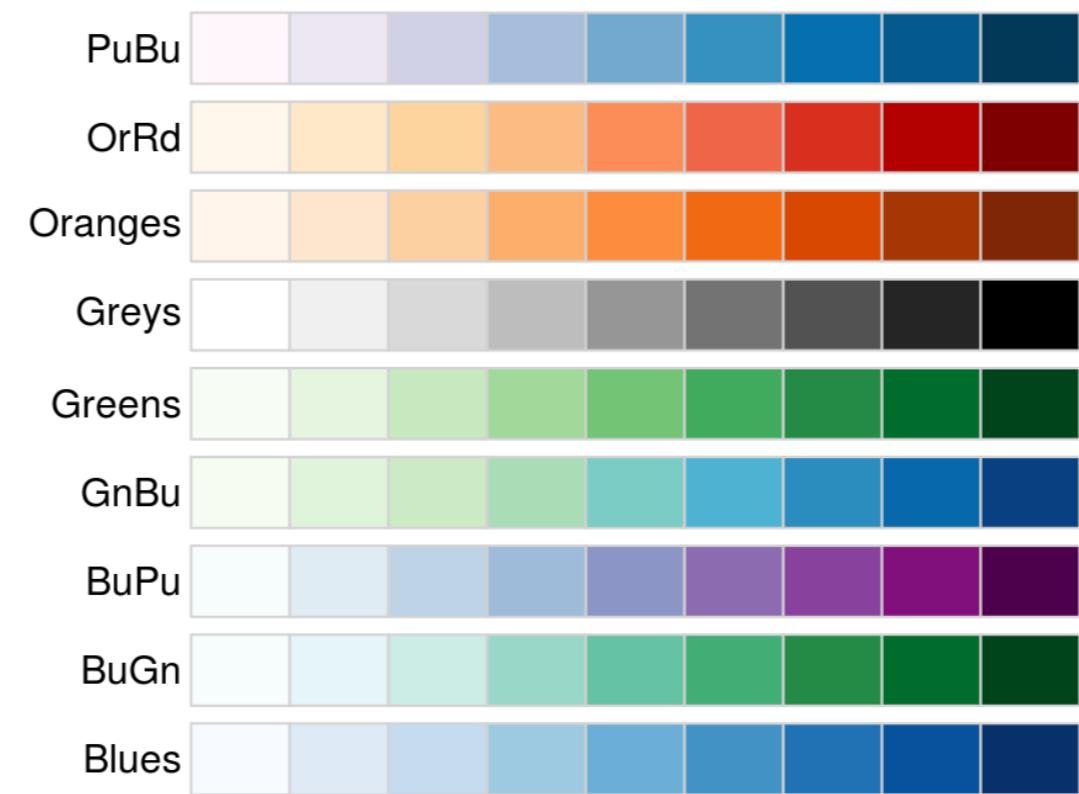
9:26 AM · Mar 25, 2015

112 RETWEETS

237 LIKES

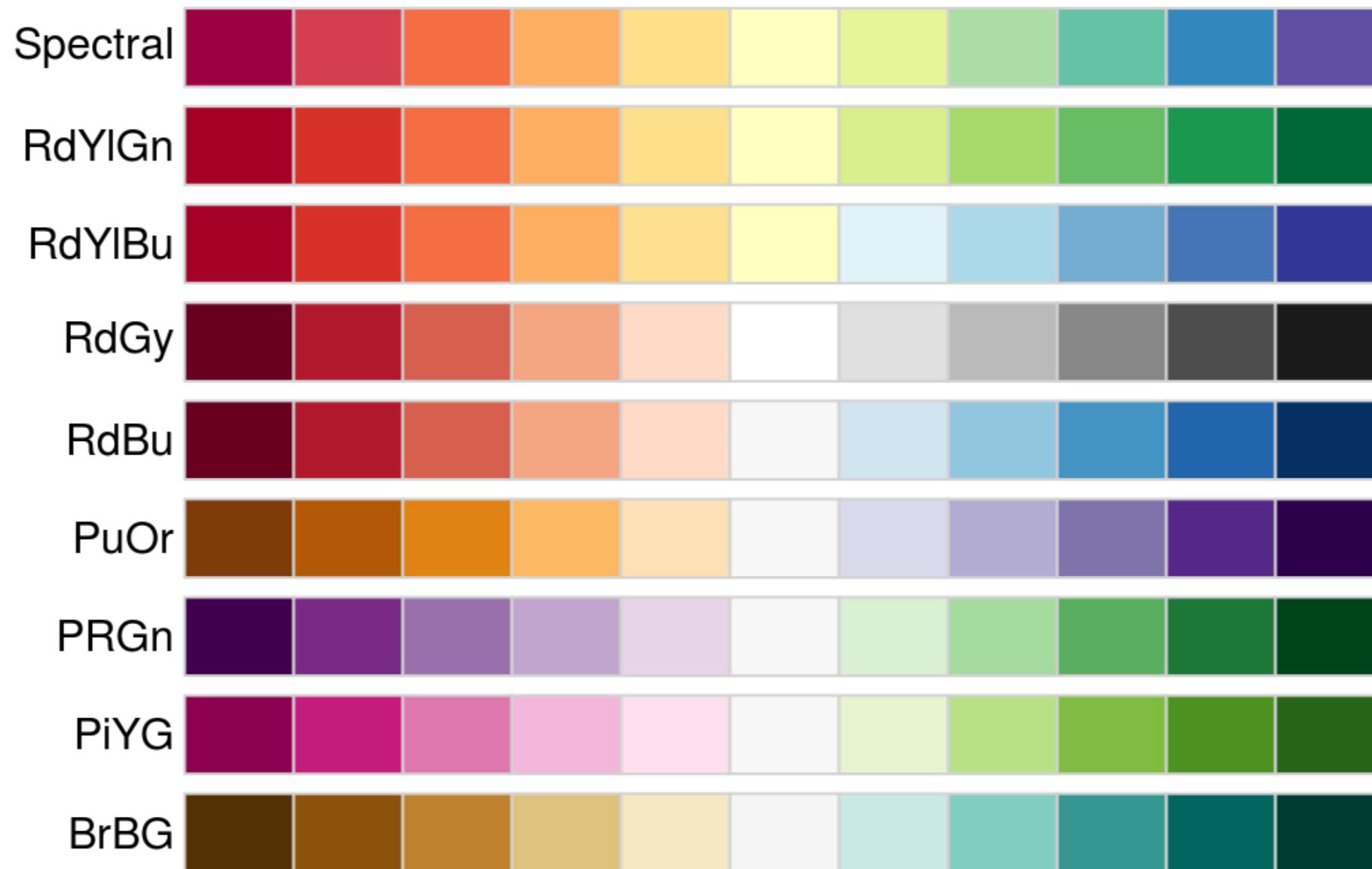
RColorBrewer Color Schemes

sequential

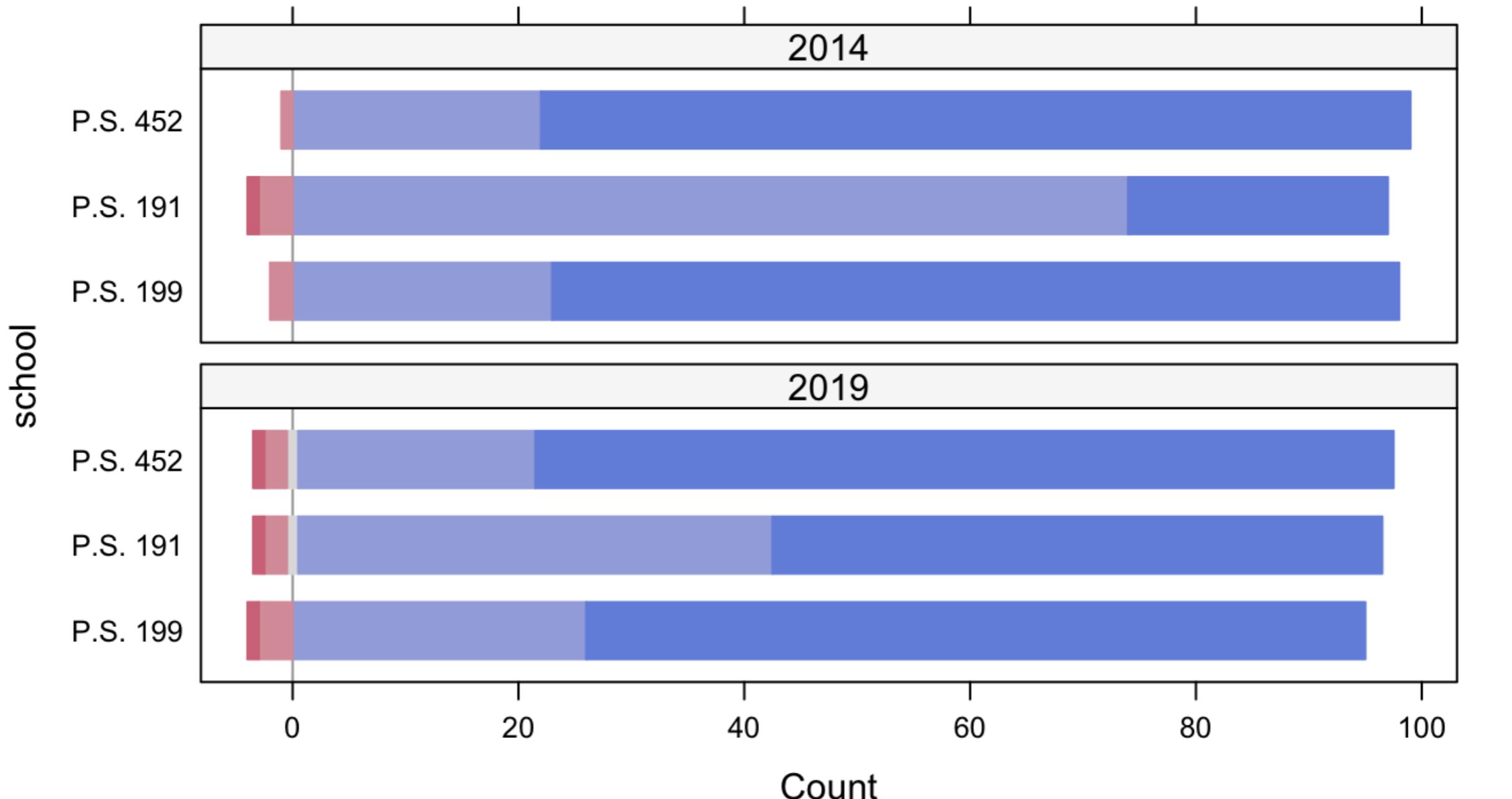


RColorBrewer Color Schemes

diverging



The overall quality of my child's teachers this year.



Very dissatisfied ■ Dissatisfied ■ I don't know ■ Satisfied ■ Very satisfied ■

(2014 question wording: How satisfied are you with the following? □

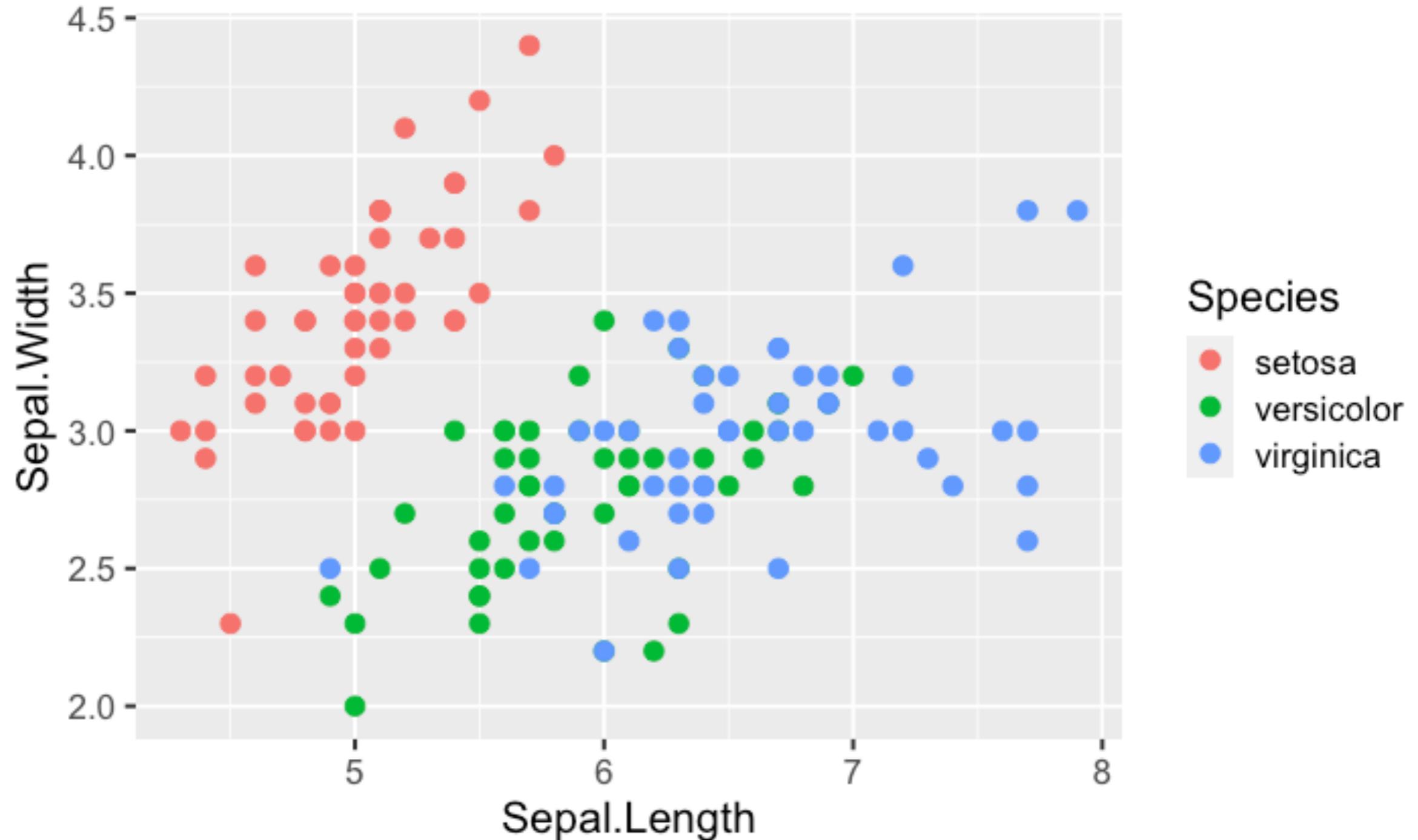
The overall quality of my child's teachers this year.)

RColorBrewer Color Schemes

qualitative (for categorical data)



qualitative (for categorical data)



Perceptually uniform color spaces

viridis



magma



plasma



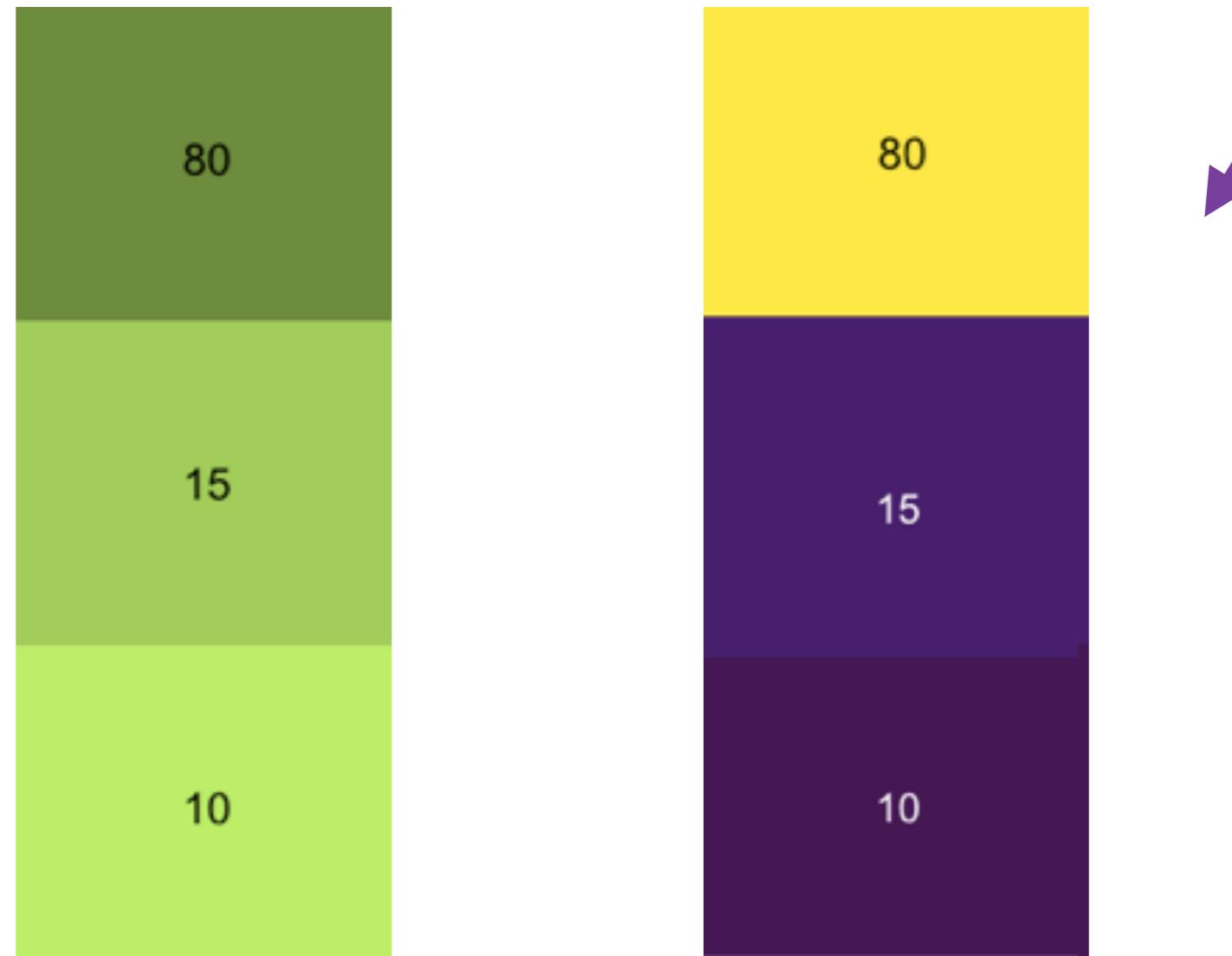
inferno



cividis



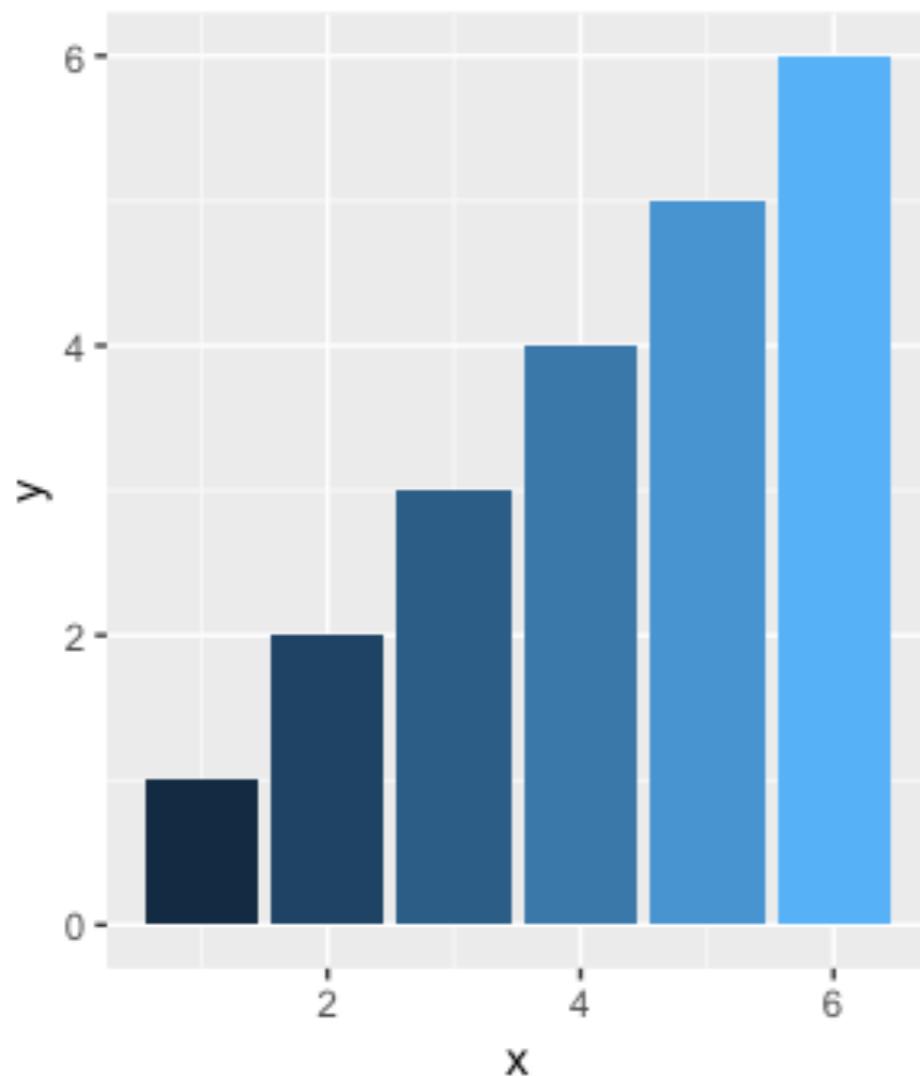
Perceptually uniform color space



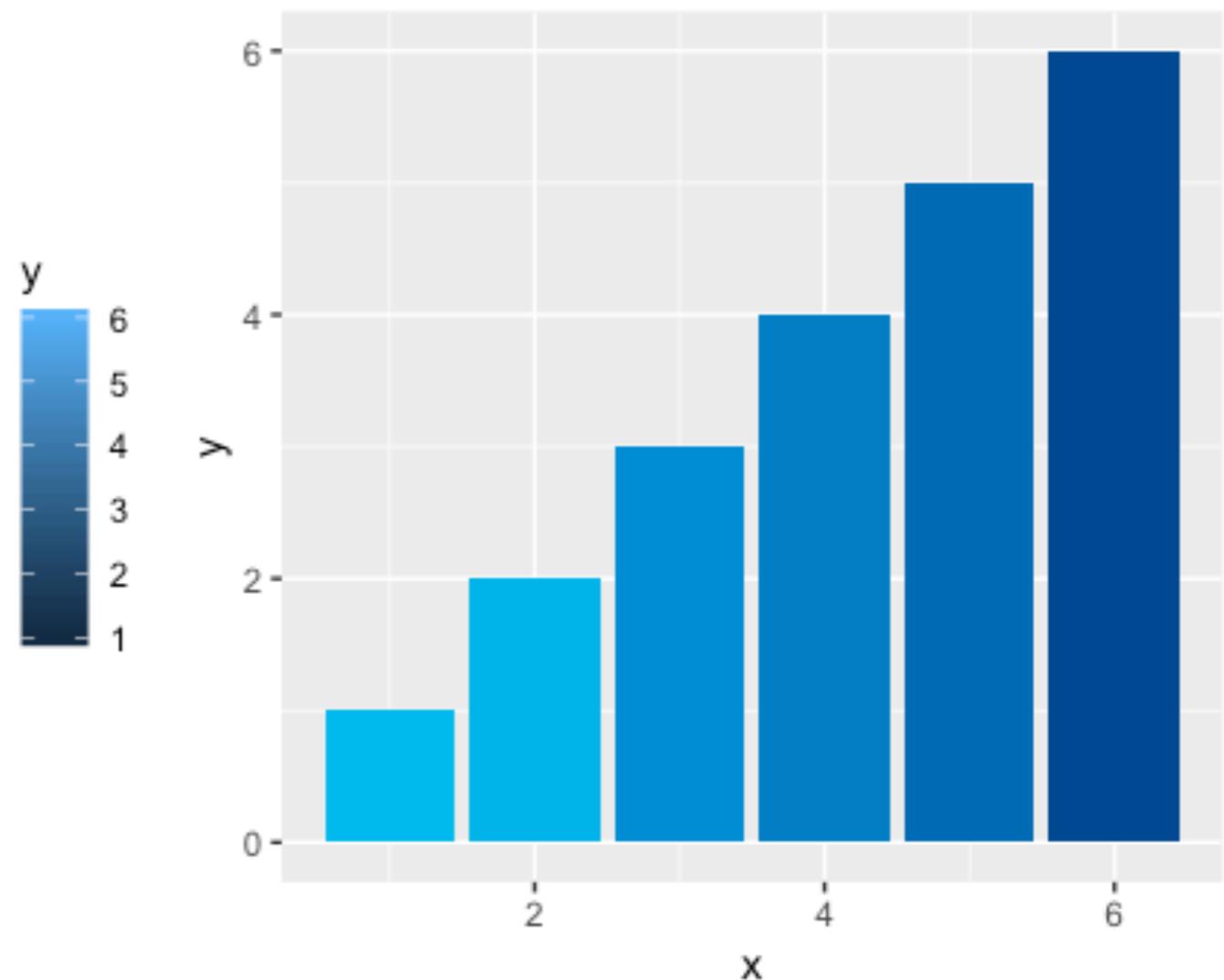
viridis

Perceived differences are proportional to scalar differences

Perceptual uniformity

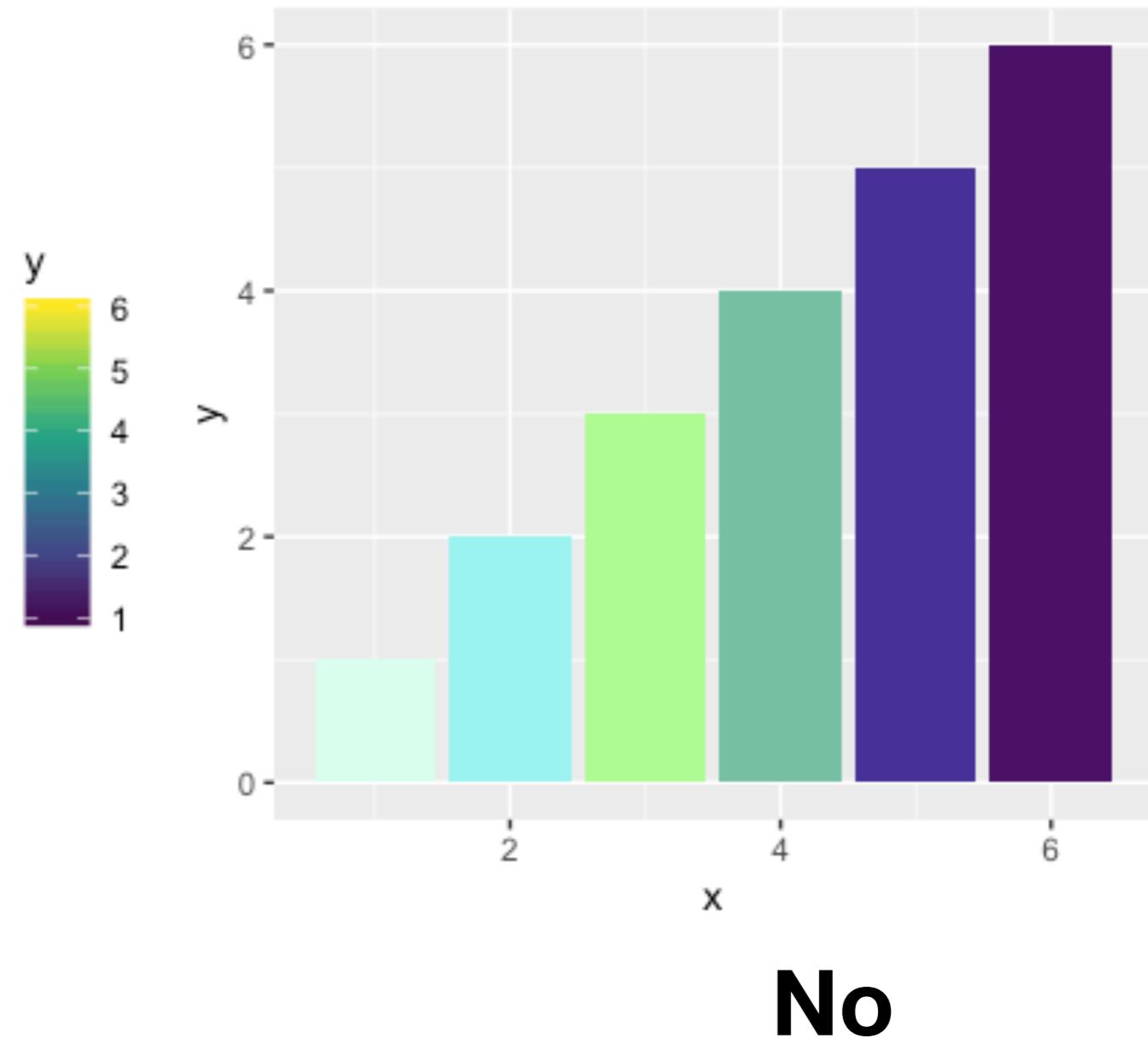
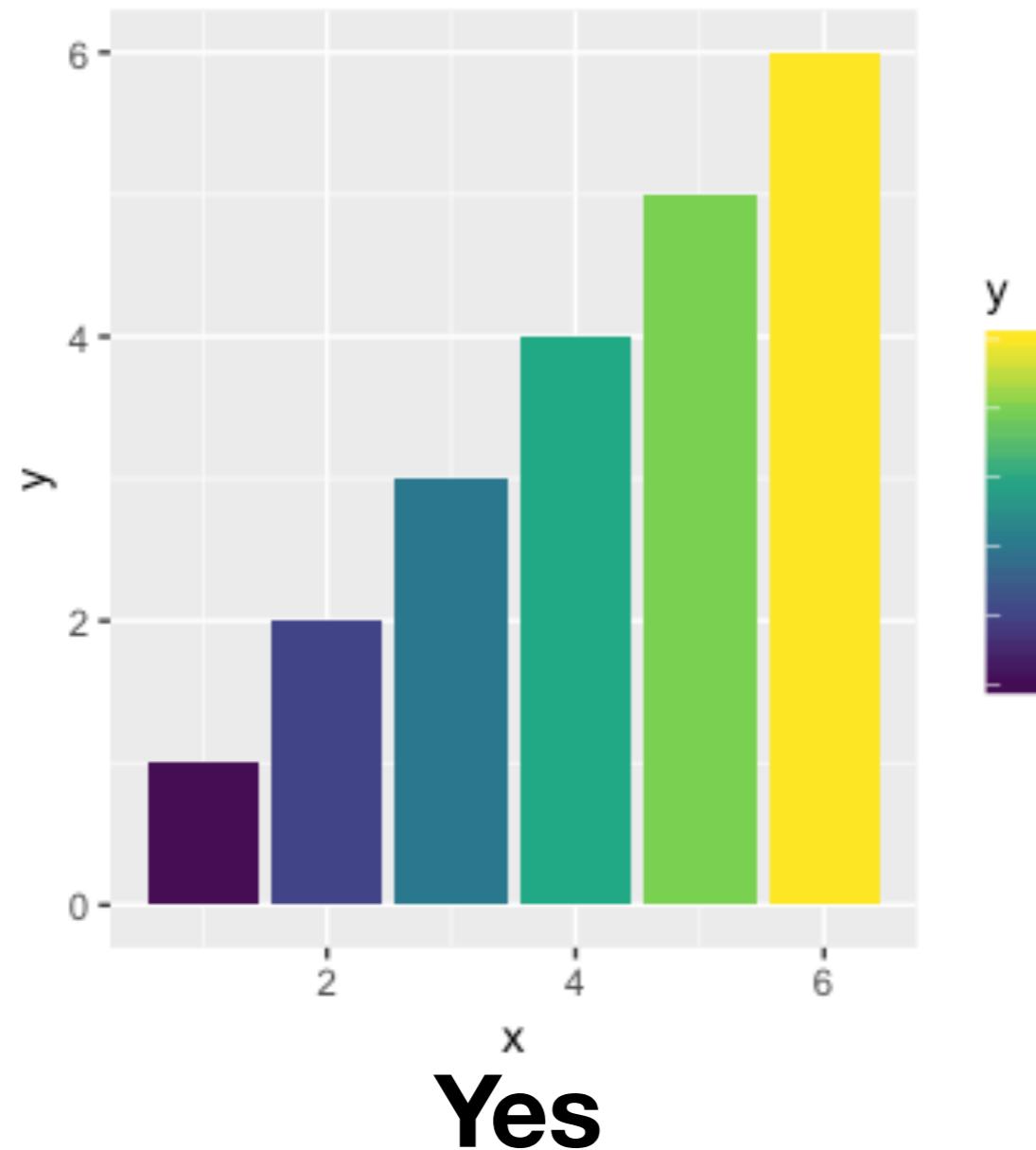


Yes



No

Perceptual uniformity



Color scheme comparison



<https://cran.r-project.org/web/packages/viridis/vignettes/intro-to-viridis.html>

Not perceptually uniform

rainbow



Not perceptually uniform



Ex[®] gentle for the
most sensitive skin.

Since babies have sensitive skin, add the chemicals and moisture
of regular diapers and you have diaper rash.

Baby Ex[®] diaper's unique high-absorbency natural-blend cotton
material provides cotton-soft, extra thick, gel-free protection
for your baby's sensitive skin. The chlorine-free materials and
absorbent polymers is non-toxic and non-irritating. Clinically
tested and pediatrician recommended for babies with allergies
and sensitive skin.



babyTM

If you are not satisfied with the baby leakage protection, you will get your money back. Read more about our leakfree guarantee at www.baby.com

Perceptual range

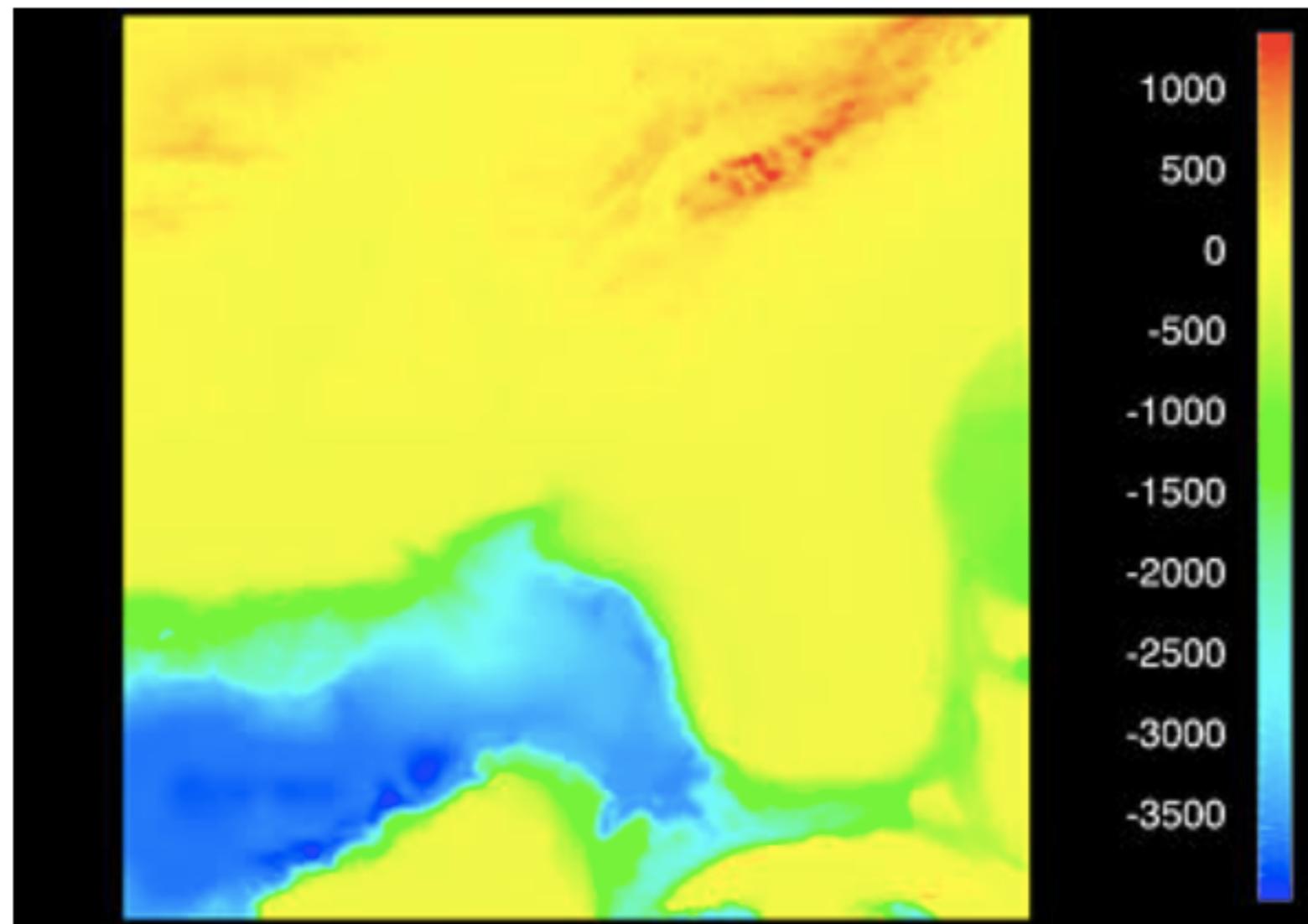
small



large

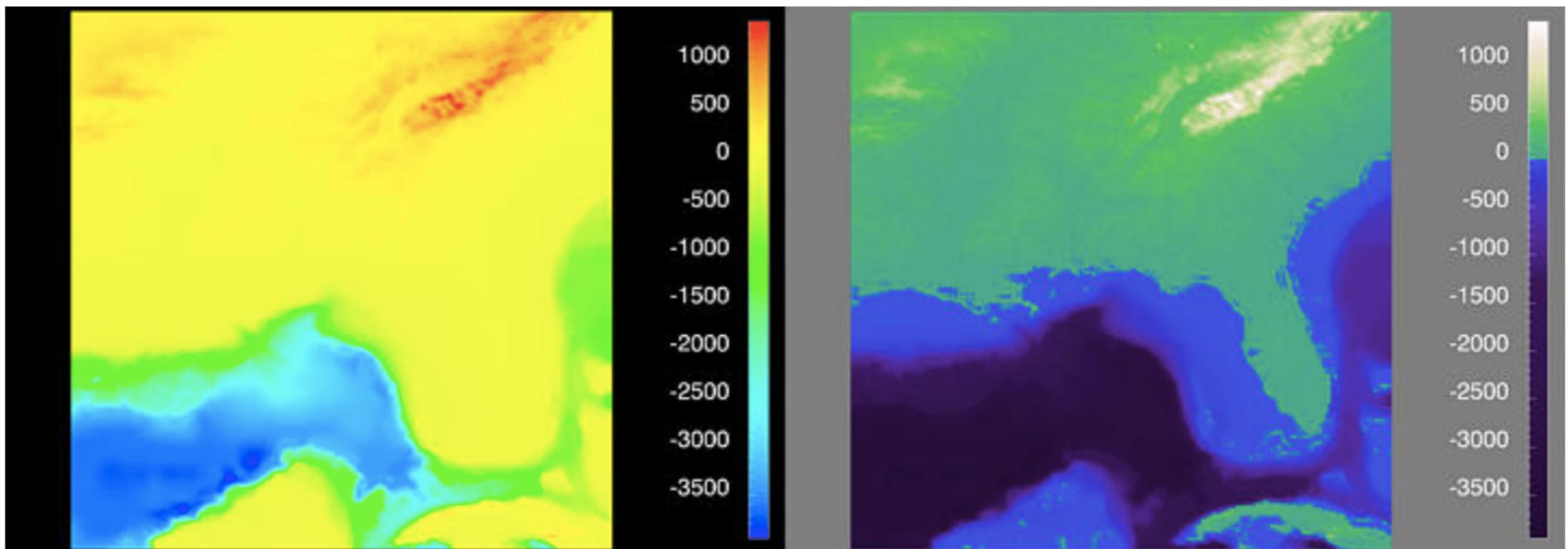


Distinguish important thresholds



Source: Krysten Thyng, "Custom Colormaps for Your Field"

Sharp break at sea level (on right)



Source: Krysten Thyng, "Custom Colormaps for Your Field"



Continuous data

OR:

fill

+ `scale_color_viridis_c()`

Rcolorbrewer

+ `scale_color_distiller(palette = "PuBu")`

reverse palette order with `direction = 1`

Continuous data

OR:

fill

Create your own sequential

```
+ scale_color_gradient(low = "white",
                        high = "red")
```

Create your own diverging

```
+ scale_color_gradient2(low = "blue",
                         mid = "white",
                         high = "red")
```

Discrete data

OR: `_fill_`

+ `scale_color_viridis_d()`

Rcolorbrewer

+ `scale_color_brewer(palette = "PuBu")`

Discrete data

OR: _fill_

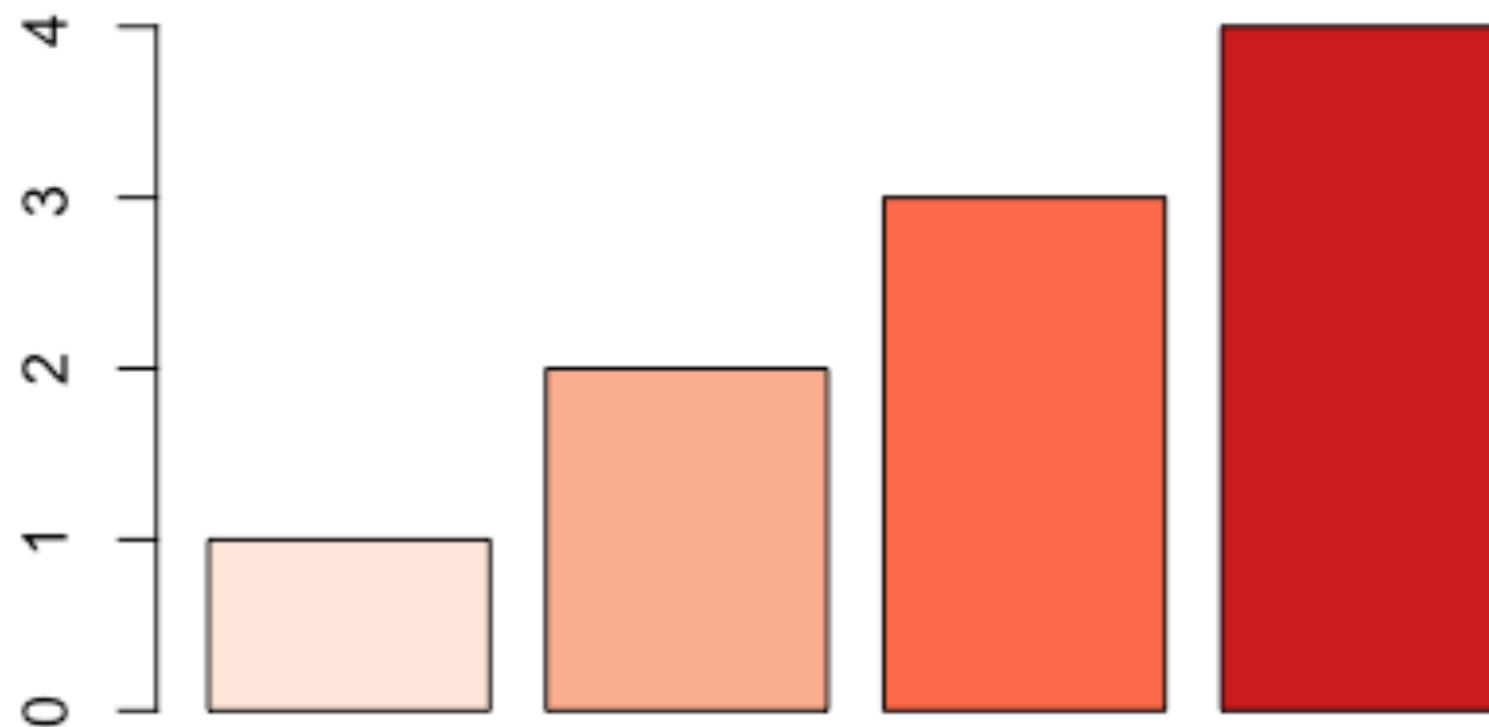
Create your own

```
+ scale_color_manual(values =  
  c("red", "yellow", "blue"))
```

Discrete ordinal data

To use with another package (such as **vcd**)

```
library(RColorBrewer)
colors <- brewer.pal(4, "Reds")
colors
#> [1] "#FEE5D9" "#FCAE91" "#FB6A4A" "#CB181D"
barplot(1:4, col = colors)
```



Color Vision Deficiency

approx. 8% of men, 0.5% of women have some form

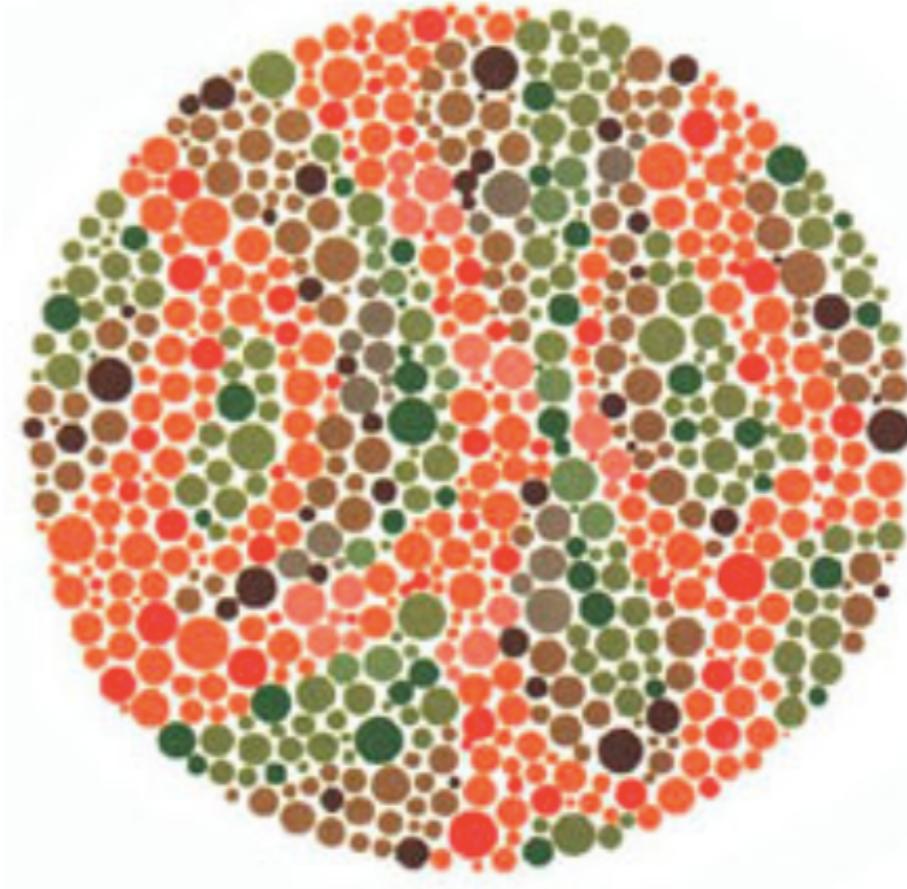
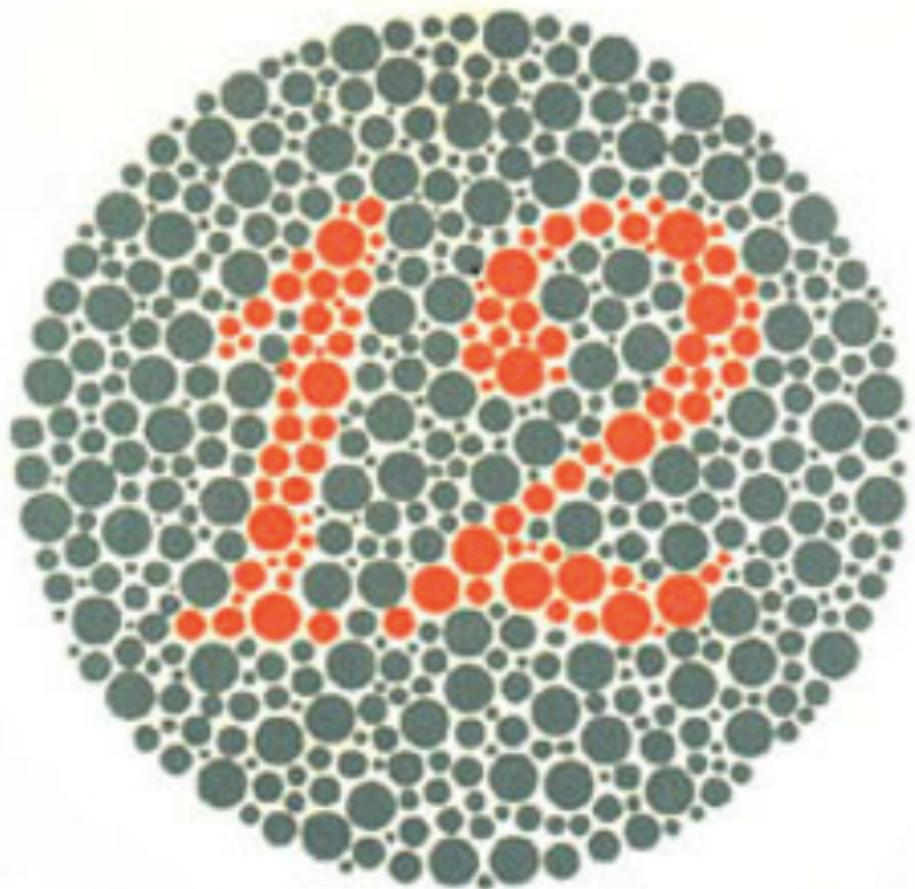
missing or deficient cones:

protanopia (red)

deutanopia (green)

tritanopia (blue)

Ishihara Test



<http://unlimitedmemory.tripod.com/sitebuildercontent/sitebuilderfiles/ishihara38.pdf>

How to make CVD friendly graphs

Use palettes that have already been tested

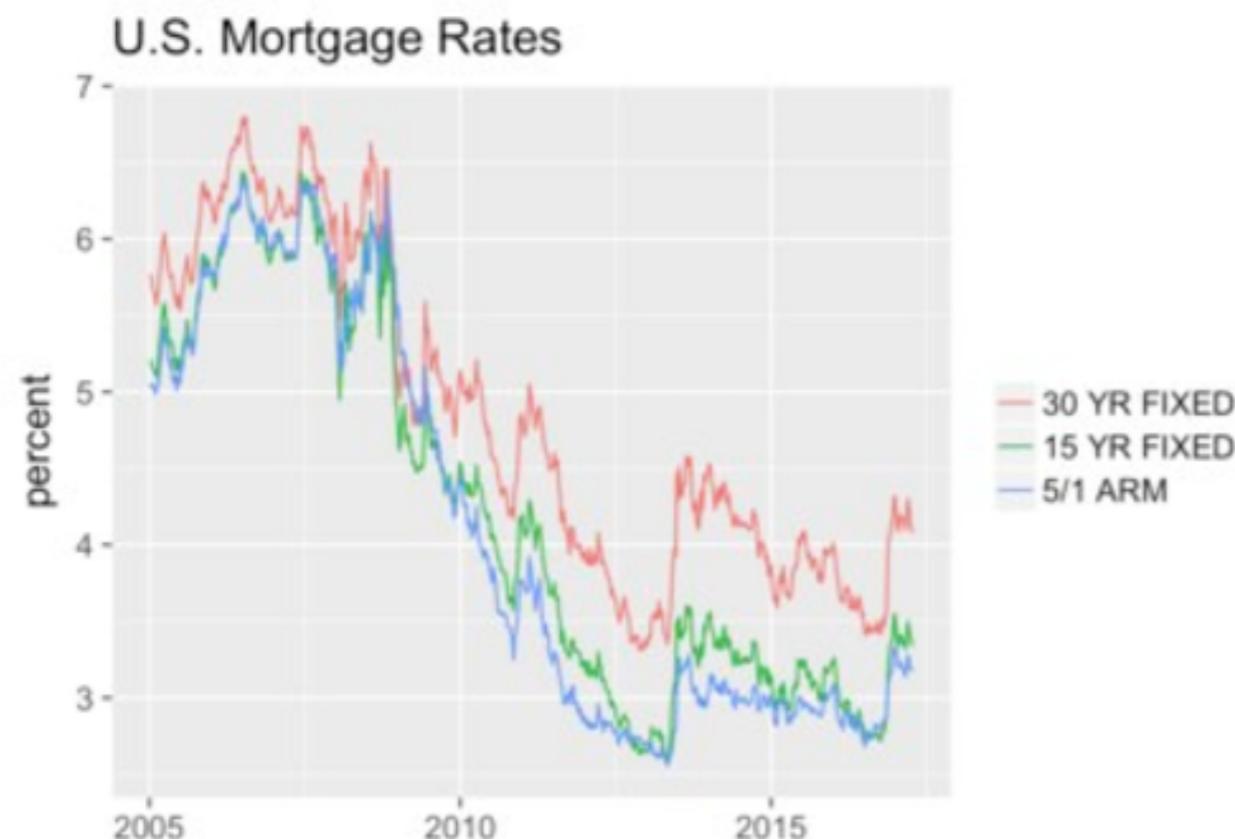
ex. viridis, scale_color_colorblind()
(ggthemes)

Use a color vision deficiency simulator
such as Color Oracle

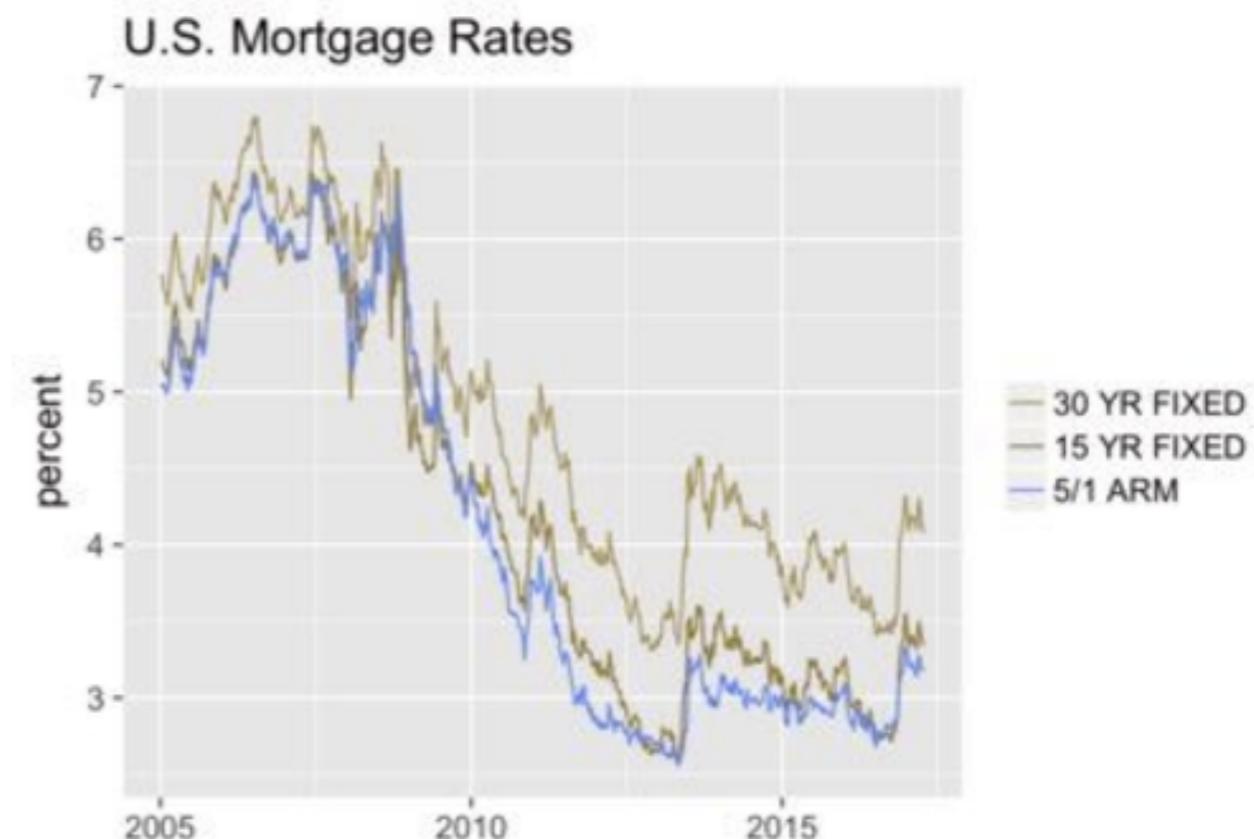
Use high contrast

Your Results:

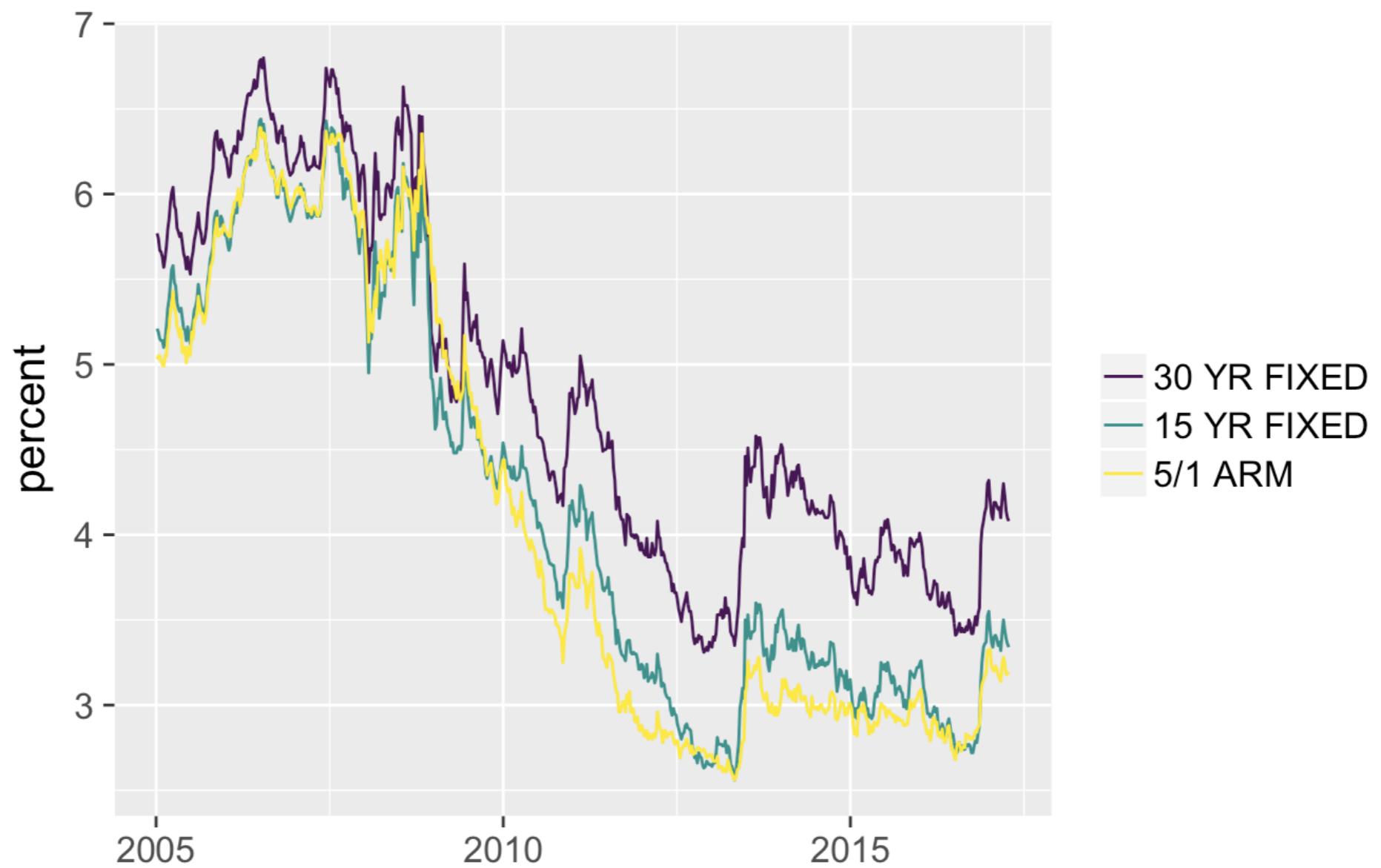
Original Image



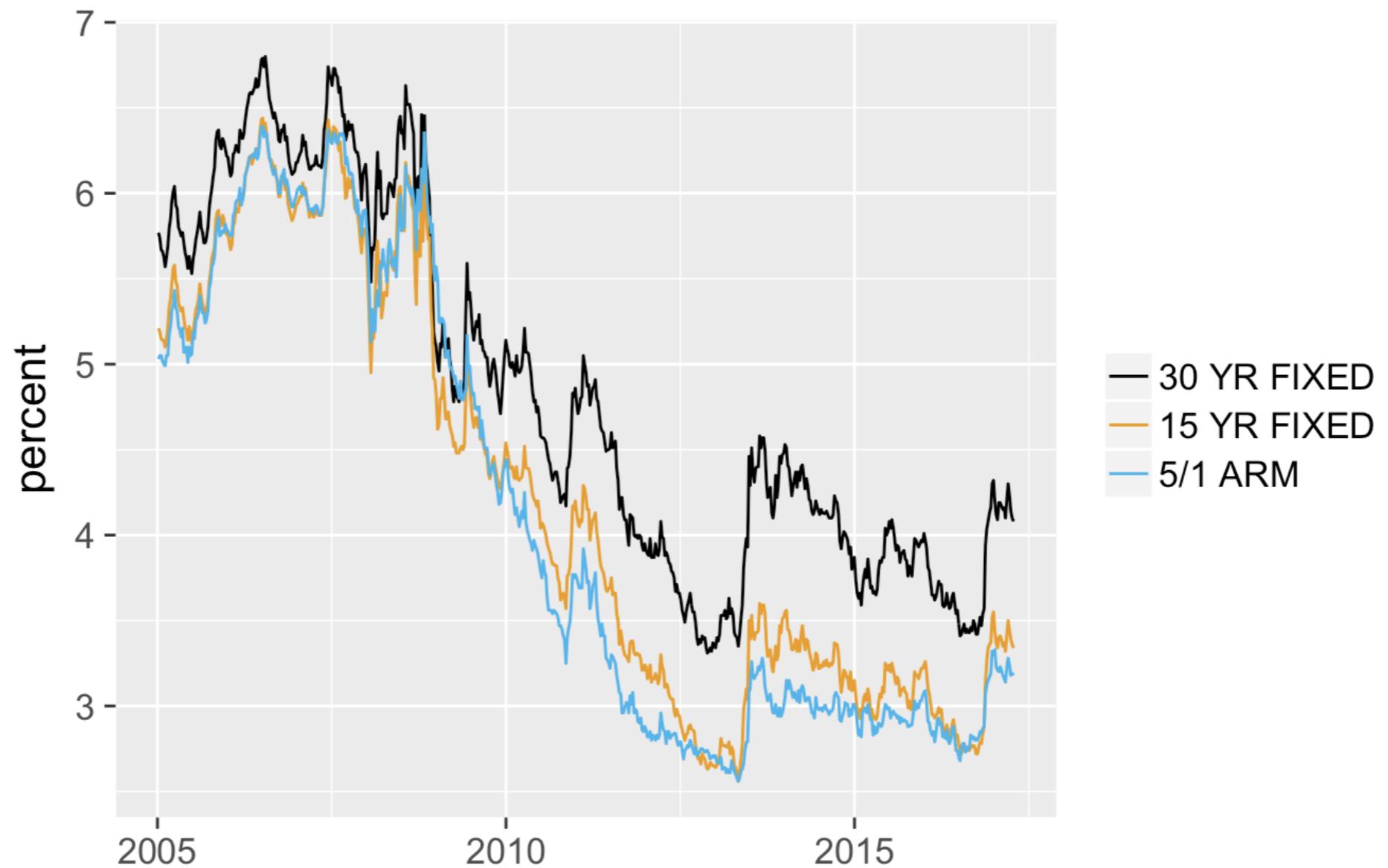
Deuteranope Simulation



U.S. Mortgage Rates

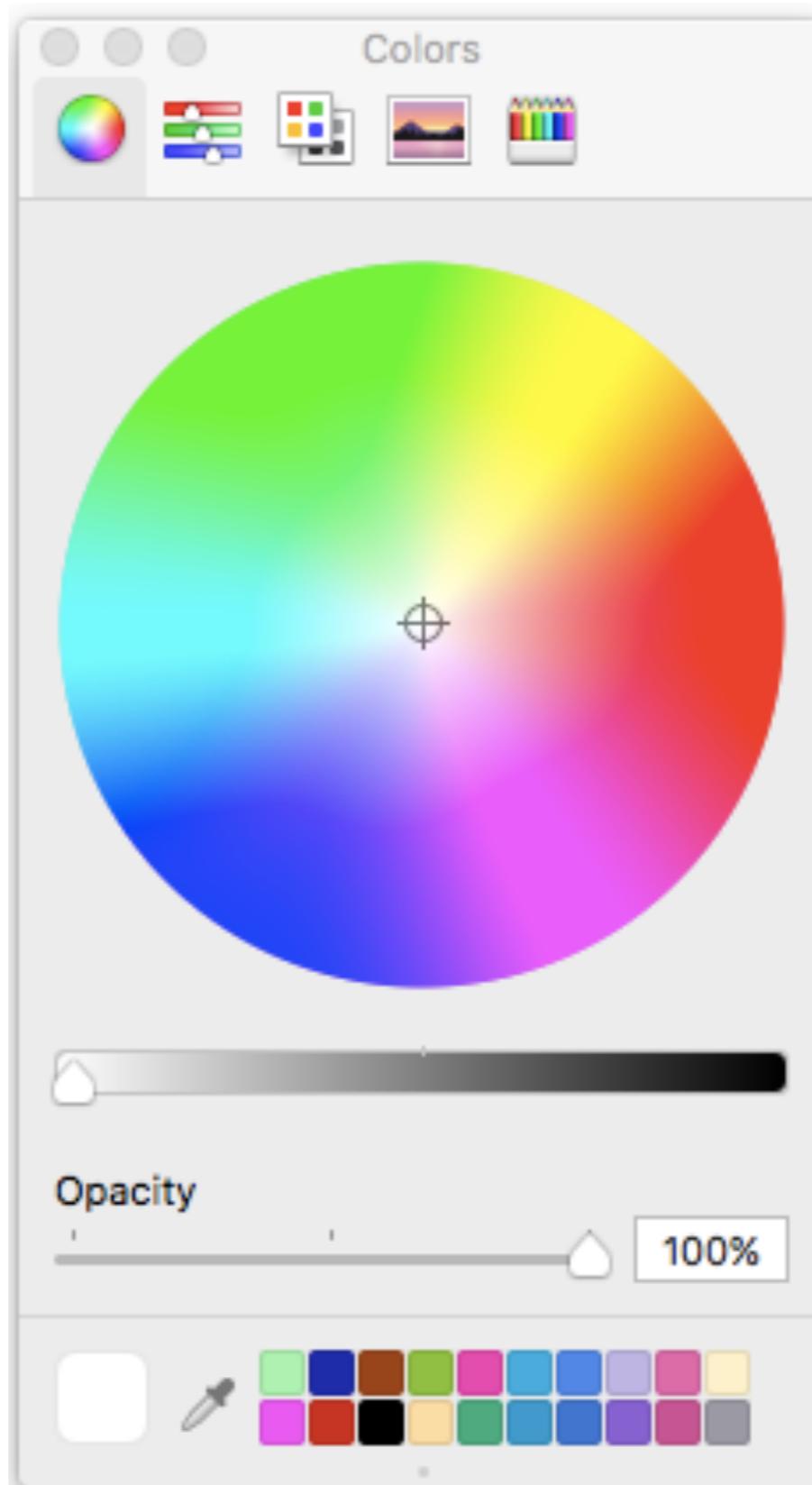


U.S. Mortgage Rates

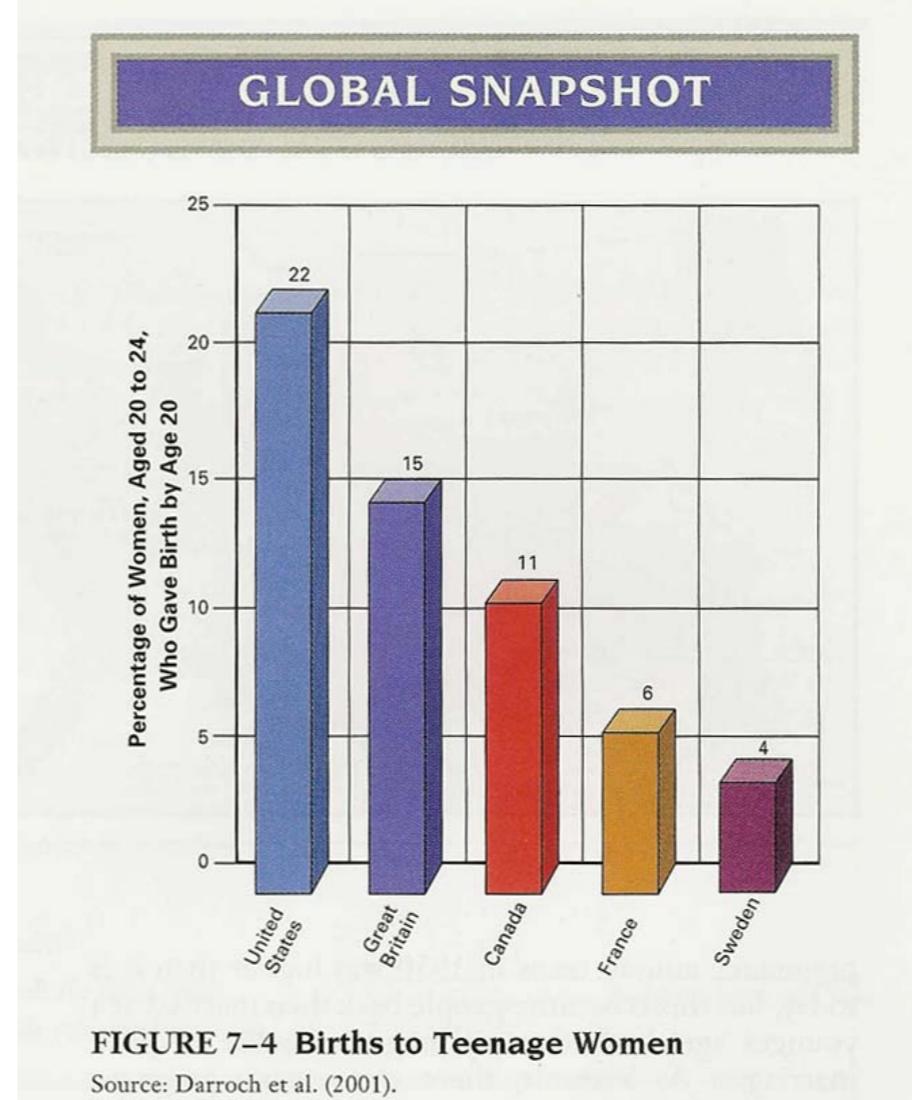
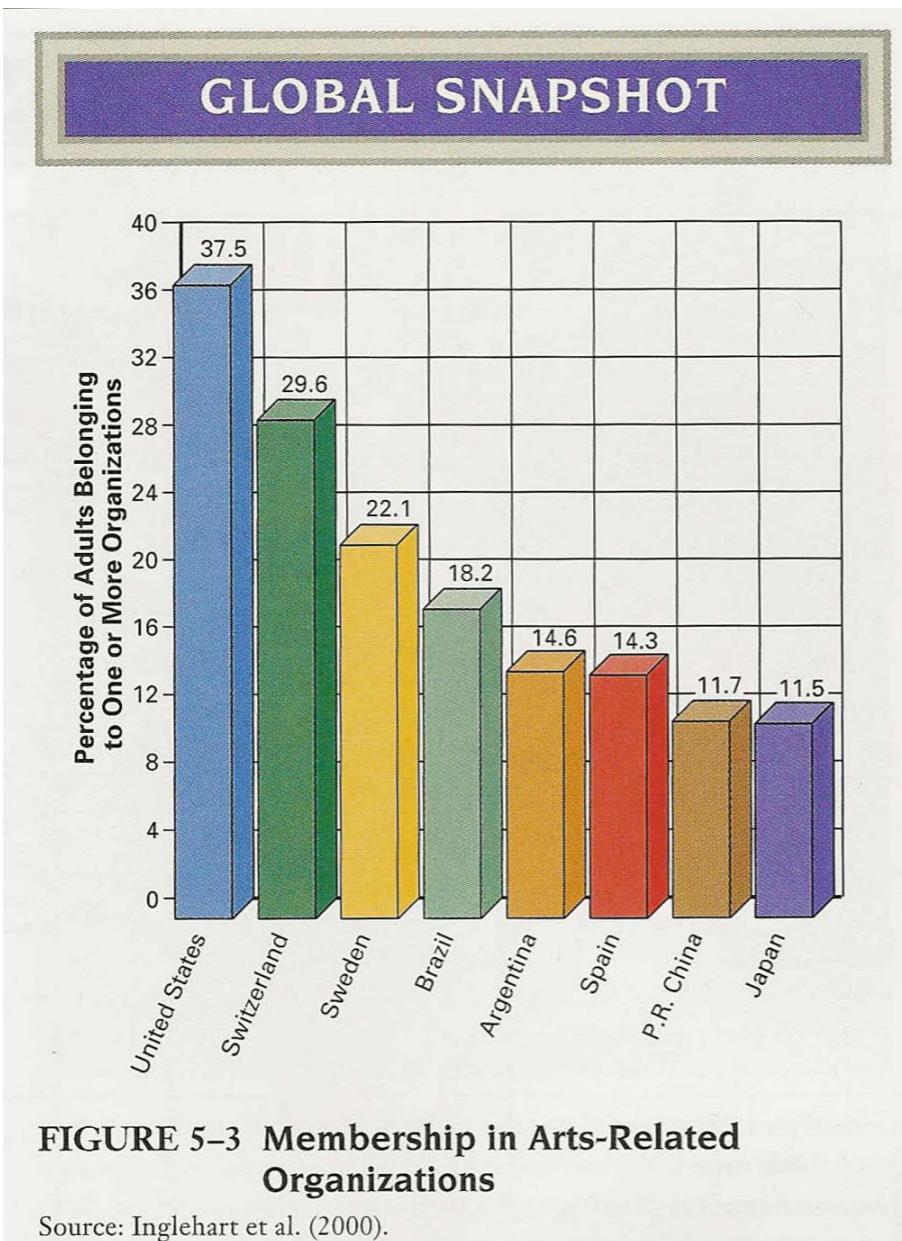


ggthemes: + scale_color_colorblind()

General color tips

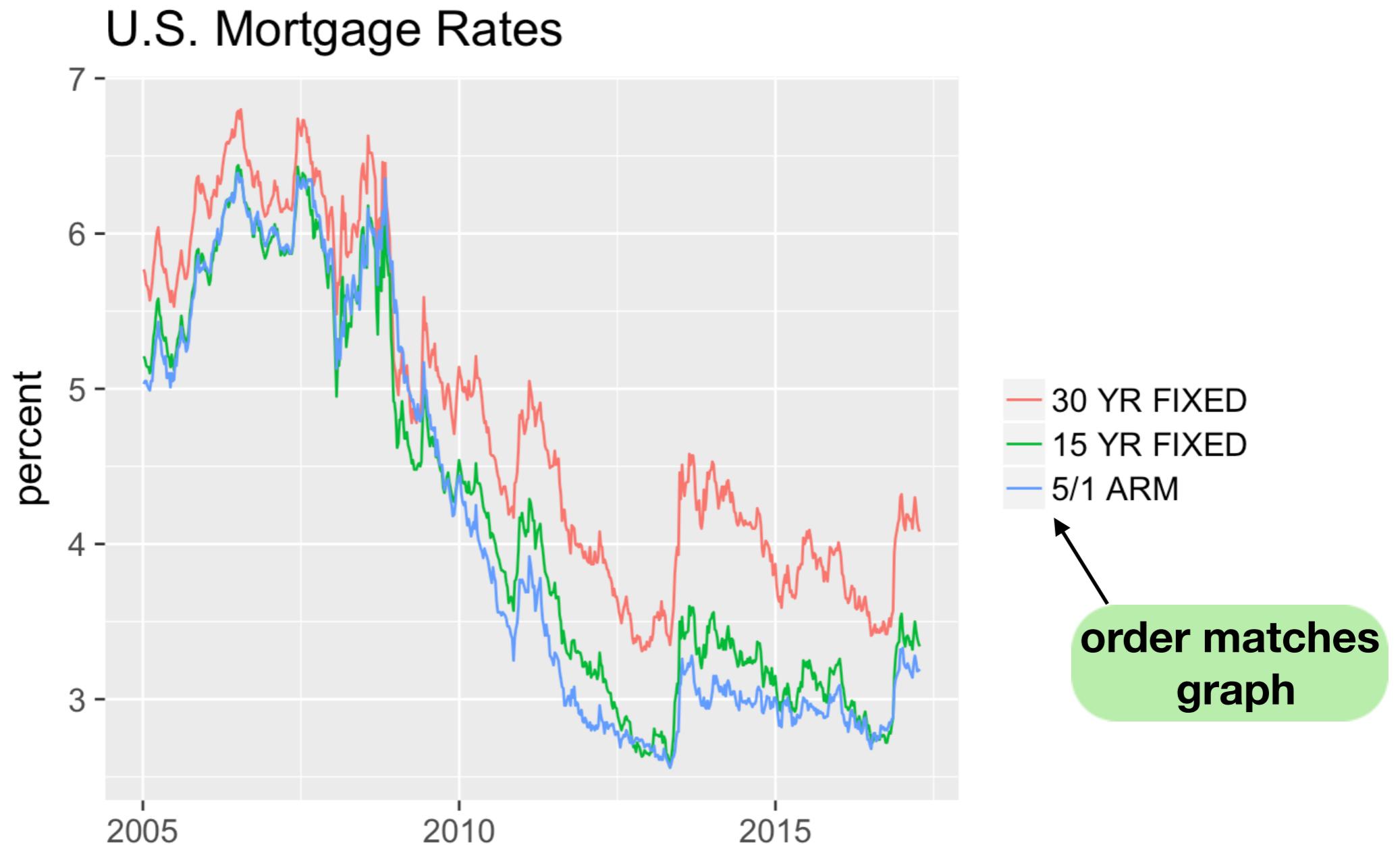


Be consistent with colors

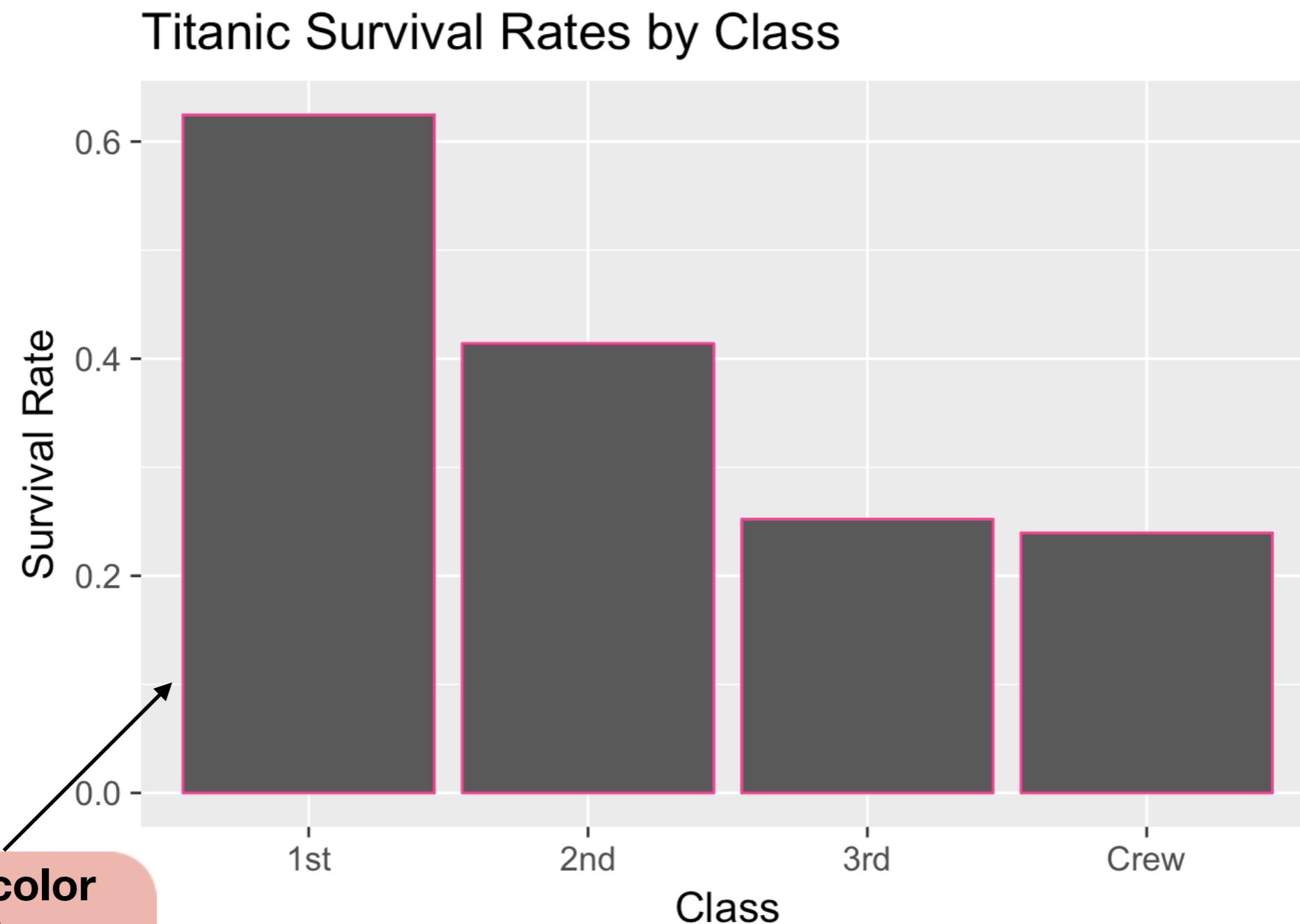


(inconsistent)

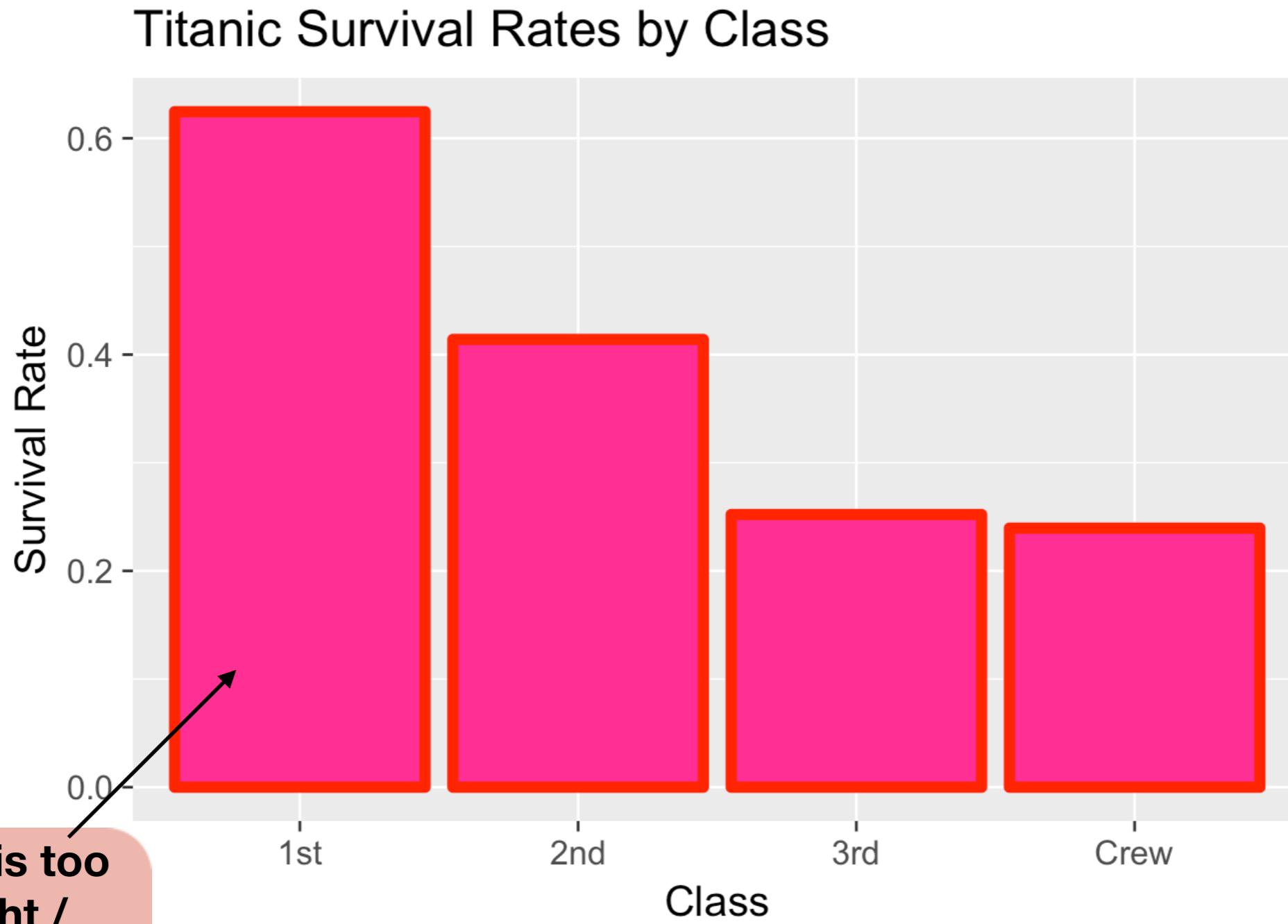
Legend order matches graph order



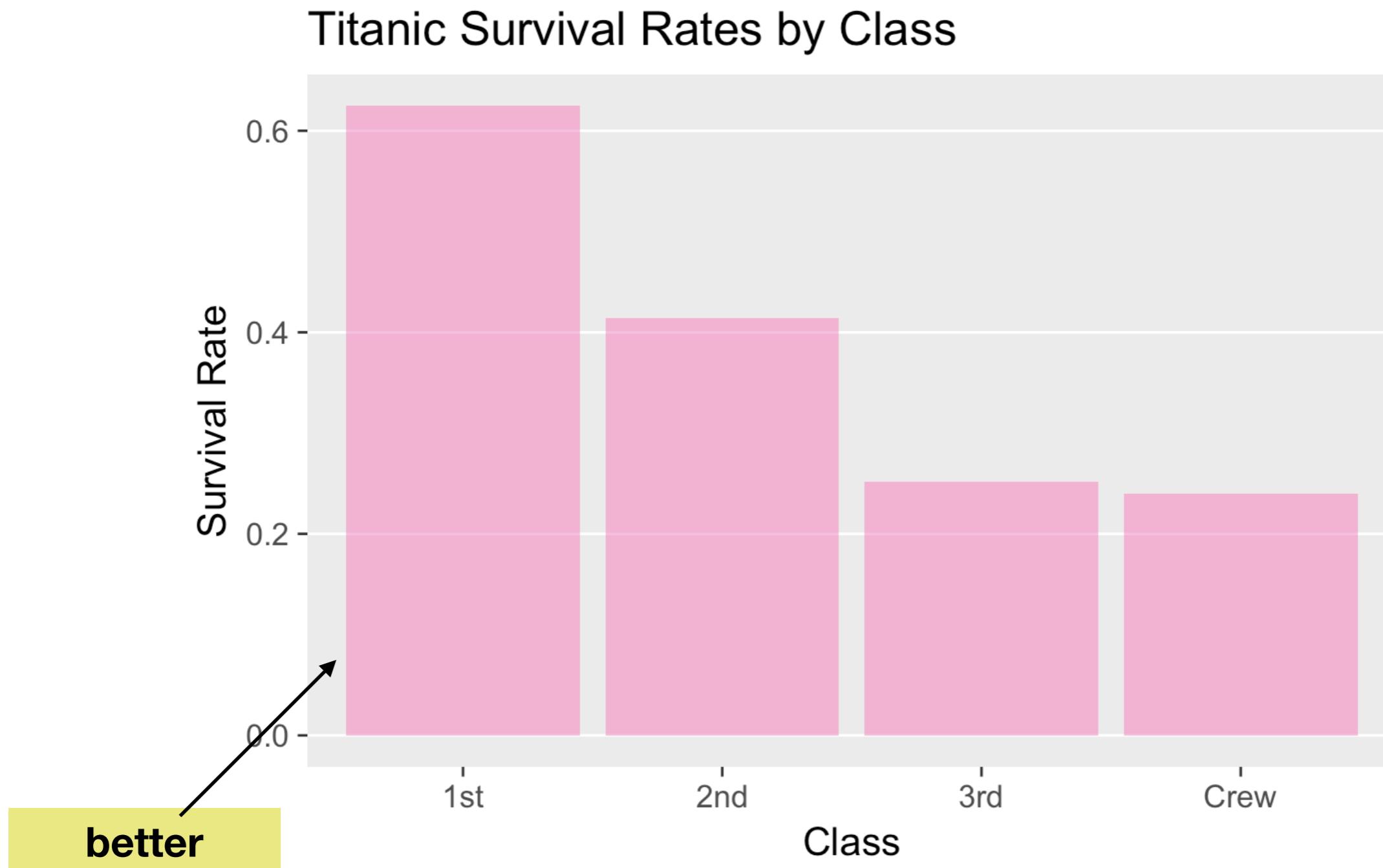
Dark fill, light border doesn't work



Limit overly bright colors



Toned down generally works better



Create your own palettes



<https://coolors.co/app>