

## 6. Color theory and application

### Lecture learning goals

By the end of the lecture you will be able to:

1. Choose appropriate color schemes for your data.
2. Use pre-made and custom color schemes.
3. Selectively highlight and annotate data with color and text.
4. Directly label data instead of using legends.

### Required activities

After class:

- Review the lecture notes.
- [Video review of visualization guidelines](#) (16 min, [slides](#))
- [Video on the programming part for color choices](#) (Halloween special, don't be scared, 44 min).
- [Section 3 on color choices](#)
- [Section 19 on common color pitfalls](#)

```
alt.Chart(df).mark_point().encode(  
    alt.X('Horsepower', axis=alt.Axis(tickMinStep=50)),  
    alt.Y('Acceleration')  
)
```

```
alt.Chart(df).mark_point().encode(  
    alt.X('Horsepower').axis(tickMinStep=50),  
    alt.Y('Acceleration')  
)
```

## Q1 Extra Credit

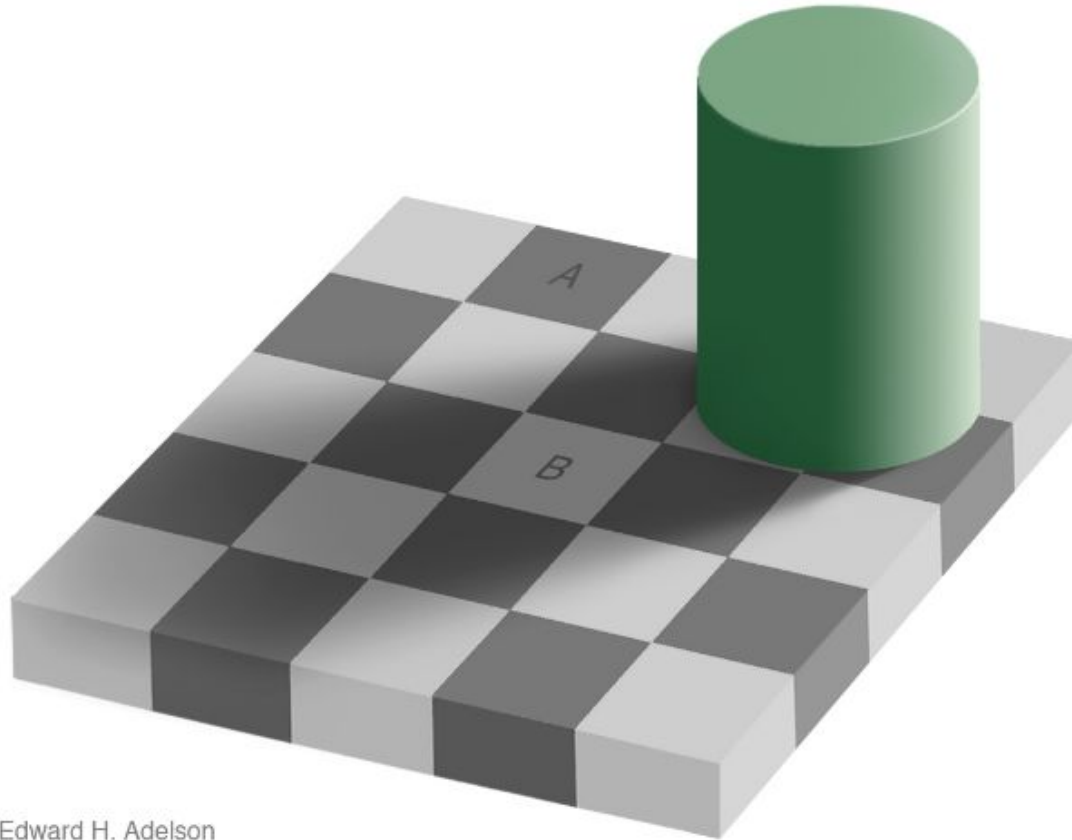
2 Points

As an extra credit assignment in 531, I thought it could be fun for you to get a chance to put the skills you have learned in class to use and make a meaningful contribution by doing something that is helpful either for me or for someone else, while also getting a bit of credit for the contribution you make.

Why bother?

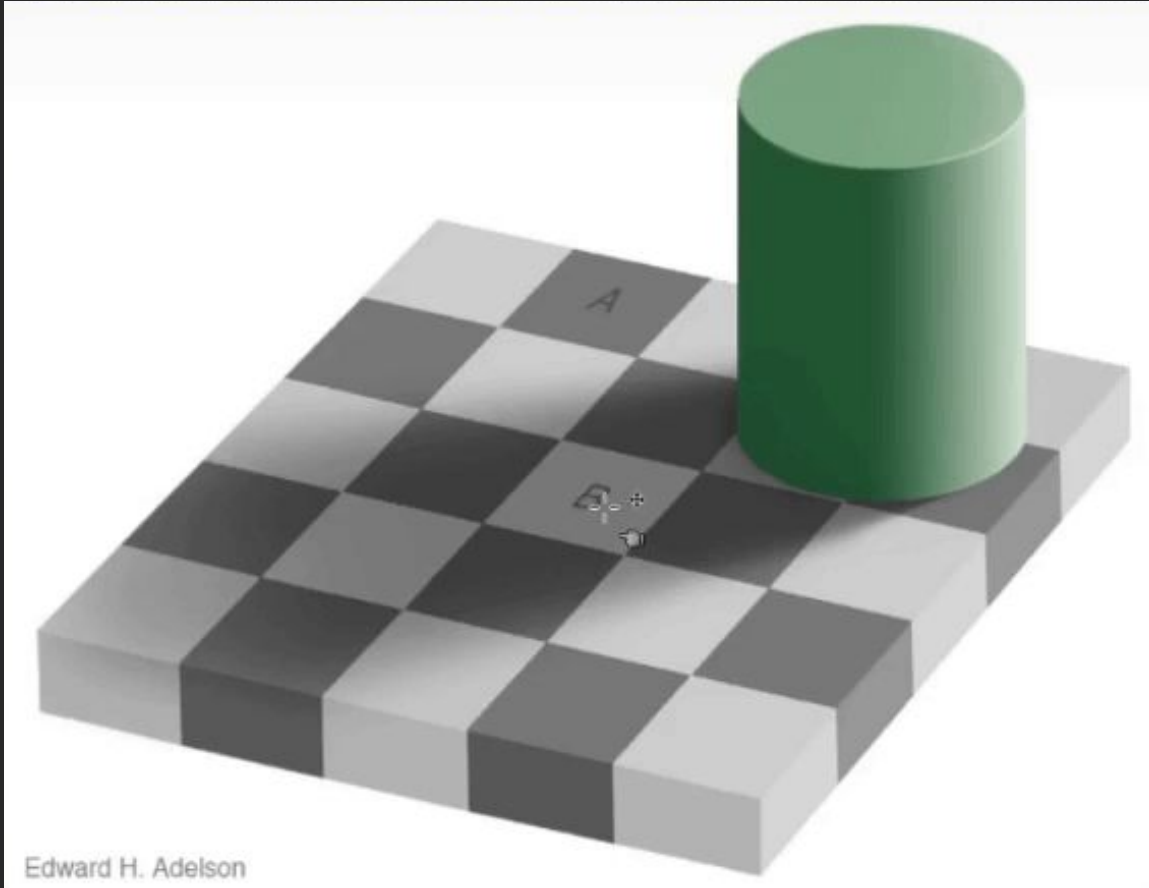


If square A is dark grey, which color is square B?



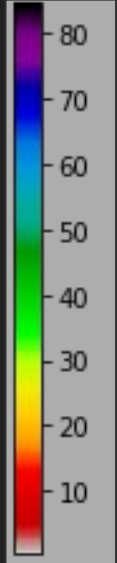
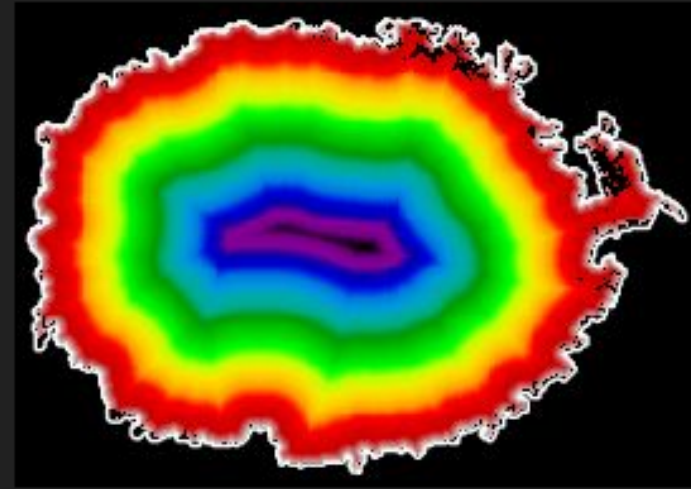
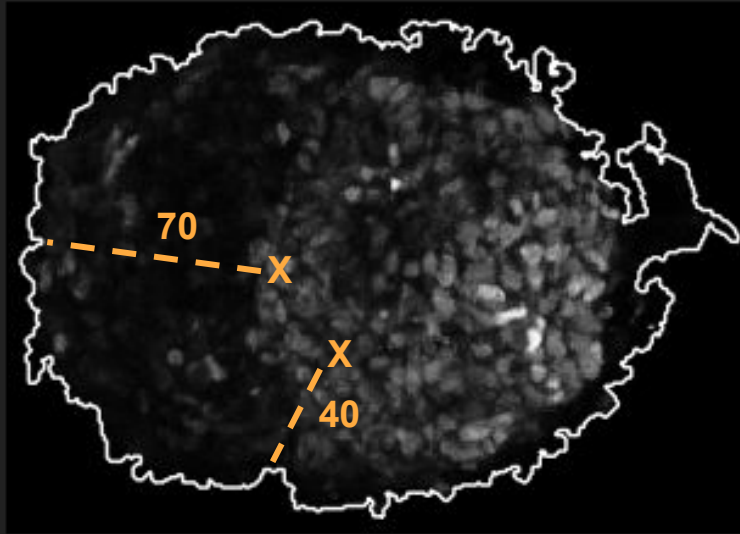
- A. White
- B. Light grey
- C. Dark grey
- D. Black

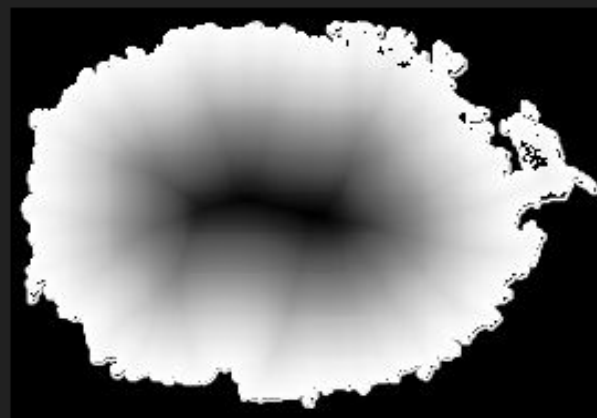
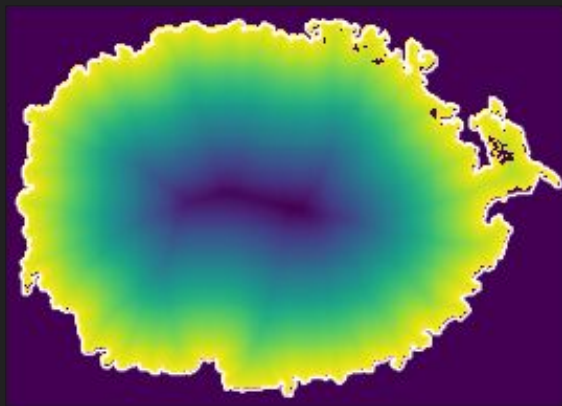
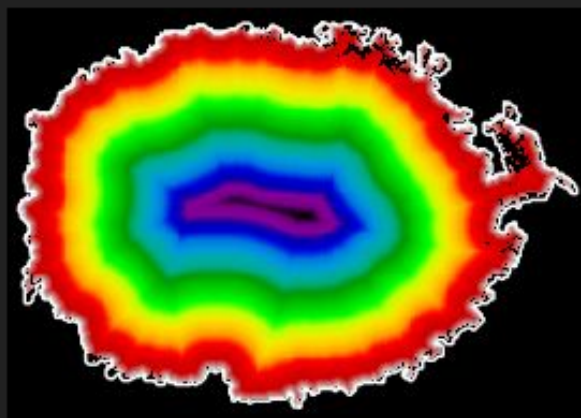
If square A is dark grey, which color is B?



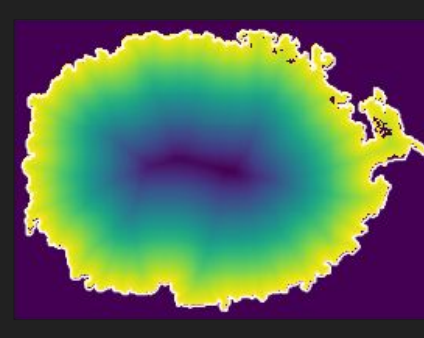
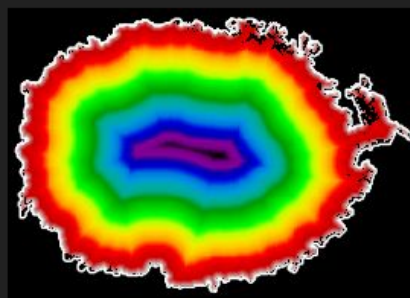
- A. White
- B. Light grey
- C. Dark grey
- D. Black

In terms of pixel distances from the edge, how many distinct groups are there in the data?

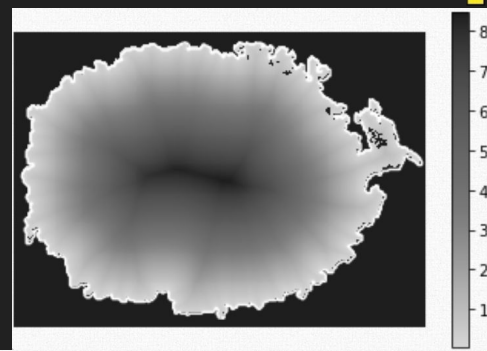
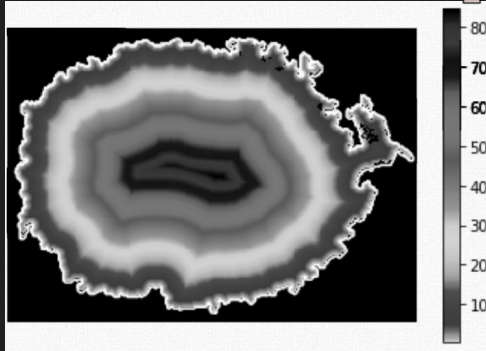




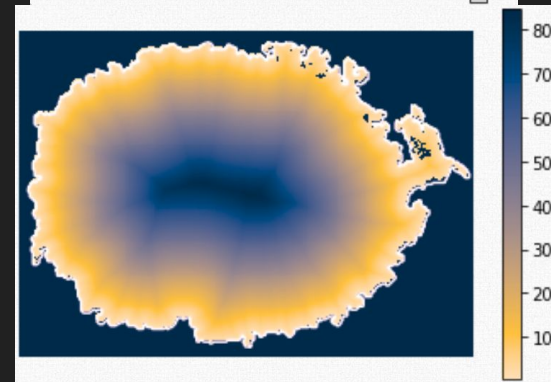
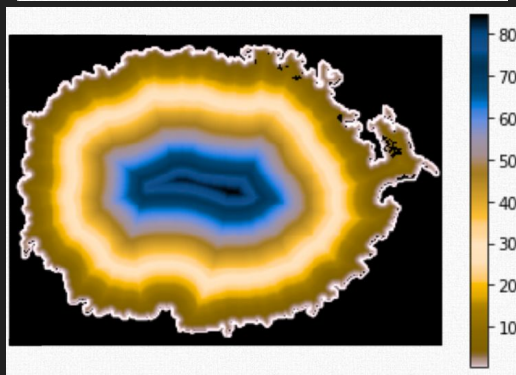
# CVD simulation



## Monochrome

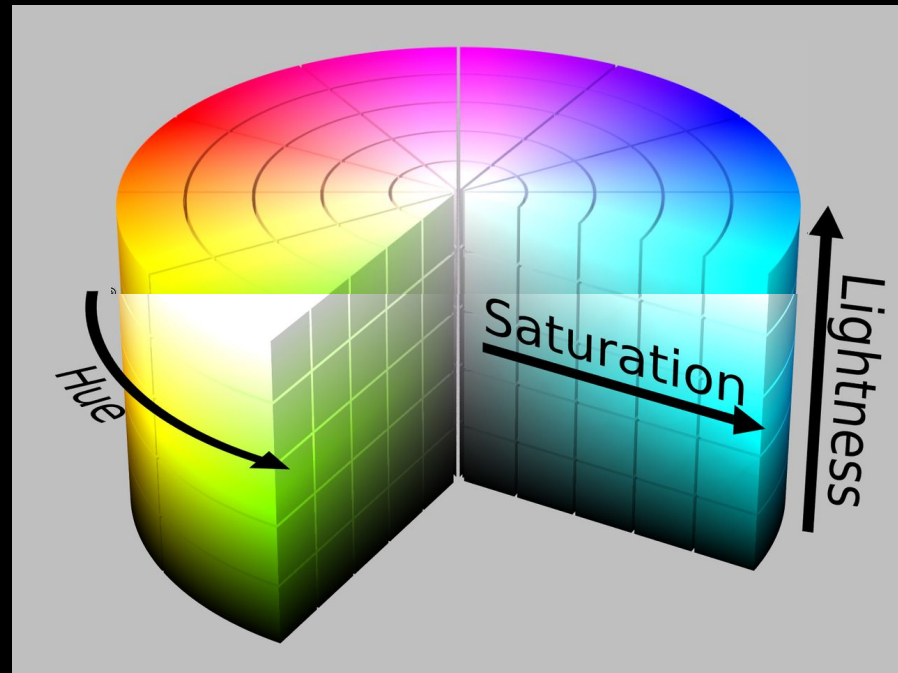
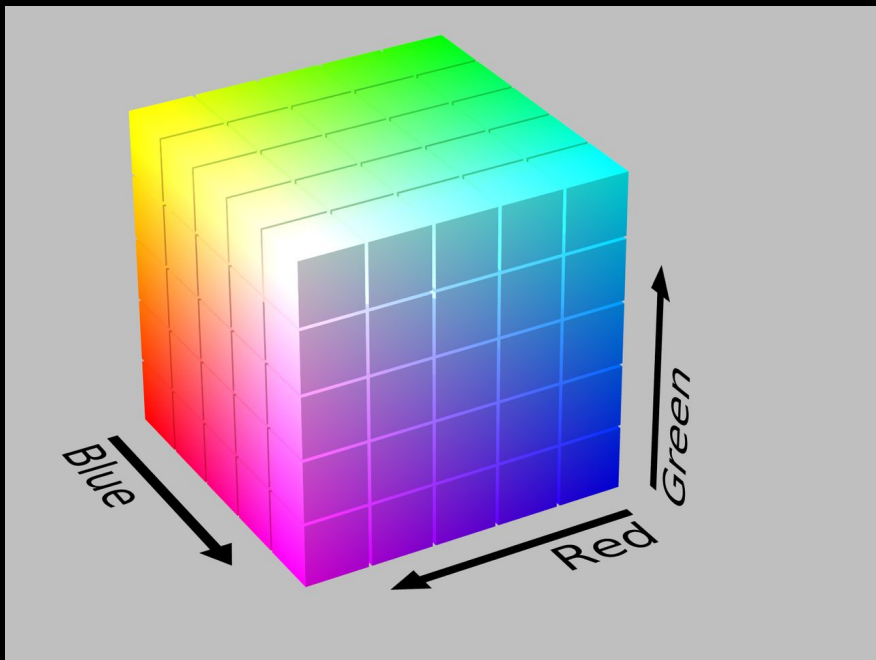


## Red-weak CVD





# JOEL'S COLOR SCHOOL



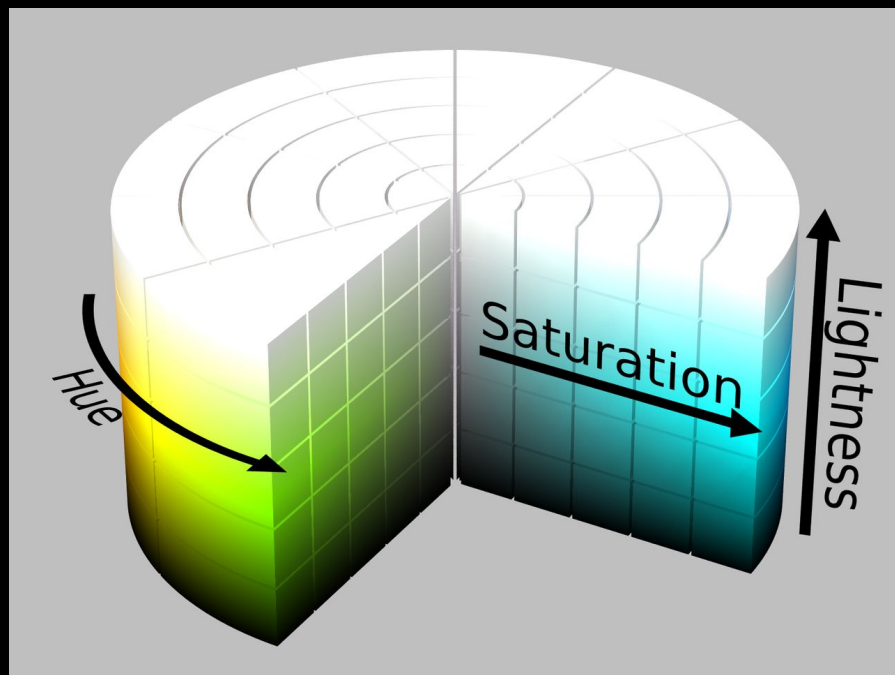
Hue - Which color?



Saturation - How vibrant/colorful?



Lightness - How bright?



Hue



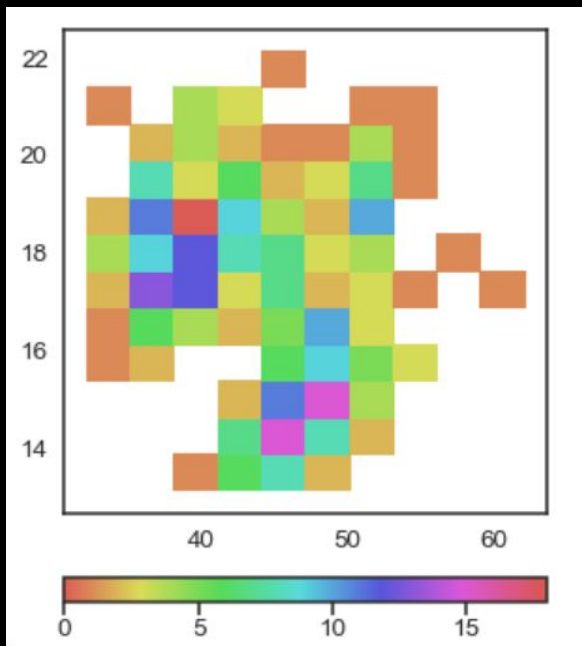
Saturation



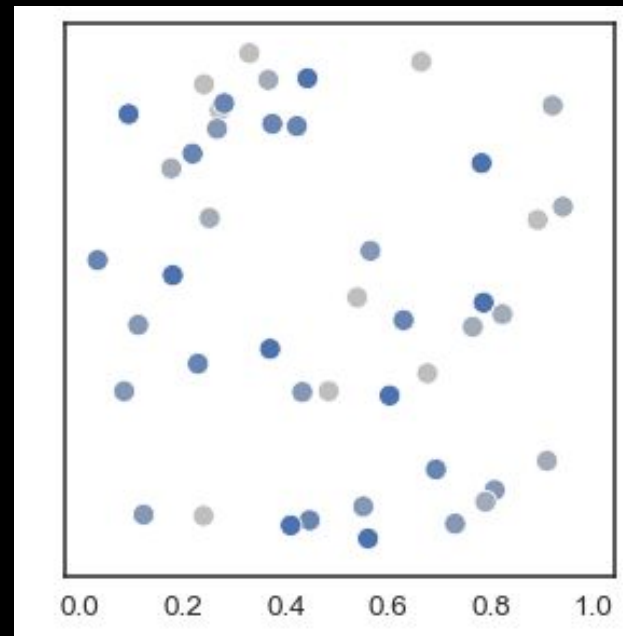
Lightness



Numerical



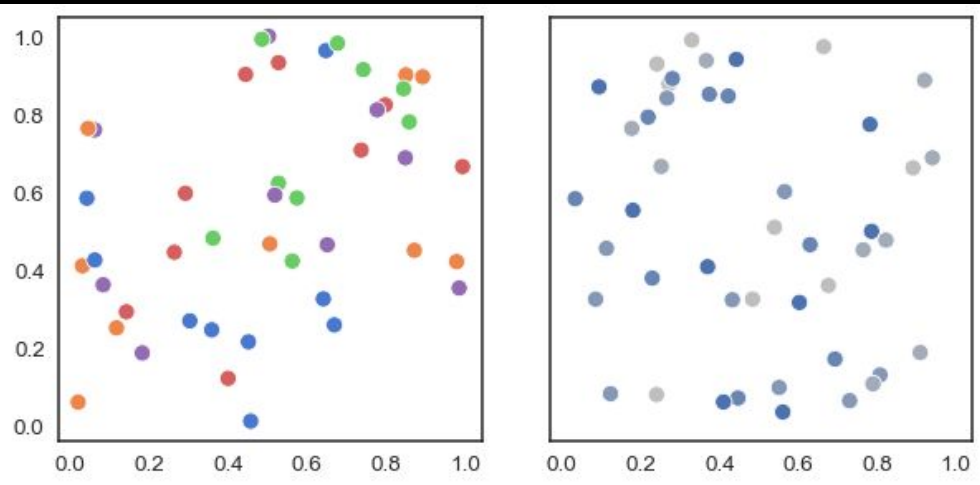
Categorical



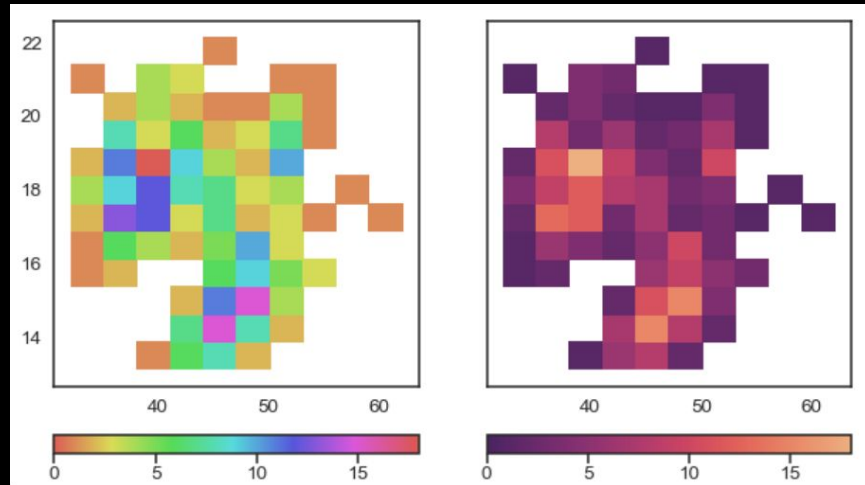
Are these color choices effective?

- A. Yes
- B. No

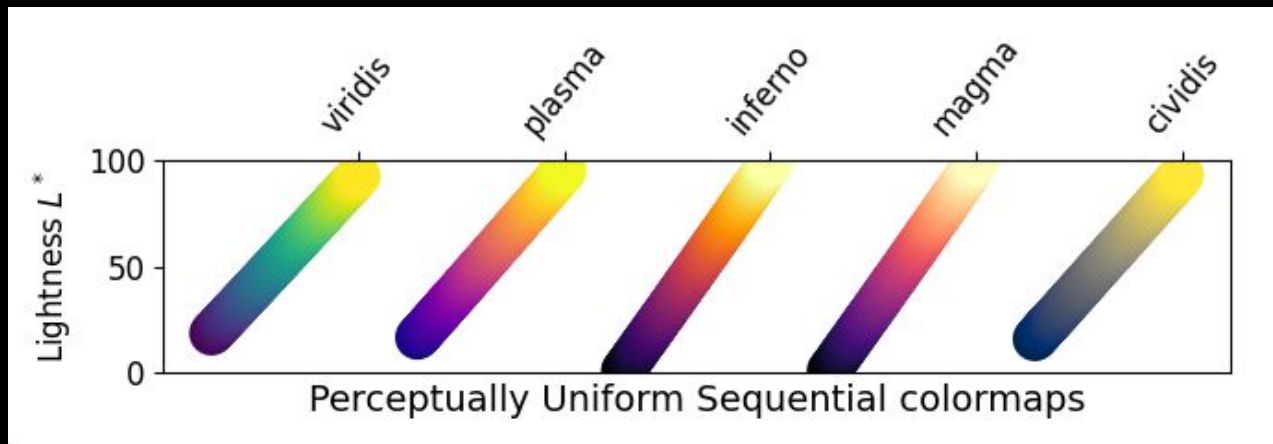
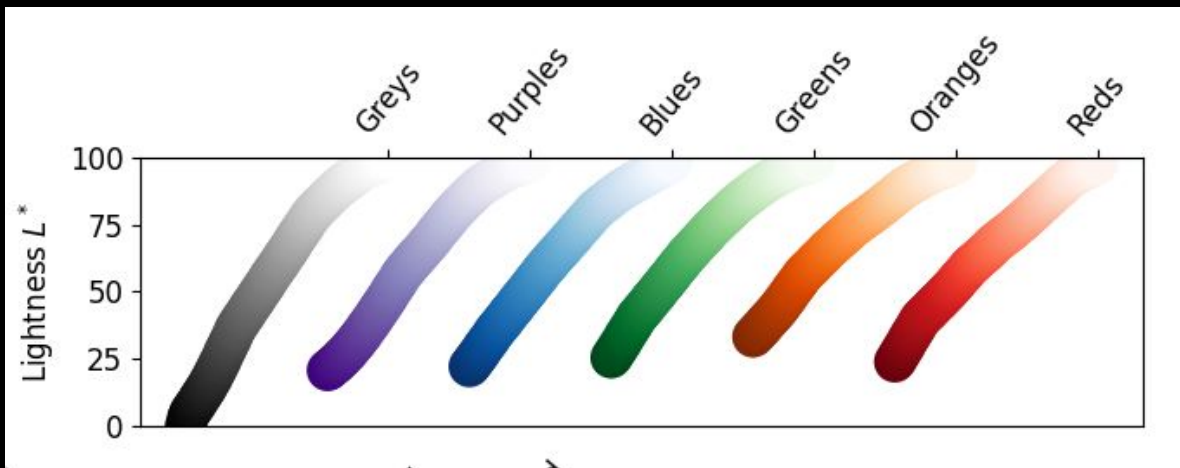
## Hue for categories



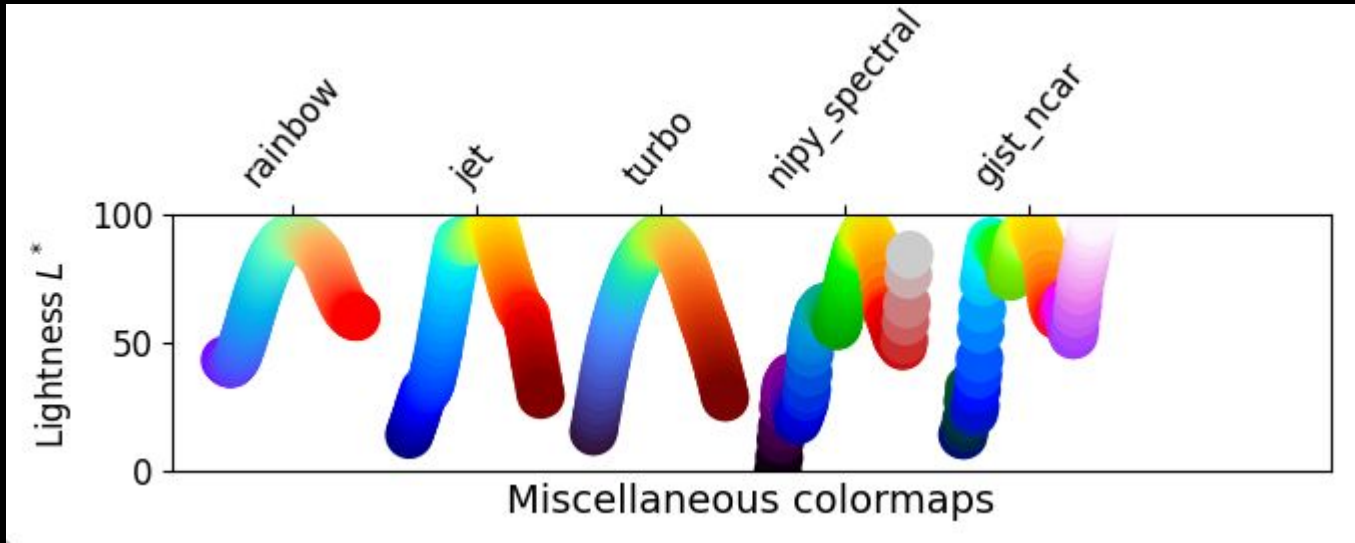
## Lightness for numbers



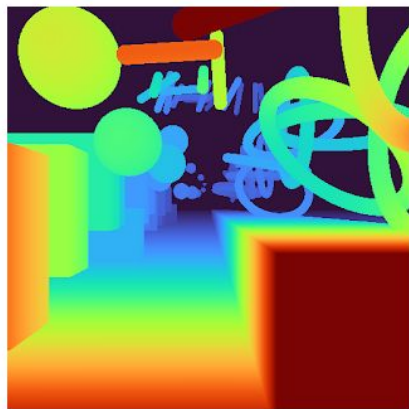
# Sequential colormaps



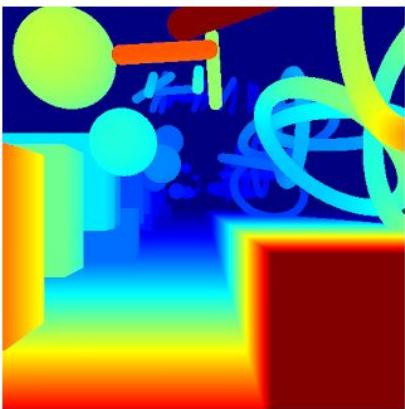
# Sequential colormaps (not perceptually uniform)



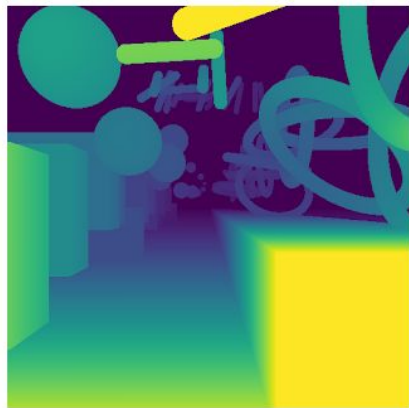
## Sequential colormaps (not perceptually uniform)



Turbo



Jet

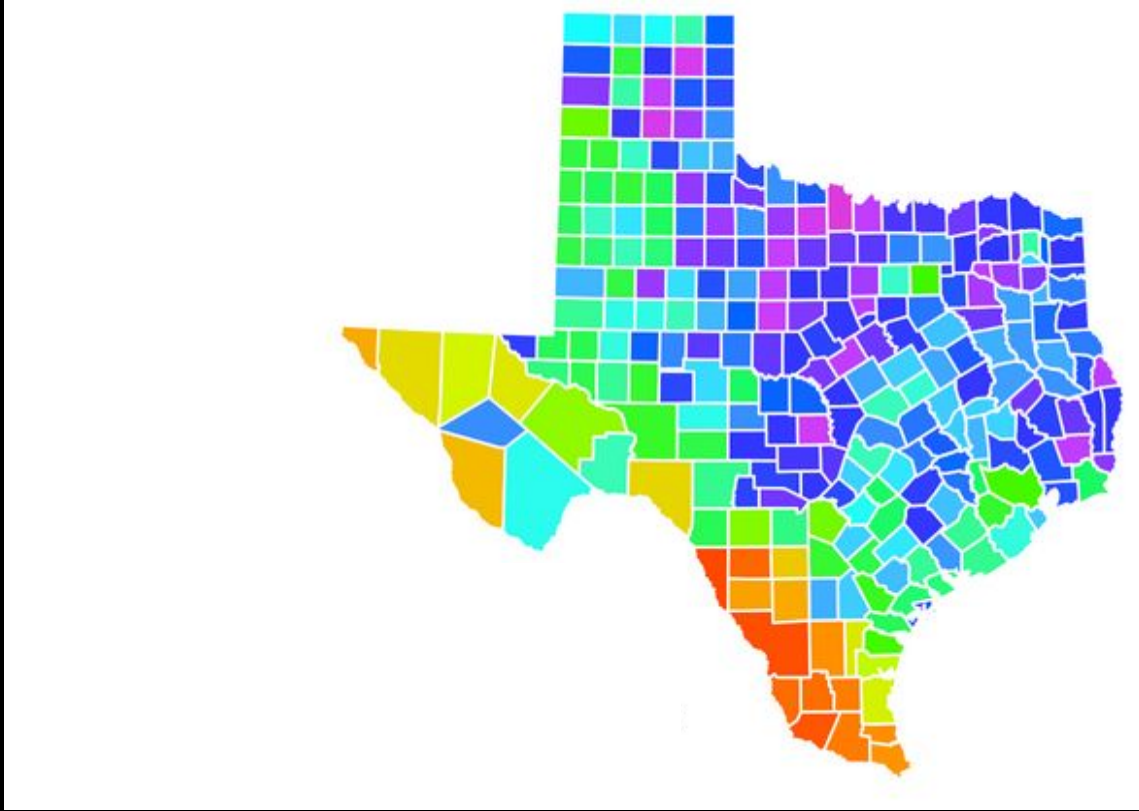


Viridis



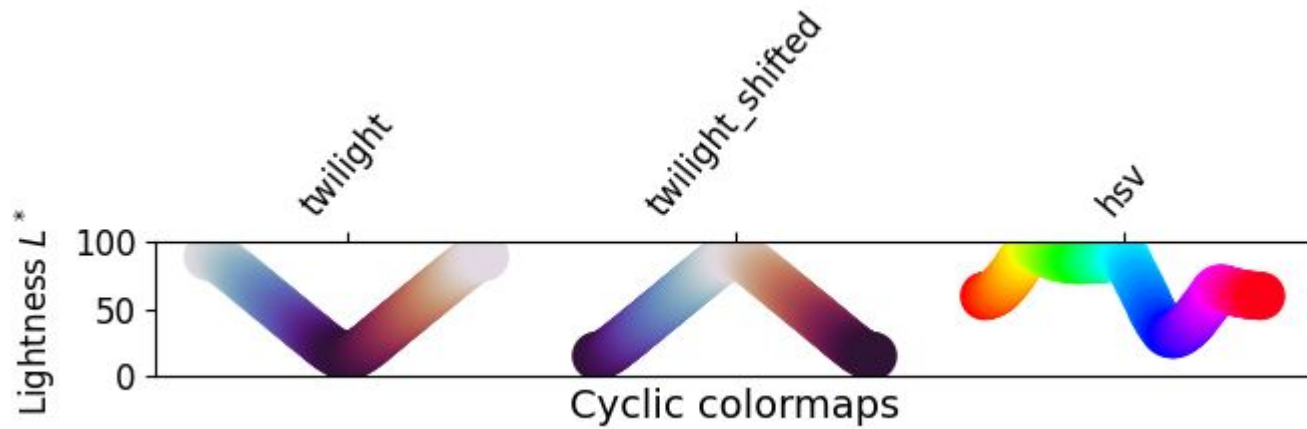
Inferno

Where do you think red falls in this sequence of colors?

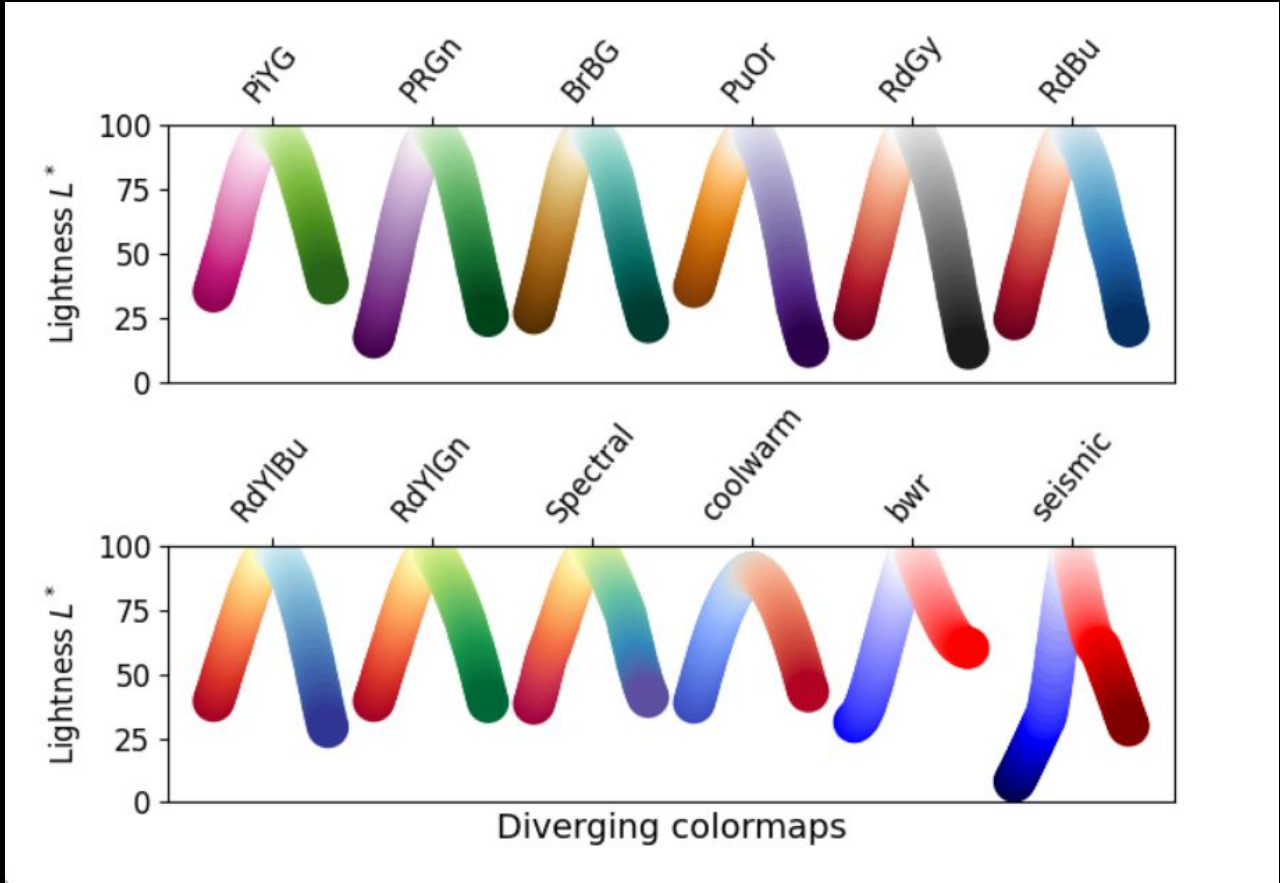


- A. Close to the low end
- B. Somewhere in the middle
- C. Close to the high end

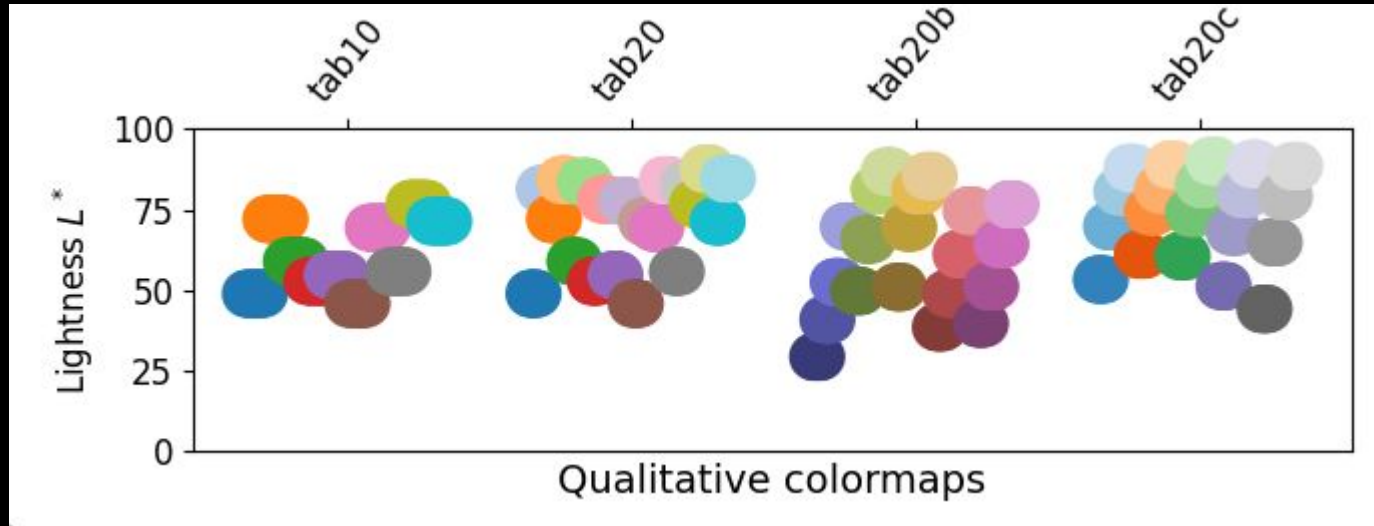
# Cyclic colormaps

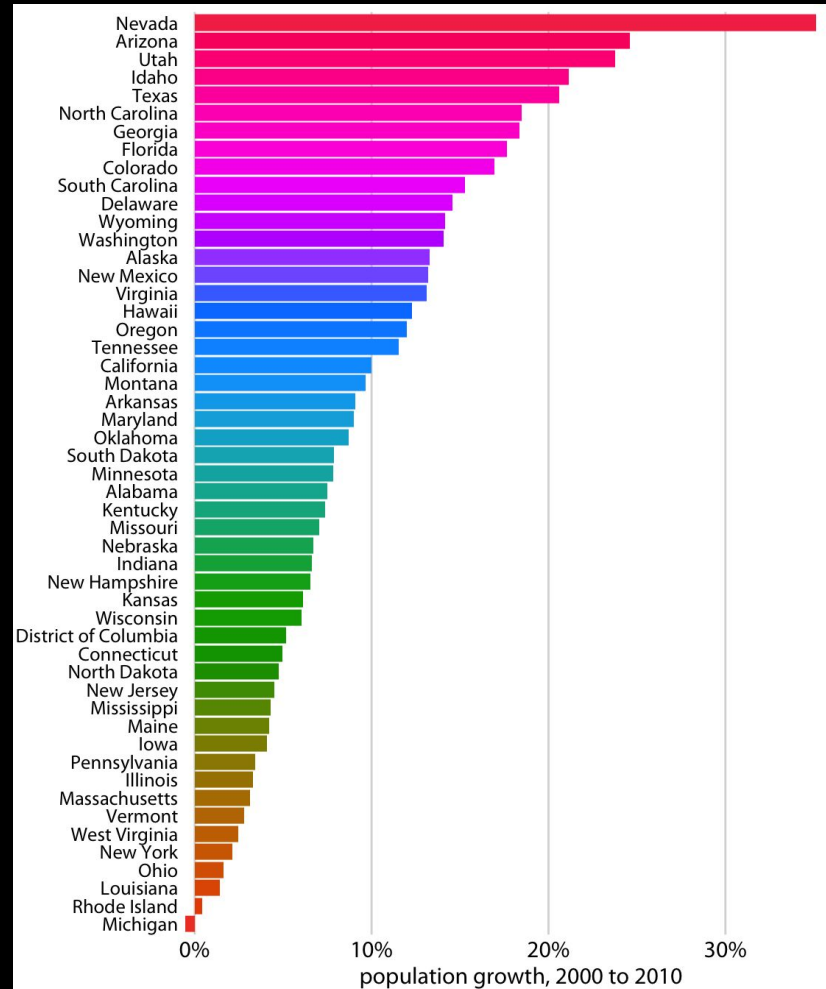
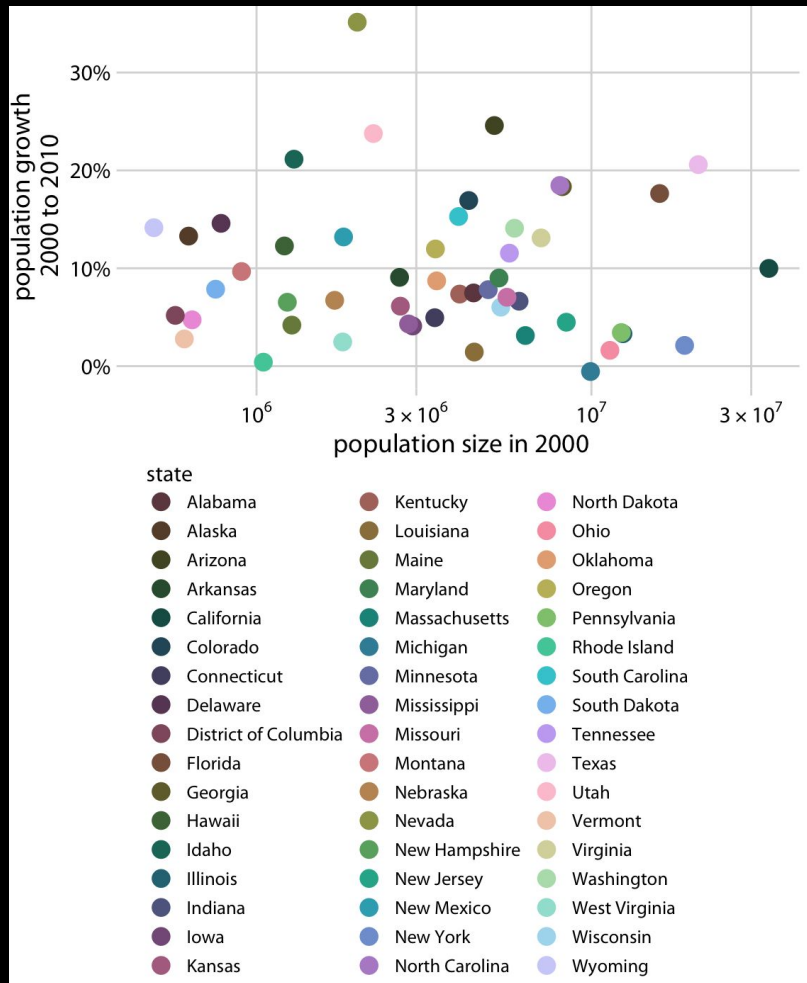


# Diverging colormaps



# Categorical colormaps





# Unintuitive color choices

