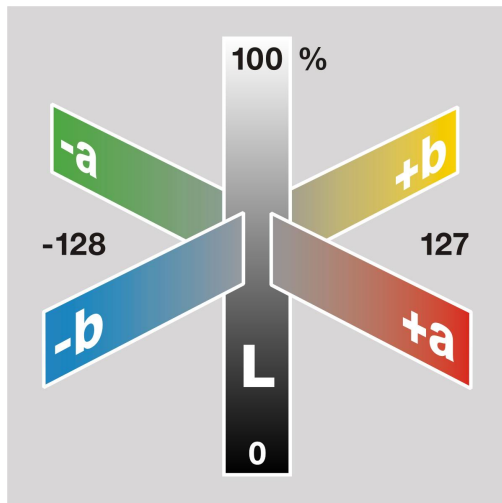# Perceptions of Matplotlib colormaps

Kristen M. Thyng
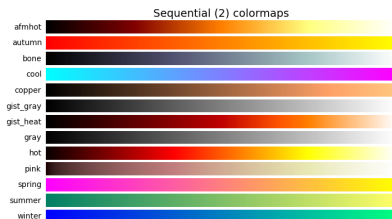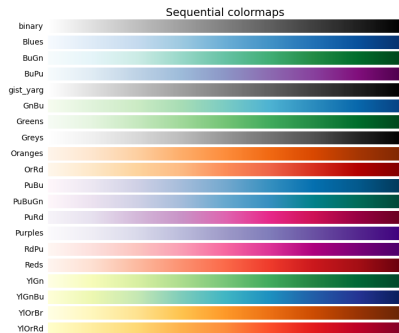
Texas A&M University

July 10, 2014

CIELAB Color Model

http://eschicleypega.blogspot.com

Sequential colormaps

Sequential (2) colormaps

http://matplotlib.org/examples/color/colormaps_reference.html

Lightness of matplotlib Colormaps

Lightness L^* along colormap index
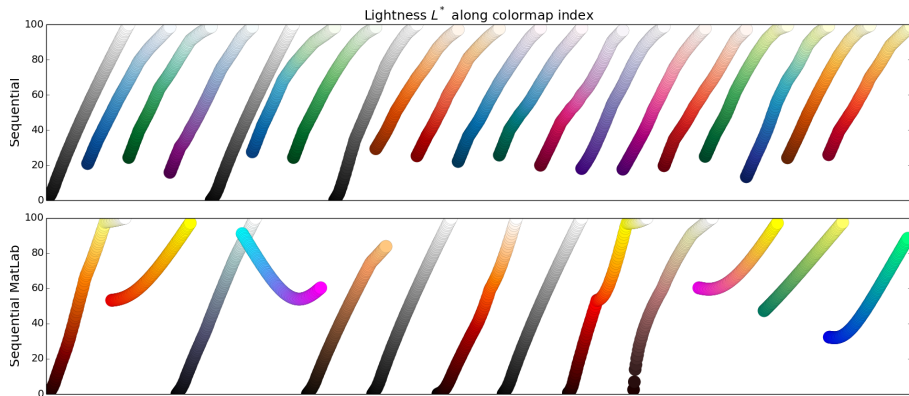
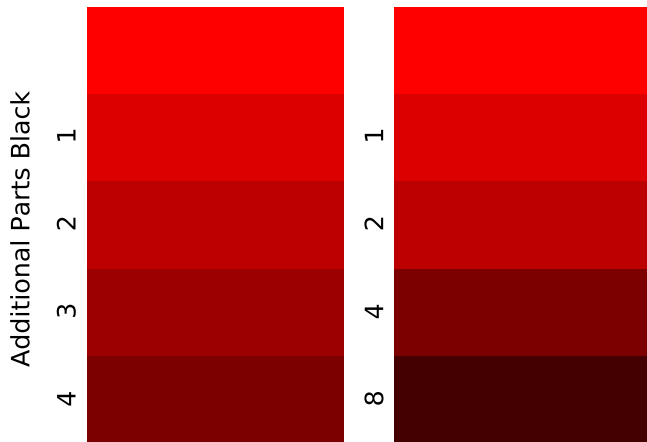# Lightness of matplotlib Colormaps

http://matplotlib.org/examples/color/colormaps_reference.html

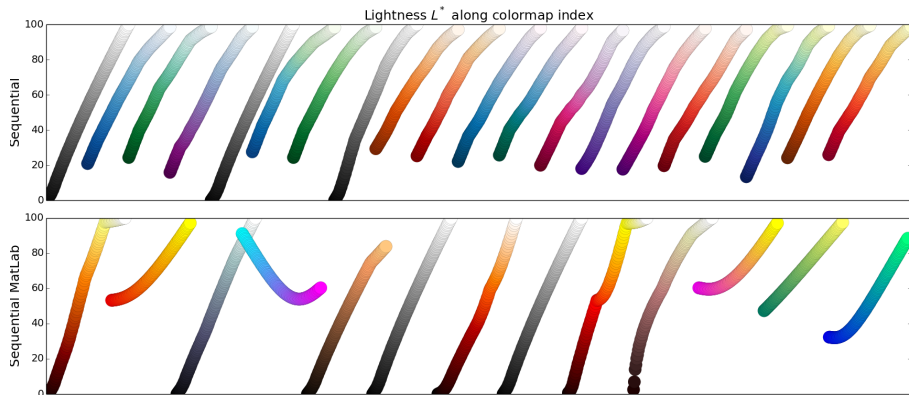Lightness L^* along colormap index
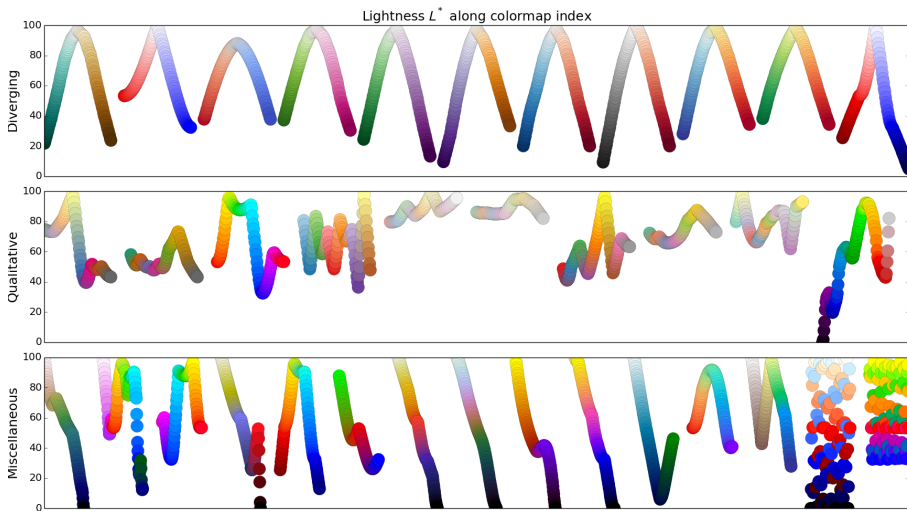
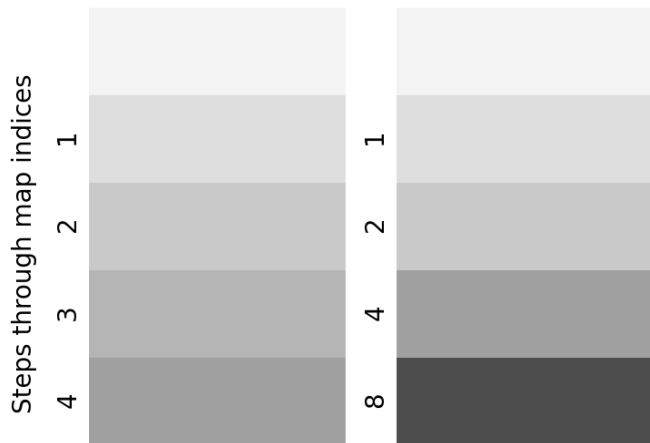# Perceived Lightness: Weber-Fechner Law (and Stevens)

Albers, J. (1975). Interaction of color. Yale University Press.

Improvement to Binary Colormap?

Lightness L^* along colormap index

Improvement to Binary Colormap?
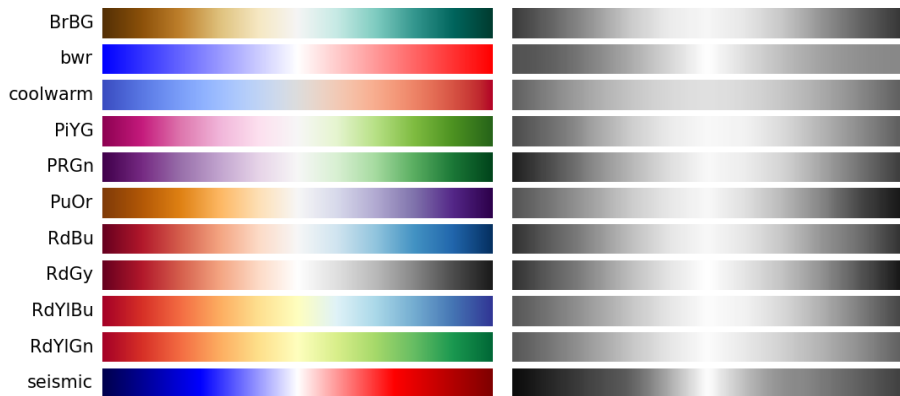
Printing to Grayscale

- Lots of ways to convert to grayscale

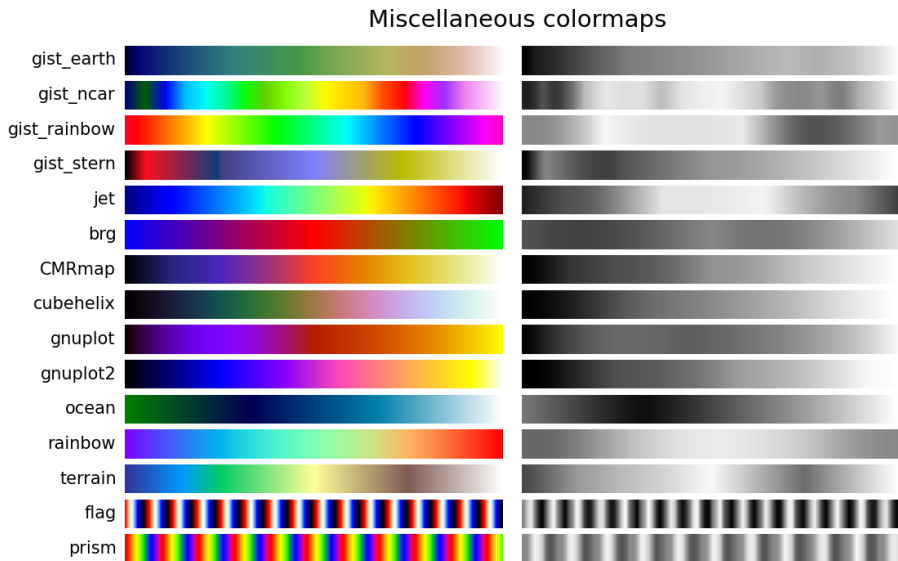- Gray = (Red * 0.2126 + Green * 0.7152 + Blue * 0.0722) (or similar*)

- Use luminance

* http://www.tannerhelland.com/3643/grayscale-image-algorithm-vb6/

matplotlib Colormaps in Grey Scale

Diverging colormaps

Miscellaneous colormaps

gist_earth
gist_ncar
gist_rainbow
gist_stern
jet
brg
CMRmap
cubehelix
gnuplot
gnuplot2
ocean
rainbow
terrain
flag
prism

Qualitative colormaps

Accent
Dark2
hsv
Paired
Pastel1
Pastel2
Set1
Set2
Set3
spectral

matplotlib Colormaps in Grey Scale

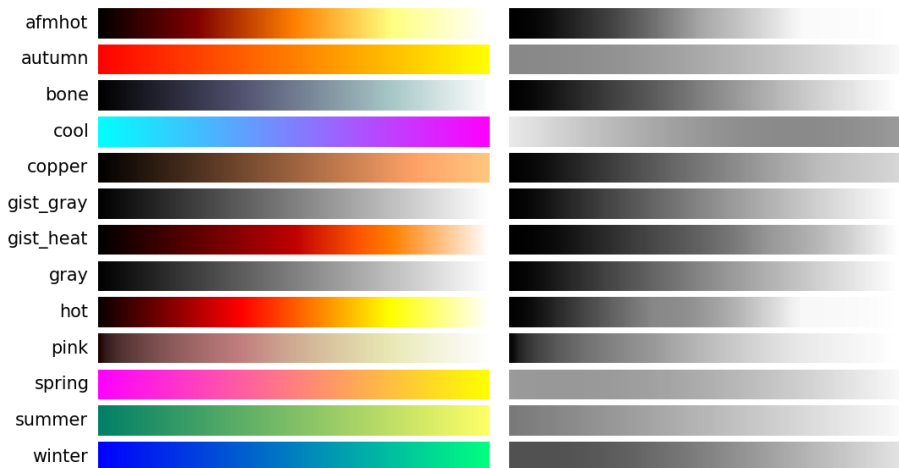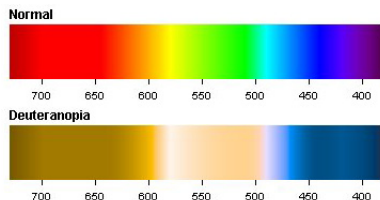Sequential colormaps
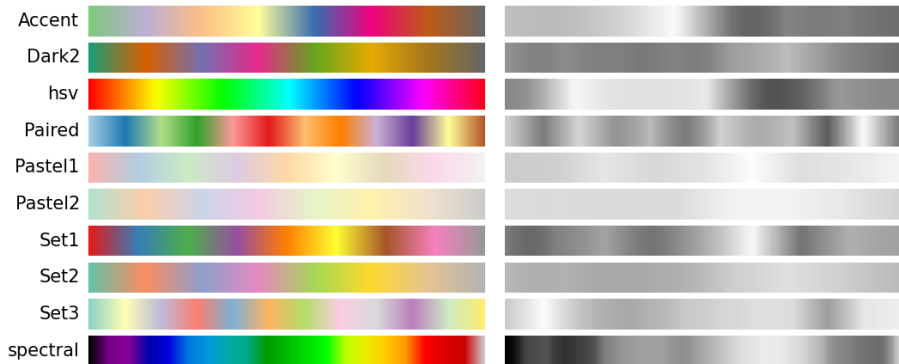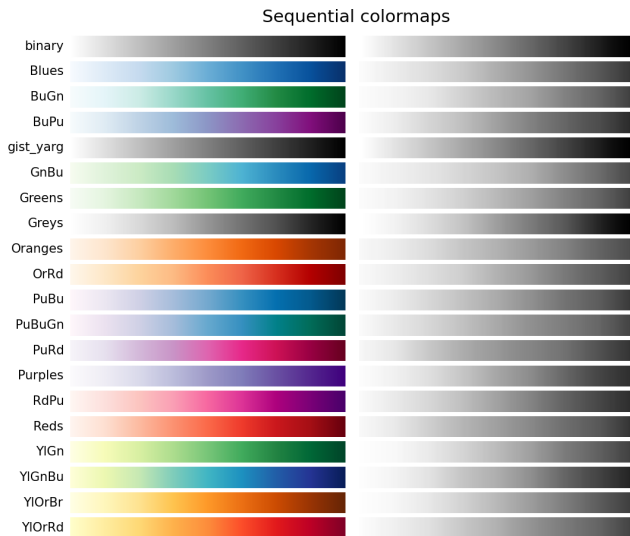
matplotlib Colormaps in Grey Scale
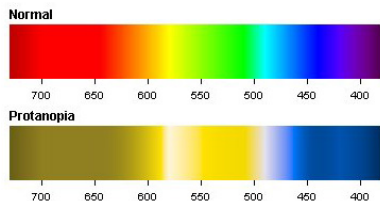

Sequential (2) colormaps

Color Blindness

Protanopia (2% male population, half mild form)

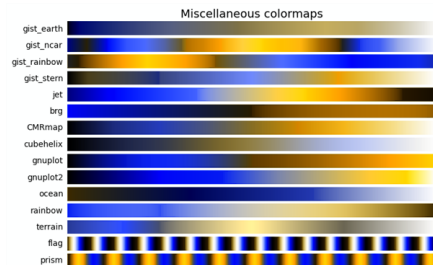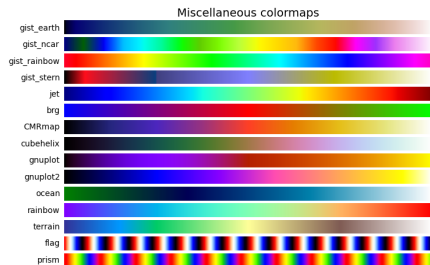Deuteranopia (6% male population, mostly mild form)

Color Blindness

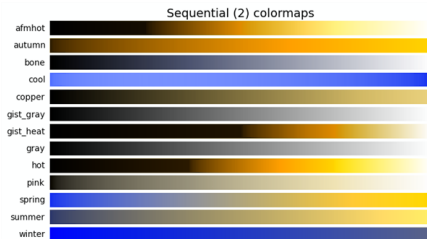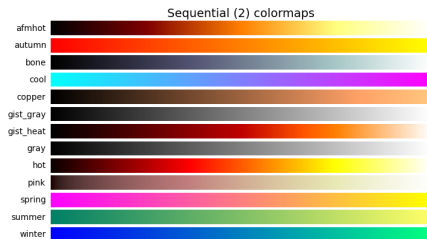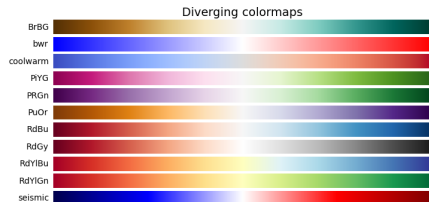Miscellaneous colormaps
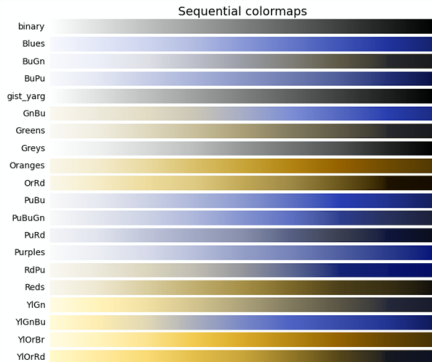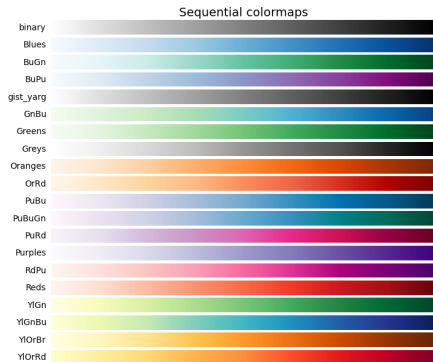
Color Blindness

http://aspnetresources.com/tools/colorBlindness

Diverging colormaps
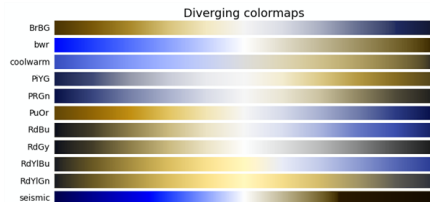
Color Blindness

Recommendations

- Best colormap depends on application, but for form information, perceptual colormaps are best

- Perceptual colormaps monotonically increase with lightness

- Not clear (to me) what functional relationship with L is best

- Many ways to convert to grayscale — luminance is a good proxy to decide on a good map

- Most common color blindness problem is red-green — try to avoid for reaching audiences most effectively

Resources

All around helpful information on colormaps:
Matteo Niccoli: http://mycarta.wordpress.com/2012/05/29/the-rainbow-is-dead-long-live-the-rainbow-series-outline/

Comparison of 7 methods of converting to grayscale:
http://www.tannerhelland.com/3643/grayscale-image-algorithm-vb6/

Color blindness: http://www.color-blindness.com