LAGER®
123 C

PILSNER®
1375 C

WHEAT BEER®
7412 C

GOLDEN ALE®
1595 C

color

Color is…

Complex

Color is…

Confusing

Color is...

Important

Color helps you

Explore

3 3 0 3 0 1 8 7 6 8 2 1 4 0 3 8 3 7 7 2 0 5 2 3 2 7 0 2 0
7 1 4 6 0 2 1 3 2 7 6 0 2 5 6 3 2 5 7 6 3 3 0 2 0 3 0 7 2
8 7 5 7 2 8 3 8 7 7 8 2 0 7 7 5 2 3 1 1 5 6 3 8 4 7 8 2 0
0 5 0 5 1 6 1 7 5 6 8 0 4 4 6 7 4 7 1 4 0 0 8 4 4 3 0 3 2
2 4 3 1 3 5 4 9 5 0 7 6 0 7 4 3 1 8 2 7 3 4 6 0 2 4 8 2 3
8 6 2 2 6 5 4 6 7 0 7 6 0 0 3 9 0 2 4 7 1 7 2 3 3 5 8 7 0
0 8 4 5 1 3 1 7 6 4 5 4 1 2 4 5 3 3 5 4 9 6 7 7 6 3 4 2 5
4 7 7 0 2 2 0 1 1 7 7 7 0 2 6 6 4 7 5 8 6 1 4 3 7 8 5 4 6
4 3 6 6 4 6 6 2 8 4 8 5 3 7 8 8 1 3 8 5 4 5 7 4 0 3 2 8 4
5 5 0 3 5 3 5 3 8 3 2 3 8 2 3 1 6 2 7 2 4 6 3 6 4 4 3 2 5
4 4 0 2 1 7 2 4 4 7 4 1 9 2 4 5 2 5 0 4 0 0 5 3 6 3 3 6 7
7 4 6 6 8 7 5 7 9 2 0 2 8 8 8 3 2 4 2 6 4 0 4 6 3 7 2 1
0 1 7 1 5 9 1 4 2 8 7 3 7 1 4 5 1 8 7 8 0 5 1 7 0 5 8 8 1
2 8 5 2 1 2 8 7 7 6 2 5 6 2 6 4 1 5 1 6 1 2 1 1 0 5 6 4 0
2 1 1 7 7 2 0 0 1 8 7 0 2 9 0 2 8 5 7 8 4 6 0 6 5 0 7 1 2
0 5 2 4 1 5 3 3 1 5 5 1 4 0 1 6 4 3 3 9 8 8 3 4 6 8 4 8 6
7 3 7 5 2 4 0 2 7 6 3 8 5 5 4 5 8 8 7 5 5 6 5 6 7 9 7 7 4
0 3 2 8 1 4 4 6 0 8 2 3 0 1 3 4 6 2 0 5 7 7 3 6 1 8 7 3 5
4 4 8 3 3 3 5 0 1 0 3 8 6 3 2 0 5 0 6 1 3 3 4 3 6 1 5 8 6
1 0 2 2 7 6 3 3 0 8 8 0 3 1 8 8 1 2 1 7 5 2 9 3 5 8 3 2 5

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3 3 0 3 0 1 8 7 6 8 2 1 4 0 3 8 3 7 7 2 0 5 2 3 2 7 0 2 0
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0 5 0 5 1 6 1 7 5 6 8 0 4 4 6 7 4 7 1 4 0 0 8 4 4 3 0 3 2
2 4 3 1 3 5 4 9 5 0 7 6 0 7 4 3 1 8 2 7 3 4 6 0 2 4 8 2 3
8 6 2 2 6 5 4 6 7 0 7 6 0 0 3 9 0 2 4 7 1 7 2 3 3 5 8 7 0
0 8 4 5 1 3 1 7 6 4 5 4 1 2 4 5 3 3 5 4 9 6 7 7 6 3 4 2 5
4 7 7 0 2 2 0 1 1 7 7 7 0 2 6 6 4 7 5 8 6 1 4 3 7 8 5 4 6
4 3 6 6 4 6 6 2 8 4 8 5 3 7 8 8 1 3 8 5 4 5 7 4 0 3 2 8 4
5 5 0 3 5 3 5 3 8 3 2 3 8 2 3 1 6 2 7 2 4 6 3 6 4 4 3 2 5
4 4 0 2 1 7 2 4 4 7 4 1 9 2 4 5 2 5 0 4 0 0 5 3 6 3 3 6 7
7 4 6 6 8 7 5 7 9 2 0 2 8 8 8 3 2 4 2 6 4 0 4 6 3 7 2 1
0 1 7 1 5 9 1 4 2 8 7 3 7 1 4 5 1 8 7 8 0 5 1 7 0 5 8 8 1
2 8 5 2 1 2 8 7 7 6 2 5 6 2 6 4 1 5 1 6 1 2 1 1 0 5 6 4 0
2 1 1 7 7 2 0 0 1 8 7 0 2 9 0 2 8 5 7 8 4 6 0 6 5 0 7 1 2
0 5 2 4 1 5 3 3 1 5 5 1 4 0 1 6 4 3 3 9 8 8 3 4 6 8 4 8 6
7 3 7 5 2 4 0 2 7 6 3 8 5 5 4 5 8 8 7 5 5 6 5 6 7 9 7 7 4
0 3 2 8 1 4 4 6 0 8 2 3 0 1 3 4 6 2 0 5 7 7 3 6 1 8 7 3 5
4 4 8 3 3 3 5 0 1 0 3 8 6 3 2 0 5 0 6 1 3 3 4 3 6 1 5 8 6
1 0 2 2 7 6 3 3 0 8 8 0 3 1 8 8 1 2 1 7 5 2 9 3 5 8 3 2 5
```

Color helps you

Measure

Color helps you

Engage

1 NEW DEFINITION IS ADDED ON urban dictionary

1,600+ READS ON Scribd.

THE LARGEST SOCIAL READING PUBLISHING COMPANY!!

13,000+ HOURS MUSIC STREAMING ON PANDORA

12,000+ NEW ADS POSTED ON craigslist

New Craigslist Ads

370,000+ MINUTES VOICE CALLS ON skype

98,000+ TWEETS

320+ NEW twitter ACCOUNTS

100+ NEW LinkedIn ACCOUNTS

20,000+ NEW POSTS ON tumblr.

1 associatedcontent NEW ARTICLE IS PUBLISHED

Y! THE WORLD'S LARGEST COMMUNITY CREATED CONTENT!!

13,000+ iPhone APPLICATIONS DOWNLOADED

IN 60 SECONDS...

6,600+ NEW PICTURES ARE UPLOADED ON flickr

QUESTIONS ASKED ON THE INTERNET...

100+ Answers.com

40+ YAHOO! ANSWERS

600+ NEW VIDEOS YouTube

50+ WORDPRESS DOWNLOADS

25+ HOURS TOTAL DURATION

70+ DOMAINS REGISTERED

60+ NEW BLOGS

695,000+ facebook STATUS UPDATES

=125+ PLUGIN DOWNLOADS

1,500+ BLOG POSTS

168 MILLION EMAILS ARE SENT

694,445 SEARCH QUERIES

1,700+ Firefox DOWNLOADS

79,364 WALL POSTS

510,040 COMMENTS

Google

Google Search

GO-Globe.com web technologies

f

Color
Perception

Light

Eyes

Mind

Light

Light

Color	Wavelength
violet	380–450 nm
blue	450–495 nm
green	495–570 nm
yellow	570–590 nm
orange	590–620 nm
red	620–750 nm

Light + color "types"

Subtractive

Additive

Eyes

Sclera

Choroid

Retina

Cornea

LIGHT

Pupil

Lens

Iris

Optic nerve

Ciliary body

Simple Anatomy of the Retina, Helga Kolb

Cones

Long
Middle
Short

Cone Response Curves

A field guide to Digital Color, Maureen Stone

Integration

A field guide to Digital Color, Maureen Stone

Mind

What color...

A

Tertiary visual cortex
(area 19), V3 and V5

Secondary visual cortex
(area 18), V2

Calcarine
sulcus

Primary visual cortex
(Brodmann's area 17), V1

B

Left

Right

Visual field

Retina

Visual cortex

Parietal

Dorsal or "where" stream

Spatial processing

Frontal

Occipital

location

movement

spatial

transformations

spatial relations

color

texture

pictorial detail

shape

size

Temporal

Object processing

Ventral or "what" stream

Color is perceptual AND cognitive

World color survey

How do people around the world name these colors?
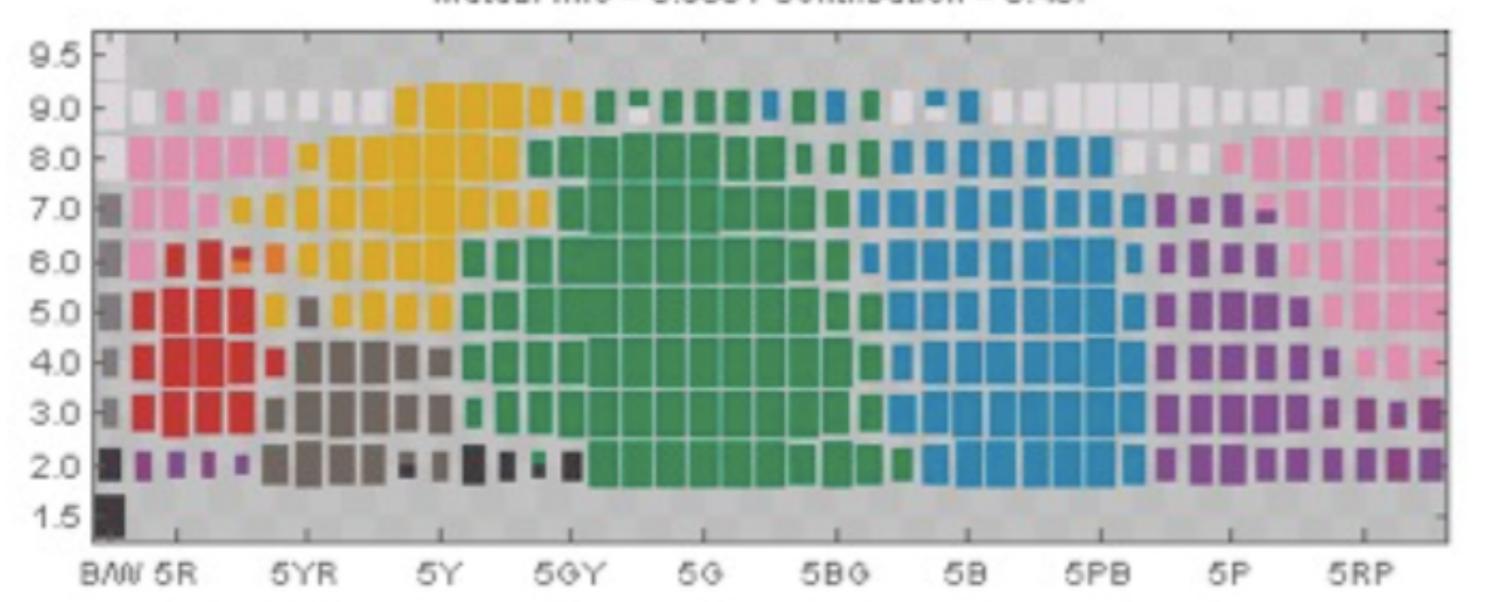
Language #72 (Mixteco)
Mutual info = 0.942 / Contribution = 0.476
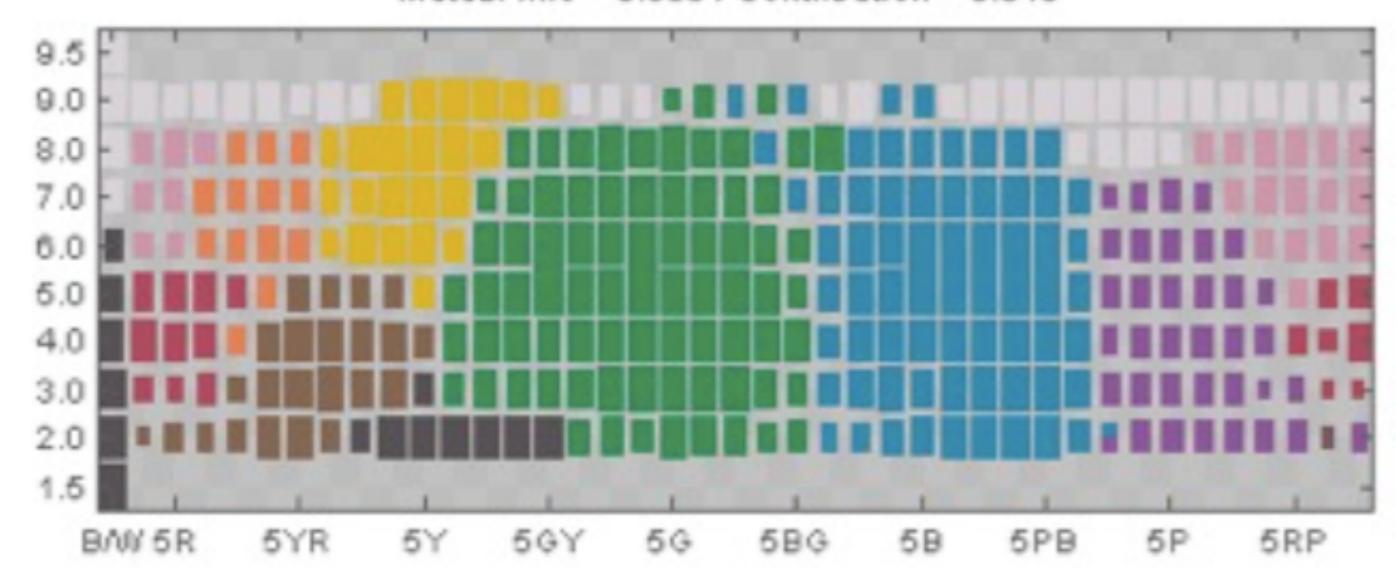
Language #98 (Tlapaneco)
Mutual info = 0.942 / Contribution = 0.524

Language #19 (Camsa)
Mutual info = 0.939 / Contribution = 0.487

Language #24 (Chavacano)
Mutual info = 0.939 / Contribution = 0.513
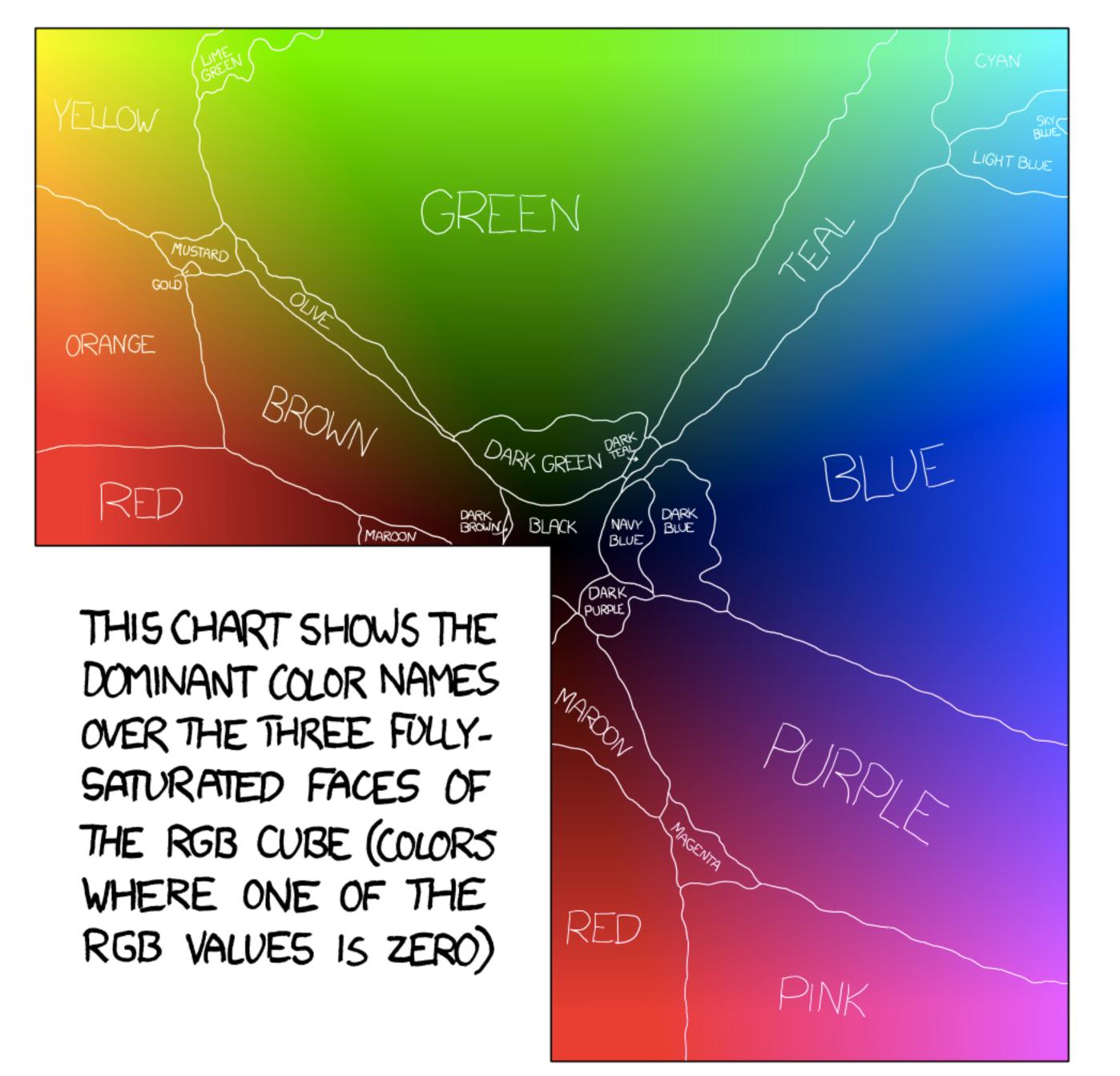
Slightly less scientific…

Color names if you're a girl...

Color names if you're a guy...

Girl name	Color	Guy name
Maraschino		Red
Cayenne		
Maroon		Purple
Plum		
Eggplant		
Grape		
Orchid		
Lavender		
Carnation		Pink
Strawberry		
Bubblegum		
Magenta		
Salmon		
Tangerine		Orange
Cantaloupe		
Banana		Yellow
Lemon		
Honeydew		Green
Lime		
Spring		
Clover		
Fern		
Moss		
Flora		
Sea Foam		
Spindrift		Blue
Teal		
Sky		
Turquoise		

Doghouse Diaries
"We take no as an answer."

THIS CHART SHOWS THE DOMINANT COLOR NAMES OVER THE THREE FULLY-SATURATED FACES OF THE RGB CUBE (COLORS WHERE ONE OF THE RGB VALUES IS ZERO)

Color
Spaces

Tension

Tension

*good for
machines*

Tension

*good for
machines*

*good for
people*

rgb

Red

Green
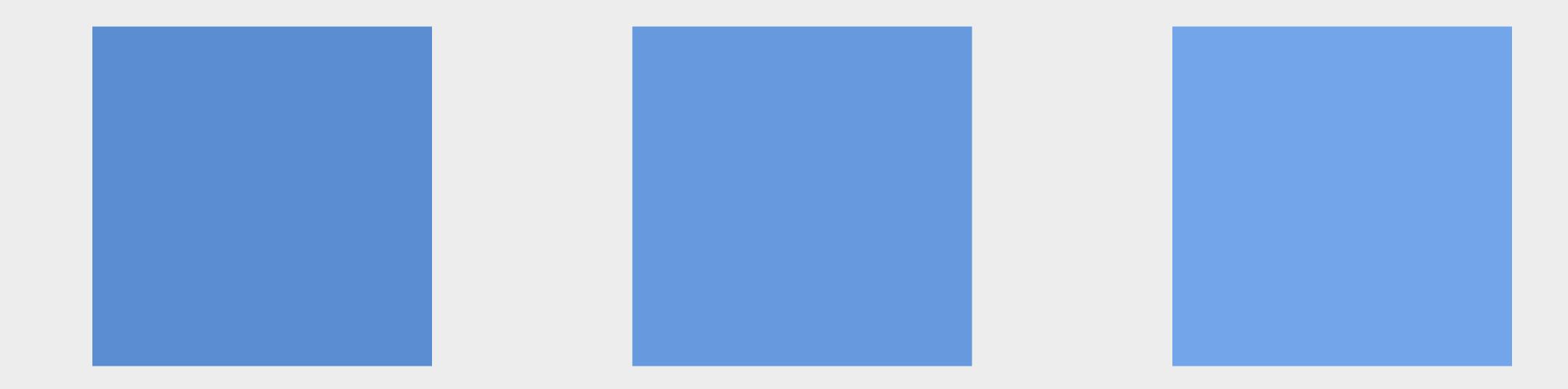
Blue

Rob Simmon, Subtleties of Color

rgb

rgb

-5%

+5%

good for machines

good for people

rgb
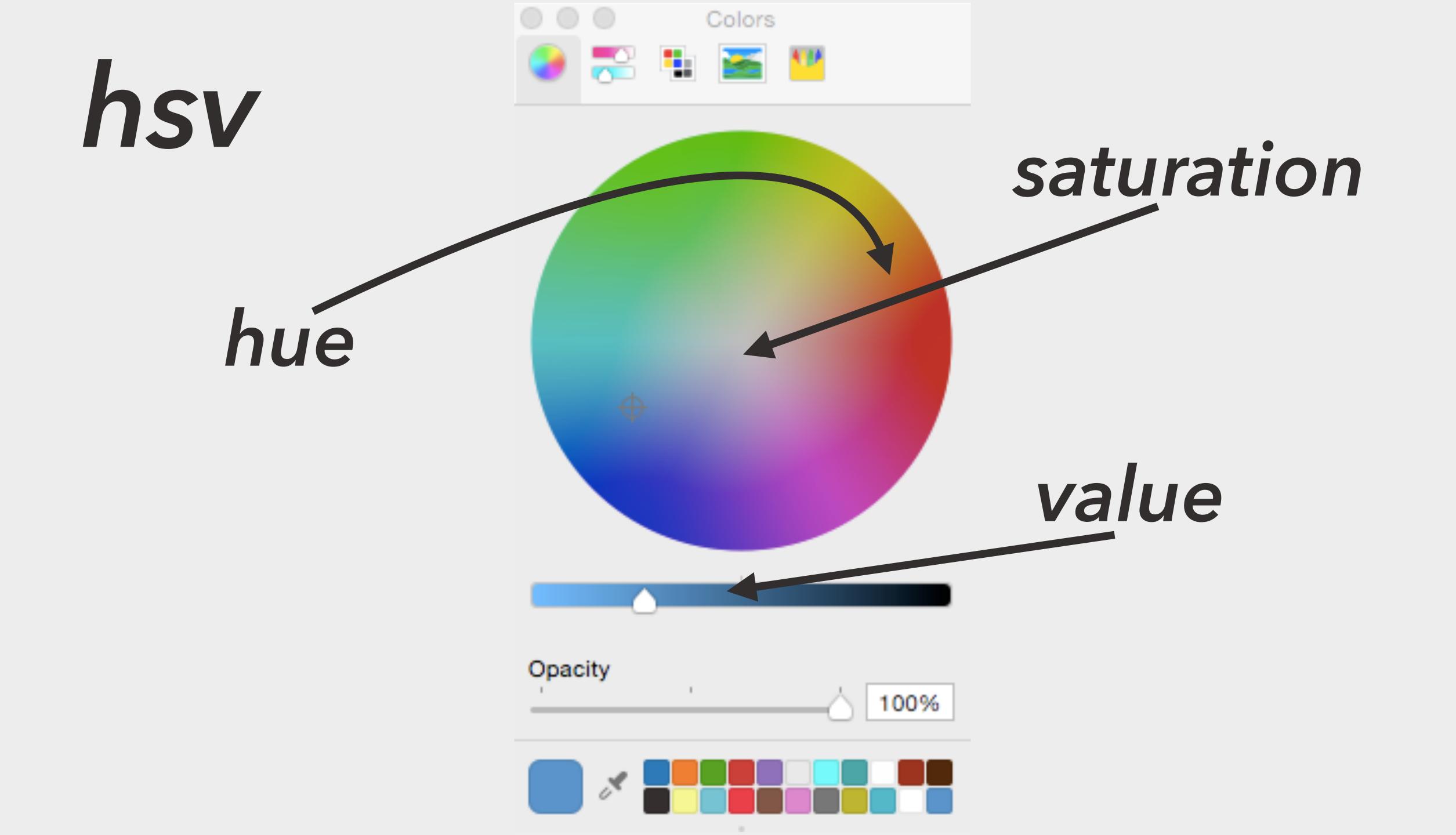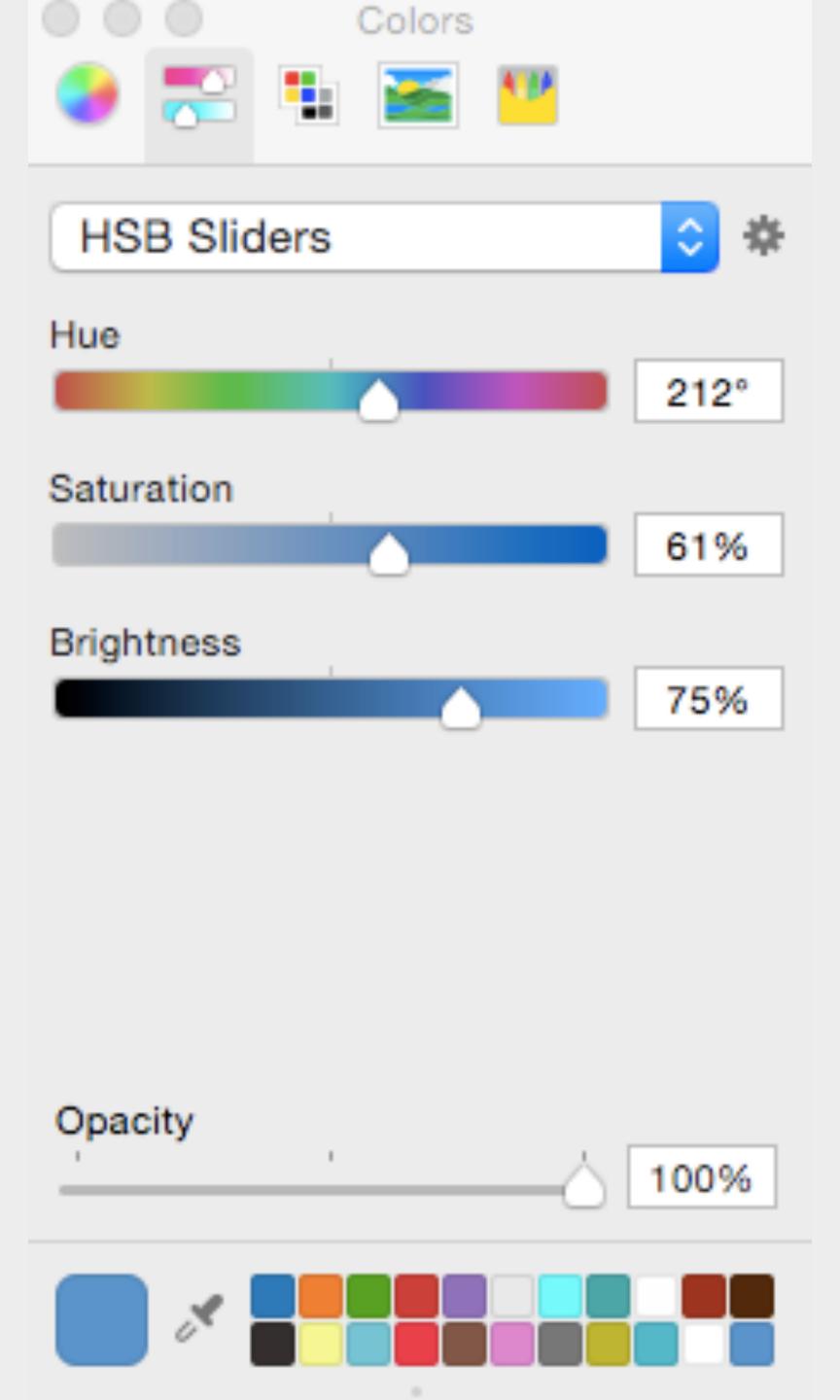
hsv

Lightness

Hue

Saturation (Chroma)
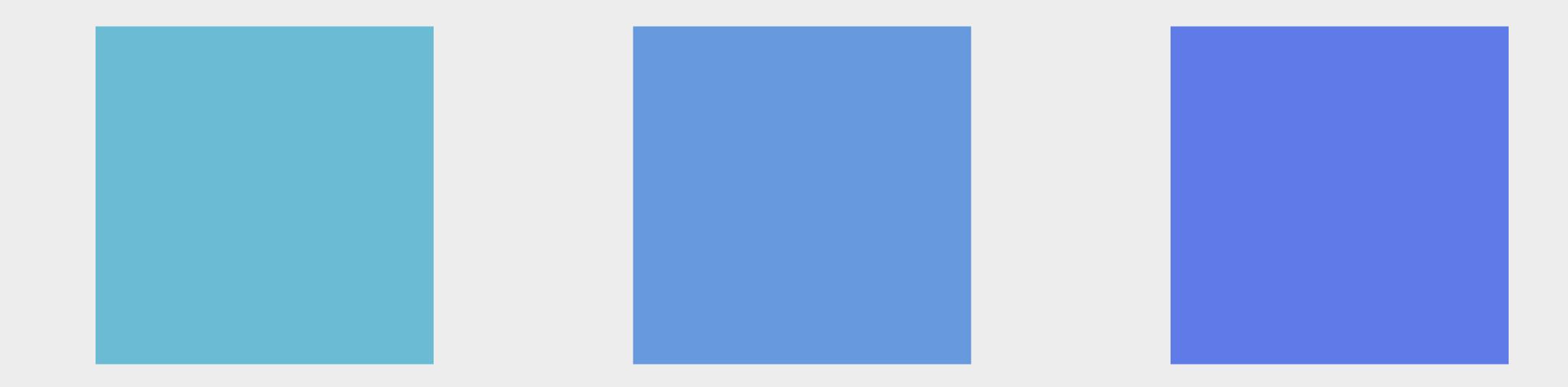
Rob Simmon, Subtleties of Color

hsv

hsv

hsv

-5%

+5%

good for machines

good for people
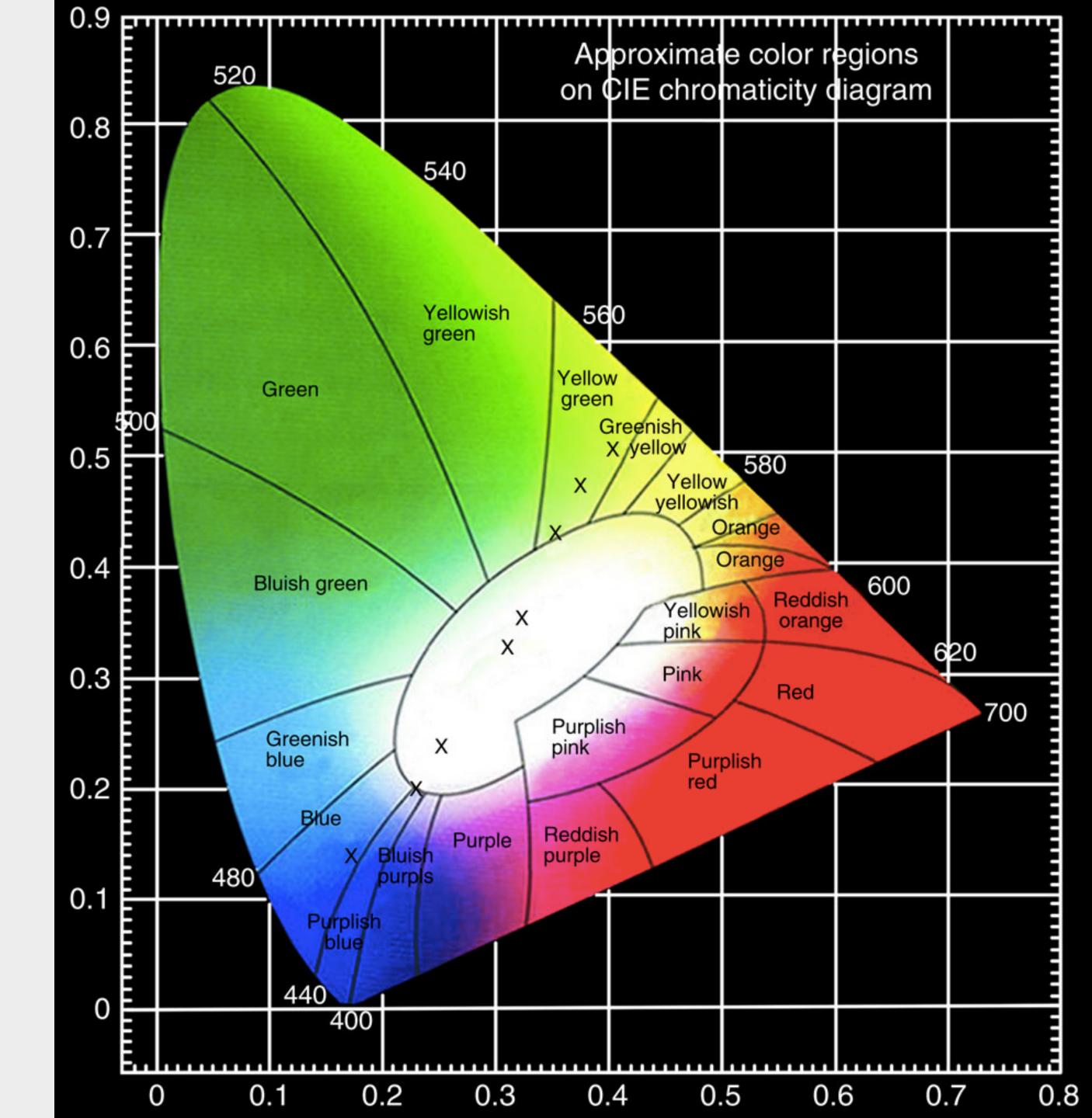
rgb   hsv

Remember?

Long
Middle
Short

CIE XYZ

Approximate color regions on CIE chromaticity diagram
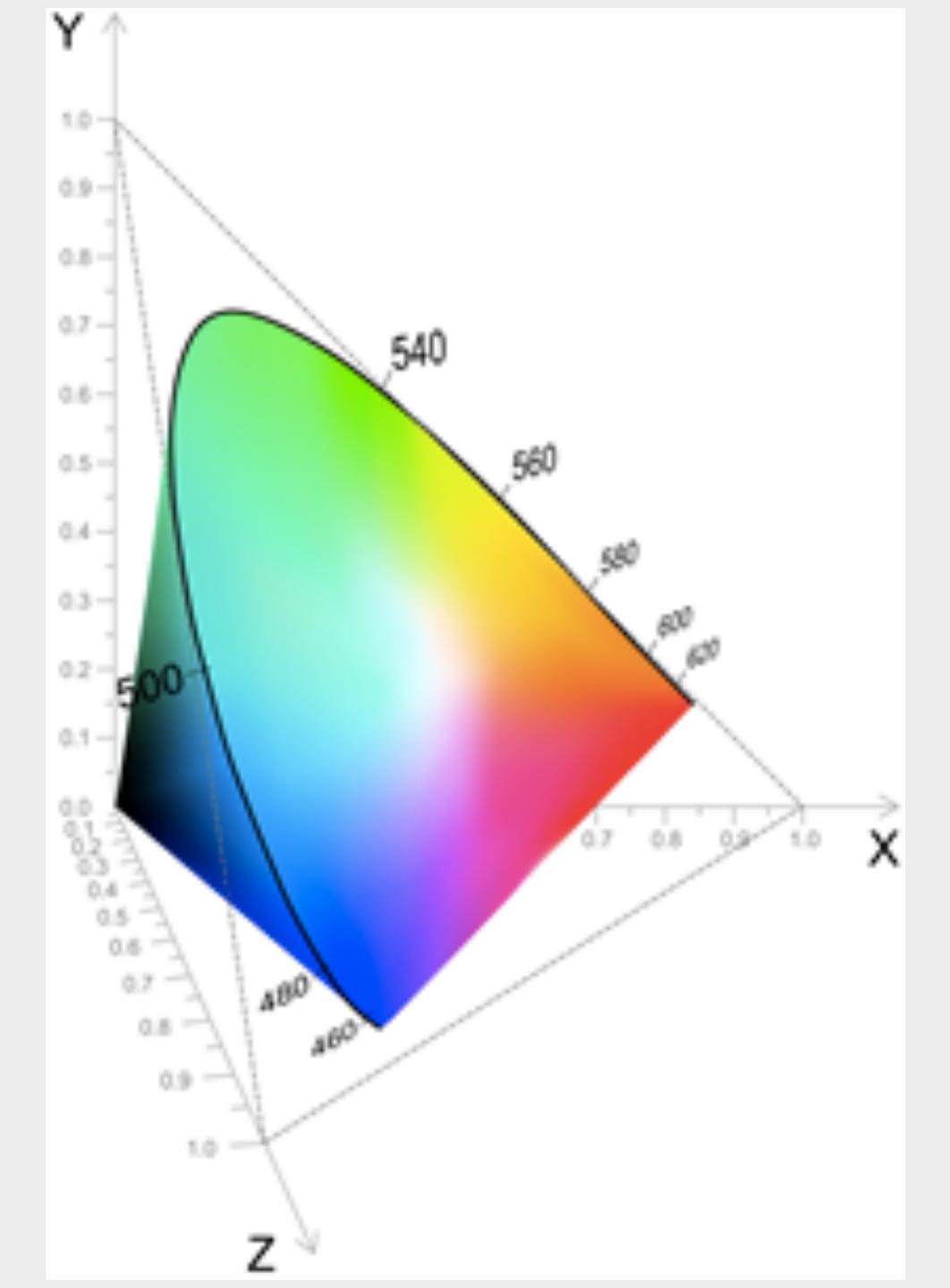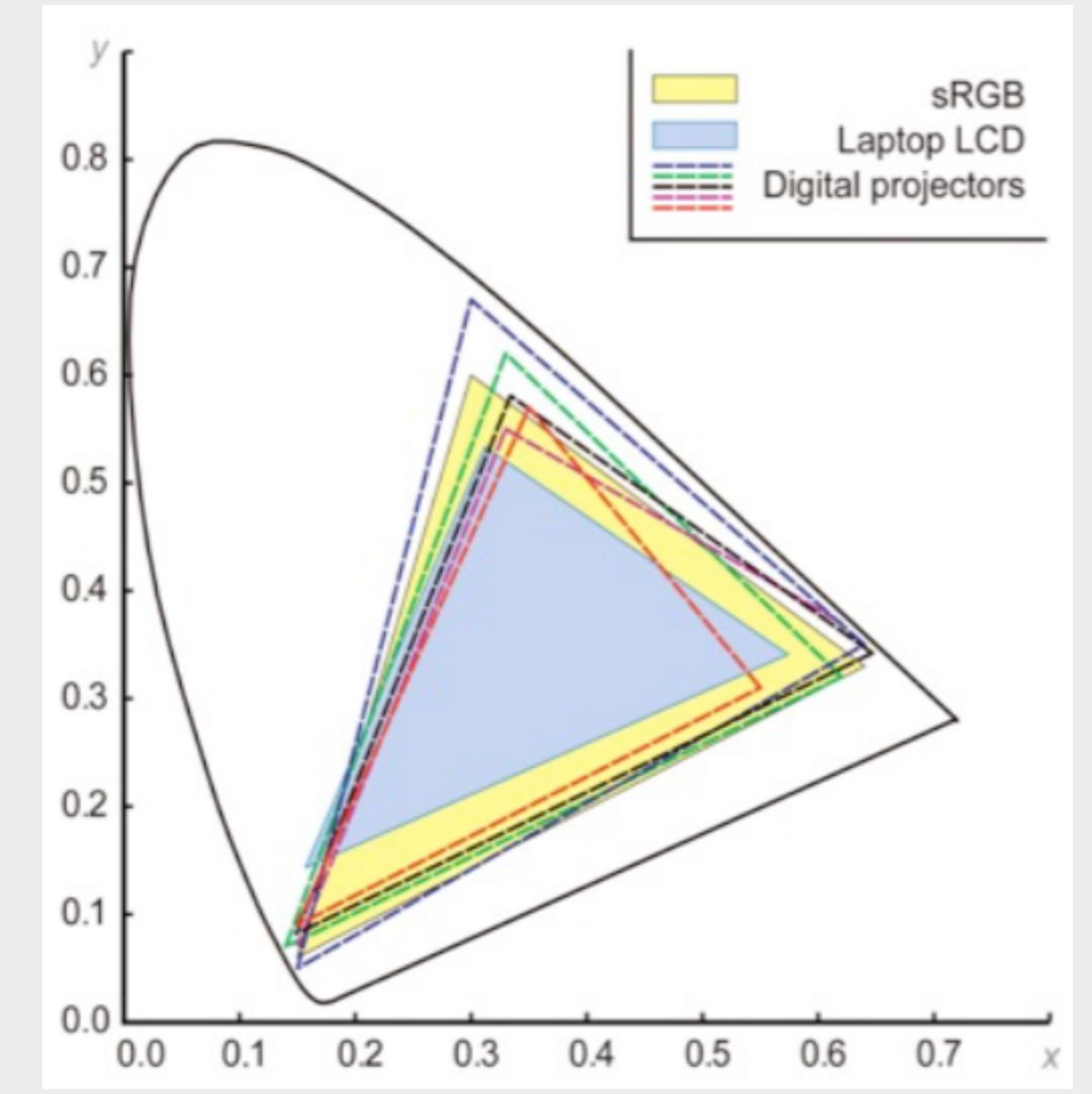
CIE XYZ
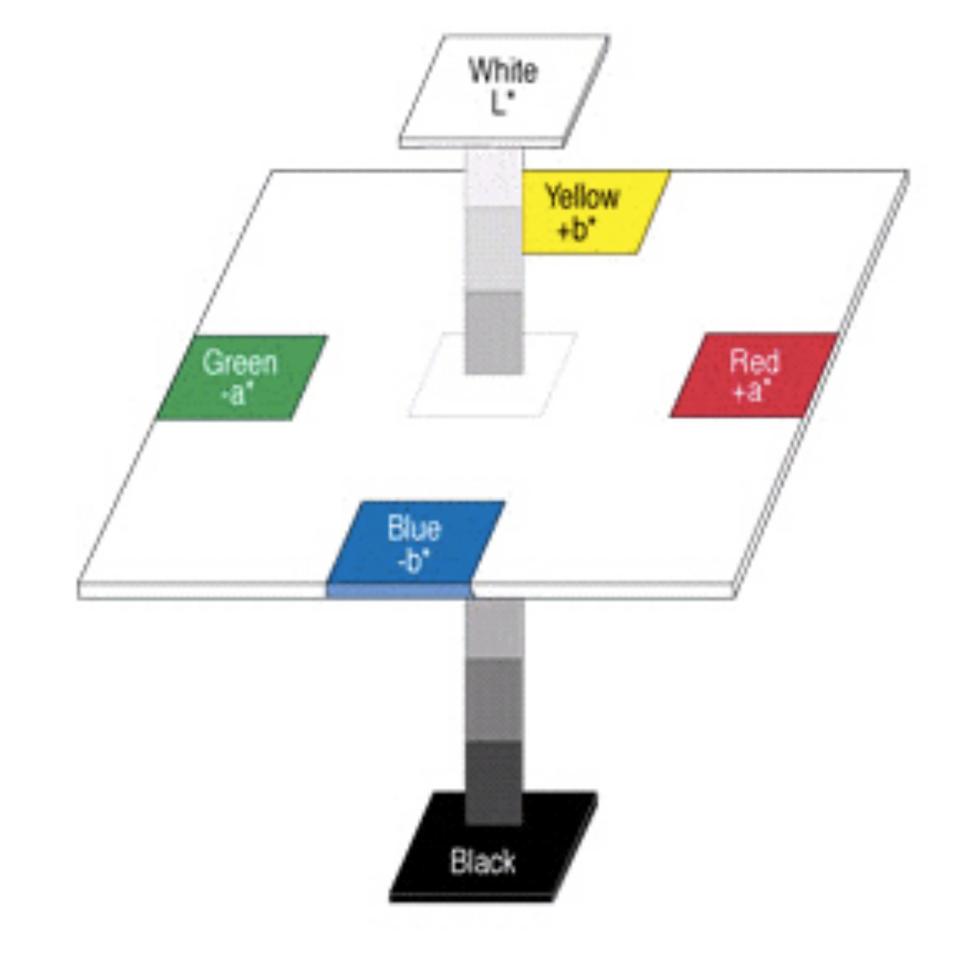
CIE XYZ

displays are an embedding
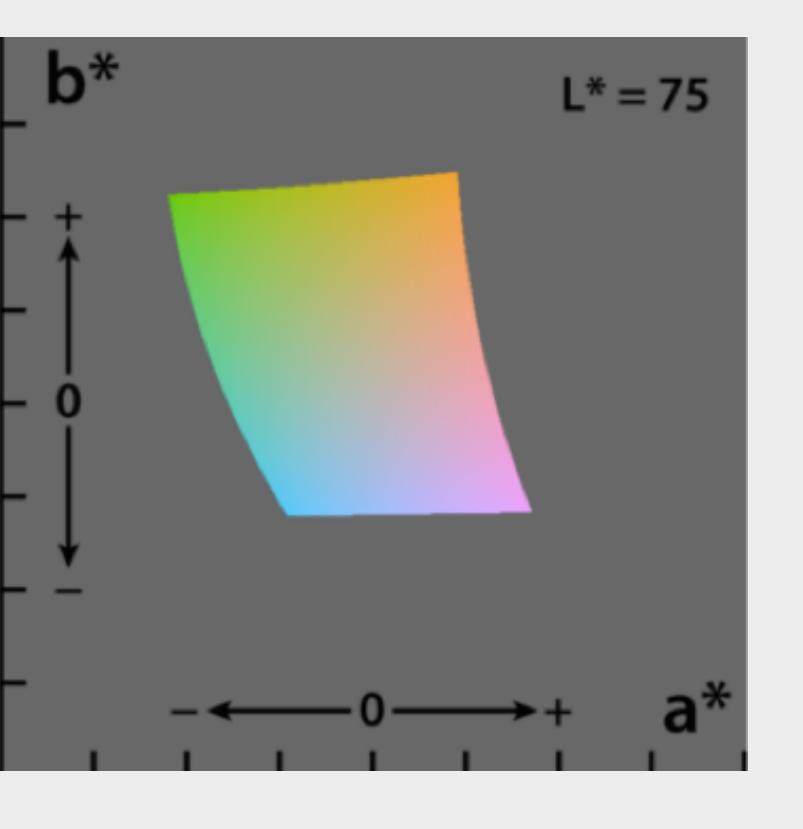
CIE Lab
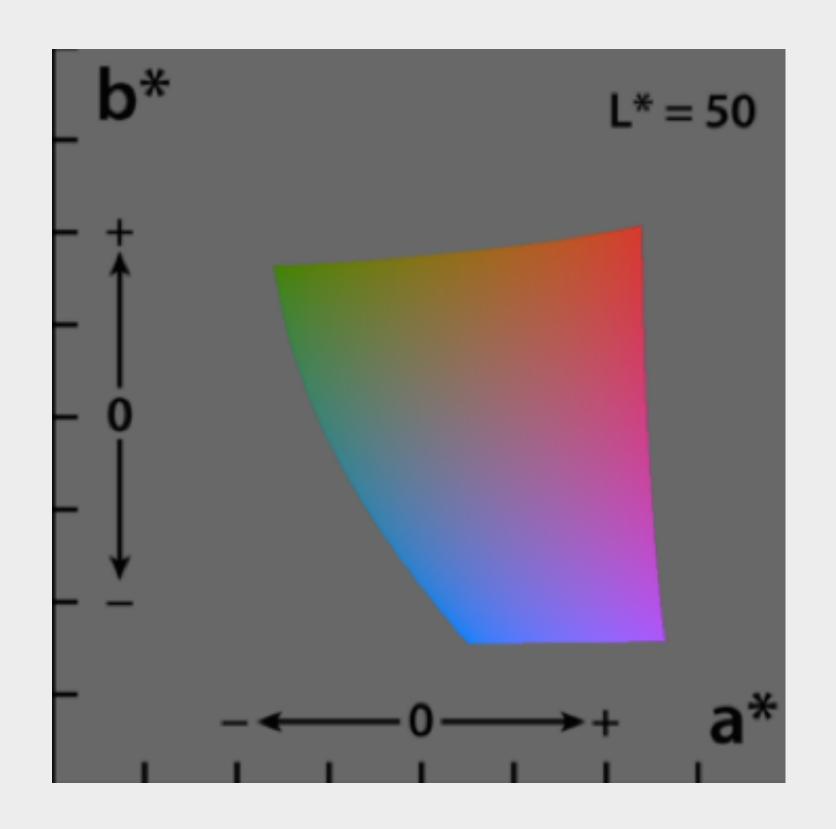
Luminance

a (red green)

b (blue yellow)
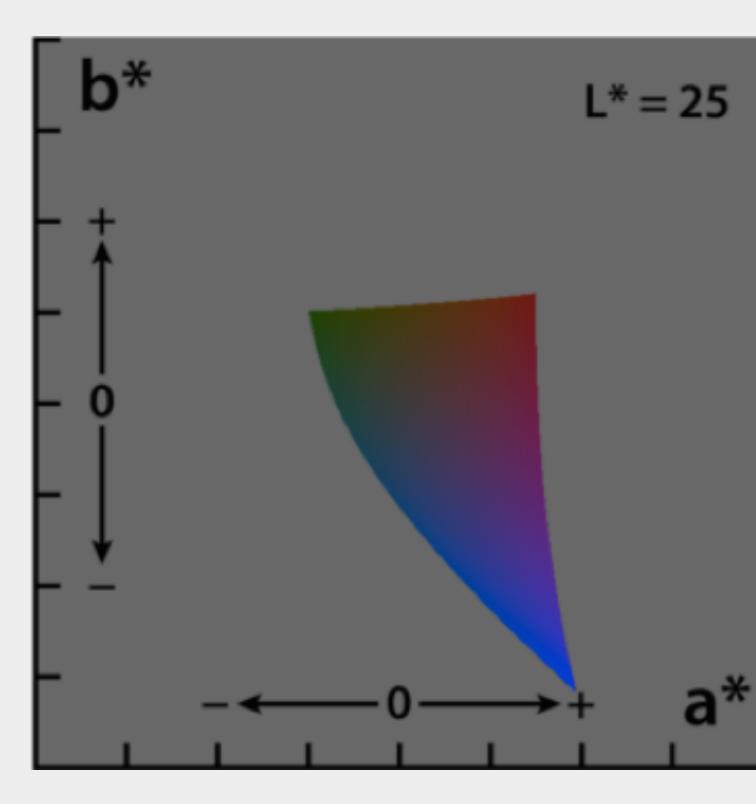
Example	L*	a*	b*
Pale Gray (nearly white)	83.70	-0.50	0.05
Medium Gray	59.60	0.00	0.50
Brilliant Red	43.70	37.10	18.70
Brilliant Yellow	83.30	1.90	77.00
Green	56.80	-30.00	15.40
Deep Blue	29.30	8.0	-17.90

CIE Lab

Lab

-5%

+5%

good for machines

good for people

rgb   hsv   Lab

Color
Usage

Map Data
To Color
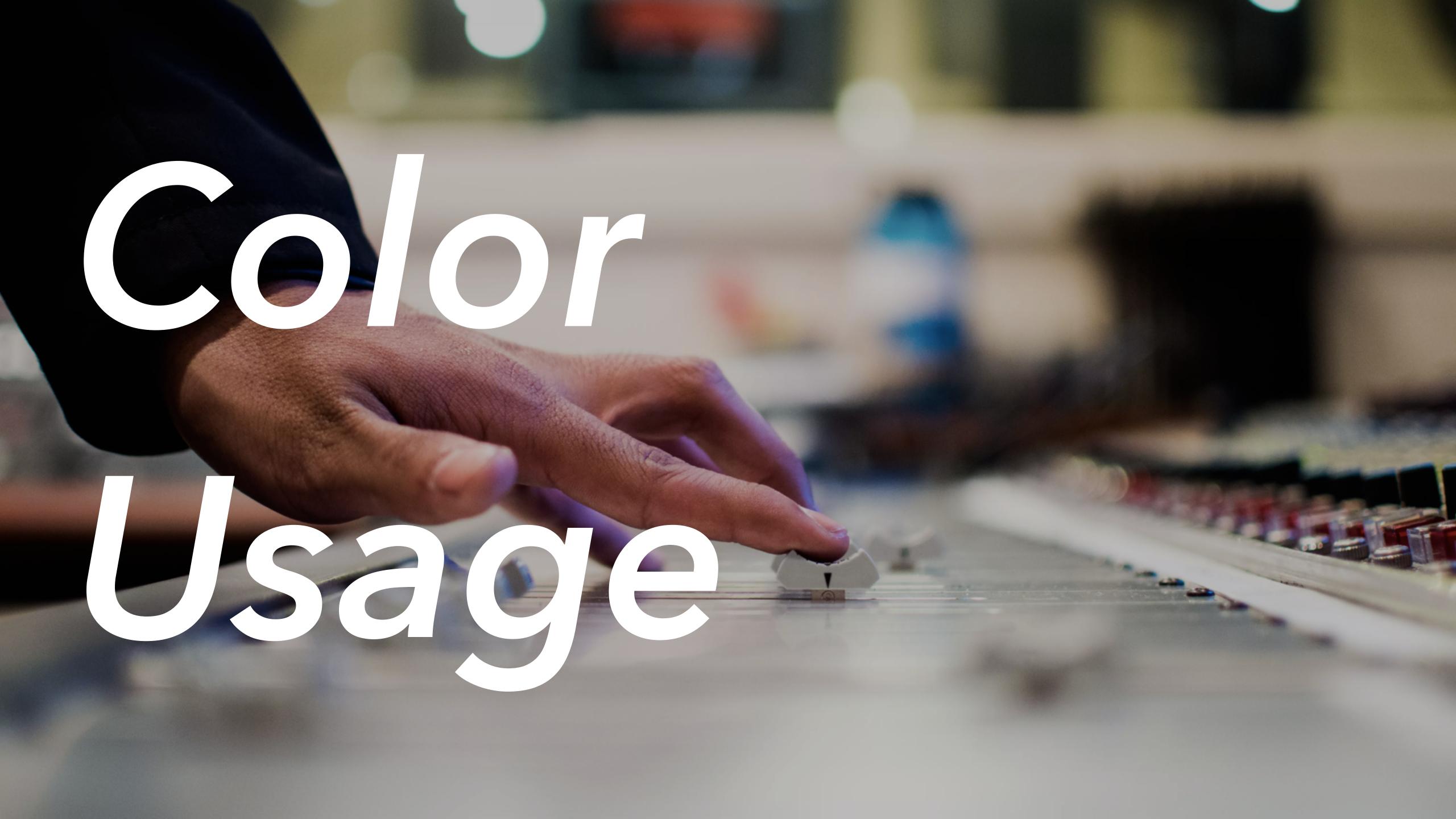
Nominal

UNITED STATES FREQUENCY ALLOCATIONS
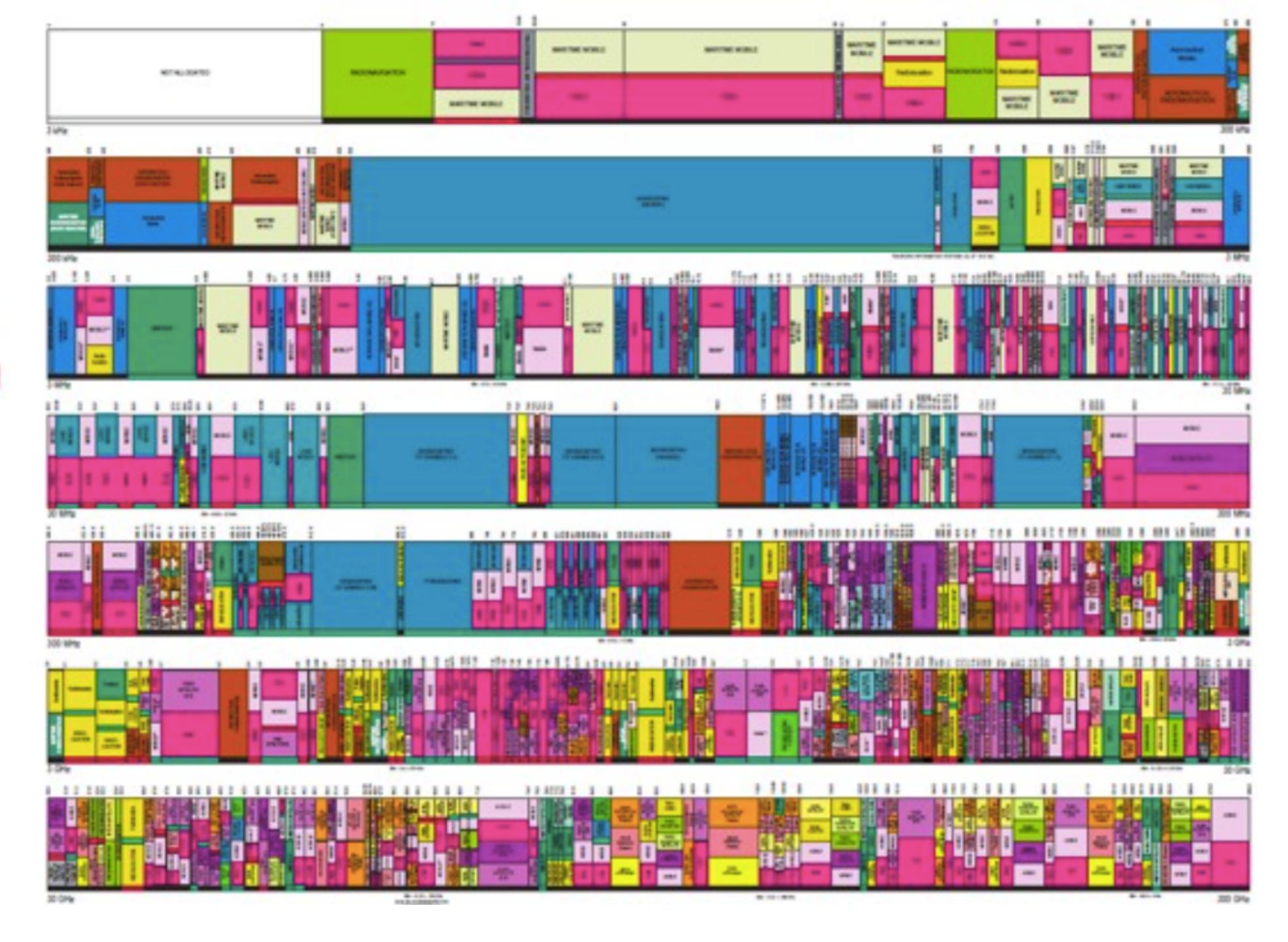
THE RADIO SPECTRUM

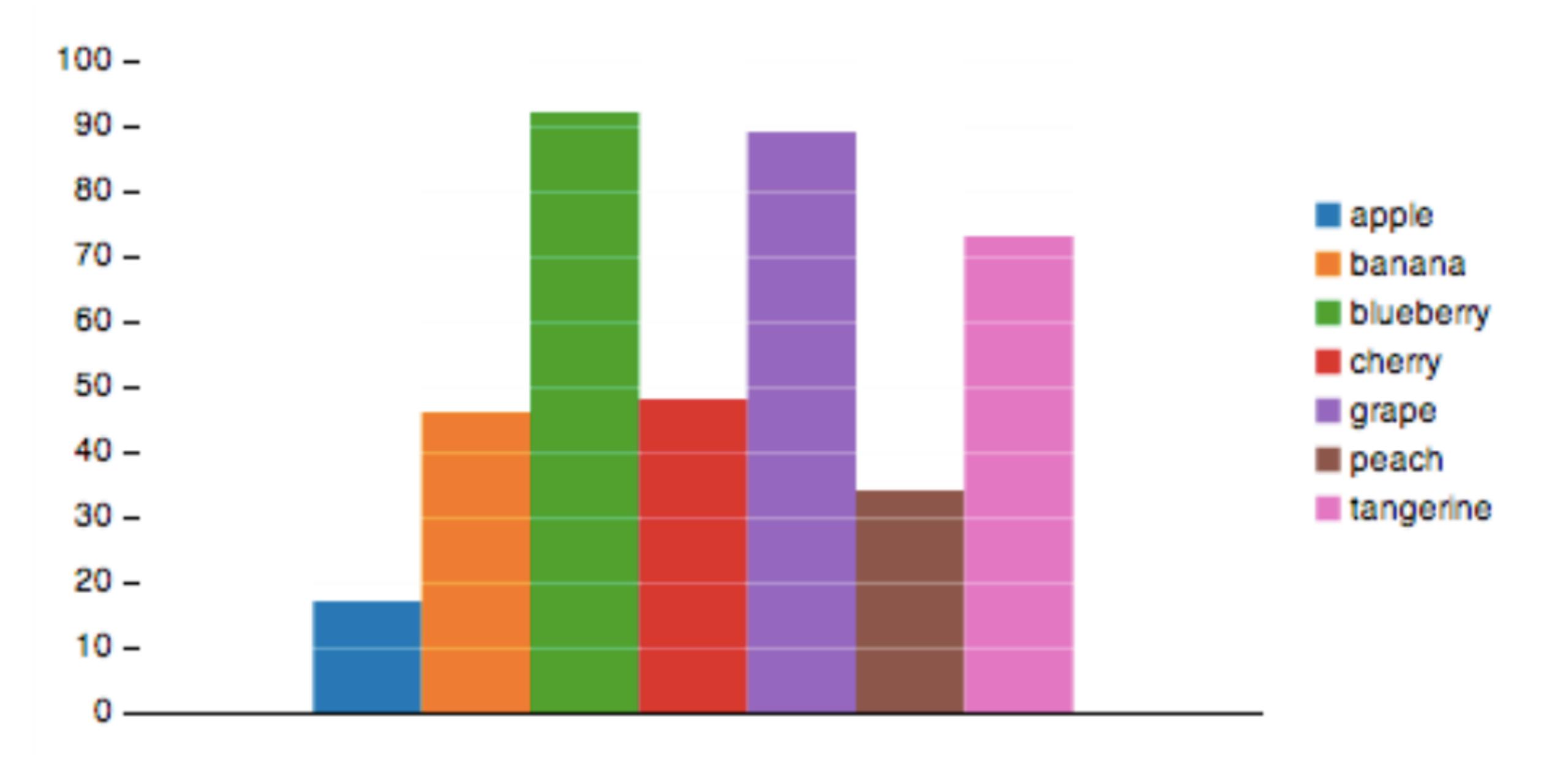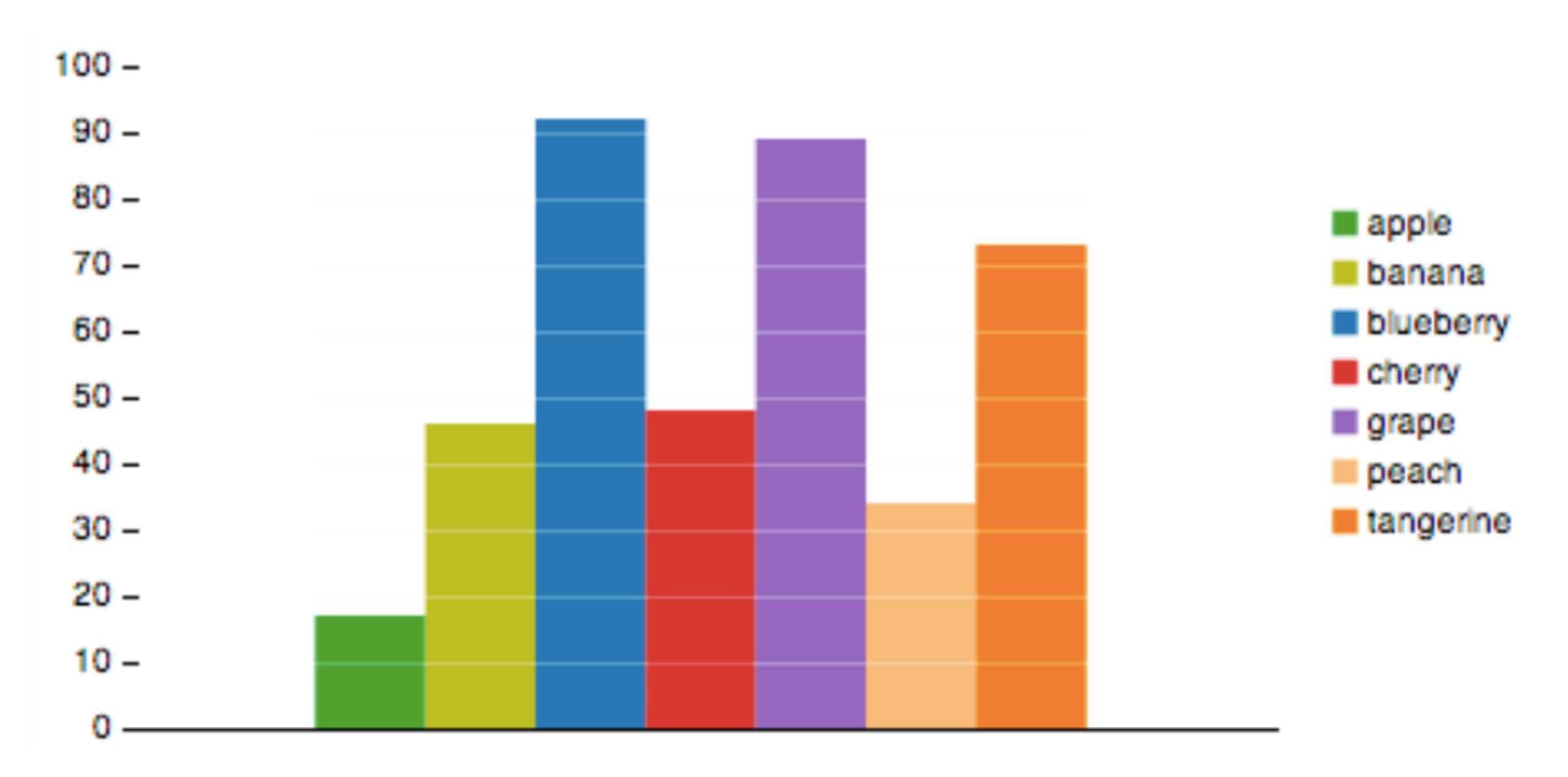# UNITED STATES FREQUENCY ALLOCATIONS

THE RADIO SPECTRUM

RADIO SERVICES-COLOR LEGEND

ACTIVITY CODE

ALLOCATION USAGE DESIGNATION

RADIO SERVICES COLOR LEGEND

AERONAUTICAL MOBILE	INTER-SATELLITE	RADIO ASTRONOMY
AERONAUTICAL MOBILE SATELLITE	LAND MOBILE	RADIODETERMINATION SATELLITE
AERONAUTICAL RADIONAVIGATION	LAND MOBILE SATELLITE	RADIOLOCATION
AMATEUR	MARITIME MOBILE	RADIOLOCATION SATELLITE
AMATEUR SATELLITE	MARITIME MOBILE SATELLITE	RADIONAVIGATION
BROADCASTING	MARITIME RADIONAVIGATION	RADIONAVIGATION SATELLITE
BROADCASTING SATELLITE	METEOROLOGICAL AIDS	SPACE OPERATION
EARTH EXPLORATION SATELLITE	METEOROLOGICAL SATELLITE	SPACE RESEARCH
FIXED	MOBILE	STANDARD FREQUENCY AND TIME SIGNAL
FIXED SATELLITE	MOBILE SATELLITE	STANDARD FREQUENCY AND TIME SIGNAL SATELLITE

ACTIVITY CODE

Use few Categories

UNITED STATES FREQUENCY ALLOCATIONS

THE RADIO SPECTRUM

Use distinct Colors

UNITED
STATES
FREQUENCY
ALLOCATIONS

THE RADIO SPECTRUM

RADIO SERVICES COLOR LEGEND

AERONAUTICAL MOBILE	INTER-SATELLITE	RADIO ASTRONOMY
AERONAUTICAL MOBILE SATELLITE	LAND MOBILE	RADIODETERMINATION SATELLITE
AERONAUTICAL RADIONAVIGATION	LAND MOBILE SATELLITE	RADIOLOCATION
AMATEUR	MARITIME MOBILE	RADIOLOCATION SATELLITE
AMATEUR SATELLITE	MARITIME MOBILE SATELLITE	RADIONAVIGATION
BROADCASTING	MARITIME RADIONAVIGATION	RADIONAVIGATION SATELLITE
BROADCASTING SATELLITE	METEOROLOGICAL AIDS	SPACE OPERATION
EARTH EXPLORATION SATELLITE	METEOROLOGICAL SATELLITE	SPACE RESEARCH
FIXED	MOBILE	STANDARD FREQUENCY AND TIME SIGNAL
FIXED SATELLITE	MOBILE SATELLITE	STANDARD FREQUENCY AND TIME SIGNAL SATELLITE

RADIO SERVICES COLOR LEGEND

ACTIVITY CODE

ALLOCATION USAGE DESIGNATION
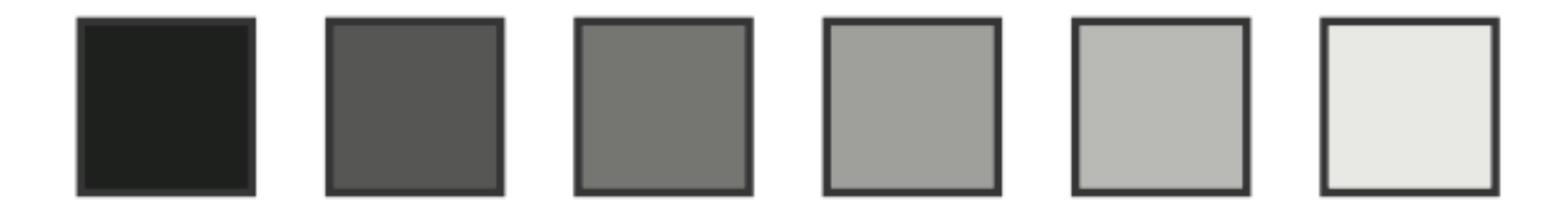
Fruits	A	E		**Vegetables**	A	E
Apple				Carrot		
Banana				Celery		
Blueberry				Corn		
Cherry				Eggplant		
Grape				Mushroom		
Peach				Olive		
Tangerine				Tomato		

Drinks	A	E		**Brands**	A	E
A&W Root Beer				Apple		
Coca-Cola				AT&T		
Dr. Pepper				Home Depot		
Pepsi				Kodak		
Sprite				Starbucks		
Sunkist				Target		
Welch's Grape				Yahoo!		
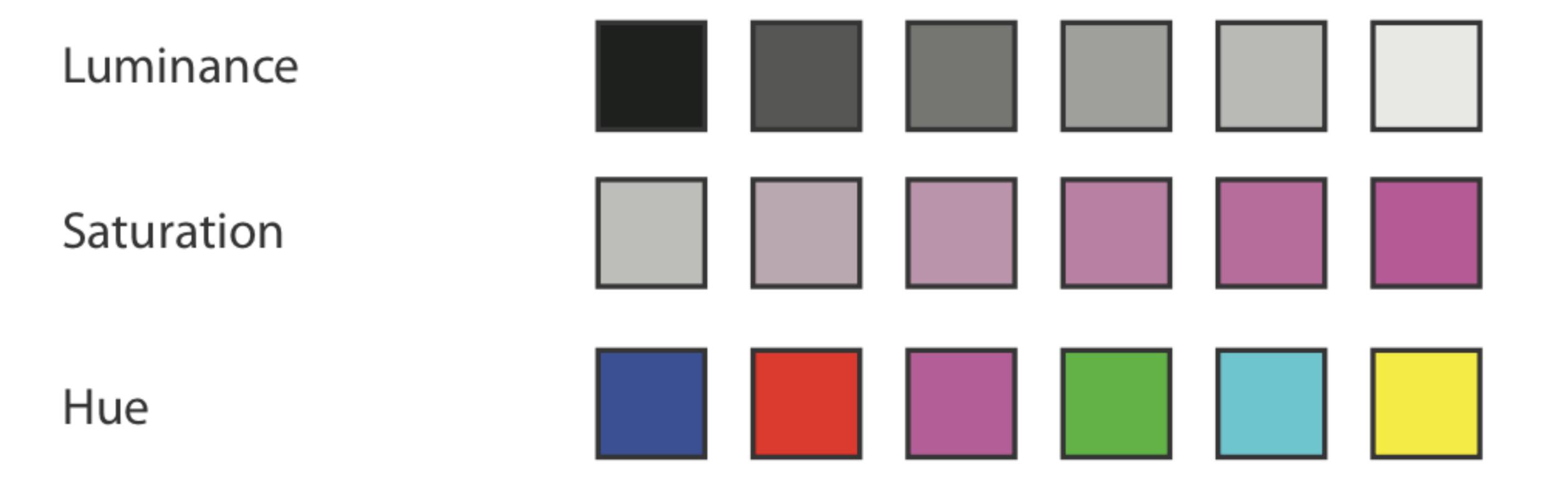
Ordinal

Luminance

Luminance

Saturation
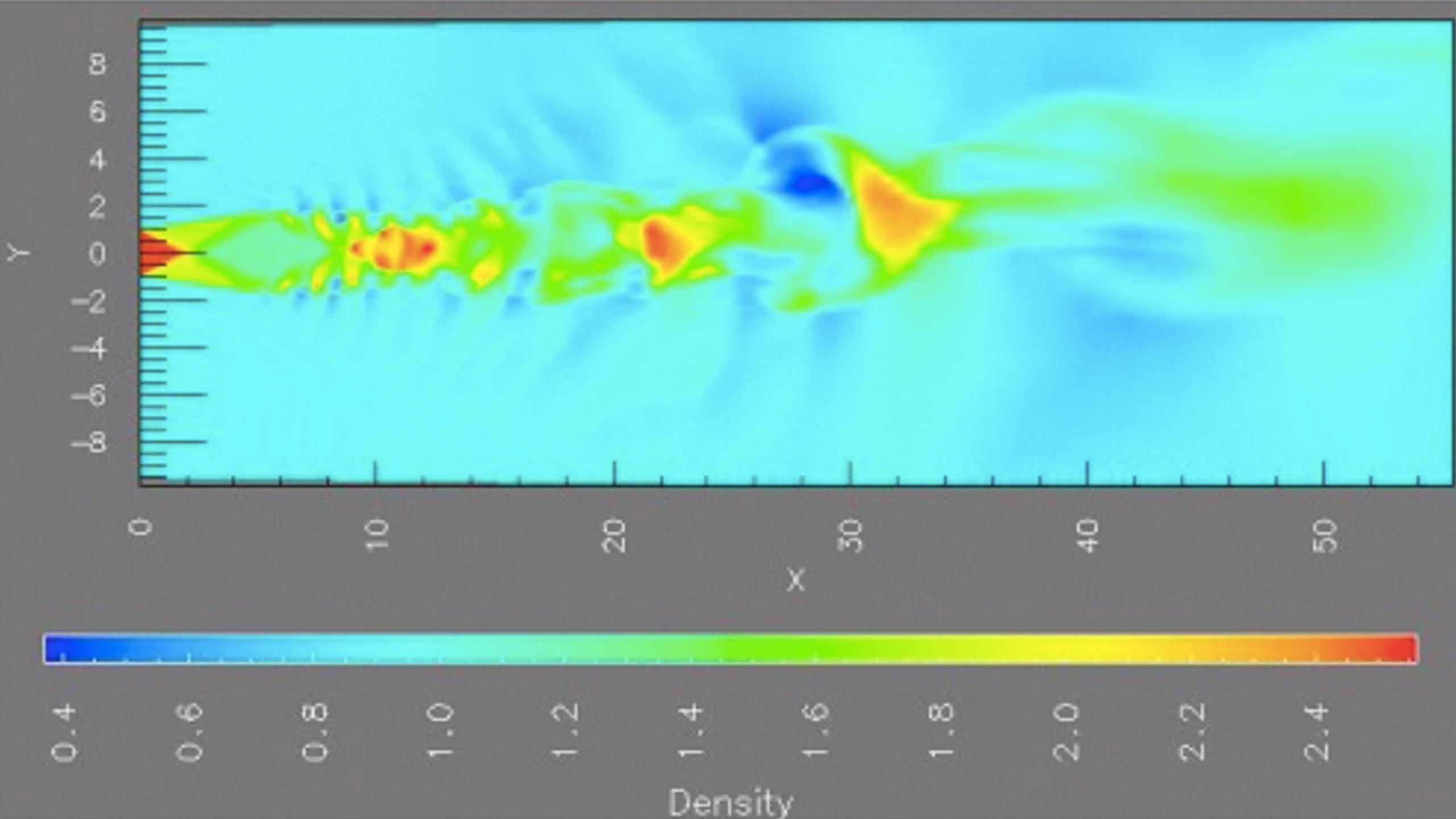
Luminance

Saturation

Hue
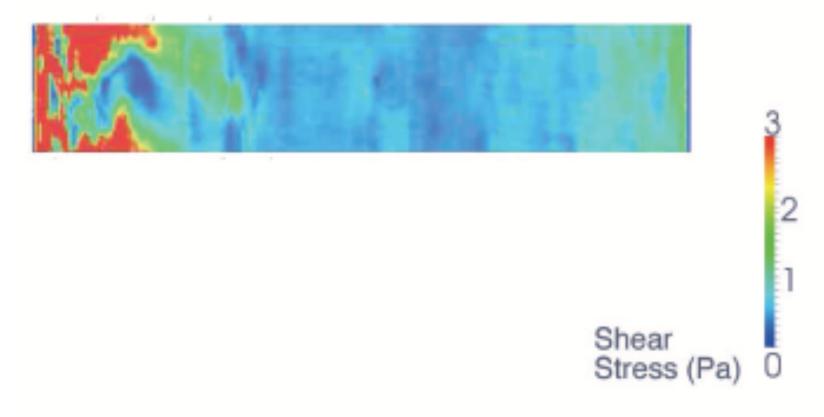
hue is not naturally ordered
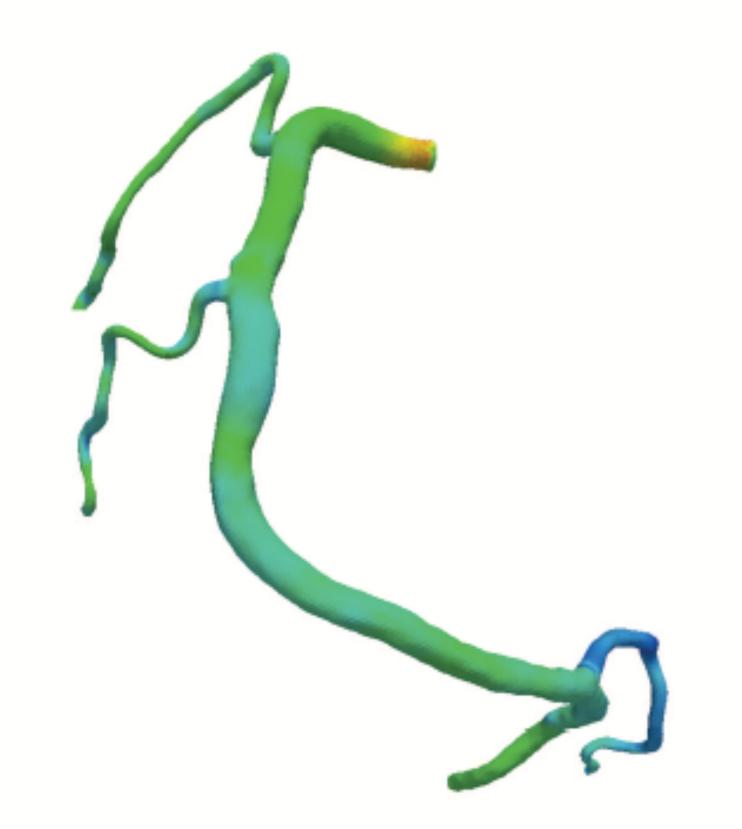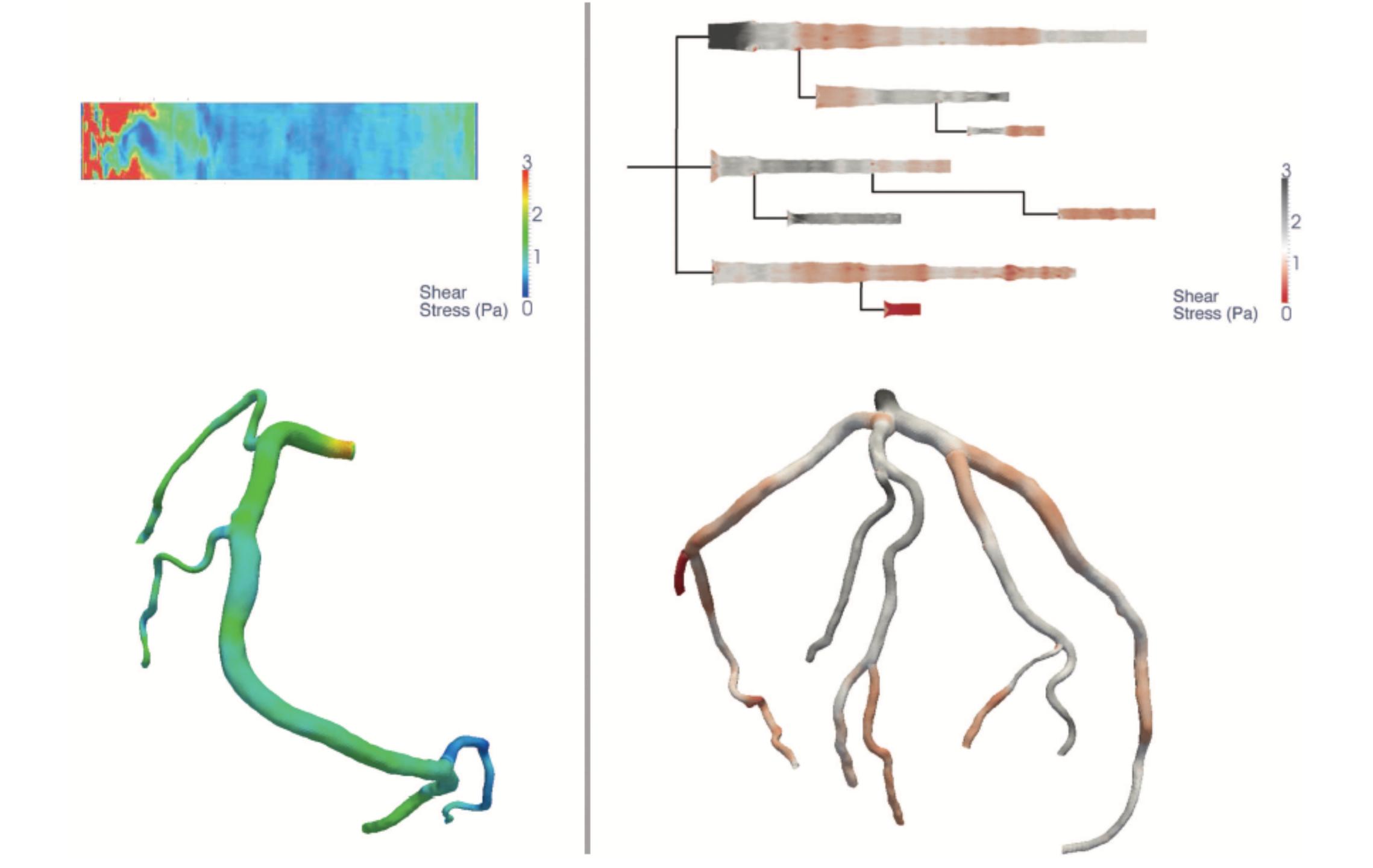
Continuous

Shear Stress (Pa)

AGE-ADJUSTED DEATH RATES BY HSA, 1988-92

HEART DISEASE
WHITE MALE

ICD-9 Categories 390–398,
402, 404–429

Age-adjusted

(U.S. rate = 205.0)

Rate per 100,000 population	Comparative mortality ratio (HSA to U.S.)
253.8 – 328.6	1.24 – 1.60
236.8 – 253.7	1.16 – 1.24
215.2 – 236.7	1.05 – 1.16
199.9 – 215.1	0.98 – 1.05
179.5 – 199.8	0.88 – 0.98
166.7 – 179.4	0.81 – 0.88
112.4 – 166.6	0.55 – 0.81

Distribution of HSA rates
per 100,000 population

Age-adjusted

(U.S. rate = 205.0)
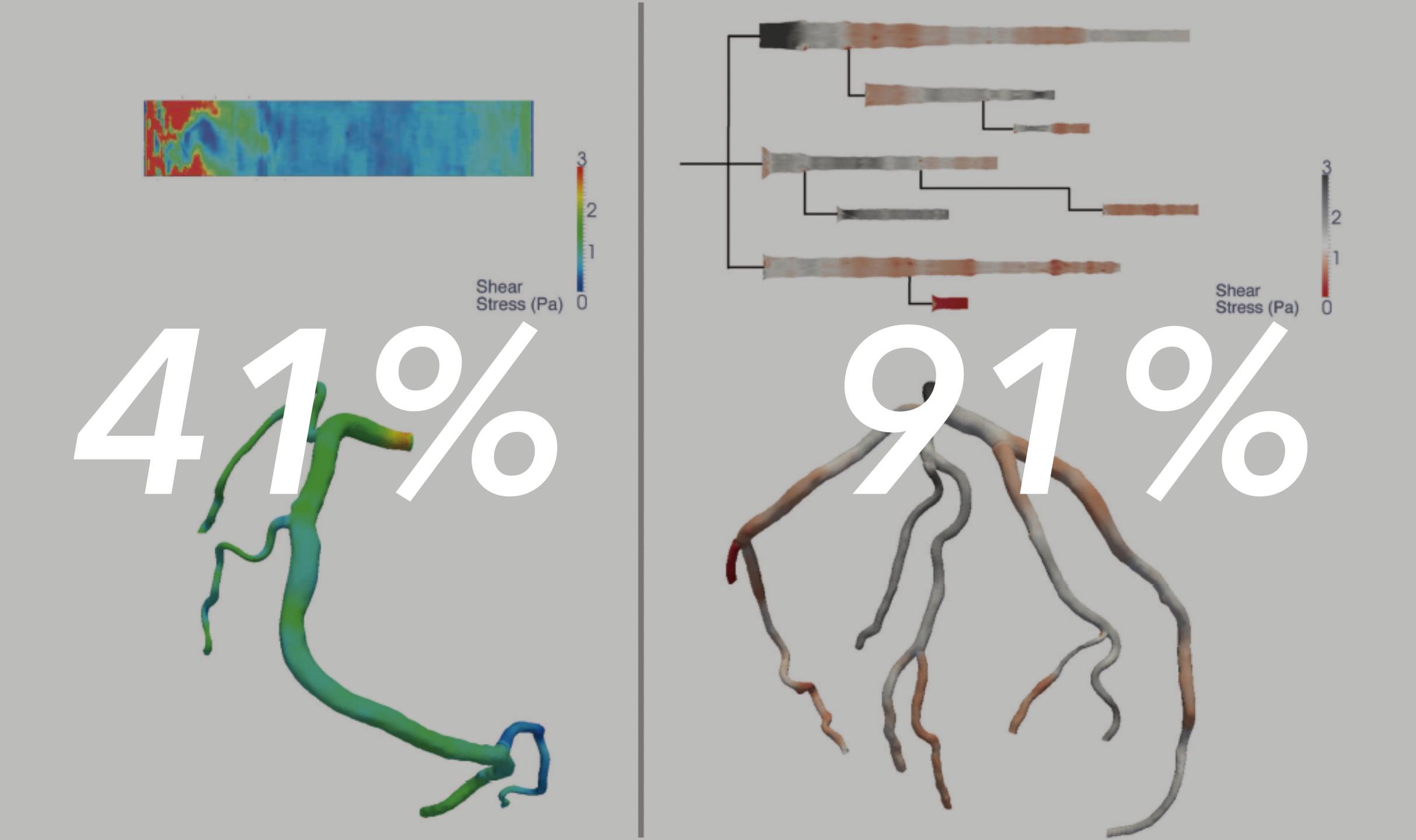
Rate per 100,000 population	Comparative mortality ratio (HSA to U.S.)
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112.4 – 166.6	0.55 – 0.81

Age-adjusted

(U.S. rate = 205.0)

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236.8 – 253.7		1.16 – 1.24
215.2 – 236.7		1.05 – 1.16
199.9 – 215.1		0.98 – 1.05
179.5 – 199.8		0.88 – 0.98
166.7 – 179.4		0.81 – 0.88
112.4 – 166.6		0.55 – 0.81

Distribution of HSA rates per 100,000 population

Age-adjusted	
(U.S. rate = 205.0)	
Rate per 100,000 population	Comparative mortality ratio (HSA to U.S.)
253.8 – 328.6	1.24 – 1.60
236.8 – 253.7	1.16 – 1.24
215.2 – 236.7	1.05 – 1.16
199.9 – 215.1	0.98 – 1.05
179.5 – 199.8	0.88 – 0.98
166.7 – 179.4	0.81 – 0.88
112.4 – 166.6	0.55 – 0.81

Distribution of HSA rates per 100,000 population

awesome ^

Color
Tools

http://colorbrewer2.org/

http://vrl.cs.brown.edu/color

Adobe Kuler

Create   Explore   My Themes

SIGN IN   Adobe

View

All Themes

Most Popular   Week Month All

Most Used

Random

QB Studio   550 413 0
Copy of CC02   273 242 0
Deep Under the ... 218 188 0

Modern Executive   343 188 0
Summer Beach   140 136 1
friends   146 130 0

Copy of A Creati... 197 128 0
Annie Colour Sc... 135 115 0
HAI IN THE SEA   158 105 1

Copy of Copy of ... 132 101 0
Warm   107 97 0
Man Pink   104 92 0
Copy of Close to ... 123 88 1

Pastel Range   85 83 0
MY GL   65 75 0
Copy of Capri   58 74 0
Efendi   90 70 0

kuler.adobe.com/explore/

Color
Caveats

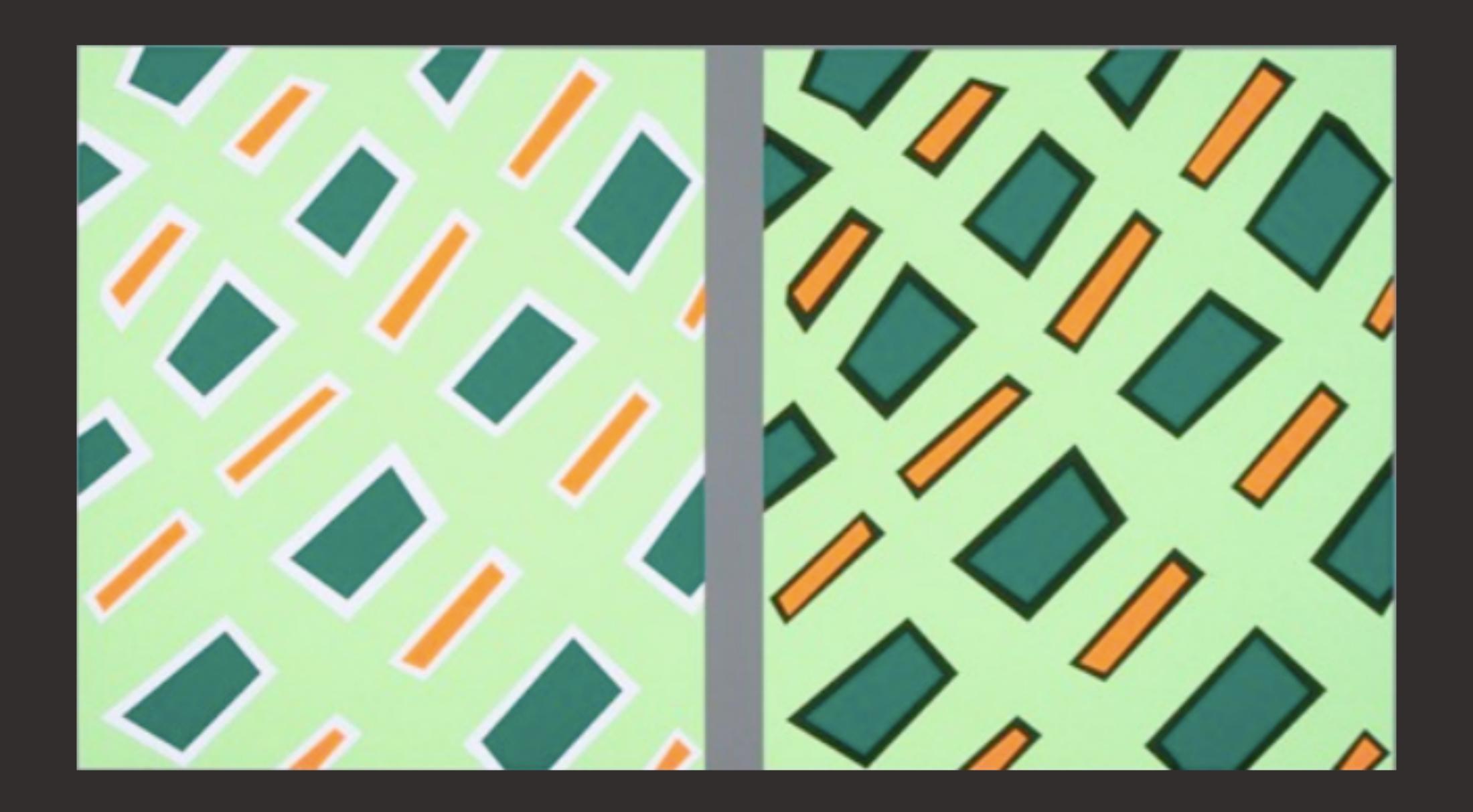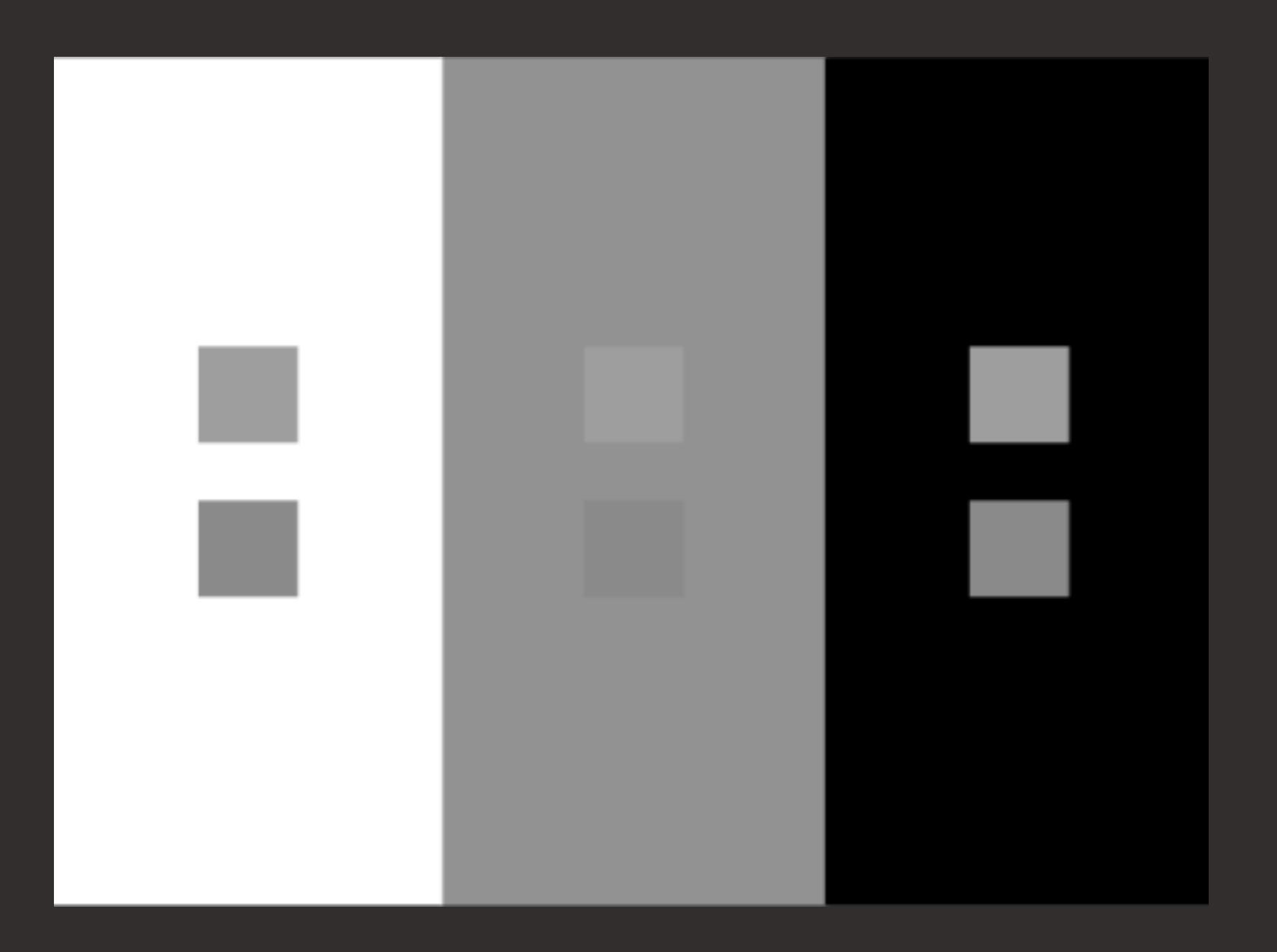# Contrast Effects

A field guide to Digital Color, Maureen Stone

Bezold Effect
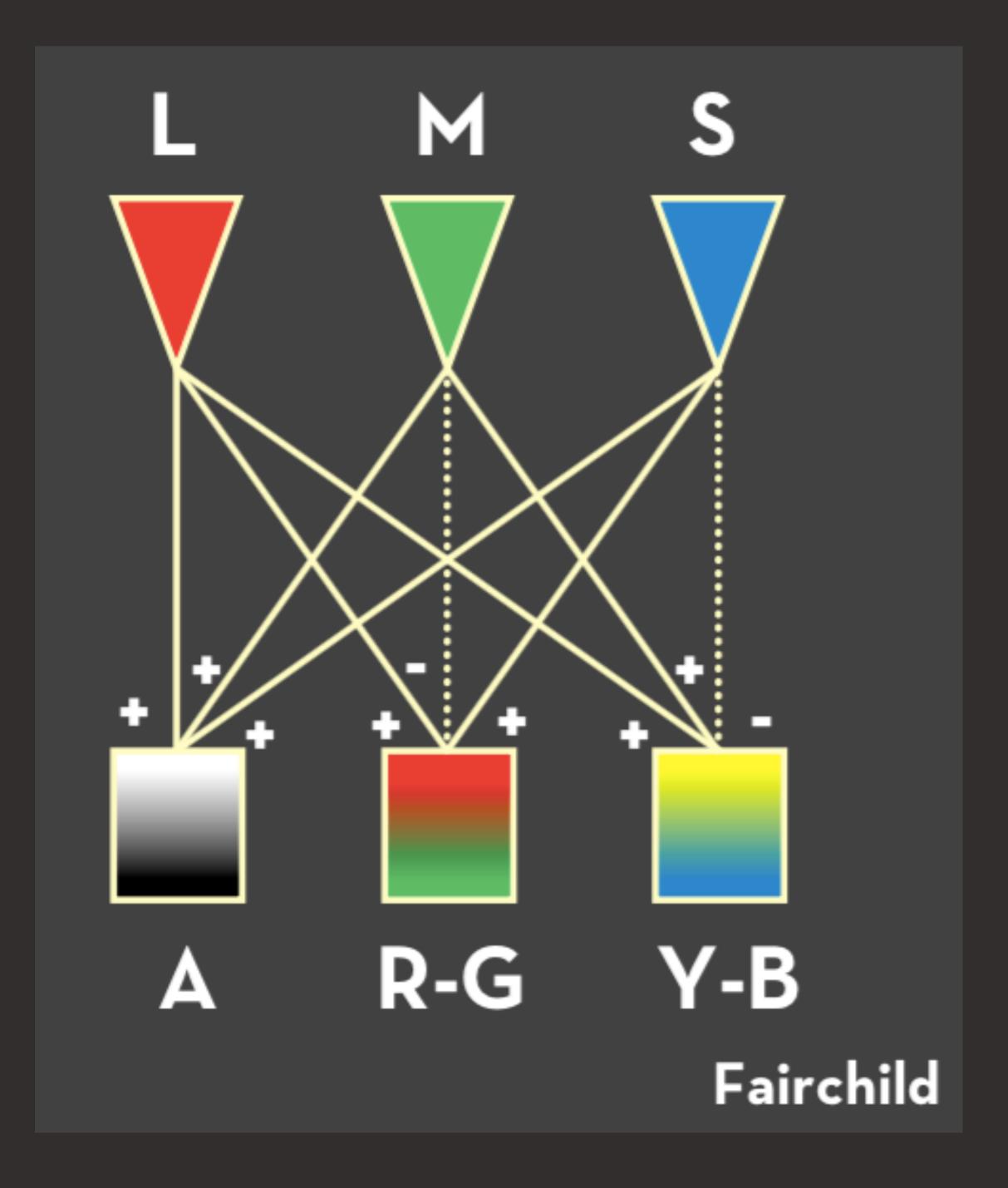
Color Appearance Models, Fairchild

"Crispening"

Legibility and readability are very important

Legibility and readability are very important

Legibility and readability are very important

Legibility and readability are very important
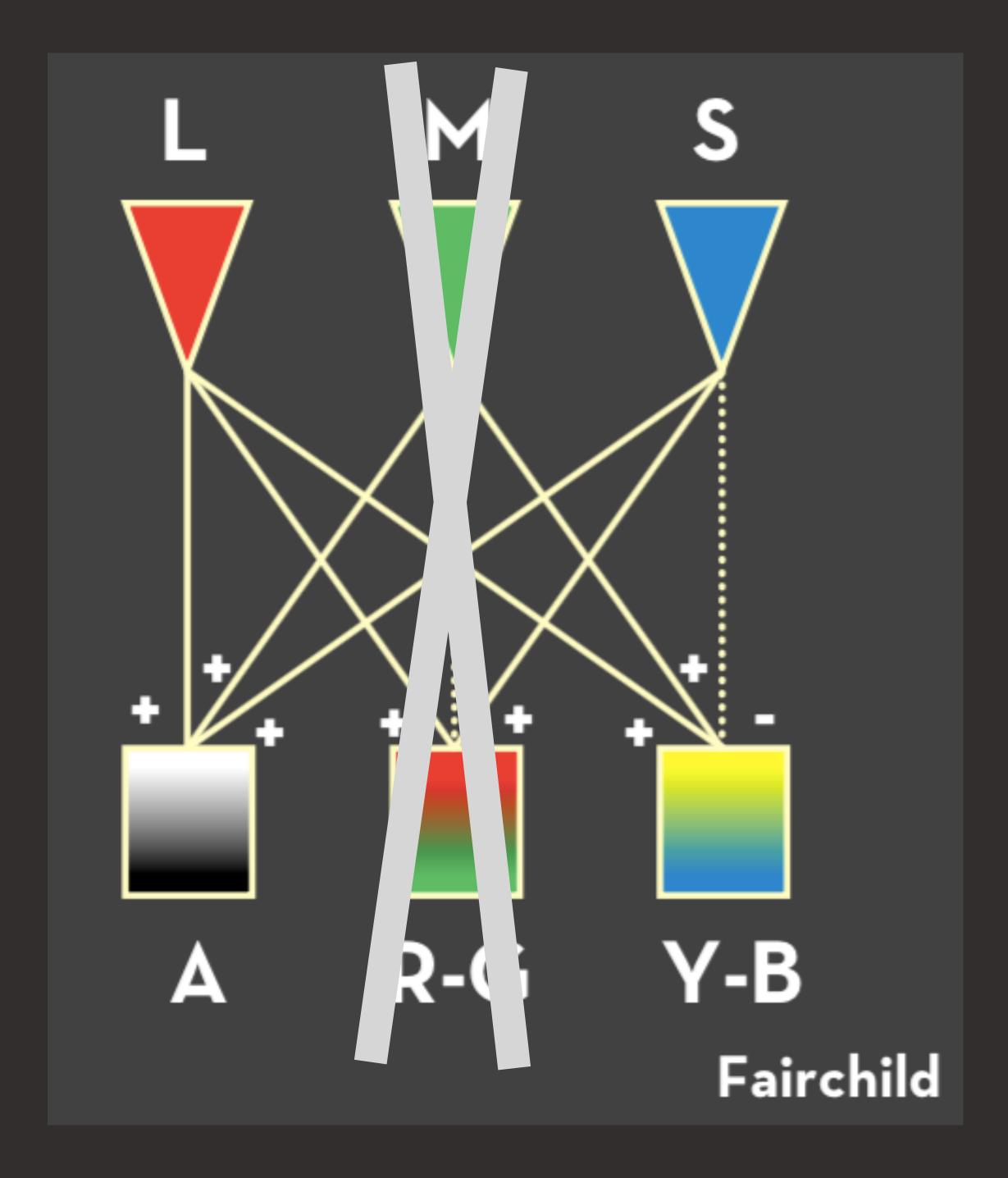
Legibility and readability are very important

Legibility and readability are very important

Legibility and readability are very important

Legibility and readability are very important

Color

Blindness

Remember?

Long
Middle
Short
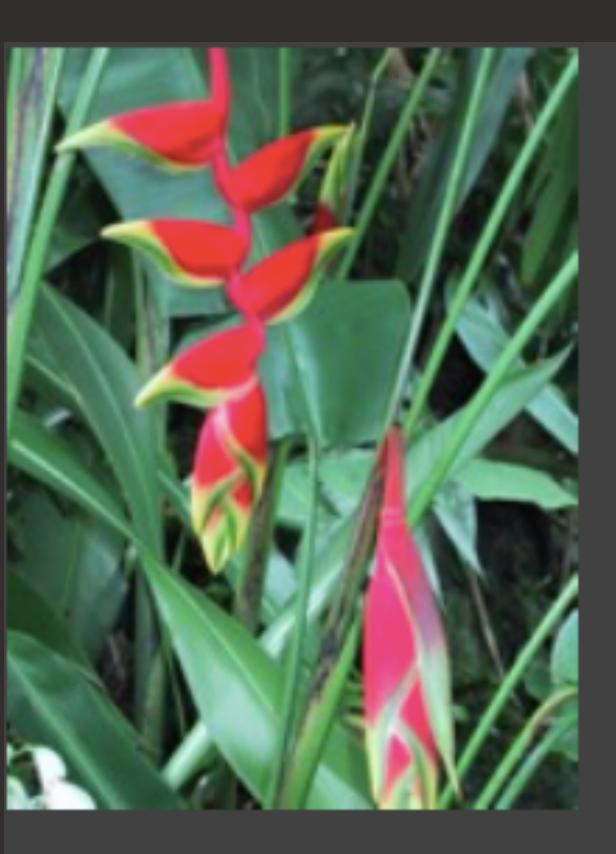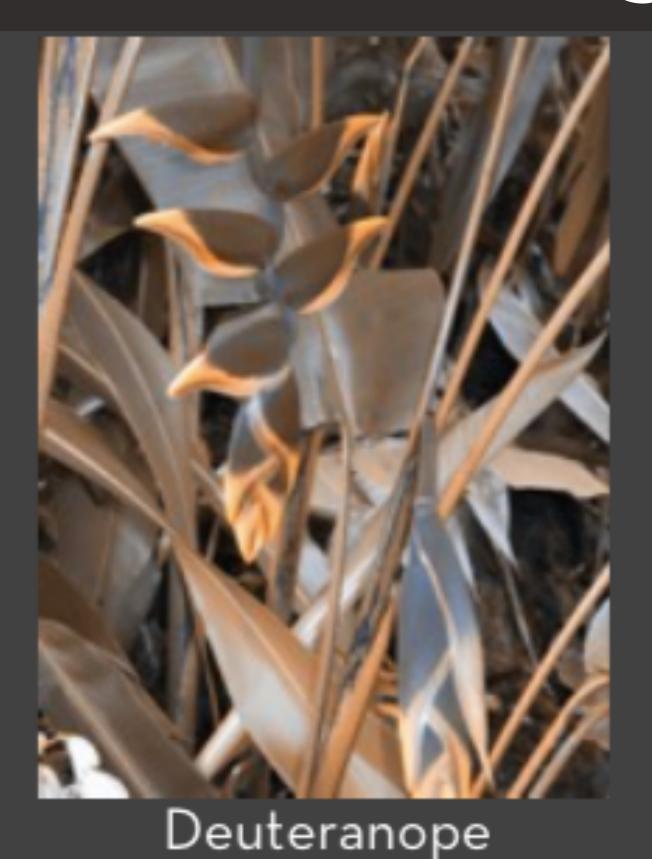
Colorblindness Types
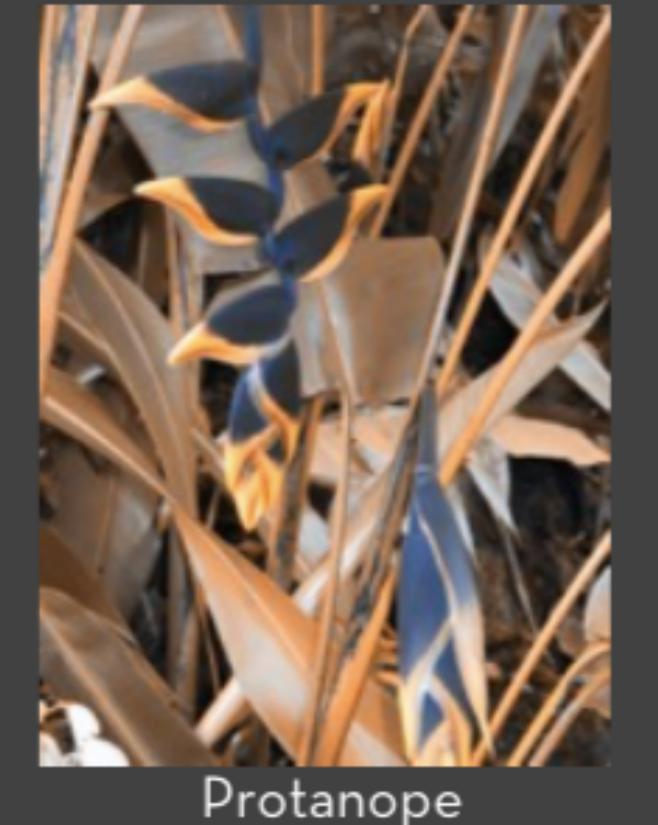
normal   **red-green**   **yellow-blue**

Deuteranope   Protanope   Tritanope

Supporting
CB
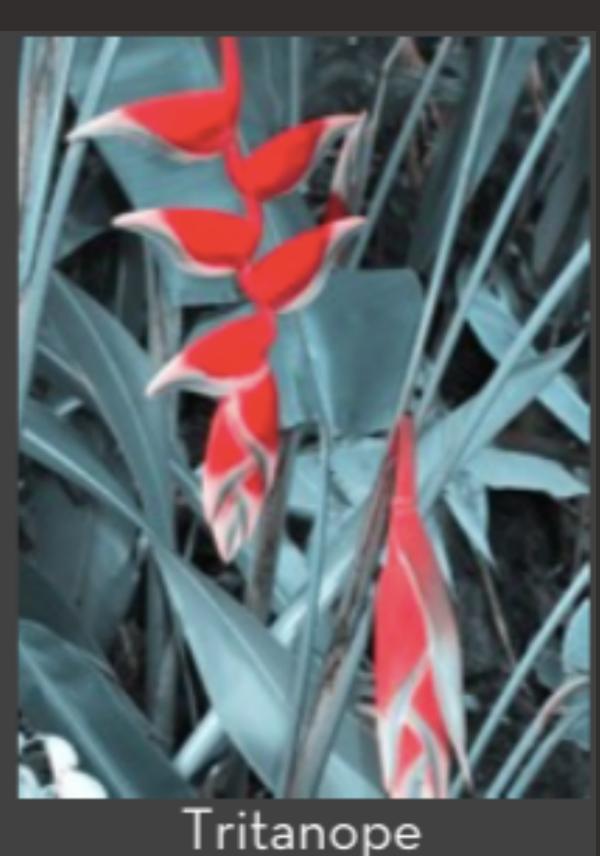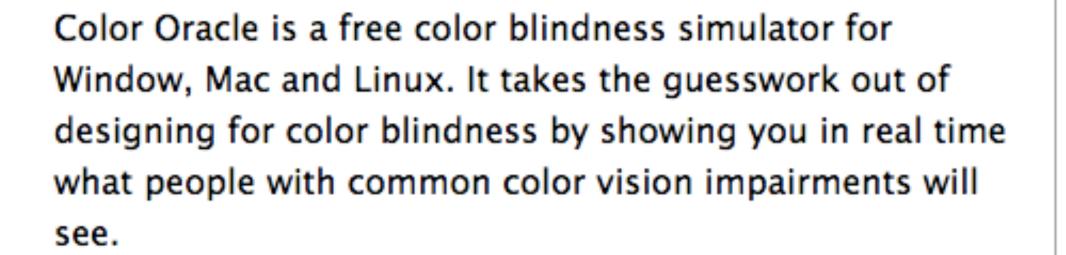
Color Oracle
Design for the Color Impaired

Color Oracle is a free color blindness simulator for Window, Mac and Linux. It takes the guesswork out of designing for color blindness by showing you in real time what people with common color vision impairments will see.

Color Oracle applies a full screen color filter to art you are designing – independently of the software in use. Eight percent of all males are affected by color vision impairment – make sure that your graphical work is readable by the widest possible audience.

Read this article for more information: Color Design for the Color Vision Impaired

Free Download

Version 1.2.1 for Windows Requires Java 6 or 7.

Version 1.1.4 for Mac OS X 10.4 or higher now supports Retina displays and OS X 10.8 or higher.
Important for Mac users: If upon launching Color Oracle you get the error message "Color Oracle can't be opened because it is from an unidentified developer", right–click the Color Oracle icon and choose Open. Then click the "Open" button at the next dialog to launch Color Oracle. See here to permanently turn this feature off.

Vischeck

User quotes:
I was browsing the net looking for a program that would define colours on my computer screen when I came across your site. I am myself totally colour blind and, although I try to be patient, I find it hard work trying to explain to people what it is like. I am going to bookmark your site and send it to

Vischeck simulates colorblind vision.

Daltonize corrects images for colorblind viewers.

How do babies see the world? Visit TinyEyes.

"Good painting, good coloring, is comparable to good cooking.

Even a good cooking recipe demands tasting and repeated tasting while it is being followed.

And the best tasting still depends on a cook with taste."

- Josef Albers