

Colour

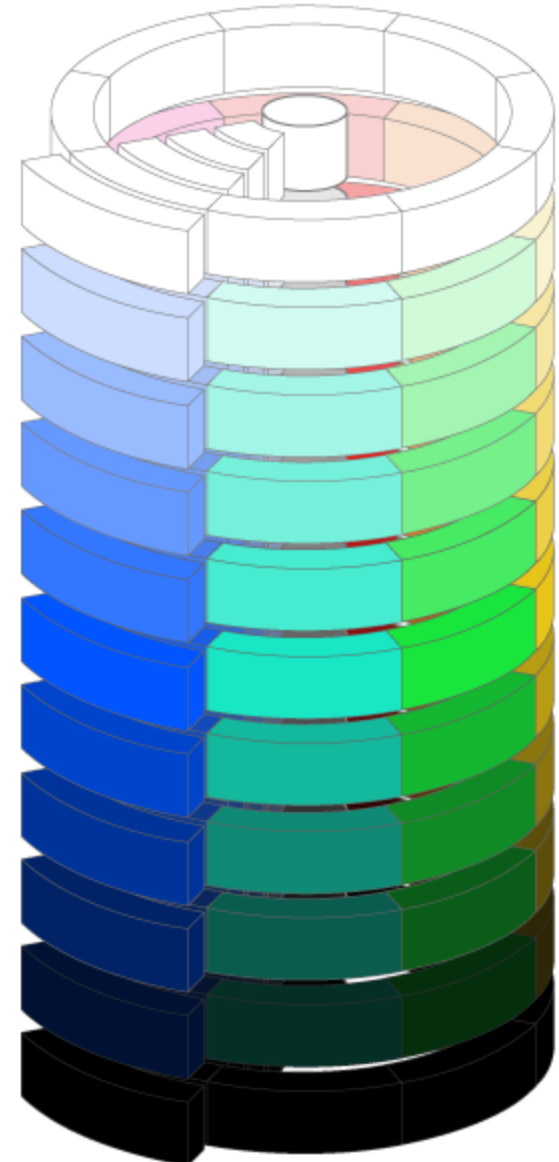
- ▶ “Colour used poorly is worse than no colour at all” - Edward Tufte
 - “Above all, do no harm”
 - colour can cause the wrong information to stand out and
 - make meaningful information difficult to see.

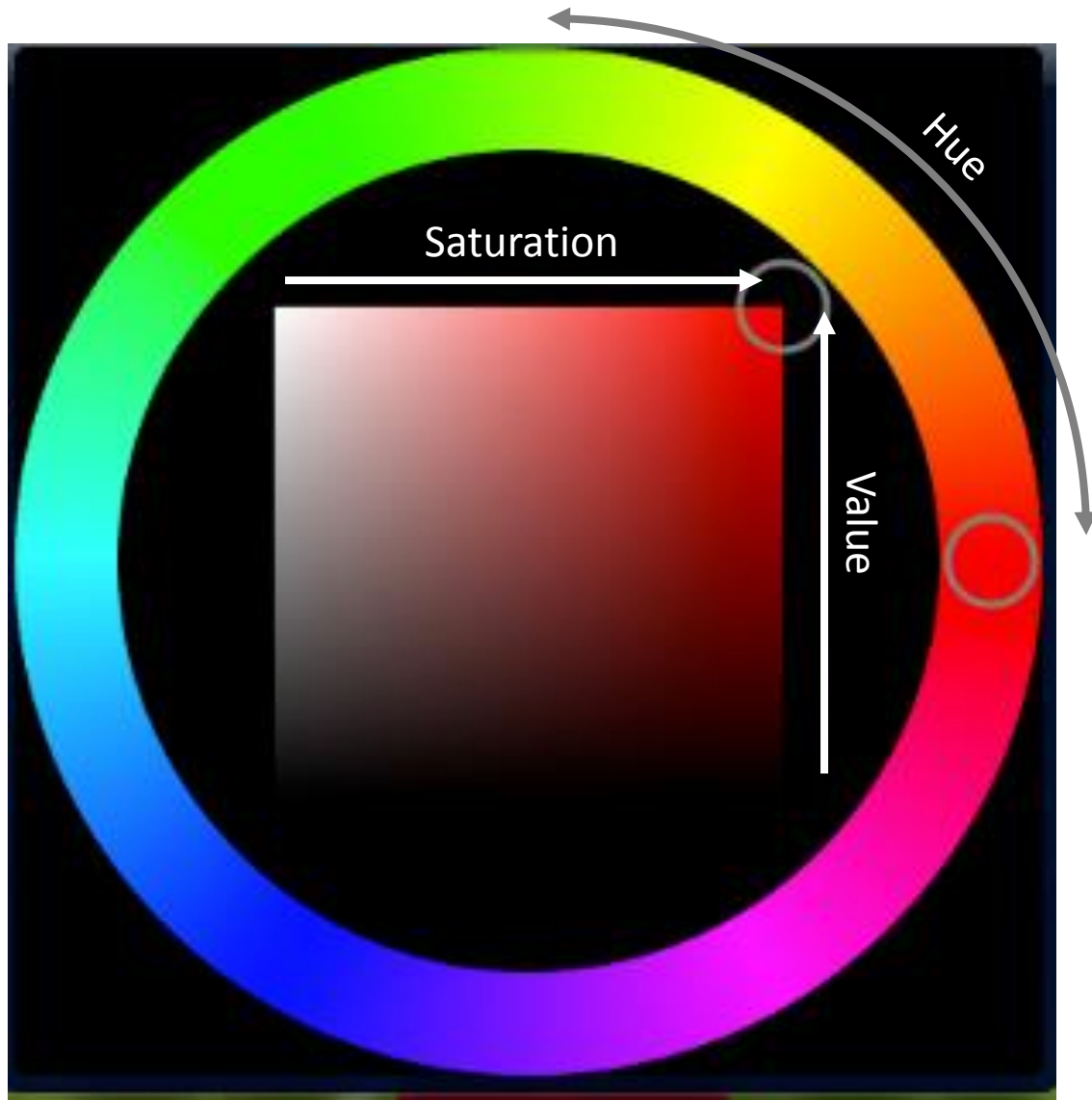
Colour space

- ▶ A *colour space* is mathematical model for describing colour.
 - RGB, HSB, HSL, Lab and LCH
- ▶ RGB is the most common in computer use,
 - but least useful for design
 - our eyes do not decompose colours into RGB constituents
- ▶ HSV, describes a colour in terms of its hue, saturation and value (lightness),
 - models colour based on intuitive parameters
 - more useful.

Colourimetry

- ▶ Hue (colour)
 - around the circle
- ▶ Saturation
 - Inside to outside
 - Colour to grey scale
- ▶ Lightness (value)
 - top to bottom





$H = 0^\circ$
(Red)

$V \setminus S$	0	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1
1					
$\frac{7}{8}$					
$\frac{3}{4}$					
$\frac{5}{8}$					
$\frac{1}{2}$					
$\frac{3}{8}$					
$\frac{1}{4}$					
$\frac{1}{8}$					
0					

Brewer Palettes

- ▶ Brewer palettes (colorbrewer.org) provide a range of palettes based on HSV model which make life easier for us....

**Avoid the use of hue to
encode quantitative variables**

Quantitative encoding
e.g. heat maps

Two-sided quantitative
encodings

QUALITATIVE

SEQUENTIAL

DIVERGING

set1



set2



pastel2



dark2



blues



greens



reds



ylorbr



spectral



rdylbu



rdylgn



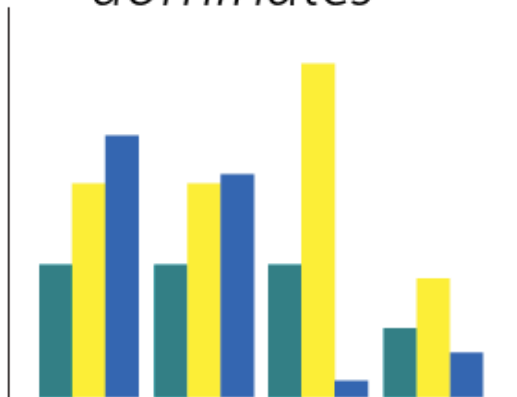
piyg



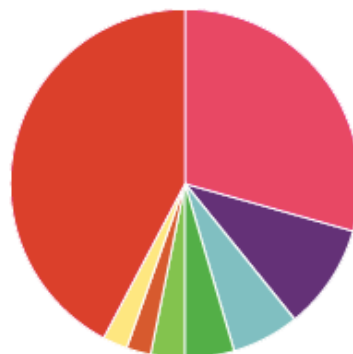
Examples

Poor use of colour

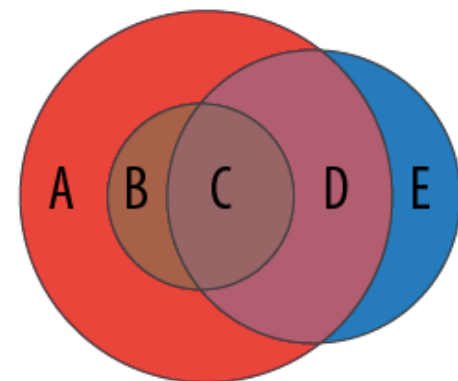
one color dominates



difficult to distinguish

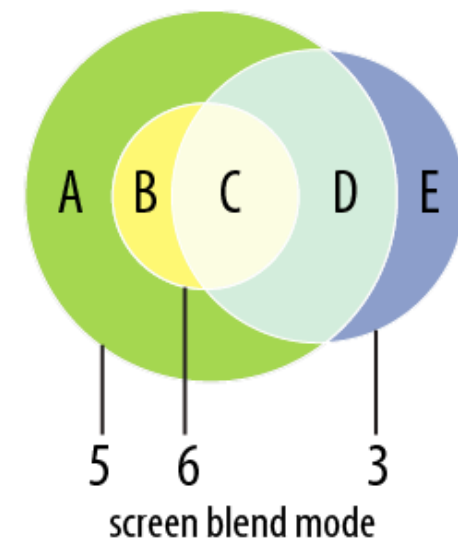
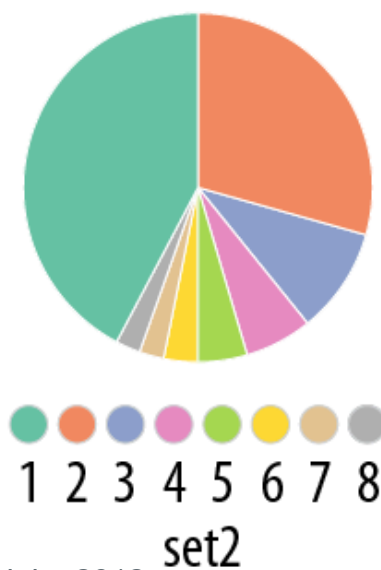
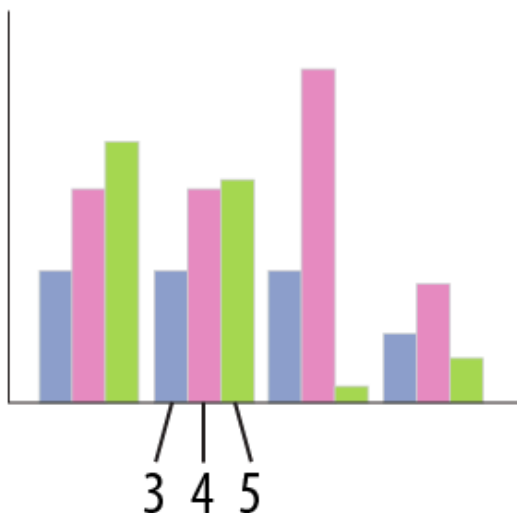


murky



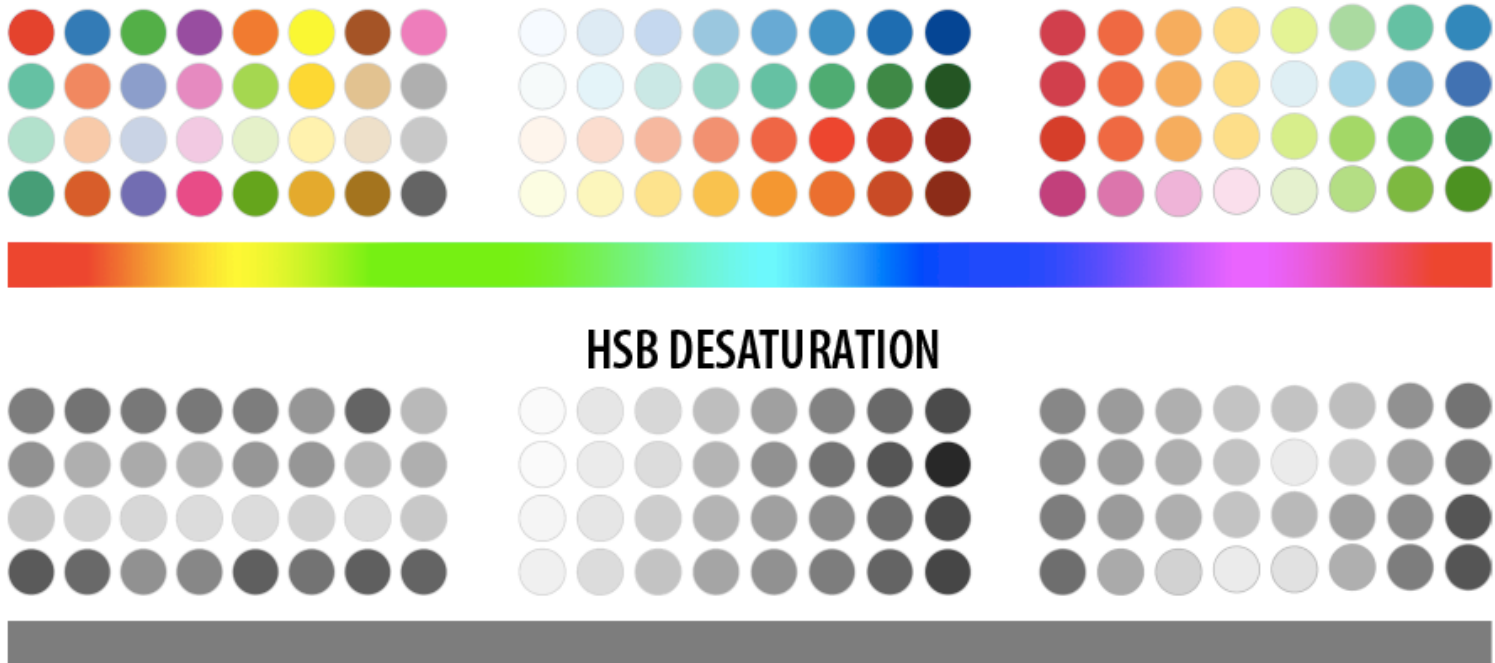
Brewer colours

recolored with Brewer palettes

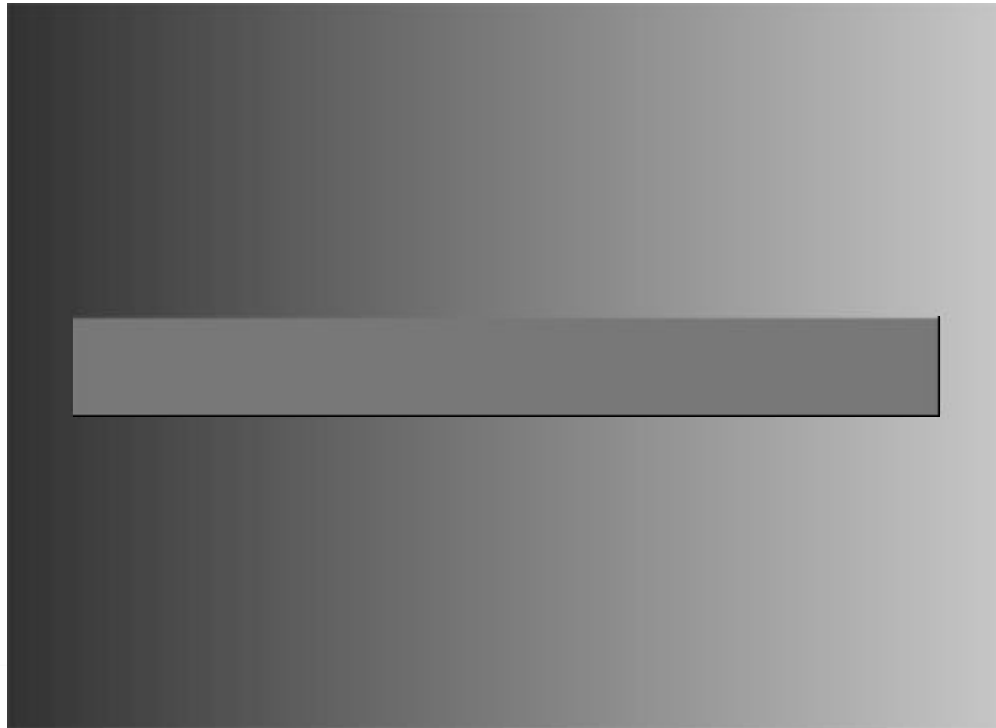


Conversion to Grey scale

- ▶ Ensure chosen colour set works well in grey scale
 - Sequential palette works well here



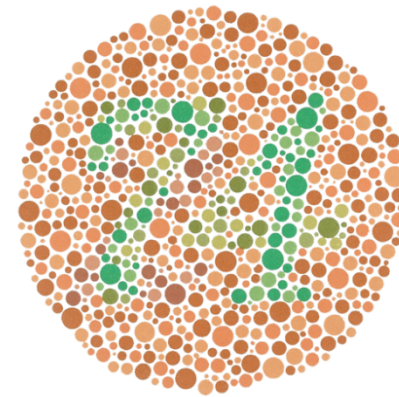
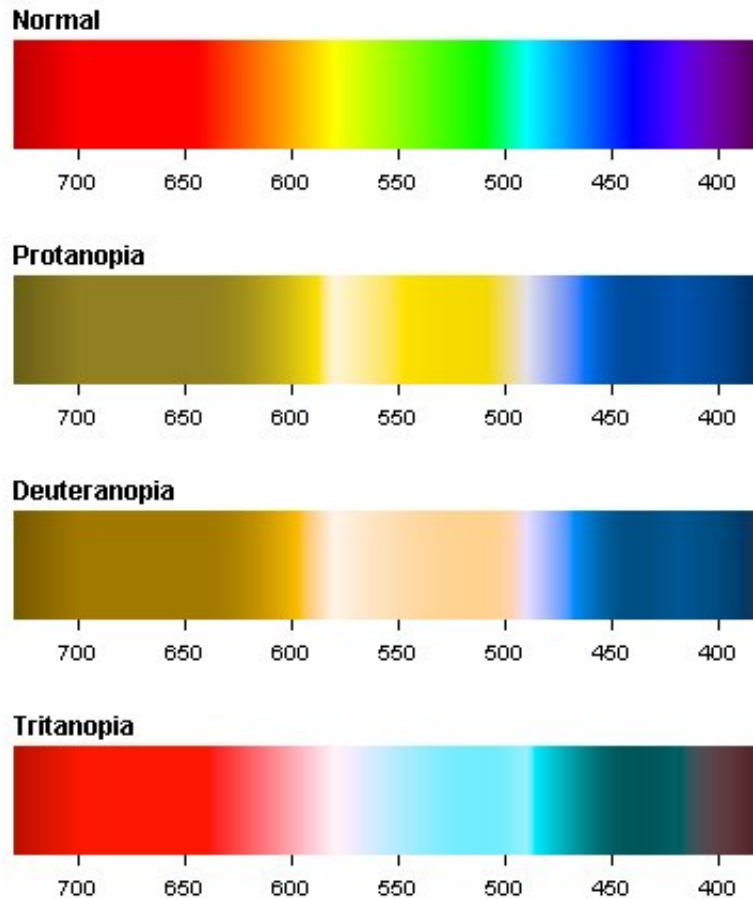
Trouble with perceptual colour....



Context Affects Perceived Colour



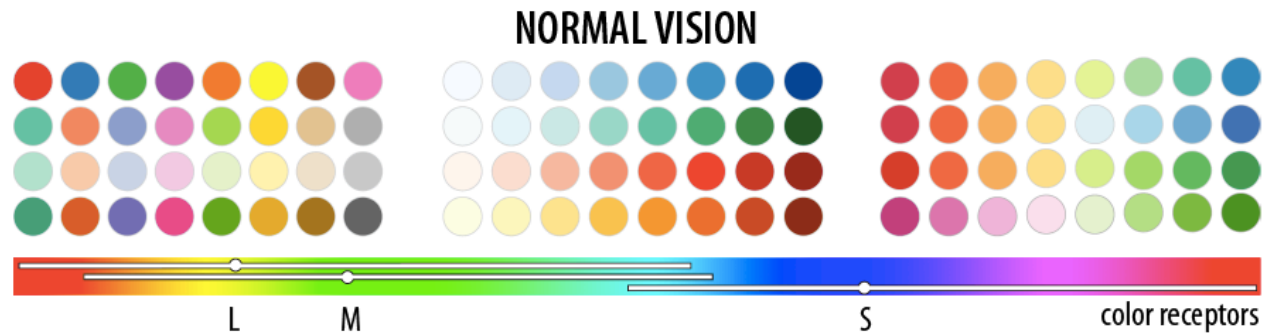
Colour & Accessibility....



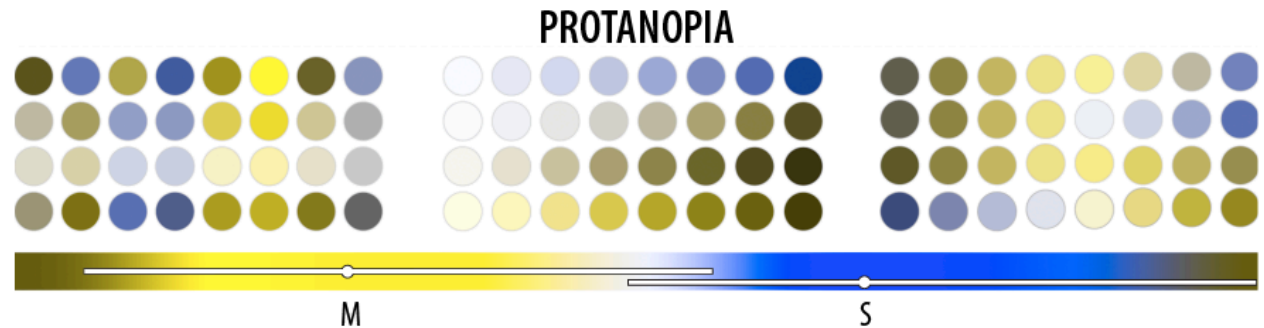
Accessibility (W3C):
10-20% of population are
red/green colour blind.
(74? 21? No number at
all?)....

Colour Blindness

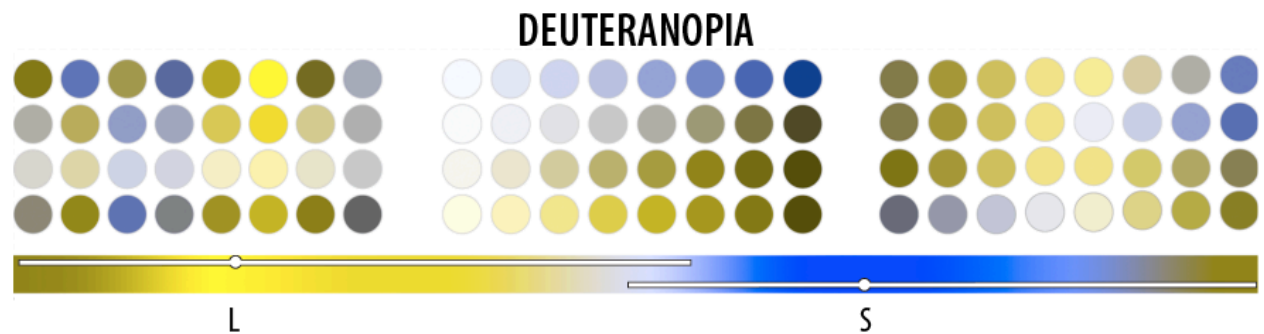
8% males of
USA descent



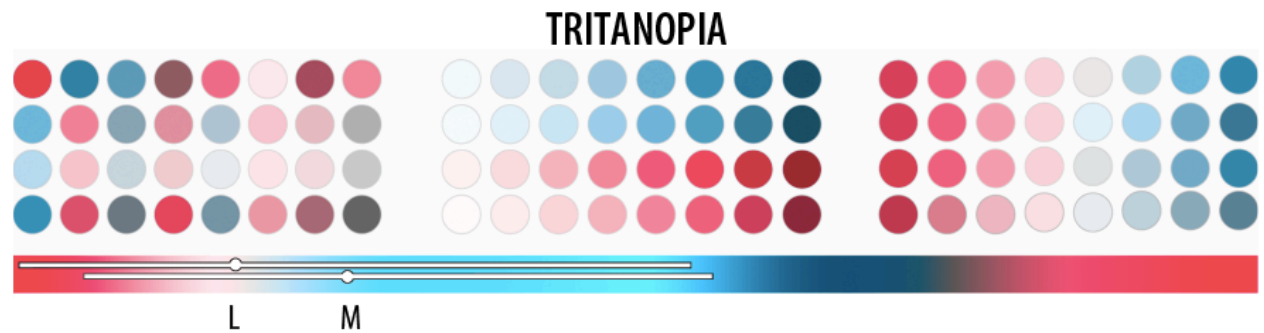
Red-green



Red-green



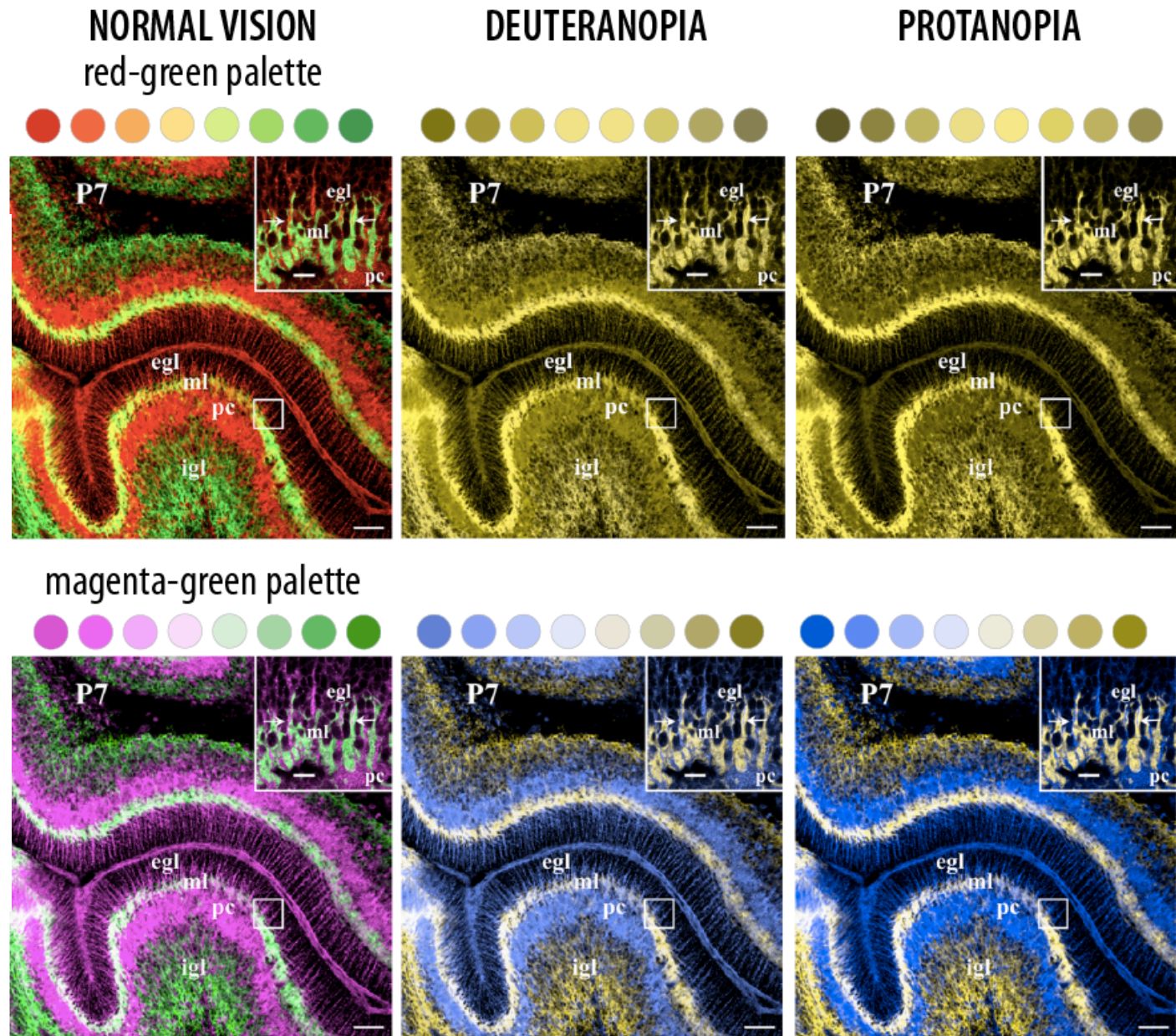
Blue-yellow



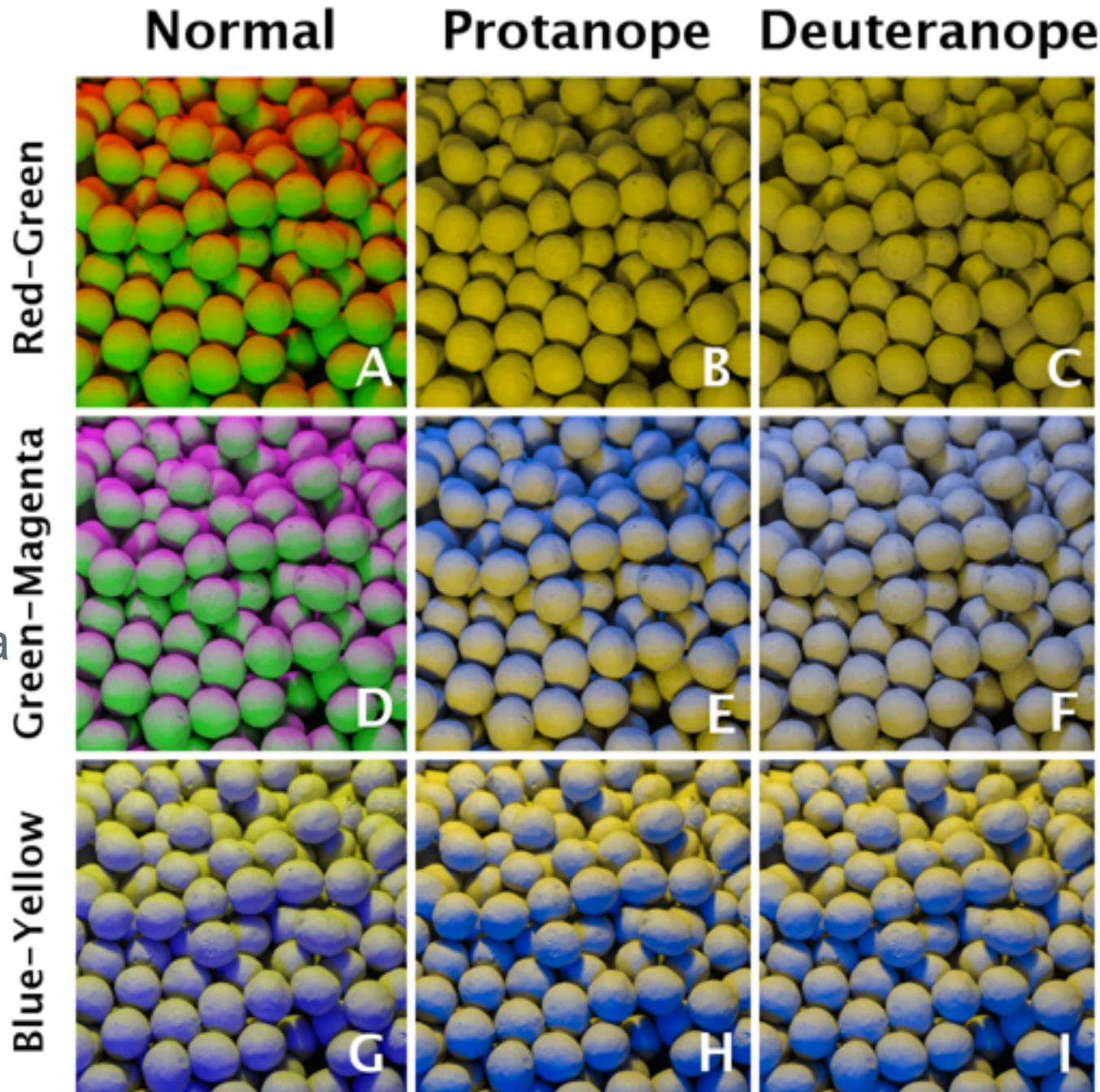
BioVis Example: Immunofluorescence images

red-green image of
P2Y1 receptor and
migrating granule
neurons,

effectively remapped
to
magenta-green using
the channel mixing
method.



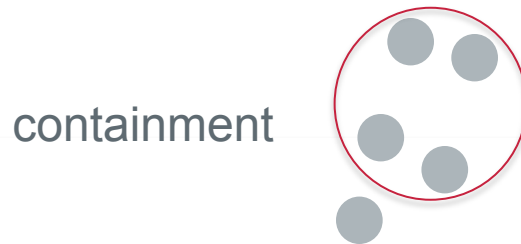
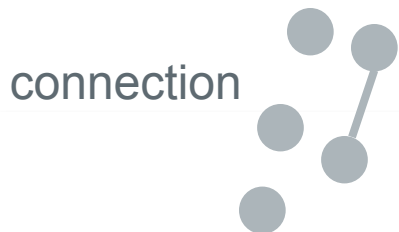
- ▶ Blue-Yellow
 - might be better than
- ▶ Green-Magenta
 - talk about same colours



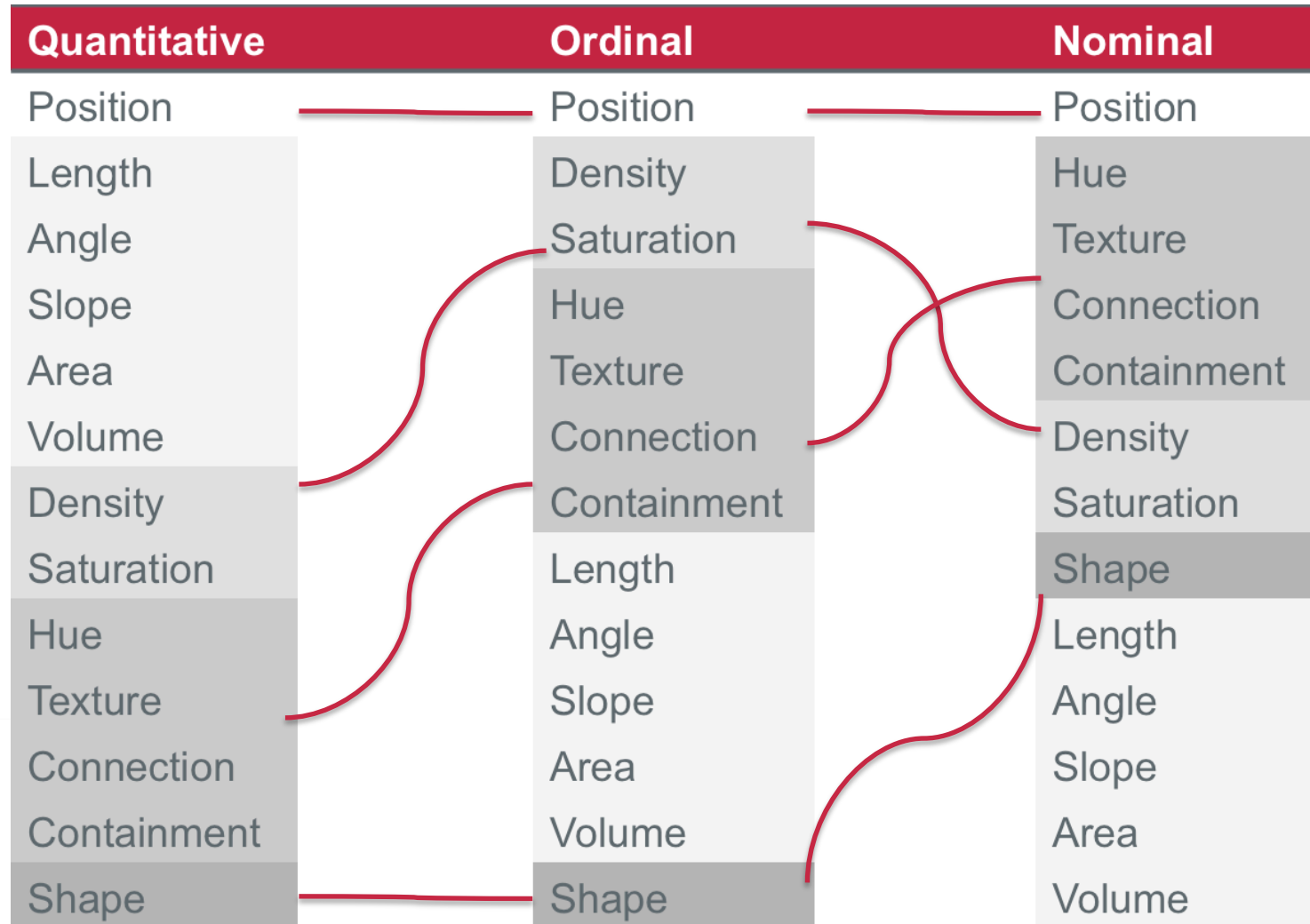
From Data to Visualization...

- ▶ The properties of the data or information
- ▶ The properties of the image
- ▶ The rules mapping data to images

Encoding Schemes



Mapping data types to encoding



Don't forget Saliency...

- ▶ Physical properties that set an object apart from its surroundings
 - Distinct features have high saliency
- ▶ Encodings have differences in discrimination and accuracy
- ▶ Context affects saliency
- ▶ Choose salient encodings for primary navigation
 - Colour is good for categories - saliency decreases with more hues.
- ▶ Focus attention by increasing saliency of interesting patterns
- ▶ Unexpected or bad things can happen when unimportant elements in a figure are salient.
 - The reader will use saliency to suggest what is important.