



Screen Layout Design and Color

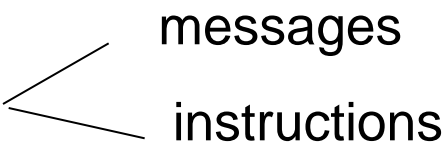


- The screen design is an important part of the UI development
- A poor screen design may degrade user performance
- Screen layout must be carefully designed
- There are numerous guidelines (we have seen already some of them)

Screen Layout Guidelines

- Several types:

General layout of information

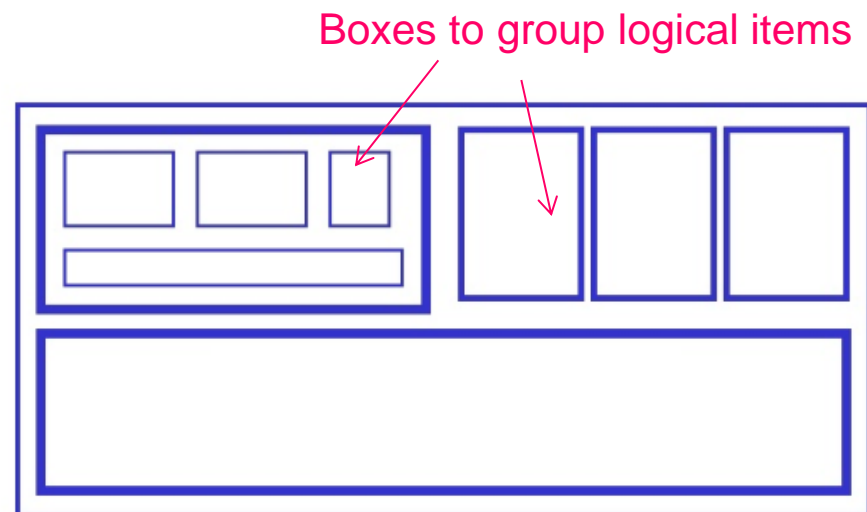
Text 
messages
instructions

Numbers

Coding techniques (color and others)

Information layout

- Include only the needed information
- Include all needed information
- Begin at the top left corner and align left (in Western culture)
- Group items according to type
- Leave plenty of white space
- Use leaders in multiple columns







Text

- Avoid using only capital letters
- Avoid text with many capital letters
- Do not use too many fonts for emphasis
- In multiple columns use leaders or greying

use fonts for emphasis
(but not too many)

ABC**C**DEF HI**J**KLM
NO**P**Q**R**STUVWXYZ

Alcântara - Terra			12:36			13:06			13:36	
Campolide	12:15		12:41	12:45		13:11	13:15		13:41	13:45
Rossio	 12:19			12:49			13:19			13:49
Sete Rios			12:19	12:43		12:49	13:13		13:19	13:43
Entrecampos			12:22	12:47		12:52	13:17		13:22	13:47
Roma - Areeiro			12:24	12:49		12:54	13:19		13:24	13:49

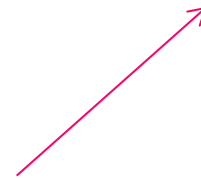
Use greying

Willy Wonka and the Chocolate Factory
Winston Churchill - A Biography
Wizard of Oz
Xena - Warrior Princess



Left aligned: more readable

Willy Wonka and the Chocolate Factory
Winston Churchill - A Biography
Wizard of Oz
Xena - Warrior Princess



Right aligned: fine for effects
But more difficult to read

In multiple columns it is difficult to read across gaps:

sherbert	75
toffee	120
chocolate	35
fruit gums	27
coconut dreams	85

use leaders

sherbert	_____	75
toffee	_____	120
chocolate	_____	35
fruit gums	_____	27
coconut dreams	_____	85

or greying

sherbert	75
toffee	120
chocolate	35
fruit gums	27
coconut dreams	85

- Messages shall:
 - Have a detail level adequate to user knowledge and experience
 - Be specific and understandable
 - Be brief and concise
 - Be positive
 - Be helpful

where do you want your order delivered?

Not a member

All fields marked with * must be filled out.

Title [dropdown]

First name *

[input field]

Installing Alexander 8:06

My Device Name

Setup [ok]

The program you have installed may not display properly because it was designed for a previous version of Windows Mobile software.

Windows

Edit Open [device icons]

Voice Speed Dial

Please speak after beep.

Cancel [keyboard icon]

Error messages

Too verbose

better

The processing of the text editor yielded 23 pages of output	Output 23 pages
Error in SIZE field	Error: SIZE range is 4 to 16
Cannot exit before saving file	Save file before exiting
Bad/illegal file name	Maximum file name length is 8 chars
Syntax error 1542	Unmatched left parenthesis in line 210

Too vague

Negative

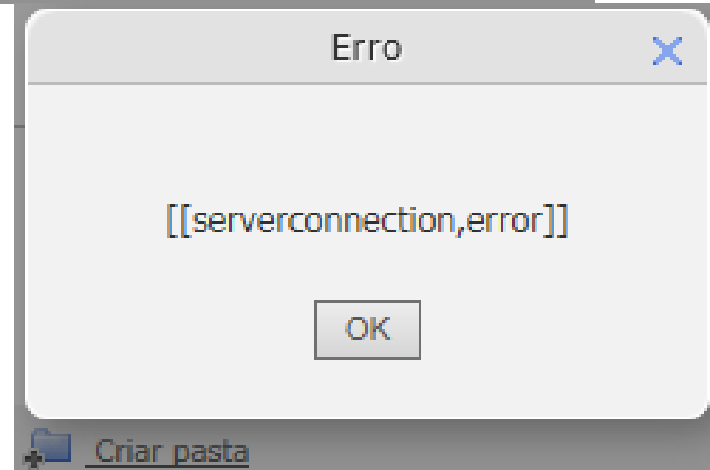
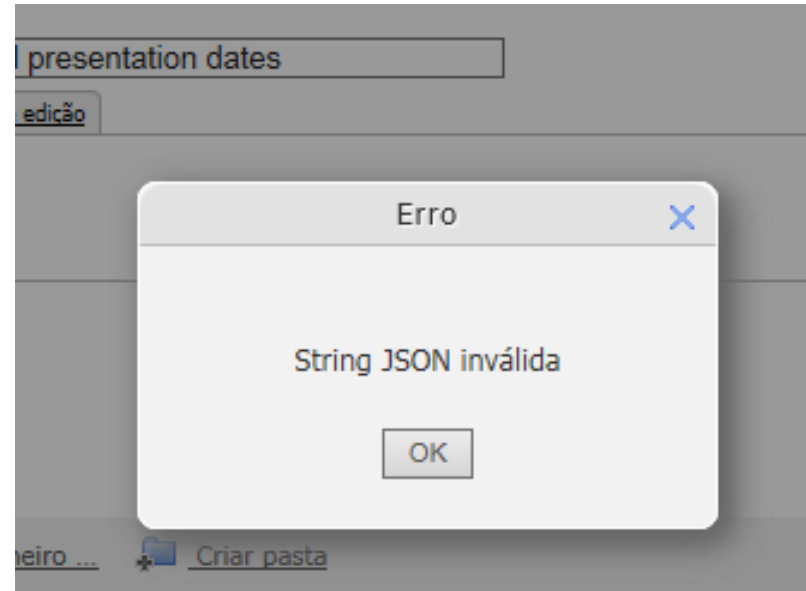
Not helpful

Examples of useless messages for users



Except (maybe) for Chinese people!

Moodle:

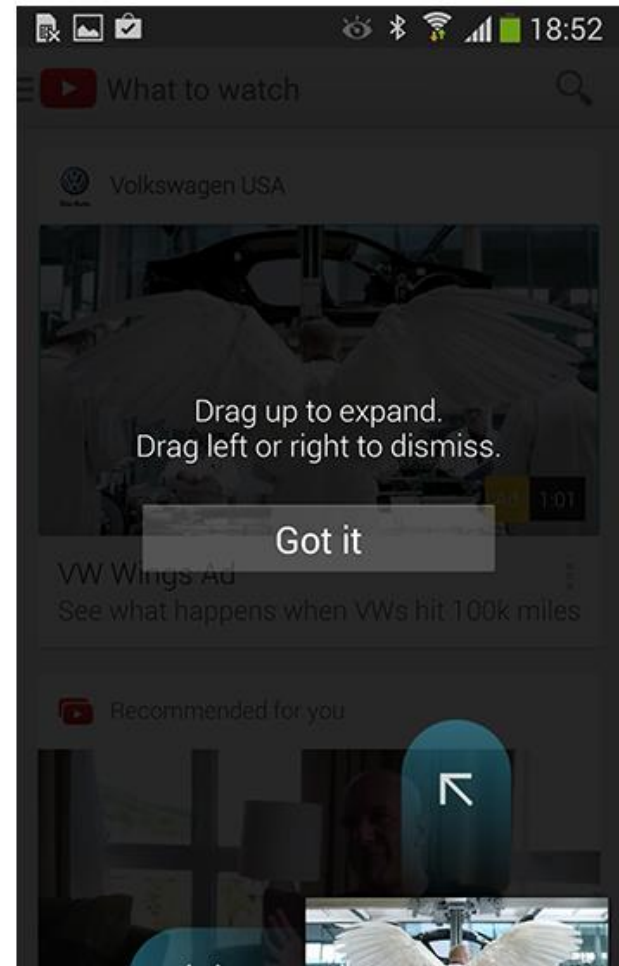


Instructional Overlays and Coach Marks for Mobile Apps

- Instructions in mobile applications must be designed for optimal scannability, as users tend to dismiss them quickly and do not read thoroughly

Main guidelines:

- Short, Focused Tips
- Avoid Chains of Tips
- Use Visuals When Possible
- Do Not Match the UI
- Keep Tips Sparse



<https://www.nngroup.com/articles/mobile-instructional-overlay/>

Numbers

- Integers shall be right justified
- Real numbers shall be aligned by the decimal point
- Avoid unnecessary zeros (at left)
- Long numbers shall be divided in groups of 3 or 4



Which is the largest?

532.56	627.865	
179.3	1.005763	75
256.317	382.583	120
15	2502.56	35
73.948	432.935	27
1035	2.0175	85
3.142	652.87	
497.6256	56.34	

Right align integers

Align decimal points

Numbers

Better

10 100 1000 10000	10 100 1000 10000
100.00 25.365 5432.01 1.45591	100.00 25.365 5432.01 1.45591
10:1 p.m. 002	10:02 p.m. 2
6173954686	617-395-4686

Coding techniques

Blinking

Bold

Size

Font

Underlining

Shape

Special characters and icons

Proximity

Borders

Sound

Colour

Main guideline: use parsimoniously any coding technique!

Specific problems for different platforms: mobile

- Many guidelines are similar for mobile and desktop design, but their mobile interpretation is much more unforgiving
 - Context of use
 - Size of screen
 - Platform limitations



<http://www.nngroup.com/articles/mobile-sharpens-usability-guidelines/>

<https://developer.android.com/design/index.html>

Links on tablet and mobile usability

Raluca Budiu, The State of Mobile User Experience, NNGroup, March, 2015

<http://www.nngroup.com/articles/mobile-usability-update/>

<https://developer.apple.com/library/ios/documentation/UserExperience/Conceptual/MobileHIG/>

<https://developer.android.com/design/index.html>

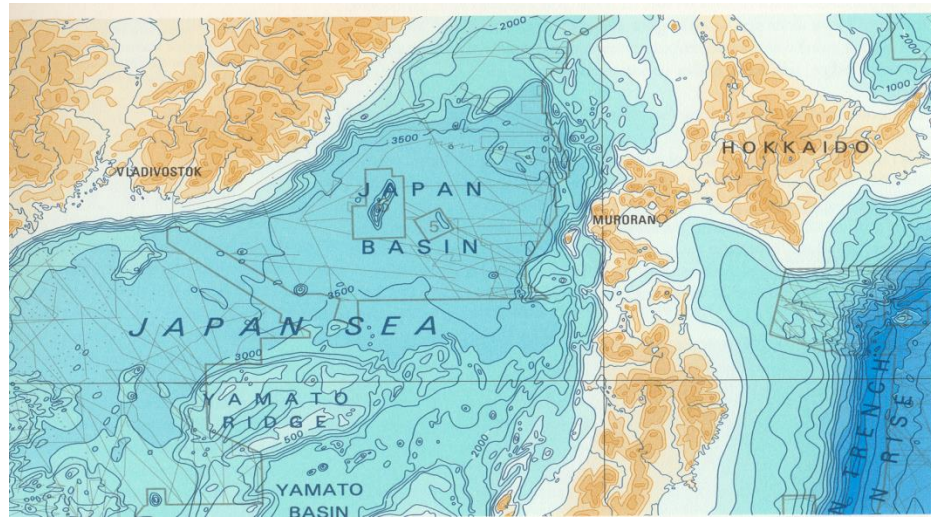
A critical situation: automotive dashboards



<https://www.scientificamerican.com/article/automobile-dashboard-technology-is-simply-awful/>
(April 2018)



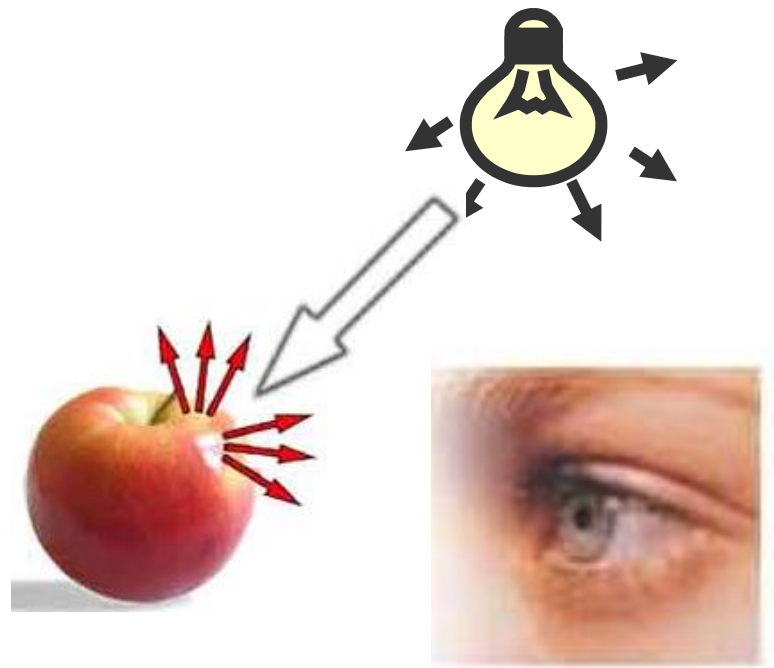
Color usage



Color

- Color is a complex and multidisciplinary subject:
 - Physics
 - Physiology and psychology
 - Art and graphic design

- The color of an object depends on the:
 - Material characteristics
 - Illumination
 - Ambient color
 - Human visual system



How many cherries?



[\(Ware, 2004\)](#)

How many cherries?



Color may support users in many tasks!

Using color

Besides increasing realism, it may have the following **advantages**:

It may:

- Show the logical organization of the information displayed
- Represent values
- Catch the attention
- Increase satisfaction
- Ease the search in complex displays
- Trigger emotions

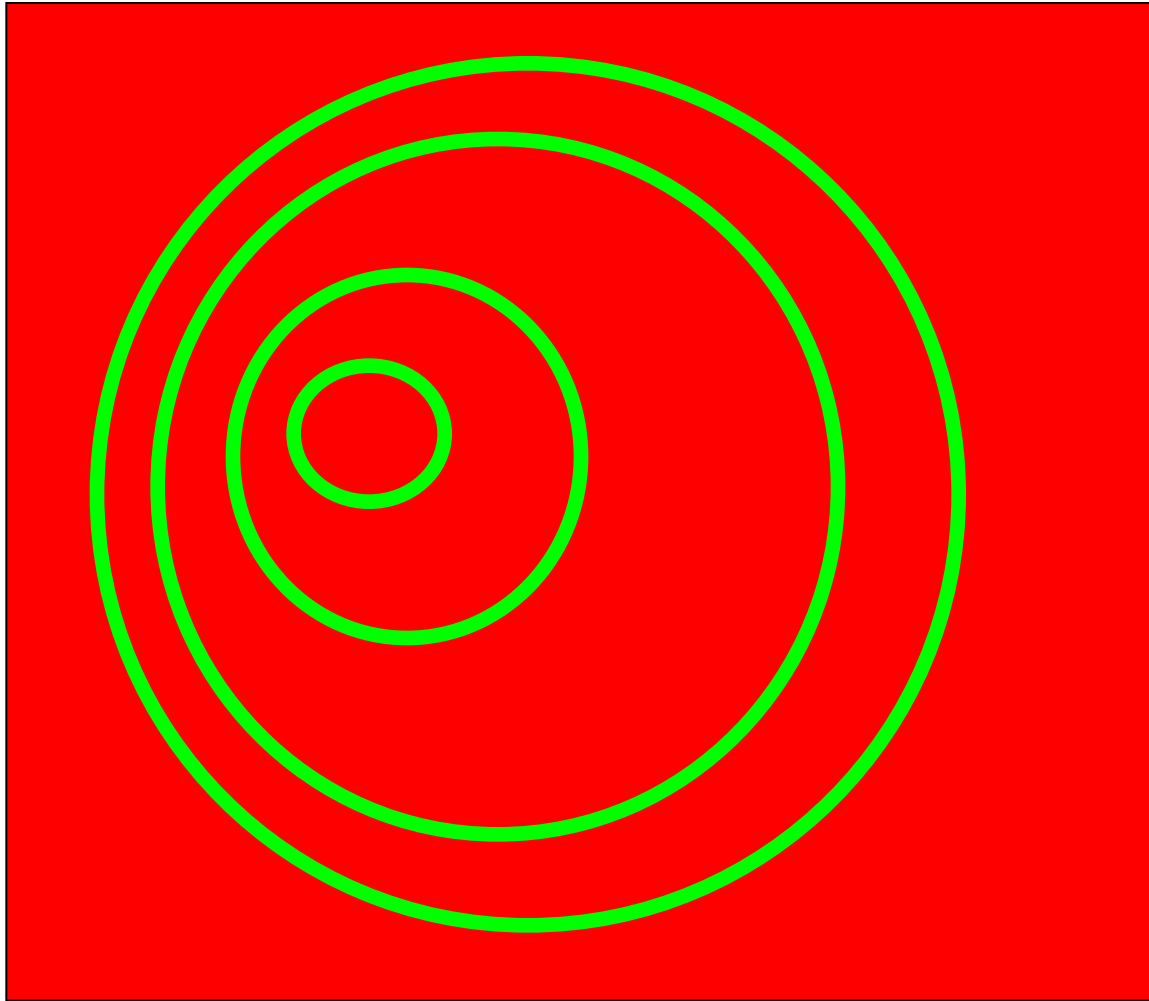
...

However, **it may degrade user's performance** if not used properly

Guidelines for using color

- **Use color parsimoniously**
- Use a limited number of colors
- Firstly make it work without color
- Use color coherently
- Avoid using simultaneously several saturated colors
- Do not convey information solely through color
- Make color coding support the user task
- Make the color coding as obvious as possible
- Allow the user to control the color code
- Take into account the cultural meaning of colors ...





Saturated complementary colors should not be used simultaneously

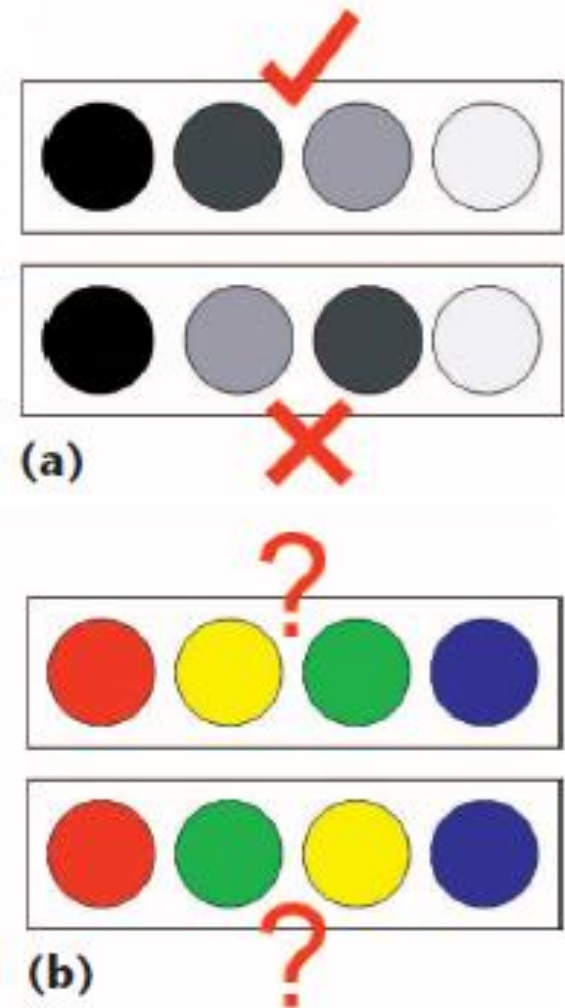


Small spots of color on a neutral background enhance relevant information

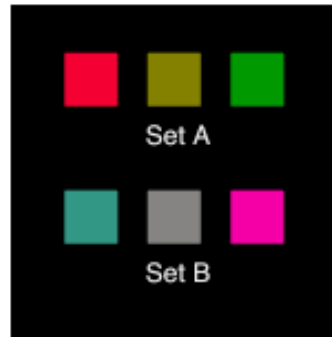
[\(Tufte, 1990\)](#)

- Do not expect to easily perceive order from color

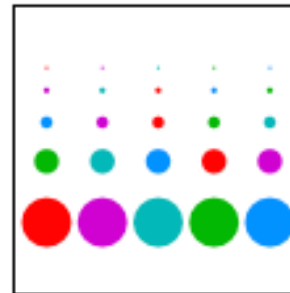
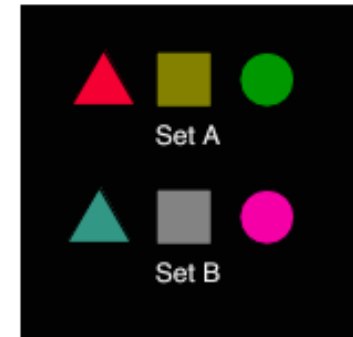
(Borland, Taylor II, 2007)



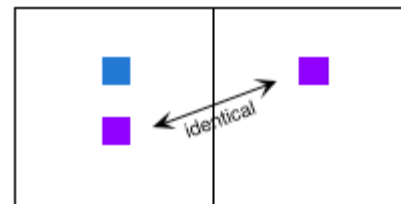
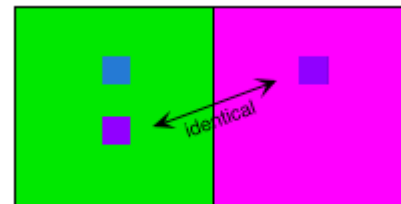
The elements within these sets look identical to deuteranopes, the most common kind of dichromat:



These can be discriminated on the basis of non-color differences:



Don't use colour coding on small elements



Use neutral gray surrounds where color judgments are critical.

Color Vision deficiencies

- $\approx 8\%$ of men and 1% of women have some type of color vision deficiency
- Generally it is genetic (associated to the X chromosome)
- Common deficiencies are explained by the lack of cones (color sensor cells in the retina) sensitive to the long and medium λ (dicromacies):
 - Protanopia (LW – “Red” cone)
 - Deuteranopia (MW – “Green” cone) (Daltonism)
- There are three types of inherited deficiencies:
 - Monocromacy (disorder or lack of all color sensitivity)
 - Dicromacy (disorder or lack of one type of cone)
 - Anomalous Tricromacy (disorder in cones)

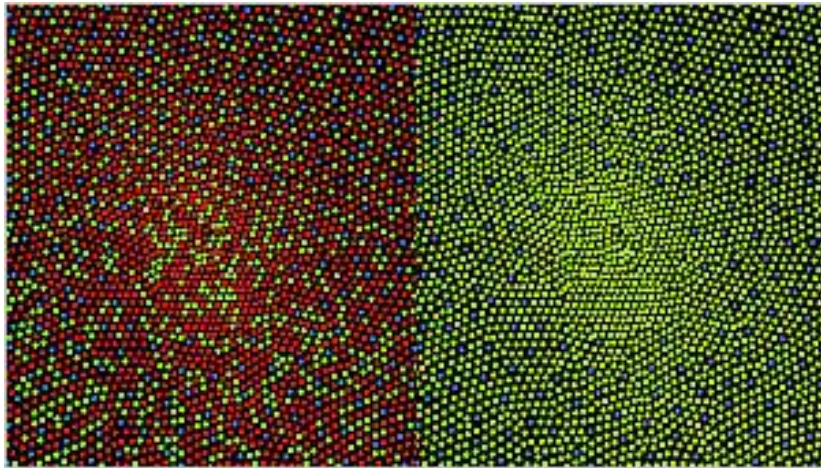
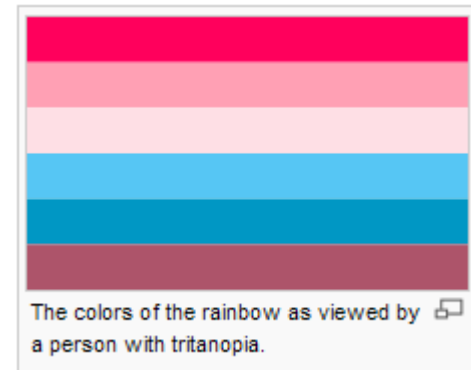
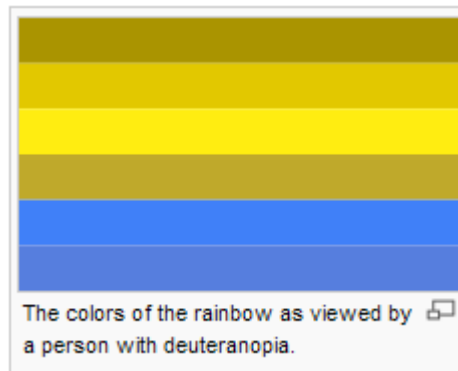


Illustration of the distribution of cone cells in the fovea of an individual with normal color vision (left), and a color blind (protanopic) retina. Note that the center of the fovea holds very few blue-sensitive cones.

http://en.wikipedia.org/wiki/Photoreceptor_cell

Rainbow colors as viewed by people suffering from color vision deficiencies



http://en.wikipedia.org/wiki/Color_blindness

Simulating color vision deficiencies



Original image as seen by a normal observer

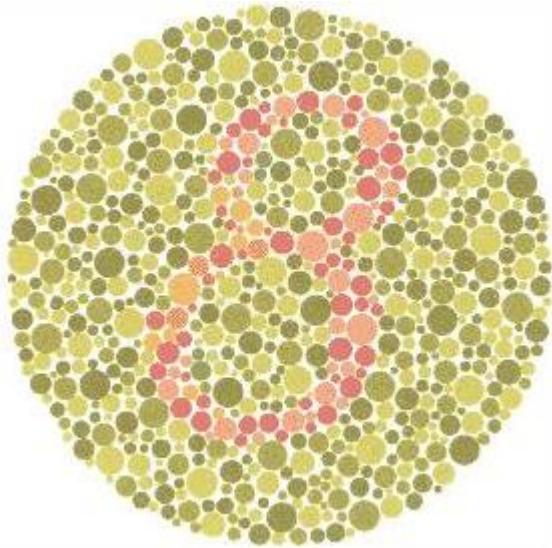


As seen by a deuteranope (daltonic)

<http://www.daltonize.org/>

Simulating color vision deficiencies

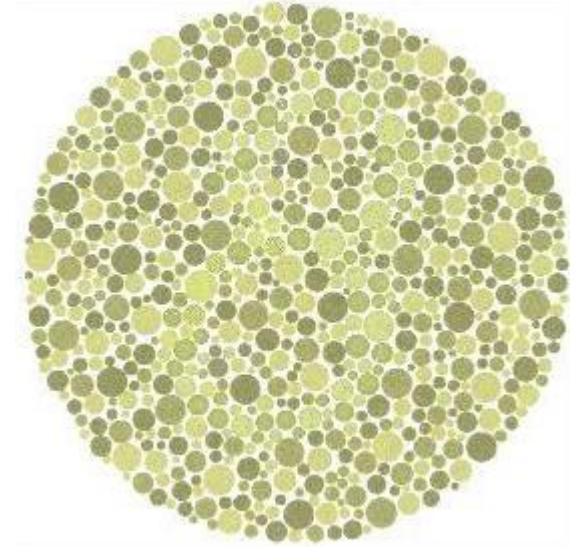
Ishihara-2



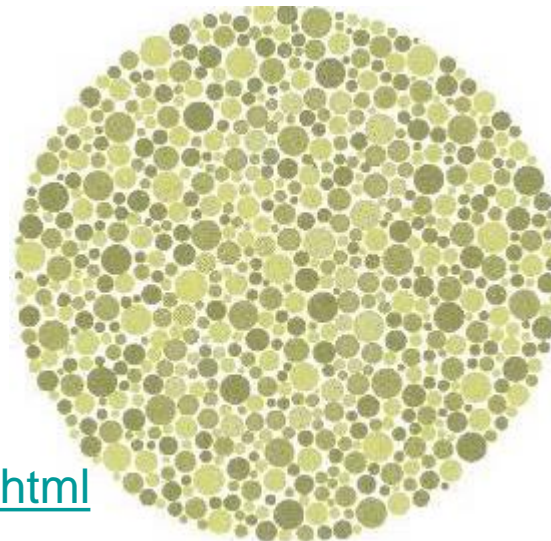
Original image as seen by a normal observer

As seen by an observer with a color vision deficiency:

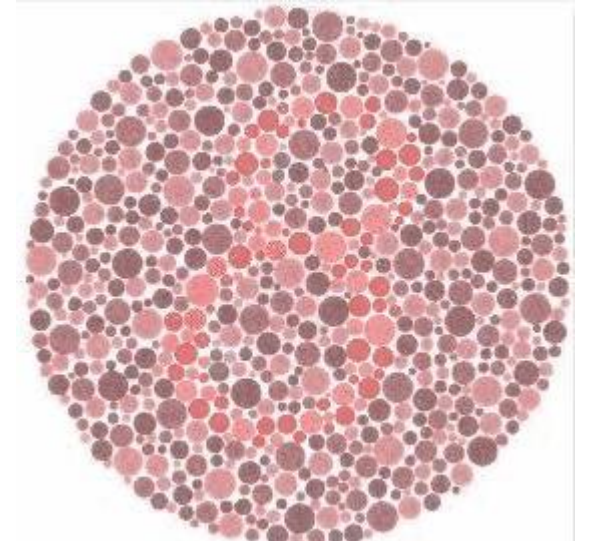
Green-Blind/Deuteranopia



Red-Blind/Protanopia



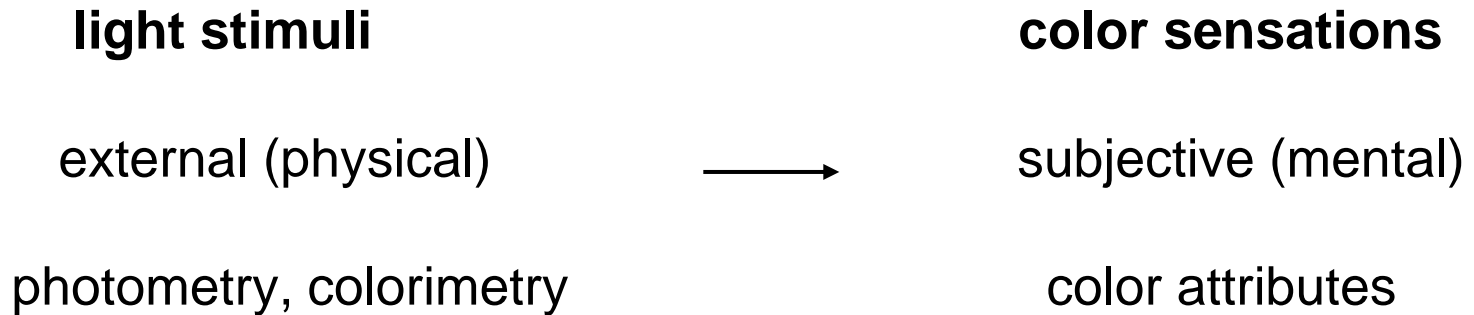
Blue-Blind/Tritanopia



<http://www.color-blindness.com/coblis/coblis.html>

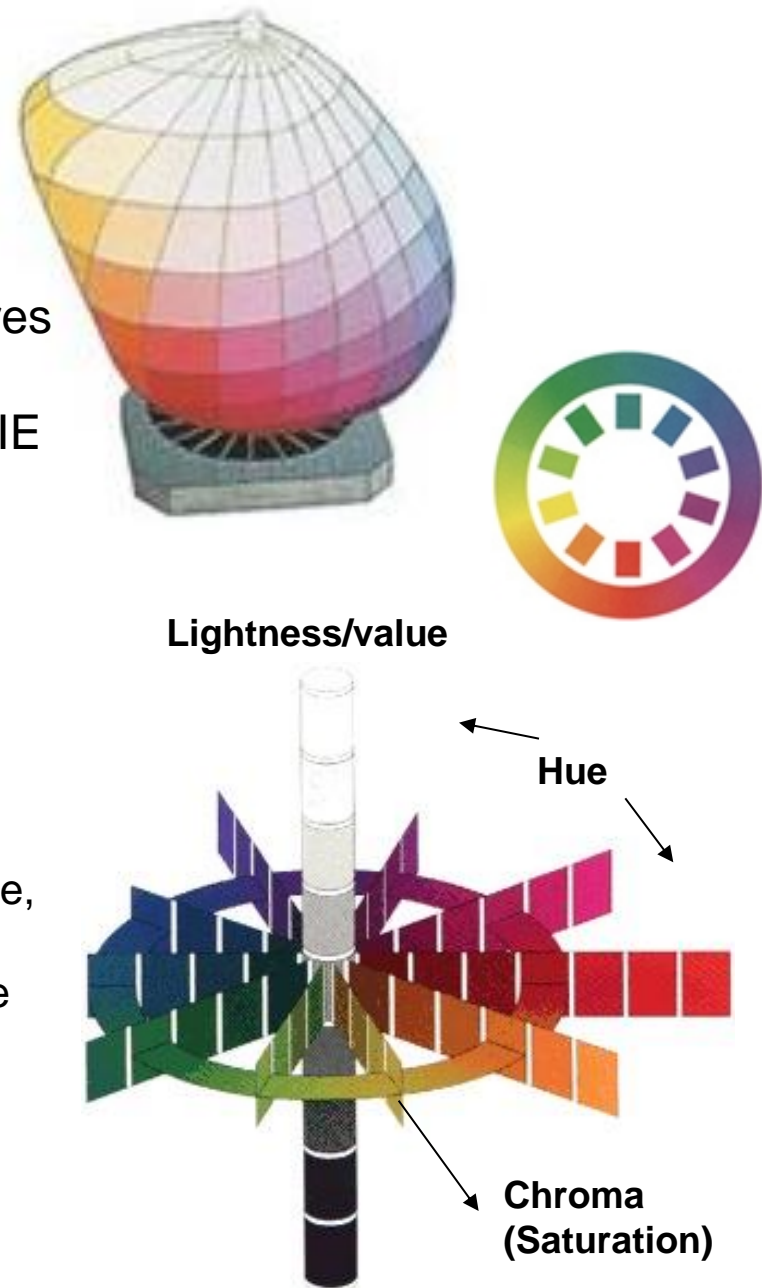
How can we describe color experience?

- Color perception happens in the mind due to light properties
- Different color descriptions are necessary for:



Munsell color model

- It was the first perceptually uniform model
- is based on a 3D space and perceptual measures
- is not a transformation of or approximation to CIE
- Magnitude of change in one parameter always maps to the same effect on perception
- Accounts for the fact that
 - a bright yellow is much lighter than a bright blue,
 - and that many more levels of saturation of blue can be distinguished than of yellow



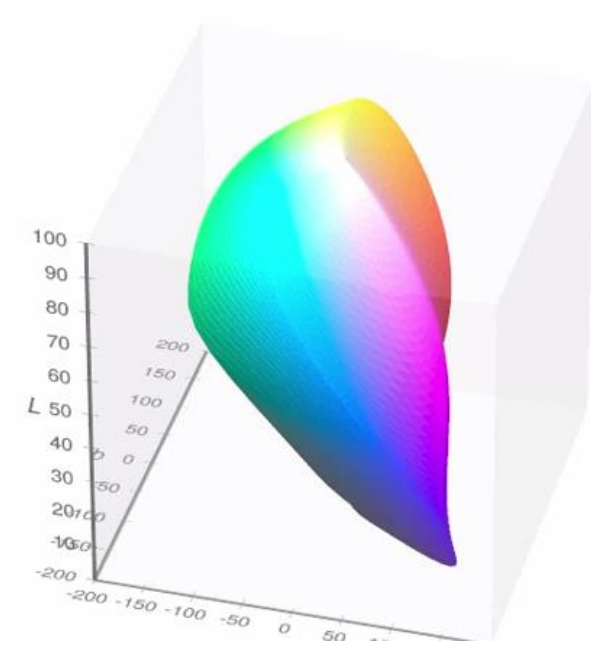
CIE Lab ($L^*a^*b^*$)

- It includes:

L^* - luminance

a^* , b^* - chrominance

- Is more perceptually uniform
- It is defined from the CIE model
- There are other CIE-based perceptually uniform color models



(Wikipedia)

Interesting Links

- Introduction to color guidelines and standards (NASA)

http://colorusage.arc.nasa.gov/guidelines_0.php

- Effective Visual Communication for Graphical User Interfaces

http://web.cs.wpi.edu/~matt/courses/cs563/talks/smartin/int_design.html

- Screen Layout and Design

<http://pt.scribd.com/doc/14784511/Chap-062-Screen-Layout-and-Design>

- Ergonomic design for human interface design, Cornell University Ergonomics Web

<http://ergo.human.cornell.edu/ahtutorials/interface.html>