Rainbow - colours in the eye and on the screen

who I am

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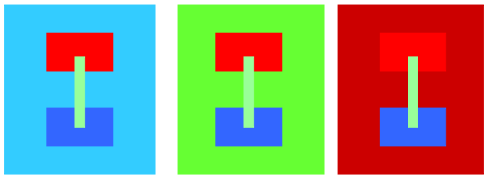
Rainbow - colours in the eye and on the screen

- play with colours
- use of colour
- 'physics' of colour
- how we see colour
- how computers do colour
- **see also** www.colormatters.com

play with colours

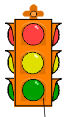
- colour is surprisingly complex
  - physics, aesthetics, psychology
- using colour can be fun
  - experiment , play with it!
- context matters
  - we all see colours differently
  - perception of colour depends on surroundings
  - different at midday or night

the eye of the beholder context matters



good use of colour

- using conventions (red for alarms etc.)
- 'branding' parts of an interface
- occasional emphasis
- redundant coding
  - i.e. in addition to other means
    - e.g. web link colours - also underlined
  - for diagrams, etc.



yucky clip art, but was all I could find

bad use of colour

- over use - without very good reason (e.g. kids' site)
- colour blindness
- poor use of contrast
- do adjust your set!
  - adjust your monitor to greys only
  - can you still read your screen?

'physics' of colour

- 'colour' is the wavelength of light
  - like pitch is the wavelength of sound
- spectrum
  - from red - longest
  - to violet - shortest
  - and beyond …
    - red → infra red (heat) → microwaves → radio
    - violet → ultraviolet → ... nasty radiation

mixing colour

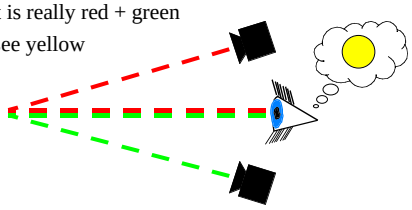
- mixing paint
  blue + yellow = green
  (really cyan)

- mixing lights
  red + green = yellow

- called additive and subtractive colour

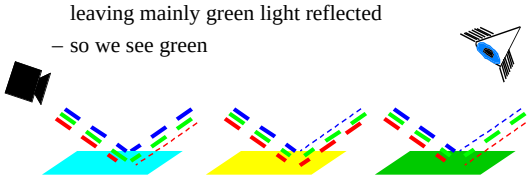
additive colour - mixing light

- physically both colours in the mixed light
- like a chord in music
- light is really red + green
- we see yellow



subtractive - mixing paint

- cyan paint absorbs a lot of red
- yellow paint absorbs a lot of blue
- cyan + yellow absorbs most of the red and blue leaving mainly green light reflected
- so we see green



primary colours

- in music we hear chords and harmony
  C + G ≠ E
- there are no primary 'notes' in music

so why three primary colours?

not physics … but the eye

in the eye

two types of sensory cells:

- **rods**
  - see black and white and grey
  - best in low light
  - good at seeing movement
- **cones**
  - see colours
  - best in bright light

how we see colour

... three types of cones:

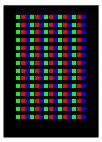
- ●red, ● green and ●blue!
- well nearly ...
  … like 3 radios tuned to different stations
- each type sensitive to a range of light frequencies
- eye compares 'response' of each kind
- each mix has same response as some pure colour
- 3 receptors => 3 dimensions of colour

rods and cones

- how many
  - more in the centre (fovea) than the edges
    => better central vision
- where they are
  - cones towards centre, rods towards edge
    => peripheral vision
    low-light, good at movement, black and white
- how fast
  - black and white faster (in brain) than colour

how computers do colour

- lots of spots of red, blue and green
- eye merges them to form colours
- like pointillist painting



- colours described using RGB
  - amount of each colour they have
  - e.g. #ff00ff = purple

variations

- different colour models:
  - HSI, CMYK, CIE
  - used for different purposes
- screen depth
  - number of bits used per pixel
    - 24 = 8 bits per colour (RGB) = 16 million colours
    - 32 as above, also 'alpha channel' (transparency)
    - 16 = 5 bits per colour = 'thousands of colours'
    - 8 too few to split, need designed palettes

palettes

- mapping:
  256 colours (8 bits) → selection of full (24 bit) RGB
- options:
  - application palettes (why funny things happen!)
  - system palette (slightly different between platforms)
  - 'web safe' colours
    - 6 colour levels for each RGB channel 6x6x6 = 216
    - combinations of hex 00,33,66,99,cc,ff
    - e.g. #cc3300, #0000ff, #999999

who it was

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see also
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