Intro to Multimedia

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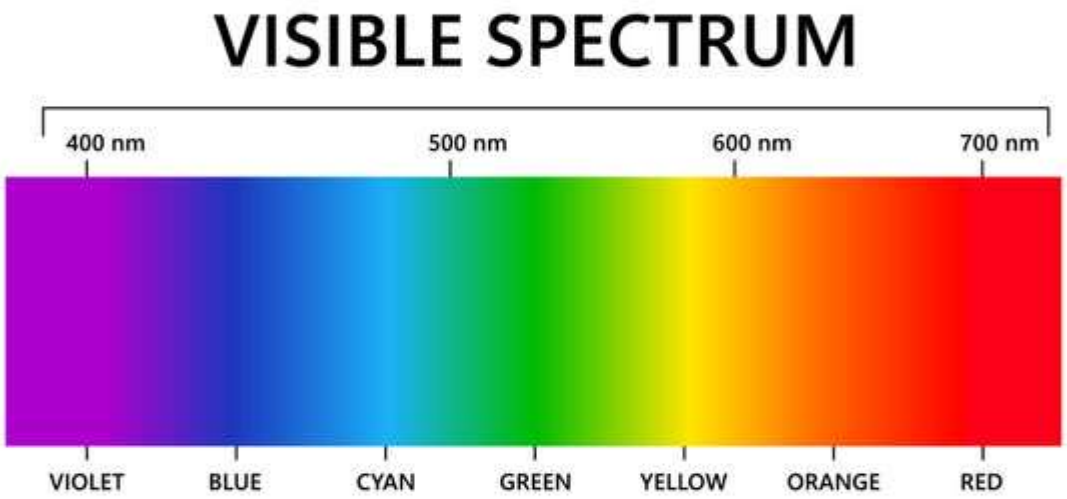
Visual Perception

Perception – The consciousness or awareness of objects or other data through the medium of senses.

Light is often measured in:

- Radiance (Watts) – Total energy emitted by the light source.
- Luminance (Lumens) – Light strength perceived by the Human eye.
- Brightness – Subjective measure of how bright an object appears.

Visible light is part of the Electromagnetic spectrum, and has a wavelength range of 400nm – 700nm, the colours we perceive on this spectrum range from blue – red.



This can be remembered with the acronym, ROYGBIV, each letter gives a colour on the spectrum, with the frequency increasing as you move through the letters, and the wavelength decreasing.

The Retina contains two forms of light receptors:

- Rods (roughly 120 million)
    - Detects shades of black and white
    - Present in peripheral vision
    - Can work in low light.
- Cones (roughly 6-7 million)
    - Sensitive to colour.
    - Mainly in central vision.

    - Only work in bright light.
    - Sensitive to three general bands of E.M radiation:
        - Red
        - Green
        - Blue

Humans are ***tri-chromatic***, meaning we respond to light in three bands. Rods work at around 498nm, meaning that the colour red interferes with them the least:

- Red – 564nm
- Green – 534nm
- Blue – 420nm

The colour sensors in the eye can become tired, and then struggle to pick up colour until they recover. This is why after-images occur, your colour sensors are stimulated and then that stimulation is removed, the other colour sensors detect more colour than the previously stimulated one, so the after image may appear a different colour from the actual image.

Active displays emit combinations of red, green, and blue light.

Passive displays emit light by absorbing and reflecting certain wavelengths, they use the primary colours Cyan, Magenta, and Yellow, this is known as the subtractive colour system, as these colours absorb red, green, and blue respectively.

Colour Sensitivity

The eye is not equally sensitive to all colours, intensity is therefore a sum of the weighted RGB components. For any colour, the intensity is given by:

$$(R, G, B), \quad I = (0.299 \times R) + (0.587 \times G) + (0.114 \times B)$$

Colour Gamut – The ranges of colours that can be produced by a display.

SVG

SVG is an XML based method of drawing graphics on the web (Scalable Vector Graphics).

- Can be slow compared to a JavaScript Canvas when lots of objects are involved.
- Supports animation, as does JavaScript and CSS, although there are certain benefits to using SVG animations.

Dynamic Web Pages

A Dynamic Web Page is a web page which contains content which changes automatically. This requires scripting, which may be either client or server side.

Multimedia Design

- Iterative design
    - Identify user needs.
    - Design a solution.
    - Prototype a solution.
    - Evaluate with real users.
- Interaction cycle
    - User evaluates and understands the display.
    - Formulates goals and generates an input.
    - Data model changes.
    - Display is updated.

Donald Norman identified two gulfs in a user's understanding of an application.

- Gulf of Evaluation
    - A user must be able to interpret what they see on the screen.
        - The text may be too small.
        - Colour contrast may make it difficult to see.
        - These are things that make an application more difficult to understand and evaluate.
- Gulf of Execution
    - This is when the user does not understand what sequence of inputs will give the desired output.
    - This might occur if for example the actions of buttons or entries are not clear.

Design Guidelines

You should:

- Be consistent in your use of
    - Size
    - Colour
    - Location
    - Wording
    - Sequencing and Order
    - Function
    - This is not only referring to consistency within your application, but consistency with other applications the user may have used.

Human memory is also an issue:

- 7 items +/- 2
- Short term memory only ~30 seconds
- Users should not be required to remember things about your application when being passed between pages.

So, we should:

- Avoid stacking tasks.
- Design the app for task closure.
- Focus on recognition rather than recall.

- Status indicators should be used, loading wheels for example.
- Text formatting
    - Only use two levels of intensity.
    - Use decorations like underlining.
    - No more than three fonts.
    - Serif fonts are easier to read but Sans-Serif looks more modern.
- Colours
    - No more than four colours per page, and 7 per application.
- Sound
    - Use harsh and soft audio tones for warnings and positive feedback respectively.
- The properties of objects should be as consistent as possible.