Cartography Lecture #4
Colours and Fonts in Maps

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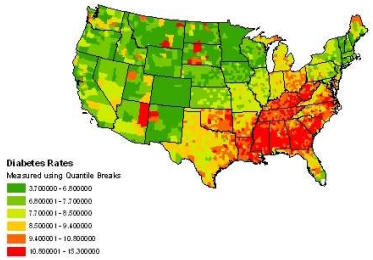
2023- Spring Semester

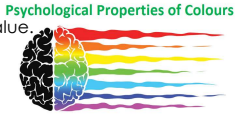
Map Design

The application of colour and fonts to the thematic map is one of the most exciting aspects of cartographic design, yet perhaps the least studied by cartographers.



Colours in Cartography:

1. Certain colour conventions guide the cartographer, especially in quantitative mapping such as on choropleth maps. Design strategies to achieve figure and ground, the proper degree of contrast, and colour harmony improve the use of colour on the thematic map.
2. Colour is produced by physical energy, but our reaction to it is psychological.
3. Colour has been found to have three dimensions: hue, saturation, and value.
4. Our perception of colour is influenced by its environment and by the subjective connotations we attach to colours.
5. Colour theorists may use either additive or subtractive colour theories and the colour models of HSV, RGB, CIE, CMYK, or the Munsell specifications.
6. Cartographic designers are aware that colours can function in certain ways in design.

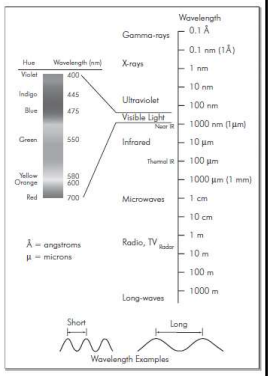


Problems in using colours in thematic maps

1. Two individuals may view the same colour but perceive it differently.
2. No standards or rules for colour use, except for a few conventions, exist for thematic maps.

LIGHT AND THE COLOR SPECTRUM

- The light that is either emitted by a source or reflected from an object.
- Light is that part of the electromagnetic energy spectrum that is visible to the human eye (as shown in the figure).
- This radiation spectrum is characterized by energy generated by the sun descending on us at different wavelengths. These wavelengths vary from very short (10^{-12} cm) to very long (10^{5} cm, or 1 km).
- All visible light comprises a very small portion of this spectrum and varies from 400 nm (nanometers—a billionth of a meter, or 10^{-9} meters) to about 700 nm.
- The composite of all visible light wavelengths is referred to as *white light* and is colourless.
- **Colour,** however, is simply light energy at different places along this visible light portion of the electromagnetic spectrum. When our eyes detect light energy at approximately 750 nm in wavelength, we see red; when we detect wavelengths at 350 nm, we see violet.

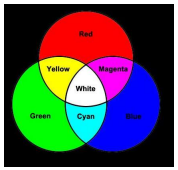


COLOR THEORIES

Depending on whether the map is viewed on-screen or printed, two prominent colour theories apply:

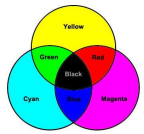
a. Additive colour theory

visible light is composed of a myriad of colours at various wavelengths, we consider white light to be made up of *three primary colours* —red, green, and blue (RGB)—



a. Subtractive colour theory.

The colour produced by printing is not based on the additive primaries of emitted light but on inks or pigments laid down on paper. These inks reduce the wavelength of the energy being reflected, thus subtracting the energy being absorbed by the ink and reflecting the remaining energy. For example, red ink absorbs the blues and greens and reflects the red to the reader's eye.



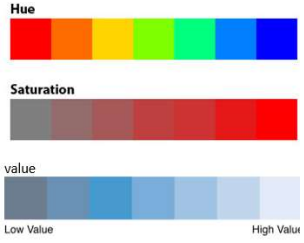
COMPONENTS OF COLOR

The components of a colour are essentially the same whether one is using additive or subtractive colour theories. The basic components of a colour are hue, saturation, and value.

a. Hue is the name we give to various colours: reds, greens, blues, browns, red oranges, and the like. Each hue has its own wavelength in the visible spectrum.

b. Saturation is also called *chroma, intensity,* or *purity.* This colour dimension can be thought of as the vividness of a colour

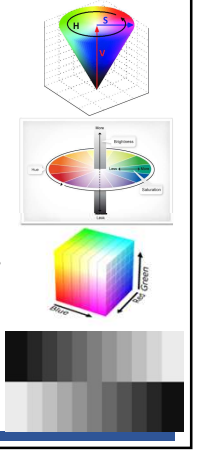
c. Value is the quality of *lightness* or *darkness* of achromatic shades and chromatic colours.



COLOR MODELS

The colour models that are applicable for designing maps for computer displays include, and required in designing maps, and that we apply the appropriate colour theory are :

- **HSV**: This model refers to the components of colour described above: hue, saturation, and value.
- **HSB and HSL**: Similar to the HSV. This type Included these two models are hue and saturation. The remaining components refer to brightness and lightness.
- **The RGB** colour model specifically relates to the **tristimulus values** components of additive colour theory. The colour models visualized using a R(red),G (green),and, B(blue) color cube.
- **Grayscale:** The grayscale uses an achromatic approach to presenting differences in shades of black. It is most applicably used for maps to be photocopied or printed in black and white on a laser printer or printing press.



COLOR IN CARTOGRAPHIC DESIGN

Thus, *structure, readability,* and the reader's *psychological reactions* can be affected using colour. Through the use of a variety of design strategies, several functional uses of colour can be achieved on the map, **The Functions of Colour in Design are summarized:**

1. Colour functions as a *simplifying* and *clarifying* agent. In this regard, colour can be useful in the development of figures and ground organization on the map. Colour can unify various map elements to serve the total organization of the planned communication.

2. Colour affects the general perceptibility of the map. Legibility, visual acuity, and clarity (of distinctiveness and difference) are especially important functional results of the use of colour.

3. Colour elicits subjective reactions to the map. People respond to colour, especially the hue dimension, with connotative and subjective overtones. Moods can be created with the use of colour.

Design Strategies for the Use of Colour

Map designers employ several strategies to use colour to its fullest potential in map communication.

1. **Developing Figure and Ground,** the figure and ground organization of the map can be enhanced using colour. Colour provides contrast—a necessary component in figure formation. The colour combination is useful in developing figure and ground organizations on thematic maps.

Figure Colors		Ground Colors
Yellow	Best	Black
White		Blue
Black		Orange
Black		Yellow
Orange		Black
Black		White
White		Red
Red		Yellow
Green		White
Orange		White
Red	Worst	Green

Source: Sharpe 1974, 107

2. **The Use of Colour Contrast,** Contrast is the most important design element in thematic mapping. The contrast in the employment of colour can lead to clarity, legibility, and better figure-ground development.

Design Strategies for the Use of Colour(cont..)

3. Colour Conventions in Mapping, Conventional uses of colour in mapping may be separated into qualitative and quantitative conventions:

a. Qualitative Conventions. Colours qualitatively used on maps are those applied to lines, areas, or symbols that show nominal or ordinal information, not amount, as follows:

1. Blue for water
2. Red with warm and blue with cool temperature, as in climatic and ocean representations
3. Yellow and tans for dry and little vegetation
4. Brown for land surfaces (representation of uplands and contours)
5. Green for lush and thick vegetation

b. Quantitative Conventions, The question of statistical graphics (including maps) became an issue at several of these.

Thank you