Map design and production

Map design and production

- maps can be produced easily through a wide range of online tools

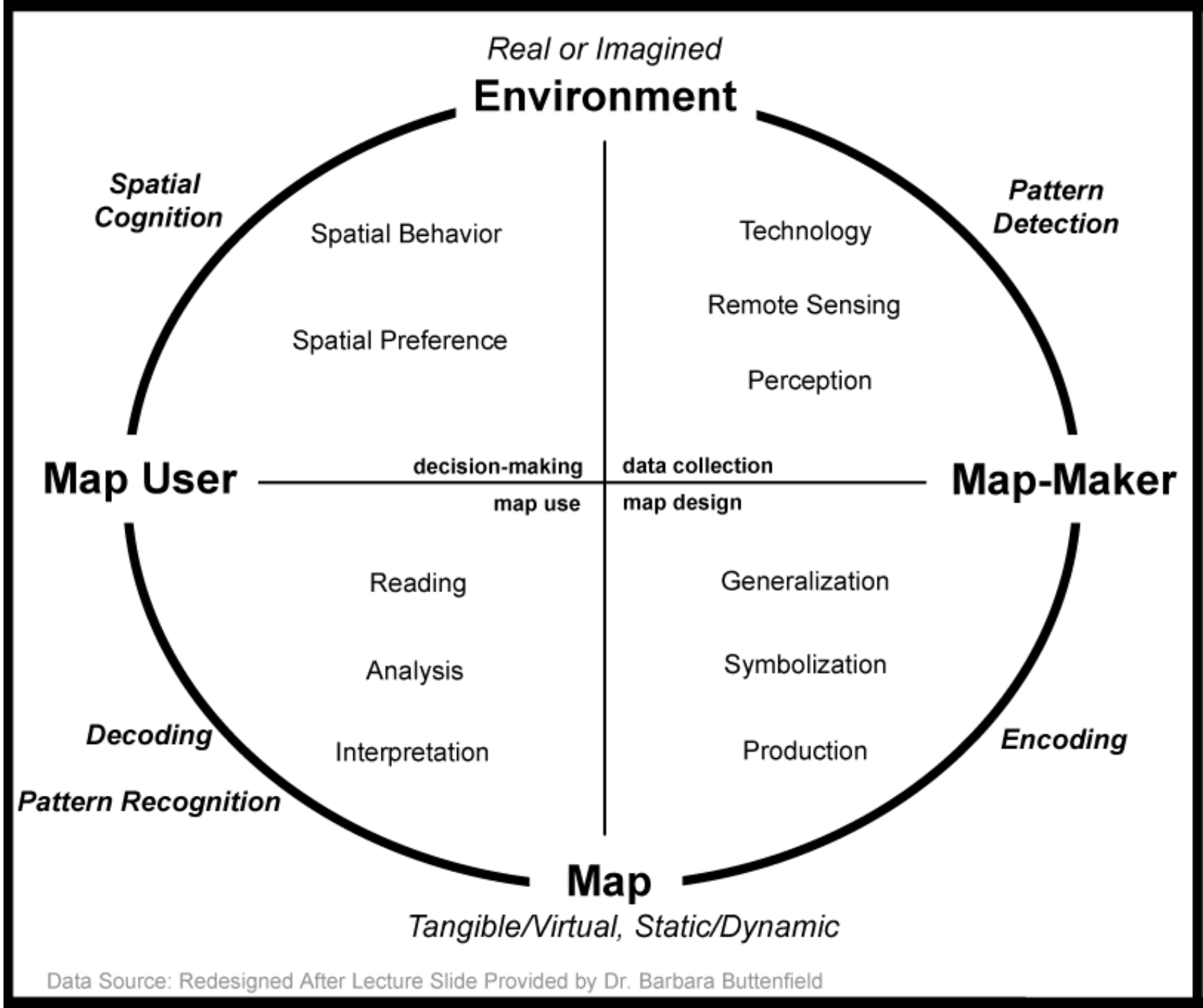
- Maps used in most activities
  - Such as urban planning,
  - through geological exploration
  - environmental management
  - to trip planning
  - and navigation

Purpose of map

- Design in cartography can be thought of as the set **of human decisions behind the map**

- **THE IMPORTANT CONSIDERATIONS IN MAP DESIGN**
- **Medium**. Many design decisions depend on how the map will be displayed, on paper or on a digital device
- **Audience and purpose.** What you intend to accomplish and for whom are huge drivers of map design (for an expert audience or for an expert audience)
- **Map-worthiness;** It's always important to think and important to your story. If not, consider other ways to visualize it, or simply provide a table
- **Interactivity**. A static map represents data at a snapshot in time. but could also be digital images on your computer or online.
- **Interactive** maps allow for user interaction, data exploration, and animation on a computer, phone, or tablet

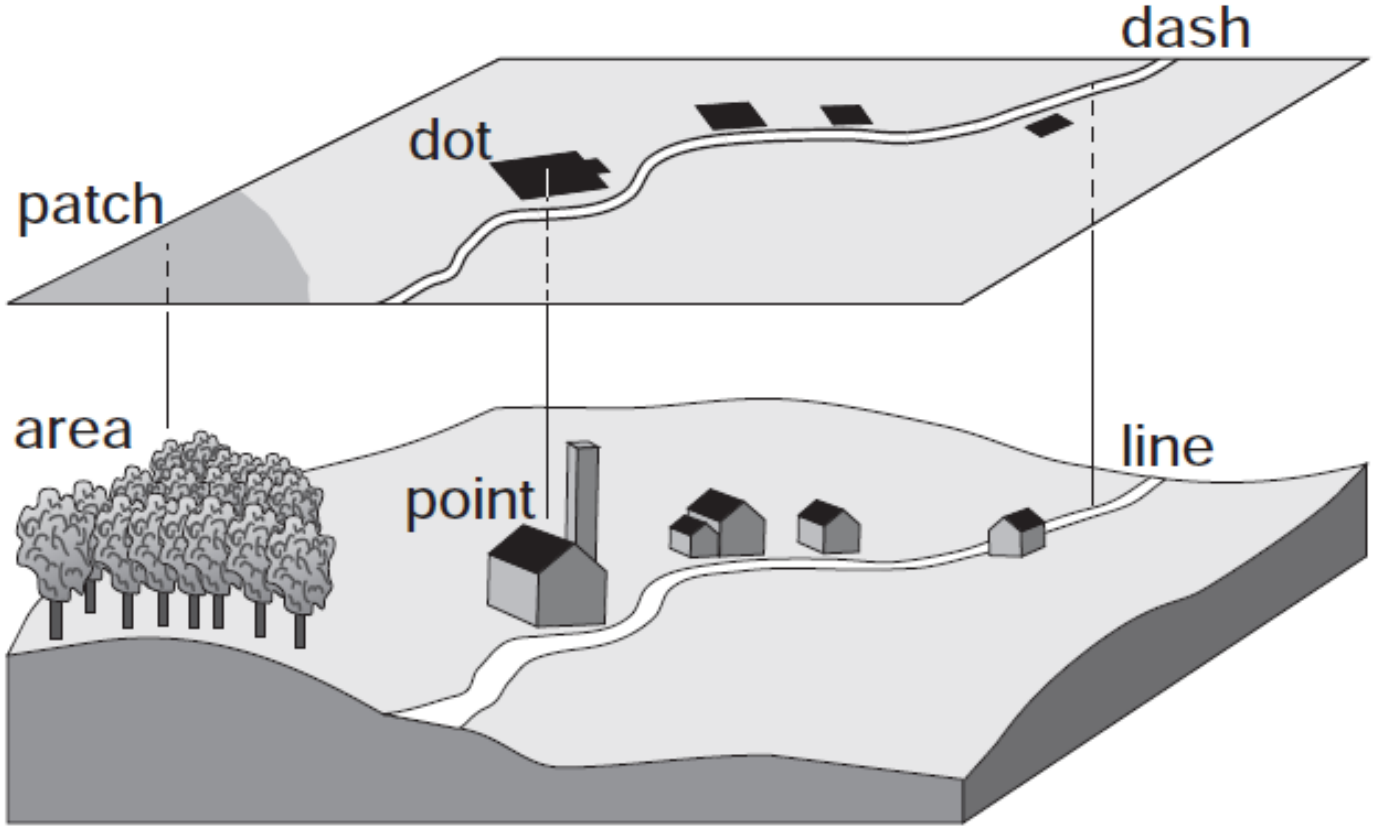
Map design and processes



Data Source: Redesigned After Lecture Slide Provided by Dr. Barbara Buttenfield

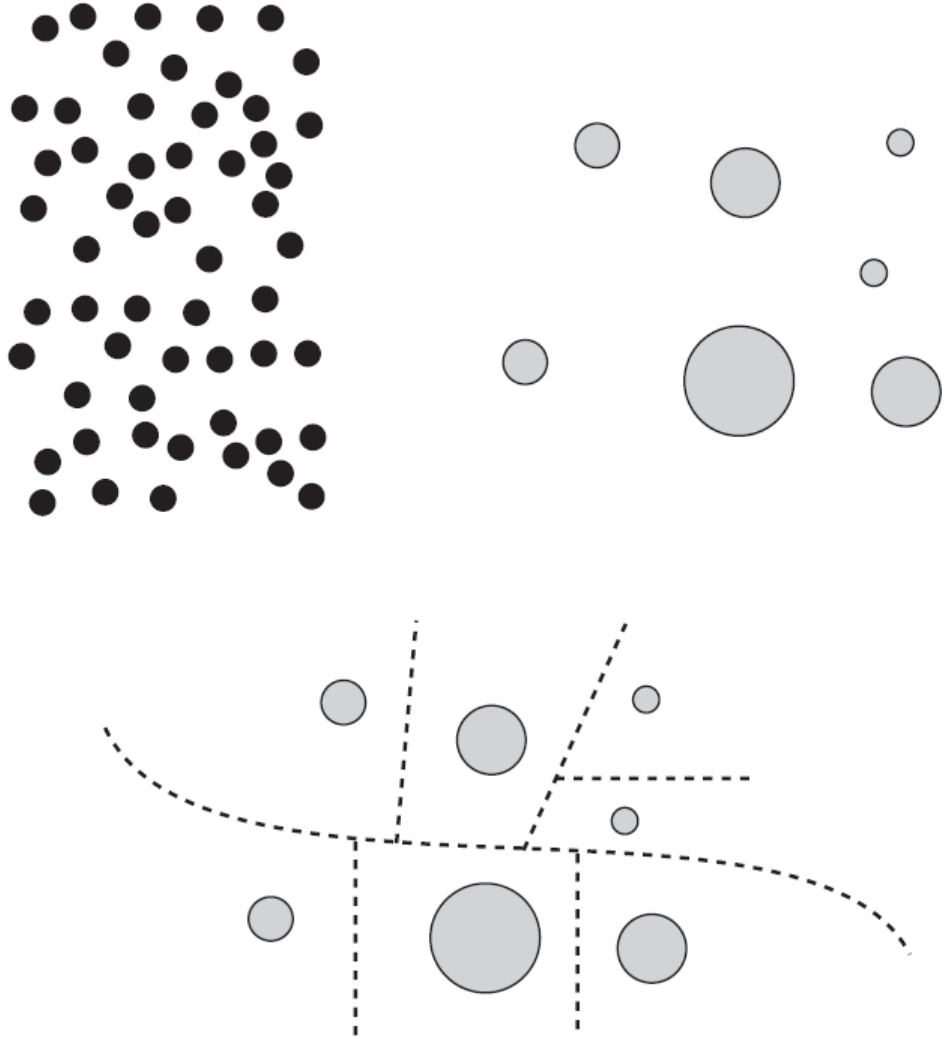
Symbols to portray data related to points, lines, areas and volumes

- The data that have to be visualized will always refer to objects or phenomena in reality



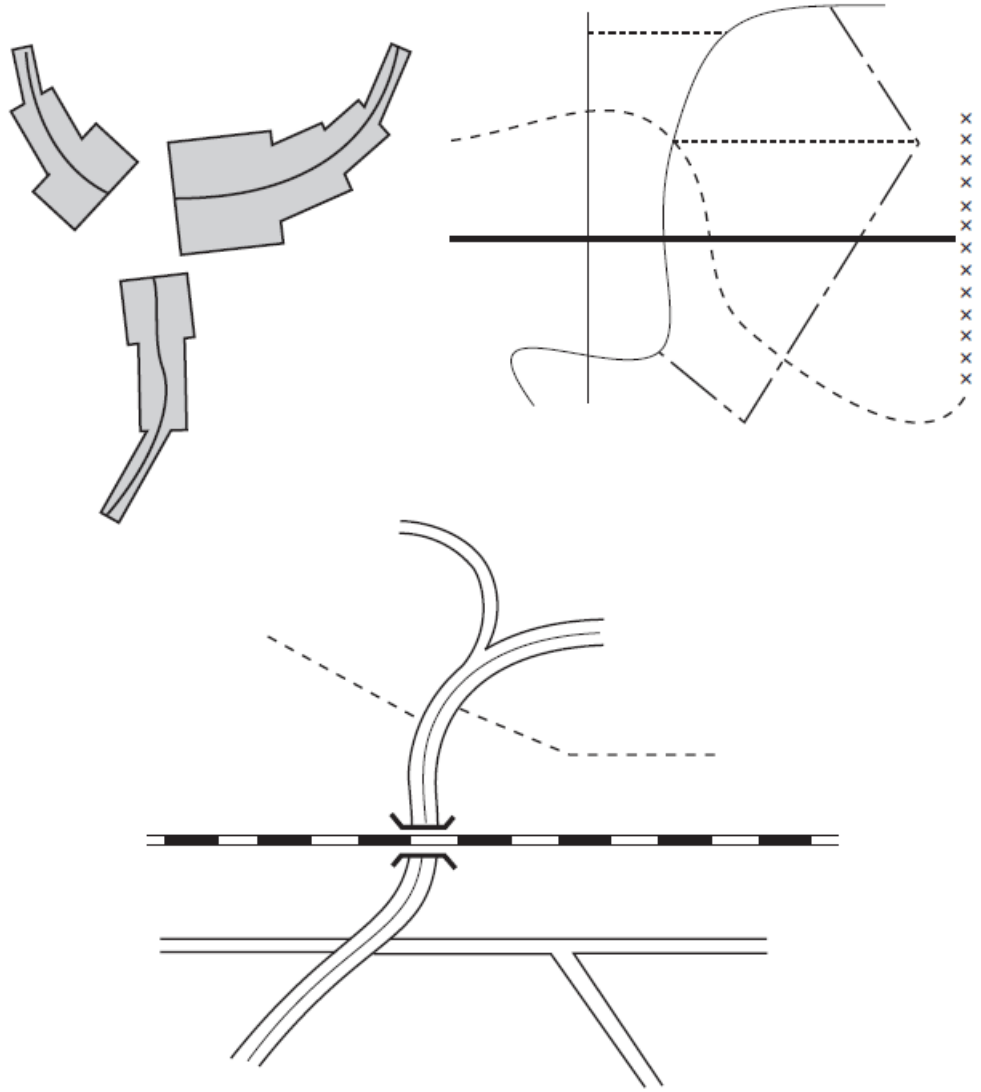
Symbols to portray data

- various kinds of point data: equal-sized dots, each denoting the same value (e.g. 10 inhabitants), dots that vary in size and thus represent different quantities for specific point locations
- enumeration areas.



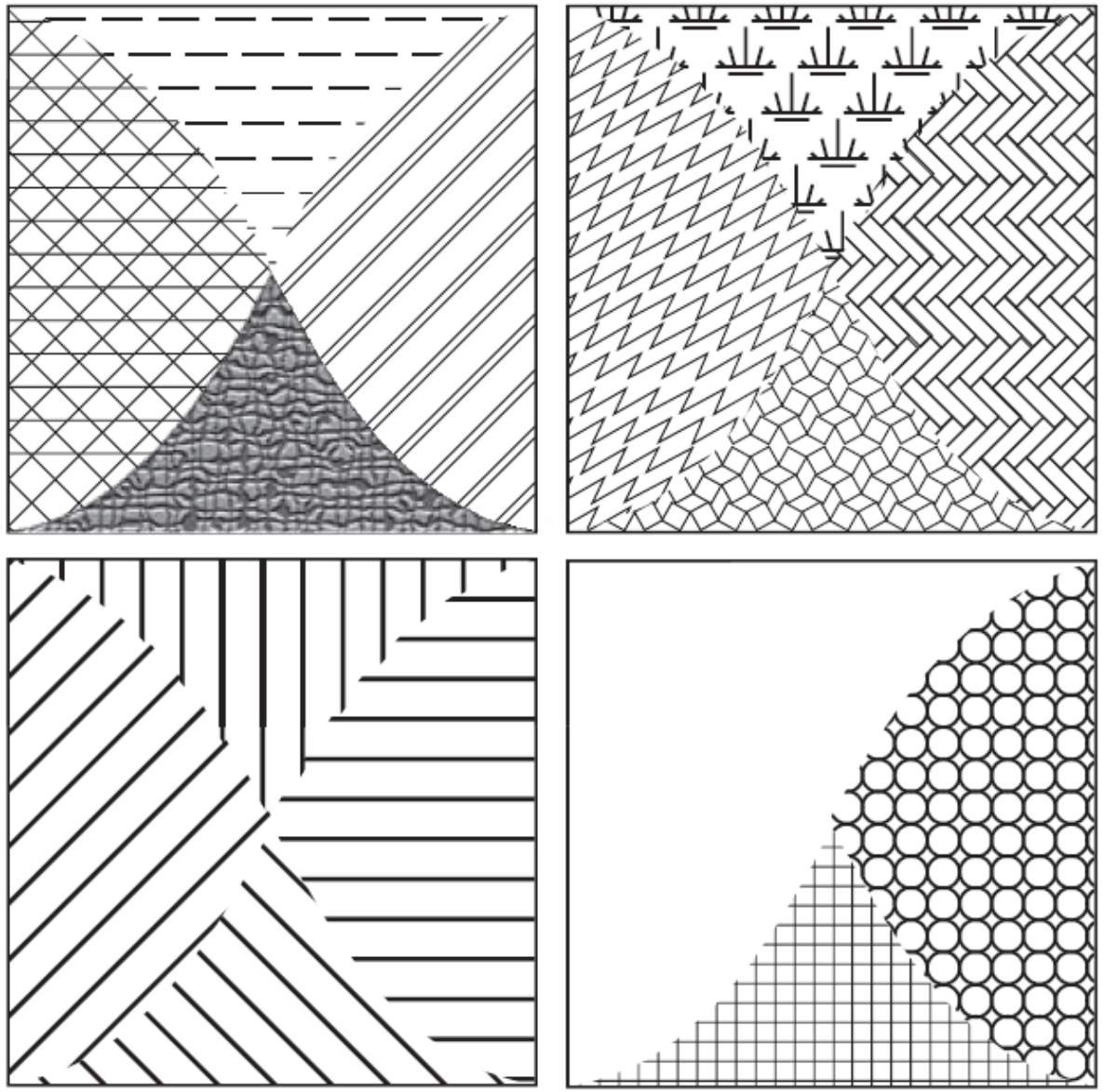
Symbols to portray data

- presents some dashes used to express various types of linear data: boundaries, roads and railways, flow lines proportional to the numbers of passengers transported



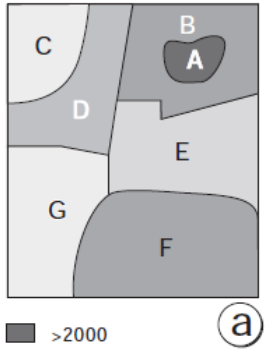
Symbols to portray data

- illustrates a number of polygons used for representing areal data:
- polygons that suggest qualitative or quantitative differences between the various areas concerned.

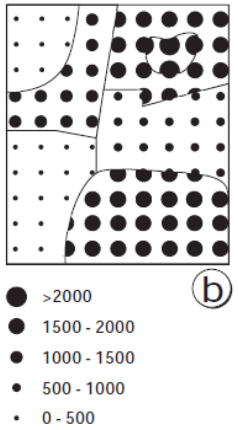


Graphic variables

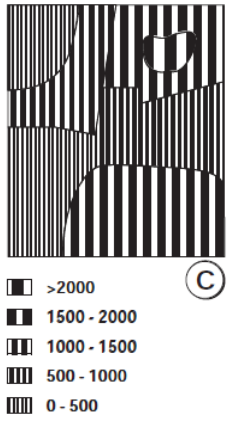
- **Graphic variables divided into four categories**
  - difference in numbers and ratios
  - difference in distance
  - difference in order
  - difference in quality.



- Difference in numbers and ratios
- the population density is rendered by grey tones



- Differences in order will be perceived from differences in symbol size
- from differences in grey value or lightness and from differences in texture
- Nominal or qualitative differences will be perceived from differences in color hue, shape or orientation.

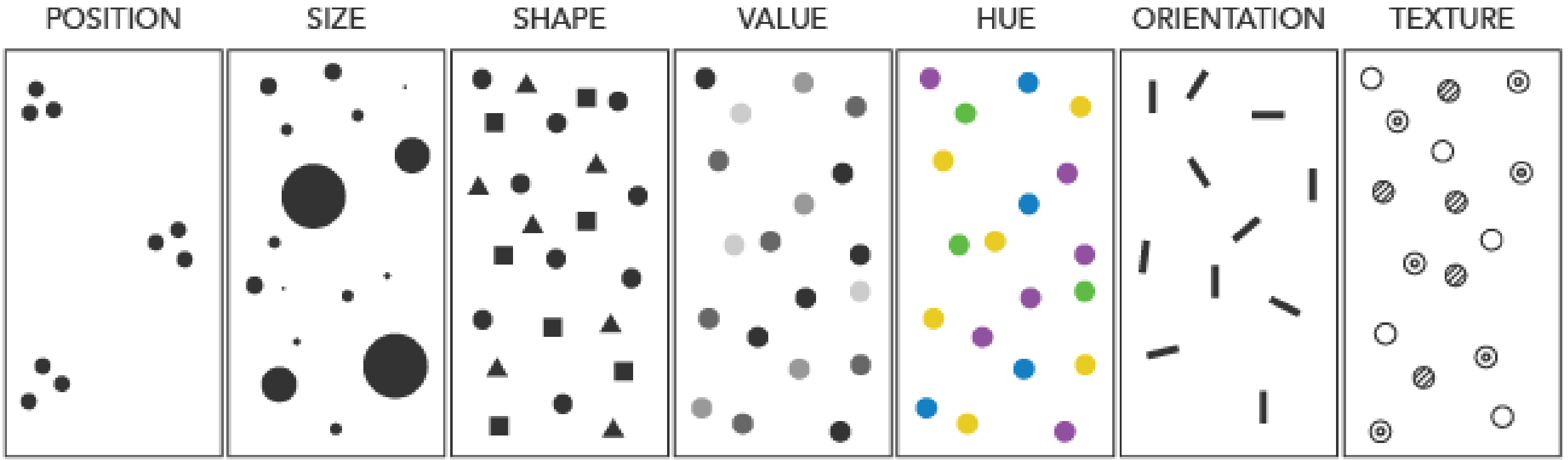


- In order for the symbol differences to be perceived as qualitative differences only

Cases of Graphic variables

- Differences in (symbol) size
- Differences in lightness or (colour) value (of the symbols)
- Differences in (symbol) grain or texture
- Difference in colour hue (of the symbols)
- Difference in orientation (of the symbols)
- Difference in (symbol) shape.

Bertin's Visual Variables Model



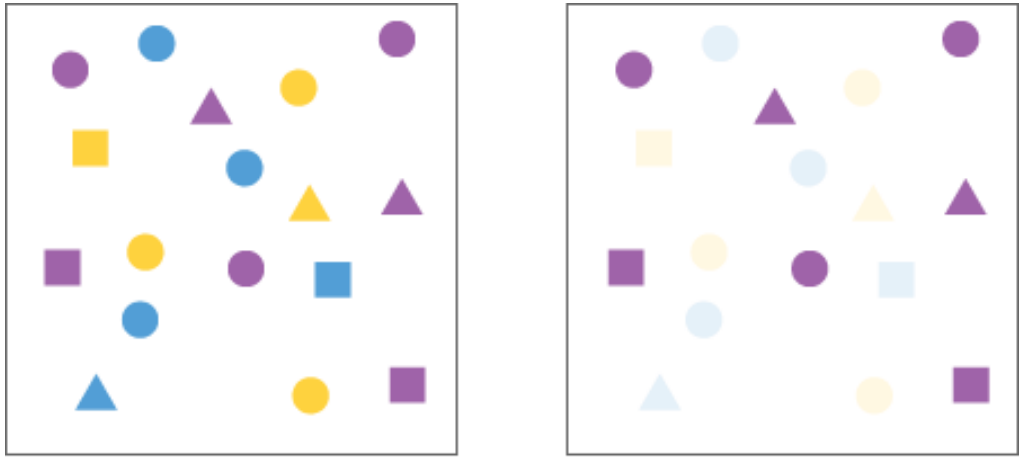
POSITION	SIZE	SHAPE	VALUE	HUE	ORIENTATION	TEXTURE
Selective Associative Ordered Quantitative	Selective Ordered Quantitative	Associative	Selective Ordered Quantitative	Selective Associative	Selective Associative (sometimes)	Selective Associative Ordered (sometimes)

Properties of visual variables

1. A **selective** variable allows us to immediately isolate a group of signs based on a change in the variable.

We can quickly and easily perceive a group of symbols based on color hue, e.g., the yellow symbols appear as a group. Therefore hue is *selective*.

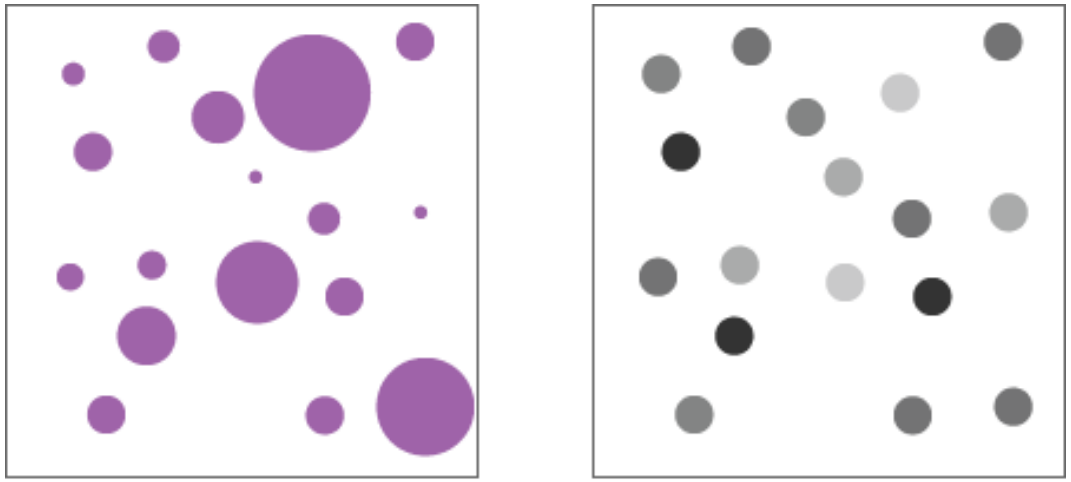
2. An **associative** variable allows grouping across changes in the variable



Symbols can be perceived as a group despite variation in shape, e.g., these similarly sized purple symbols appear as a group. Shape is therefore *associative*.

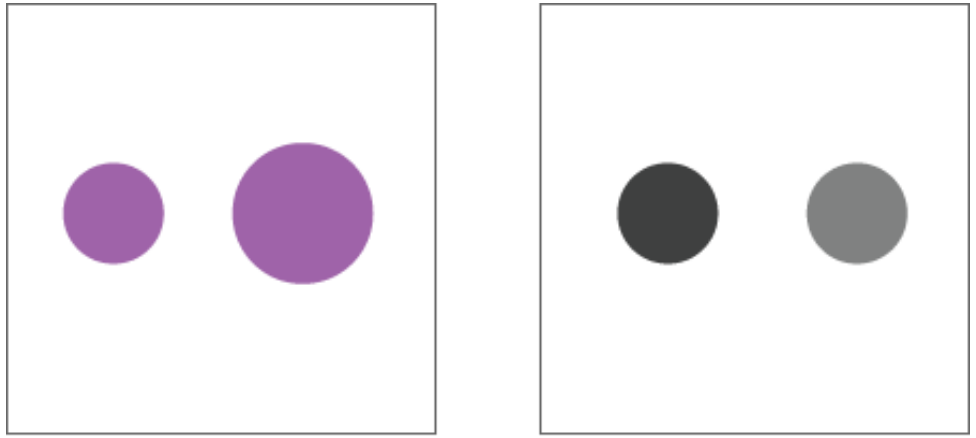
Properties of visual variables

3. **Ordered** variables have an immediately recognizable sequence.



With both size and value, it is immediately obvious that there is some sequence to the symbols (small to large, light to dark). Size and value or *ordered*.

4. **Quantitative** variables allow an estimation of the actual numerical difference between symbols.



We can see that one purple circle is about twice the size of the other, but can't similarly measure a difference in lightness. Size is *quantitative*.

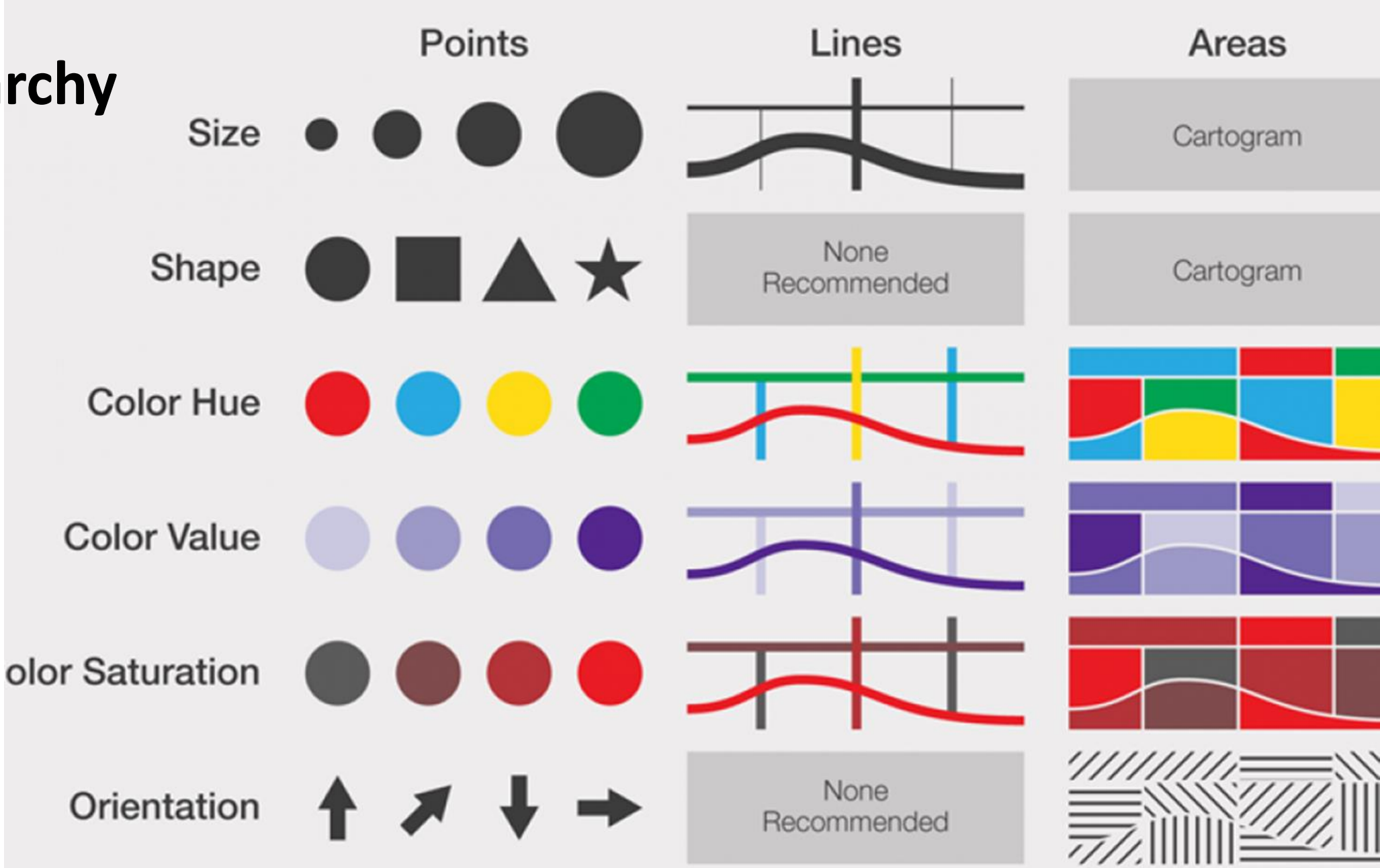
Visual hierarchy

- Cartographers use visual hierarchy to emphasize the more important parts of a map and de-emphasize the less important ones thereby creating a layering of information.

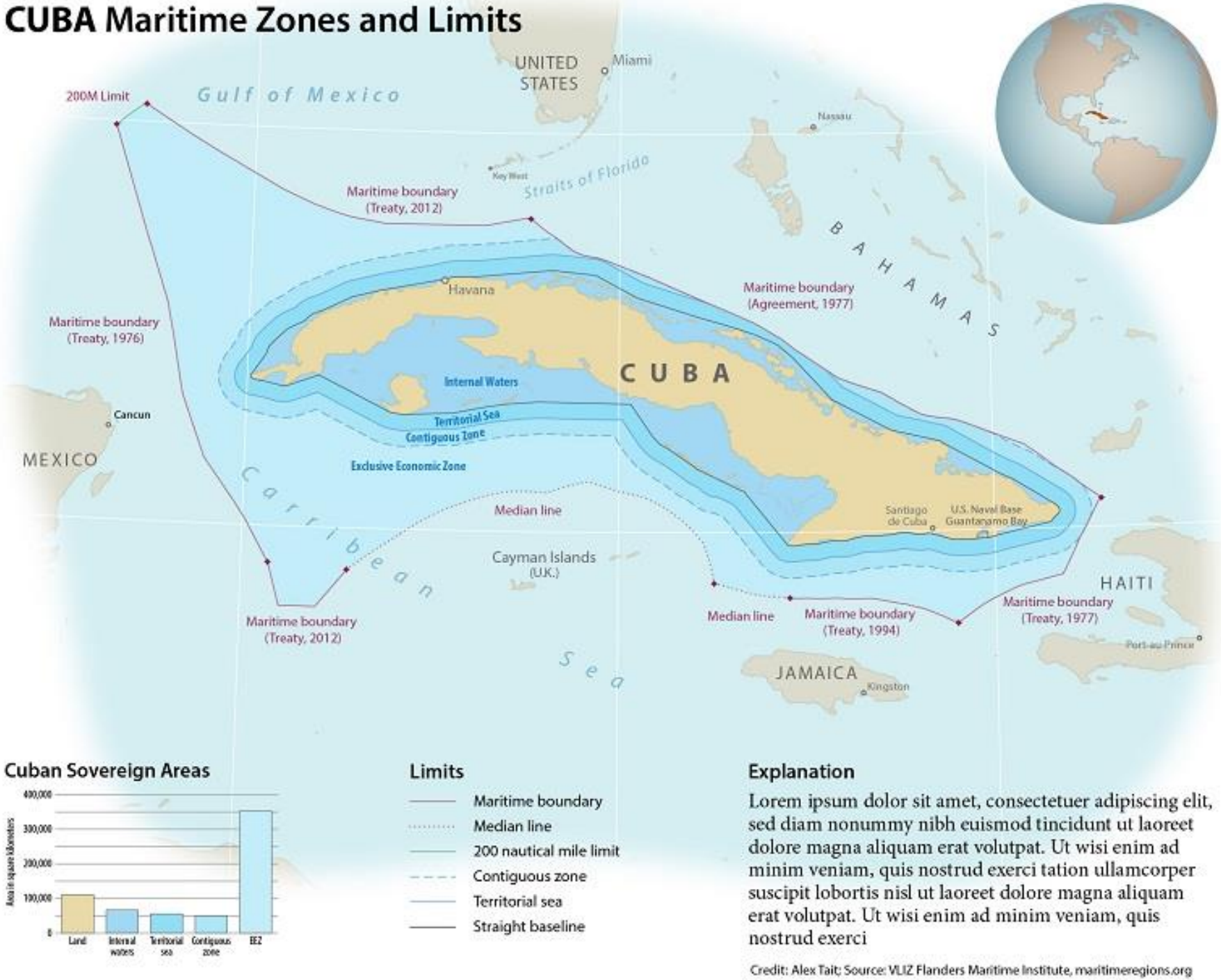
- visual hierarchy is the apparent order of importance of phenomena perceived by the human eye.

- As the viewer organizes the visual field, some objects naturally appear more important than others.

Visual hierarchy



Visual hierarchy



Visual Weight

- **Size**
  1. The size of a symbol is how much space it occupies
  2. This commonly refers to the area of point symbols
  3. Size differences are relatively easy to recognize
  4. making it a useful variable to convey information such as a quantitative amount of something, or relative importance

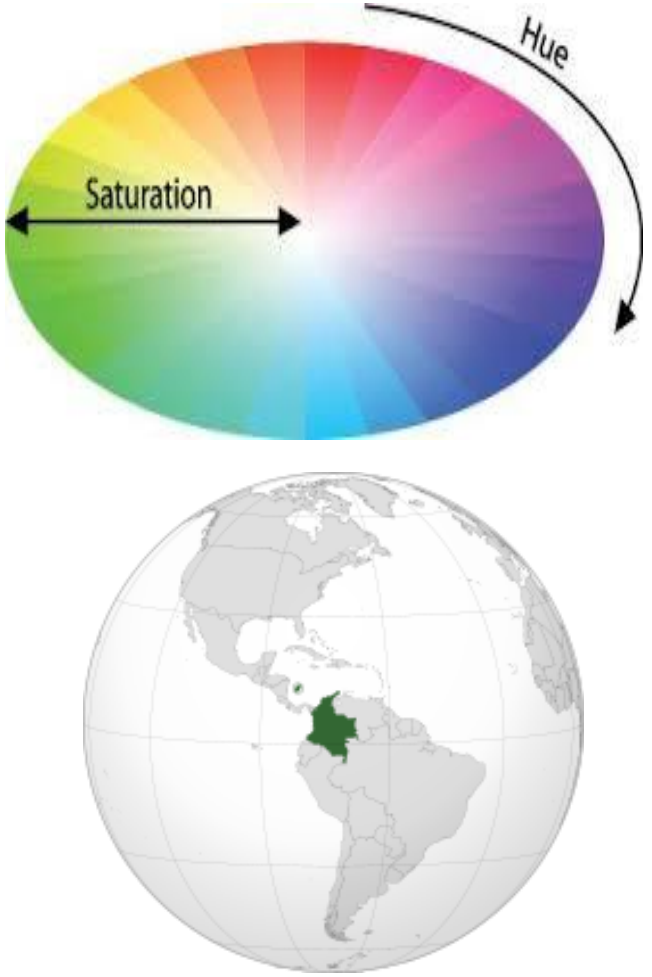
National Park standard point symbols, using shape to represent different types of facilities, a nominal variable.

- **Shape**
  - A shape is a simple design that is used to symbolize an attribute on a map
  - Shape is most commonly attached to point features in maps
  - Some shapes are simple in nature and thus are more abstract

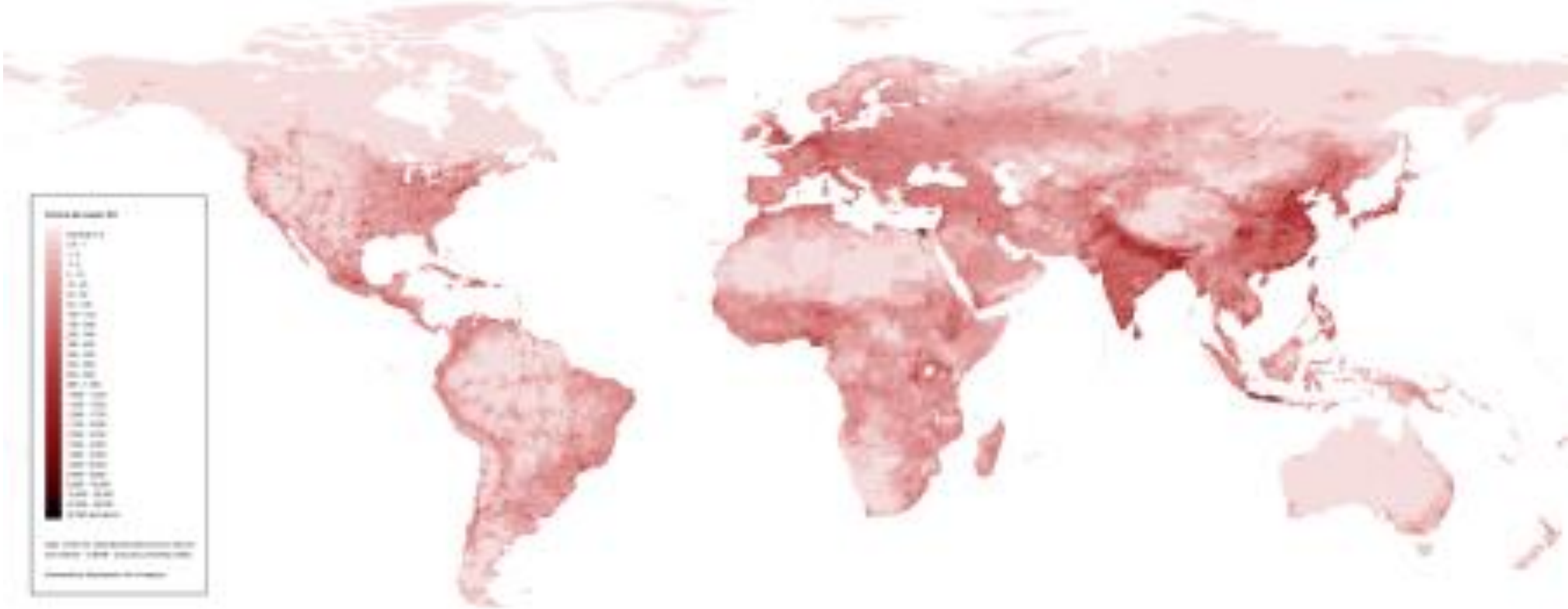
Visual Weight

- **Color: hue**
  - Hue is the visual perceptual property corresponding in humans to the categories called red, green, blue
  - use hue to differentiate categories of nominal variables such as land cover types or geologic layers
  - Hue is also often used for its psychological connotations, such as **red implying heat or danger** and **blue implying cold or water.**

- **Color: value/lightness**
  - The **saturation** of a color is its purity or intensity,
  - t is very effective at establishing figure-ground and visual hierarchy, with bright colors generally standing out more than muted tones or shades of gray.



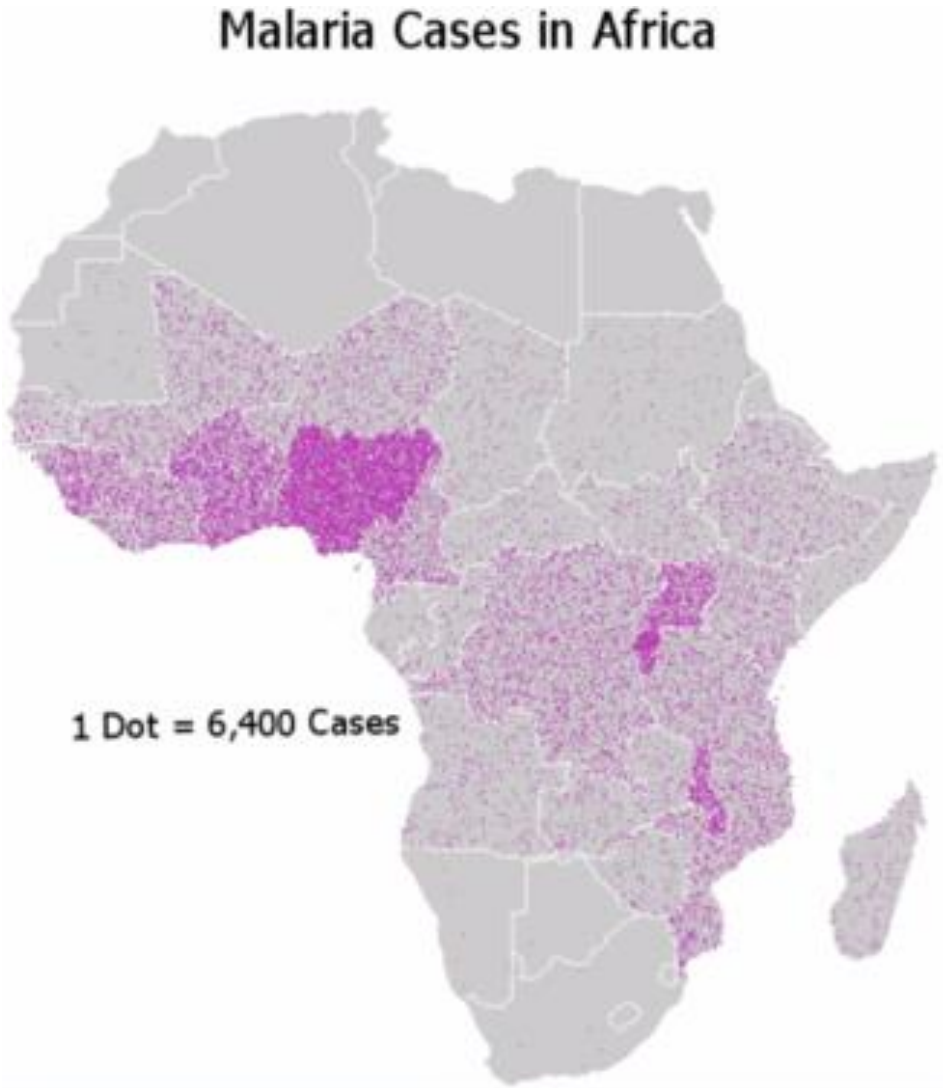
The synergy of Saturation (color vs. gray), value (dark vs. light), and position (centrality) to strongly establish figure-ground and visual hierarchy



Population density (a ratio-level variable) represented as color value, with an intuitive correspondence (i.e., dark looks like more people). Value also establishes figure-ground (color vs. white). Hue does not carry information here, but serves an aesthetic purpose.

Visual Weight

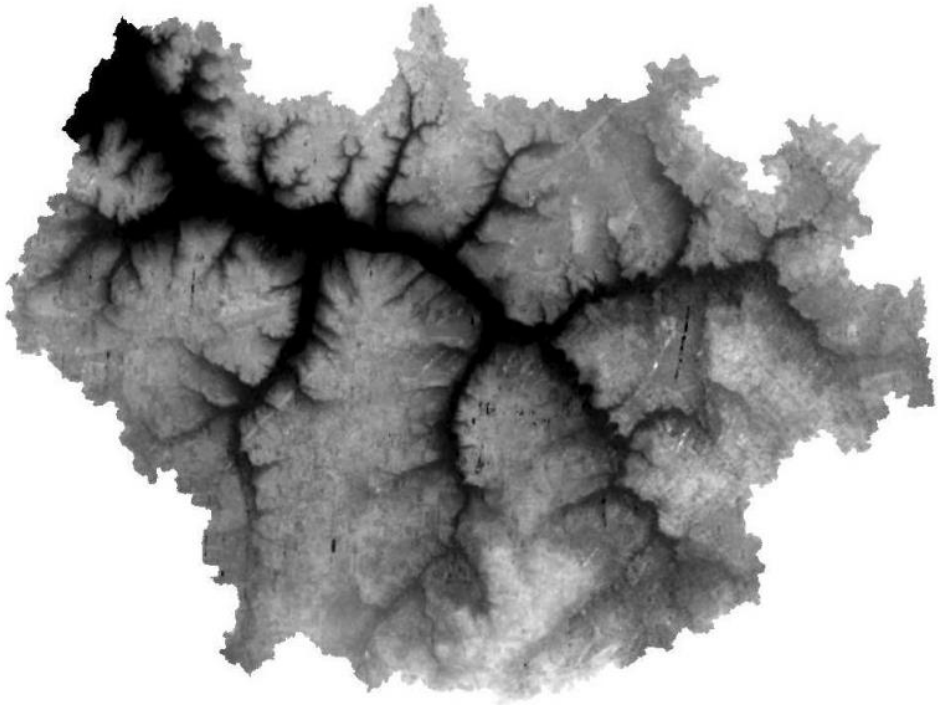
- **Pattern/Texture**
  - The amount of white space between the sub-symbols in the pattern.

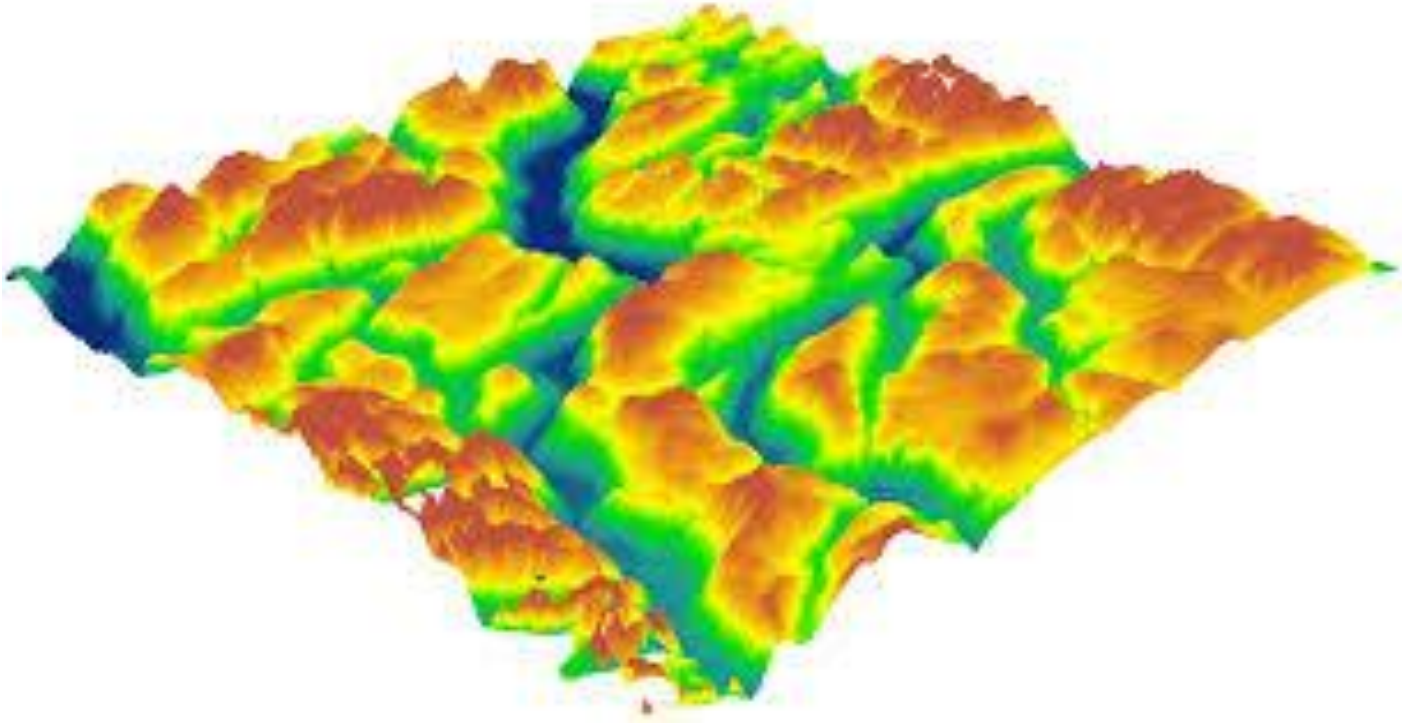


texture (dot density) representing disease incidence (a ratio or count-level variable), which gives the appearance of density. Also, saturation (color vs. gray) is used to create a visual hierarchy, and value (gray vs. white) establishes a figure-ground contrast for Africa.

Visual Weight

- **Height and Hue and value/lightness**
  - On three-dimensional perspective maps, it is common to extrude shapes in the z direction, so that height represents a property





Level	Distinction	Preferred Variables	Marginal Variables	Examples
Nominal	Same or different	Color Hue, Shape	Pattern Arrangement, Orientation	Owner, Facility type
Hierarchical	Degree of qualitative difference	Color Hue	Shape, Arrangement	Languages, Geologic formation
Ordinal	Order	Color value, Color saturation, Transparency, Crispness	Size, Height, Color Hue, Pattern Spacing	Socioeconomic status (rich, middle class, poor)
Interval	Amount of quantitative difference	Color value	Size, Color saturation, Opacity, Hue	Temperature, Year
Ratio	Proportional difference	Size, Height, Color value	Transparency, Pattern Spacing	Population growth rate, population density
Cyclical	Angular difference	Color hue, orientation		Day of the year, Aspect of terrain