

# SYMBOLISATION

*Generalisation:  
which / how many  
features we display..*

*Symbolisation:  
how to display them?*

General Goal:  
“easy and effective  
communication”

- based on design  
principles and common  
sense as much as rules



# Similar principles in traffic signs

## Effective easy communication



[www.doodlesandjots.com](http://www.doodlesandjots.com)





Road sign in Belorussia (next to historic church)

# Symbols: Visual Design Variables

**Shape:** the detail or outline of a point symbol

**Pattern:** regular repetition of shapes

*Texture:* variation of tones or lines

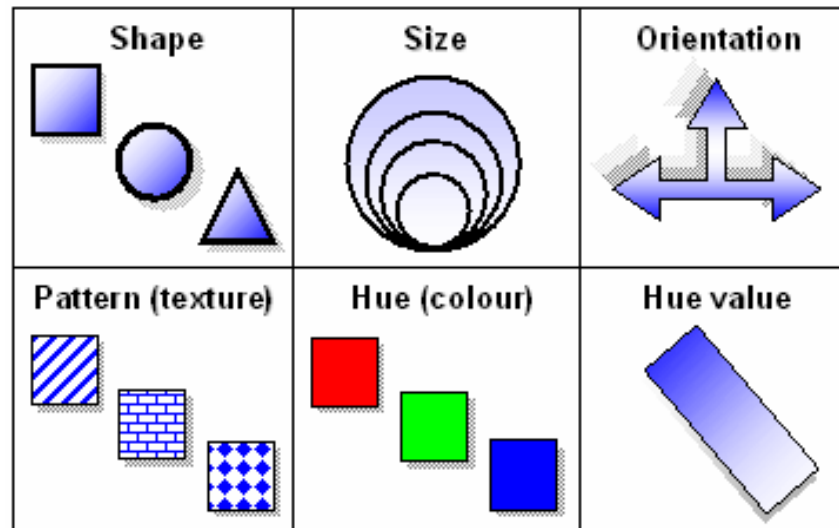
*Orientation:* direction of symbol element



















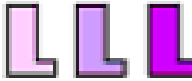



**Size:** size of a point, width of a line

**Tone:** shades of gray (% black)

**Colour:** hue, chroma and value

Visual Variables



	Point	Line	Area
Shape			
Pattern			
Texture			
Orientation			
Size			
Tone			
<u>Colour:</u>			
Hue			
Chroma			
Value			

**Weak variable**

**Very weak**

**Strongest variable**

# Visual Design Variables

**Colour:** has three 'dimensions'

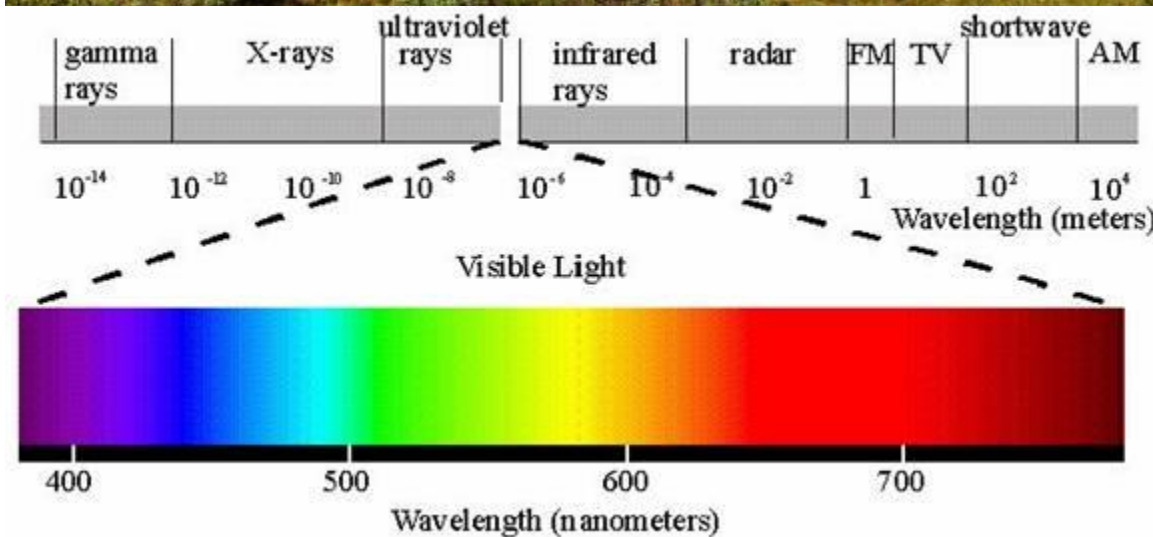
**hue** (wavelength): "the visual sensations from different wavelengths of light " e.g. red, blue

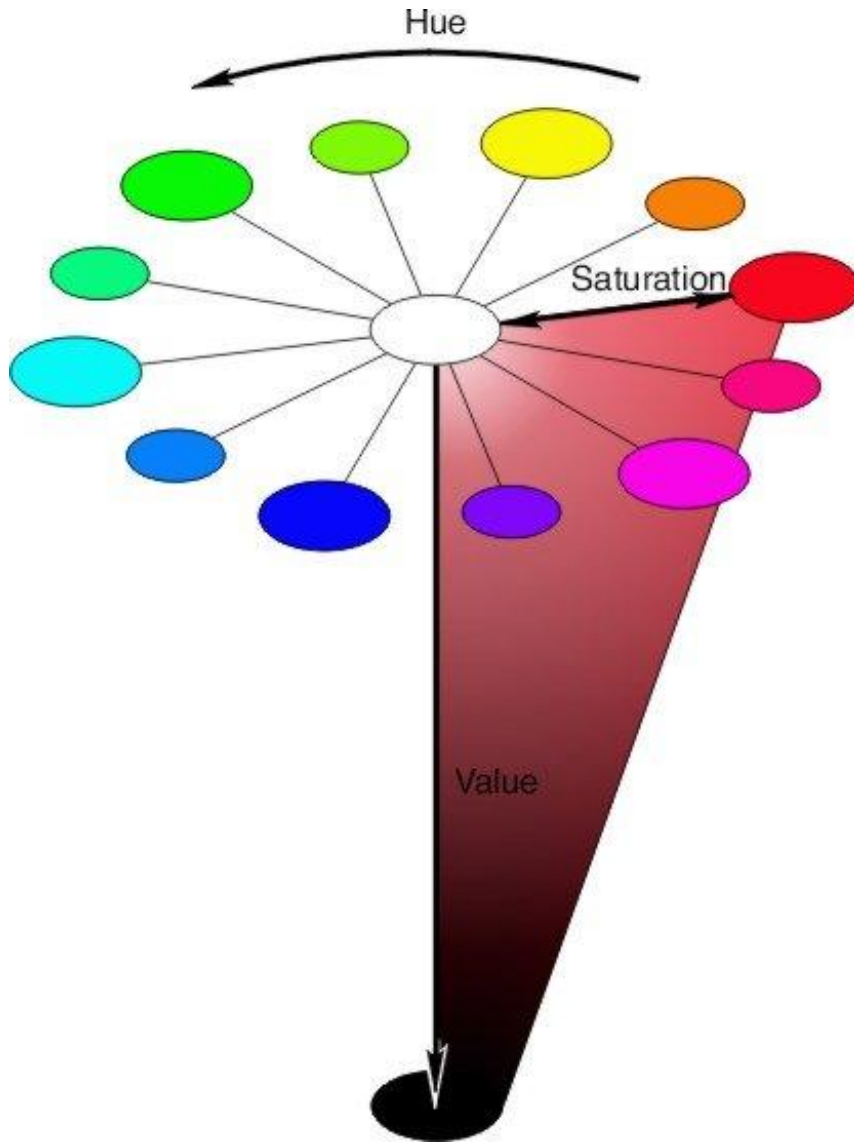
**chroma (saturation):** saturation or intensity = tints,  
e.g. pale v solid blue

**value** (intensity): lightness or darkness = shades,  
e.g. blue v blue/black



the longest wavelengths of light (red) are the least refracted





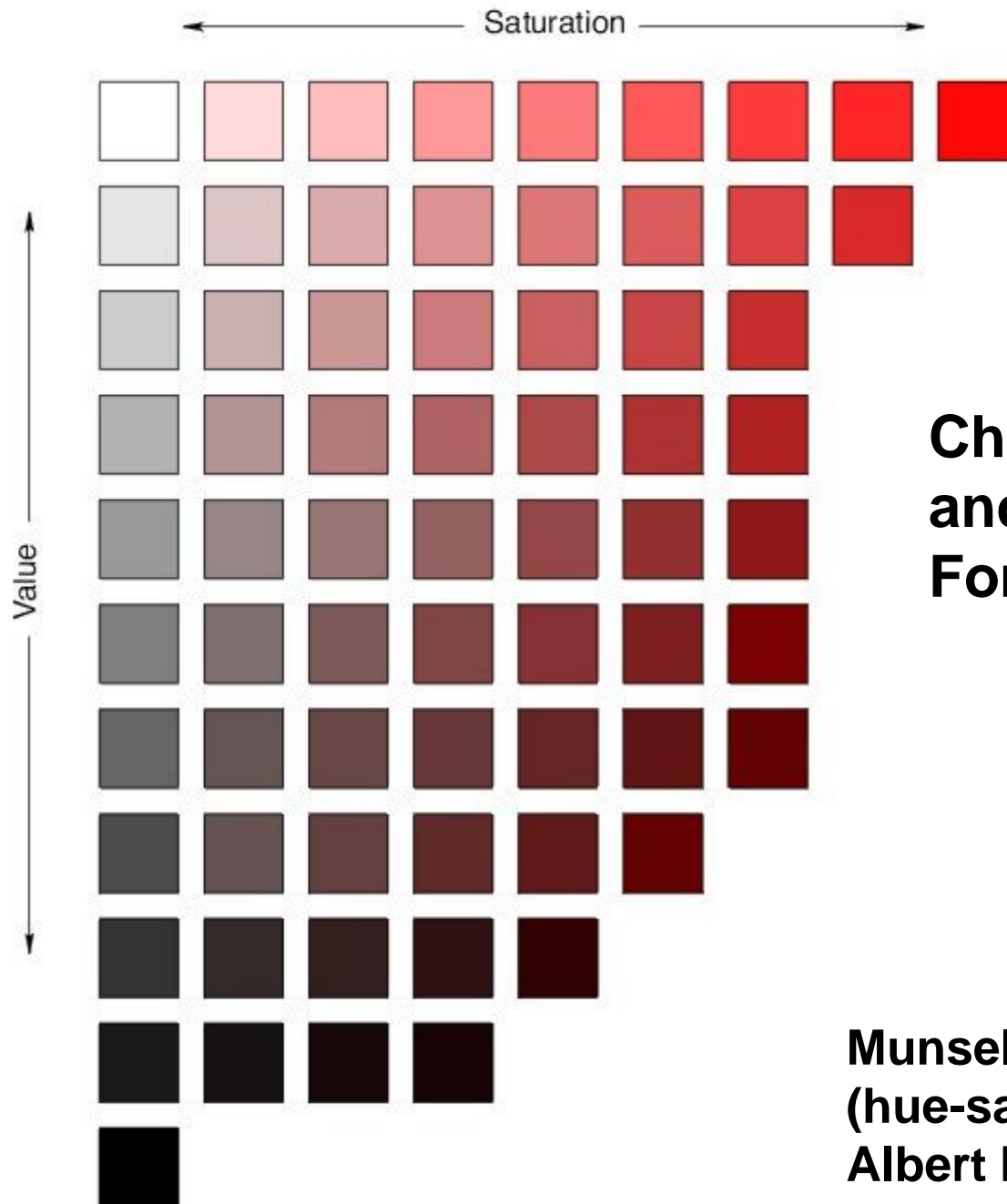
*hue* - basic visible colour,  
e.g. 12 step wheel (RGB mix)

Chroma - a colour's  
intensity or saturation.

*value* - relative  
lightness - darkness.  
Can be hard to see  
variations in value

<https://htmlcolorcodes.com/color-picker/>

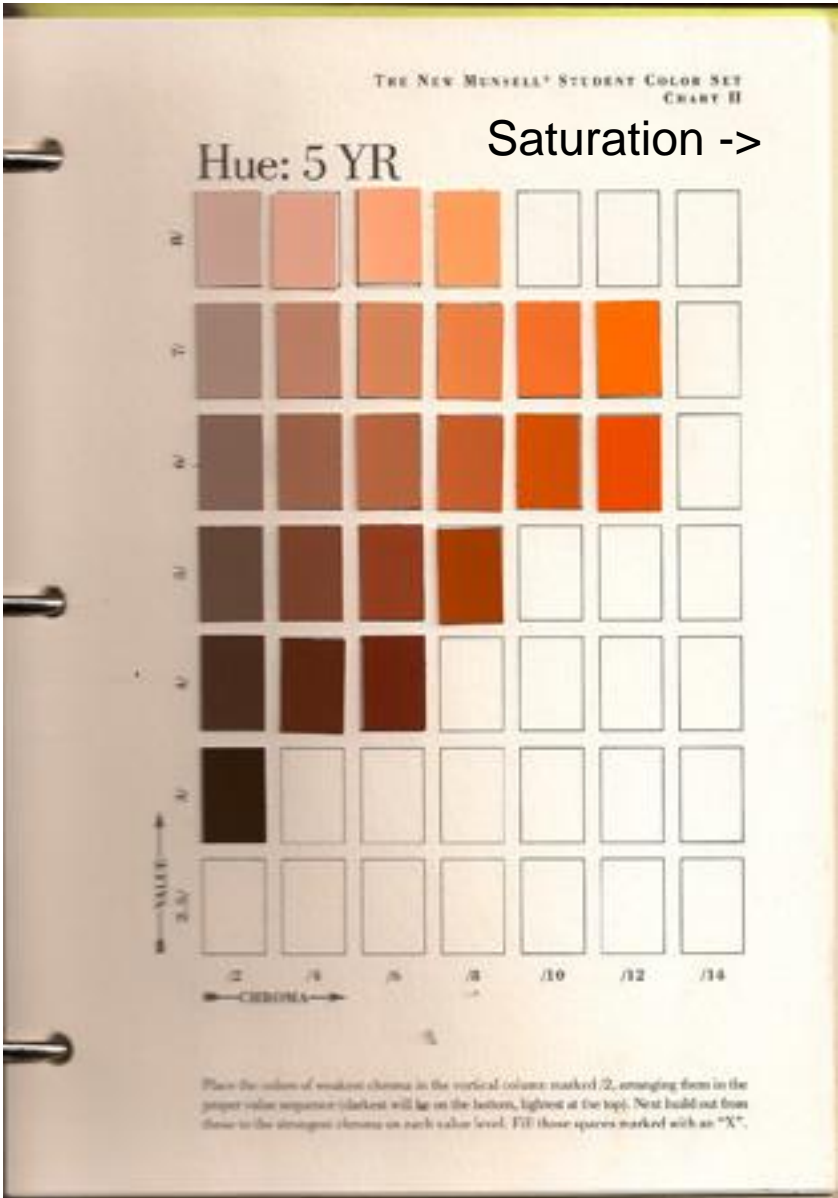




**Chroma / saturation  
and value / intensity  
For one hue (red)**

**Munsell soils color chart  
(hue-saturation-intensity)  
Albert Munsell, 1858 - 1918**

# Munsell color chart (hue-saturation-intensity) for soils - also used for beers



Color based on Standard Reference

SRM/Lovibond	Example	Beer color	EBC
2	Pale lager		4
3	German Pilsener		6
4	Pilsner Urquell		8
6			12
8	Weissbier		16
10	Bass pale ale		20
13			26
17	Dark lager		33
20			39
24			47
29	Porter		57
35	Stout		69
40			79
70	Imperial stout		138

# Design criteria: 1. 'Association'

*Symbols should be 'associated' with their features, physically or by function*

Vegetation



green

Contours



brown

*(except on ice ...)*

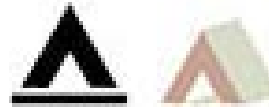
Battlefield



Winter sports



Camping



Railway line



# Taking association too far ?



One man's campaign to make football (soccer) signs more realistic :

... missing the point of generalization/symbolisation





# Point symbols

Are mostly based on Shape  
And also colour

Solid or open ?

Letters are not used much

- can be confused with place names except:

**H** Hospital

**P** Parking

**i** Information (or I ?)



Asterisk 3



Asterisk 4



School 1



School 2



Airplane



Airfield



Airport



Handicapped 1



Handicapped 2



Hospital 1



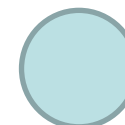
Hospital 2



Interstate HWY  
1



'Abstract': if space is limited





# Association - Lines

The interface displays a list of features and their associated line styles in a grid:

Feature	Line Style
Highway	Thick solid red line
Highway Ramp	Thin solid red line
Expressway	Thick solid green line
Expressway Ramp	Thin solid black line
Major Road	Thin solid black line
Arterial Street	Thin solid black line
Collector Street	Thin solid black line
Residential Street	Thin solid black line
Railroad	Thin solid black line with cross-ticks
River	Thin solid blue line
Boundary, National	Thick dashed black line
Boundary, State	Thick dashed black line

On the right side, there is a preview area showing a green line. Below it, the "Options" section includes:

- Color: A color selection box showing green.
- Width: A numeric input field set to 1.00.

At the bottom right, there are buttons for "Properties...", "More Symbols", "Save...", "Reset", "OK", and "Cancel".

Too big for  
most  
streams



Beware of  
defaults !

# Association - Lines

- 'permanent' physical features are shown as solid.

e.g. rivers, roads



- Less certain features are shown in broken lines.

e.g. intermittent streams, trails



- Administrative boundaries use a dot-dash pattern



# Areas (polygons) - output design

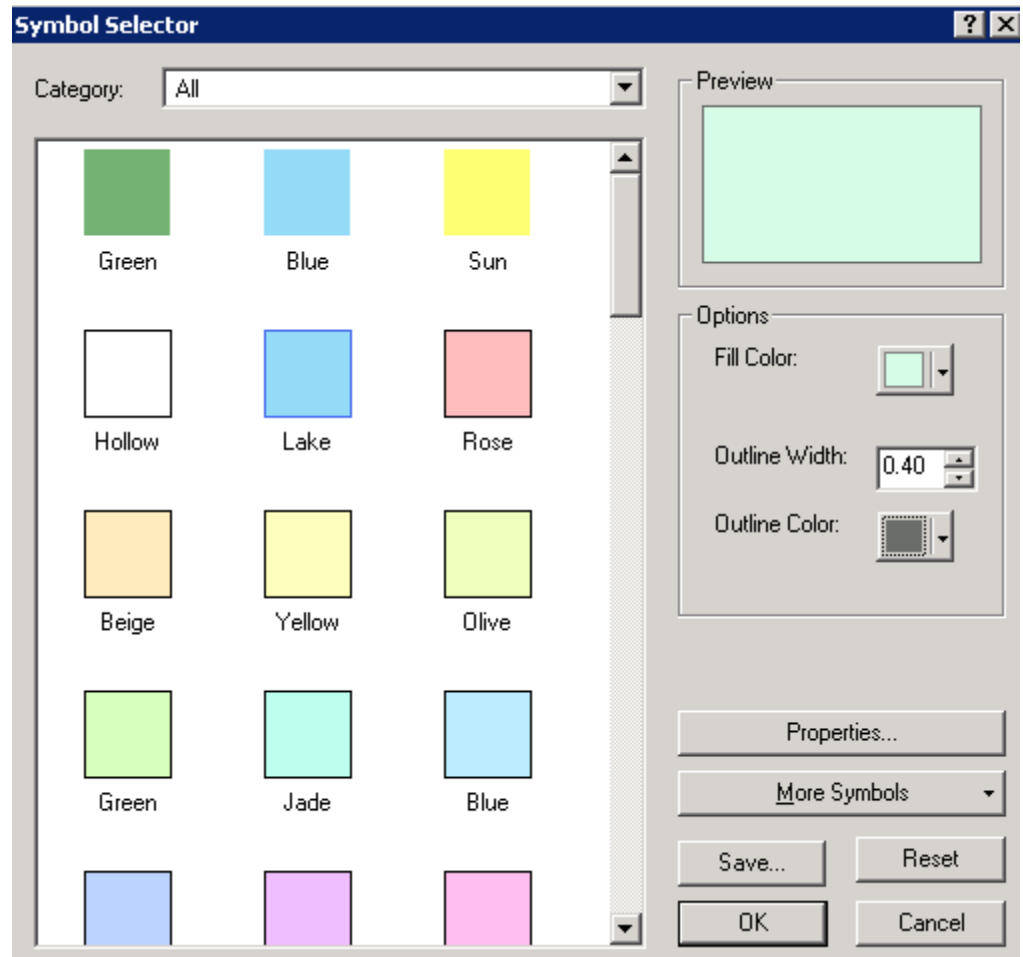
## Fill - colour, pattern

Colours should be associative

Avoid really solid colours  
(except for small areas)

















































## Outline ? - colour, width

- No polygon outline for  
'uncertain' boundaries



# More OK and ugly Esri polygon patterns – don't copy defaults ...

ESRI

							
Green	Blue	Sun	Hollow	Lake	Rose	Beige	Yellow
							
Olive	Green	Jade	Blue	Med Blue	Lilac	Violet	Grey
							
Orange	Coral	Pink	Tan	Lt Orange	Med Green	Med Yellow	100 Year Flood Overlay
							
500 Year Flood Overlay	Potential Flood Overlay	Biohazard Overlay	Chemical Overlay	Radiation Overlay	Poison Overlay	Noise Overlay	Historic Site
							
Cropland	Open Pasture	Orchard or Nursery	Vineyard	Scrub 1	Grassland	Scattered Trees 1	Sand
							
Water Intermittent	Reservoir	Wetlands	Swamp	Mangrove	Glacier	Snowfield/Ice	10% Simple hatch

Mostly avoid

# More notes on polygons / areas

Use of fill vs outline vs both depends on:  
**meaning / significance of area edge**

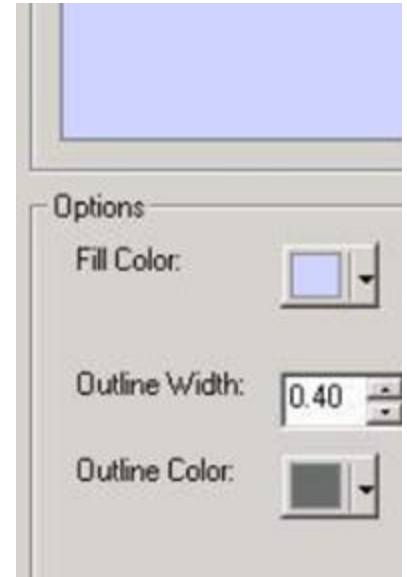
Rivers and lakes: outline (+ colour fill)

Park boundary: outline / no fill ?

Forest /vegetation: fill only (no outline)

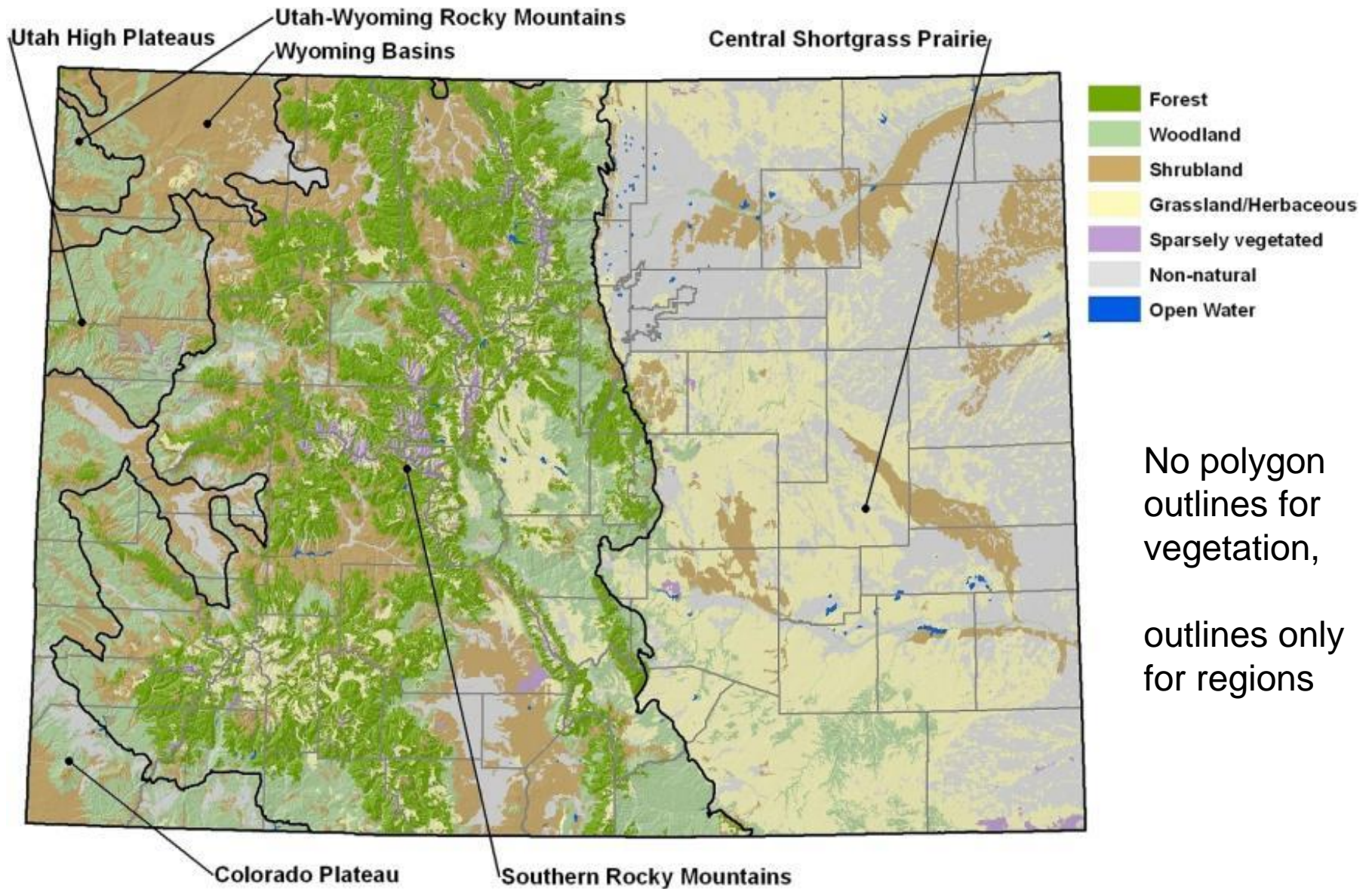
Size: small area - fill (+outline) maybe solid colours

large areas - outline only, light colours only

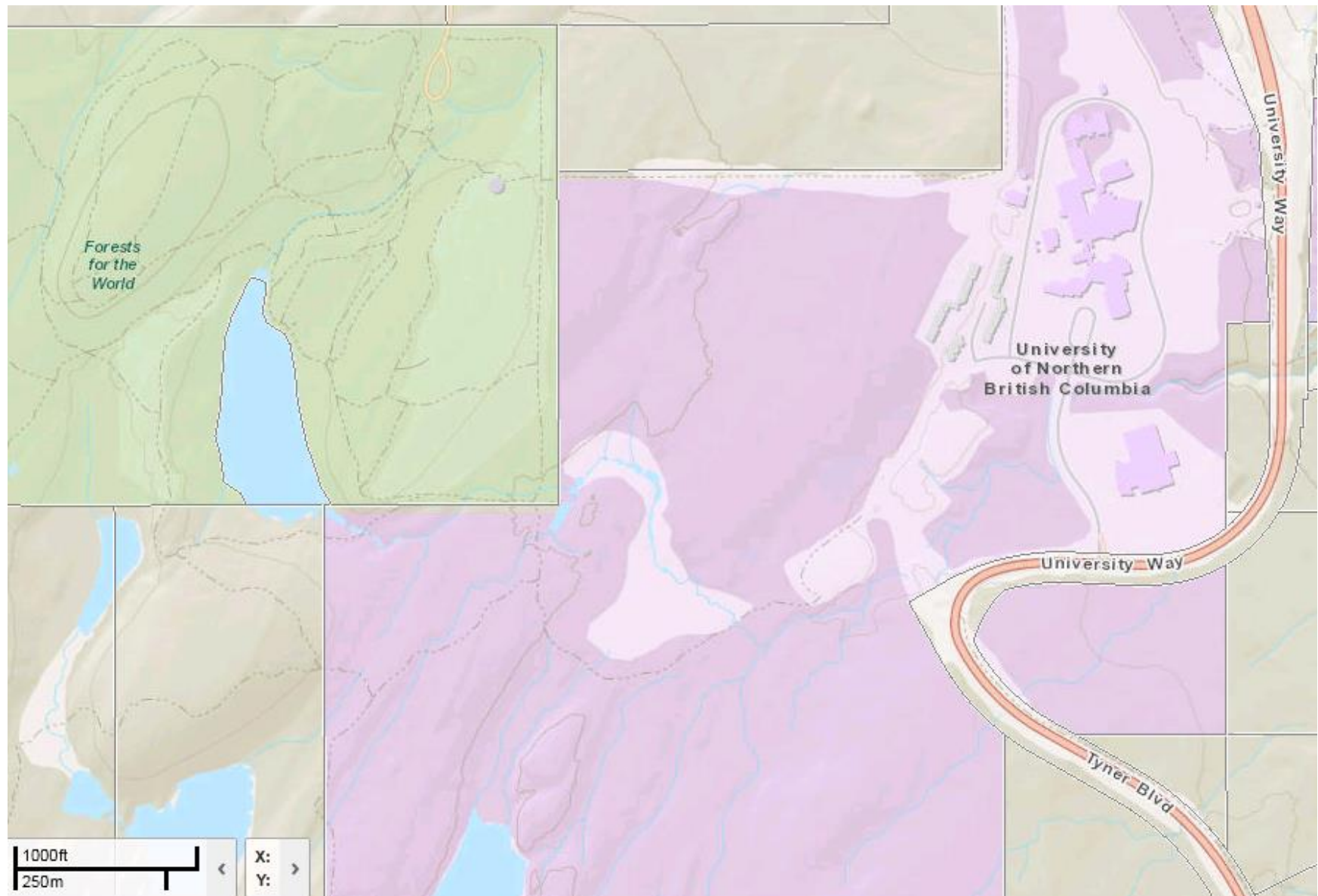




## Example 1



## Example 2: PGmap – use of area transparency – but outline only might be better



Boundaries are not marked – no signs or fences



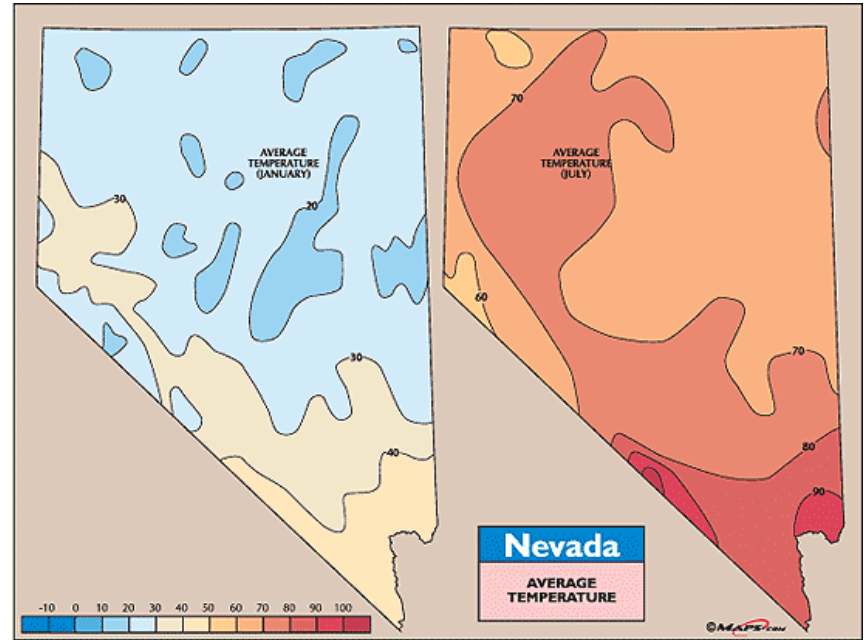
# Colour associations: physical and psychological

Yellow - sun, bright (cheery..) ;

Blue - water, calm, cool etc..

Red - heat, danger, blood ?

Green - vegetation, parks, recycling ?

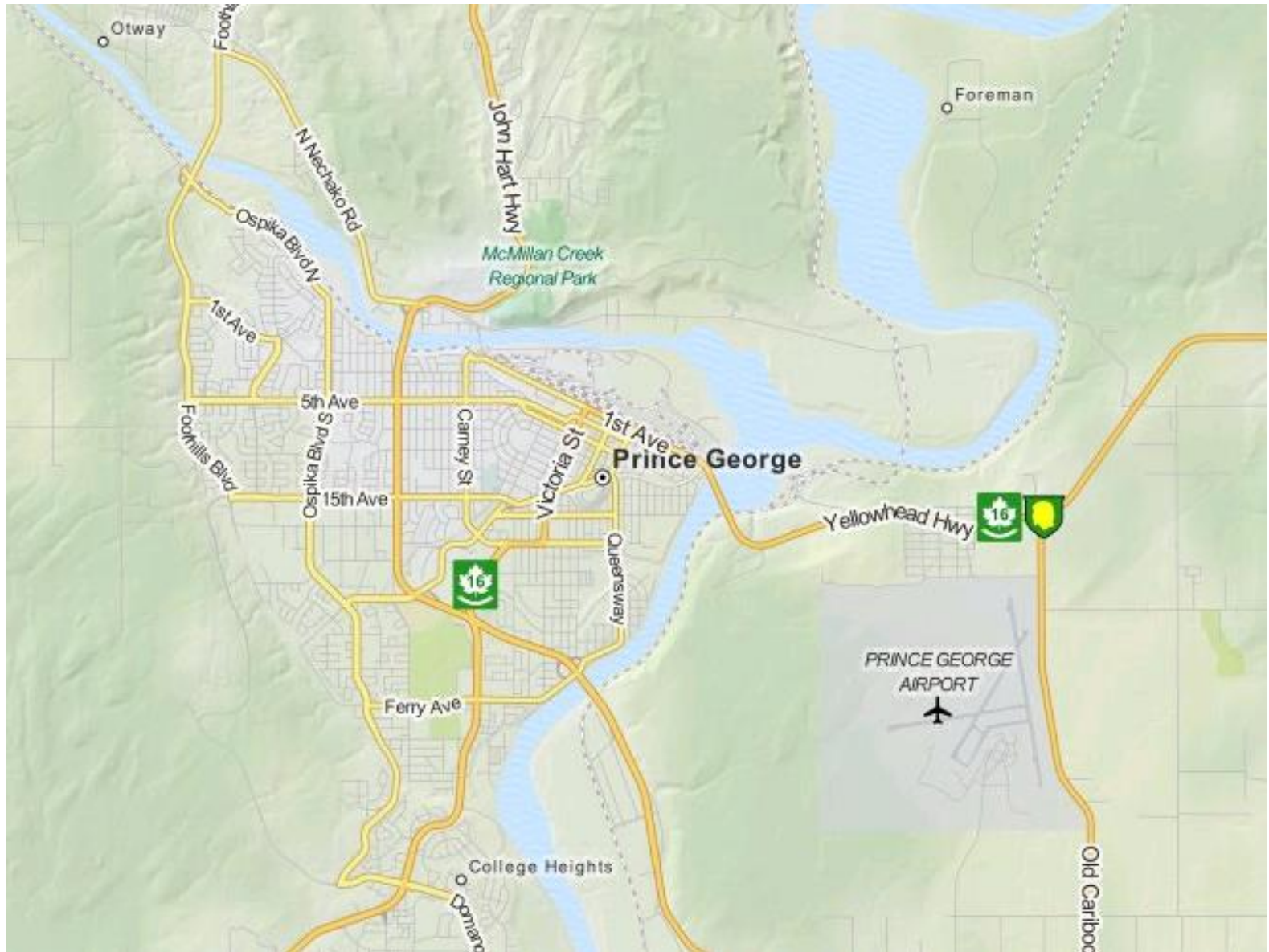


<http://visual.ly/meaning-colour-marketing>



# Association - size

larger / more important features e.g. road width



# Association

## Conventional symbols - e.g. topographic mapping

### Canada NTS conventions

**Green** – forest vegetation

**Red** – main roads

**Orange** - minor roads

**Black** – buildings

**Urban** – pink





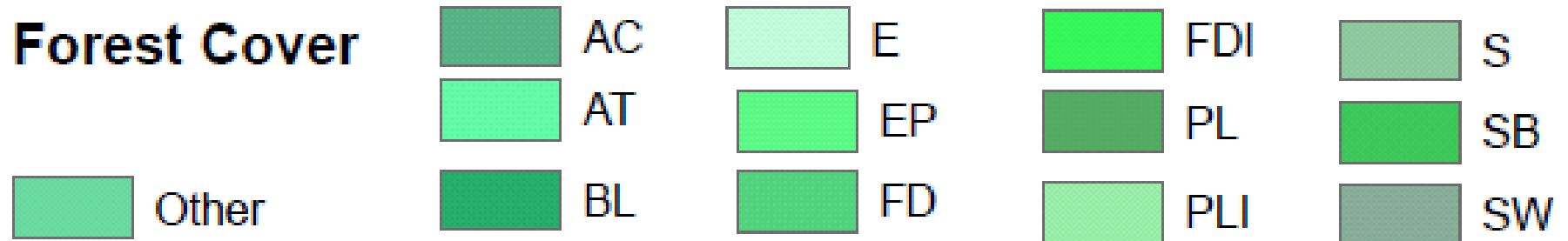
most conventions are based on association e.g. blue for water, while others are less obvious, e.g. pink / orange for urban.



**Association taken too far - ensure good contrast**  
**Too similar for the human eye**

**Example: unsuccessful forest classification (primary species)**

**colours: too many similar tints/shades of the same hue**



## 2. Qualitative versus quantitative - 'data association'

**Qualitative:** [nominal / categorical]

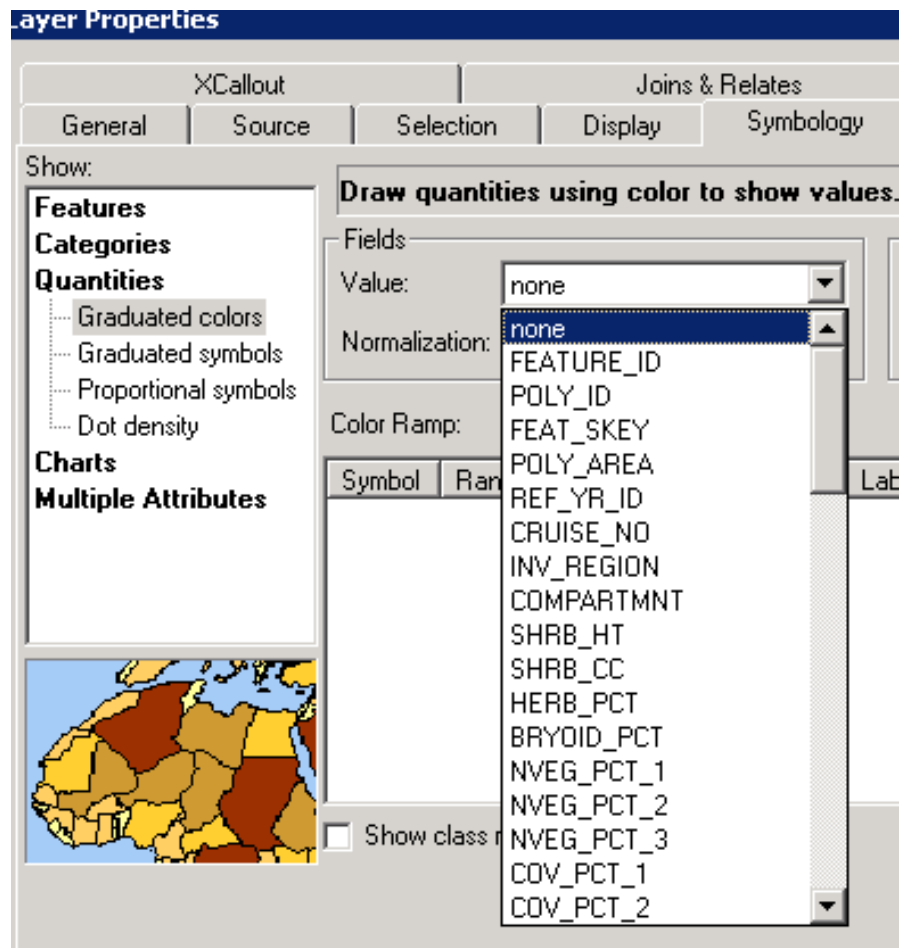
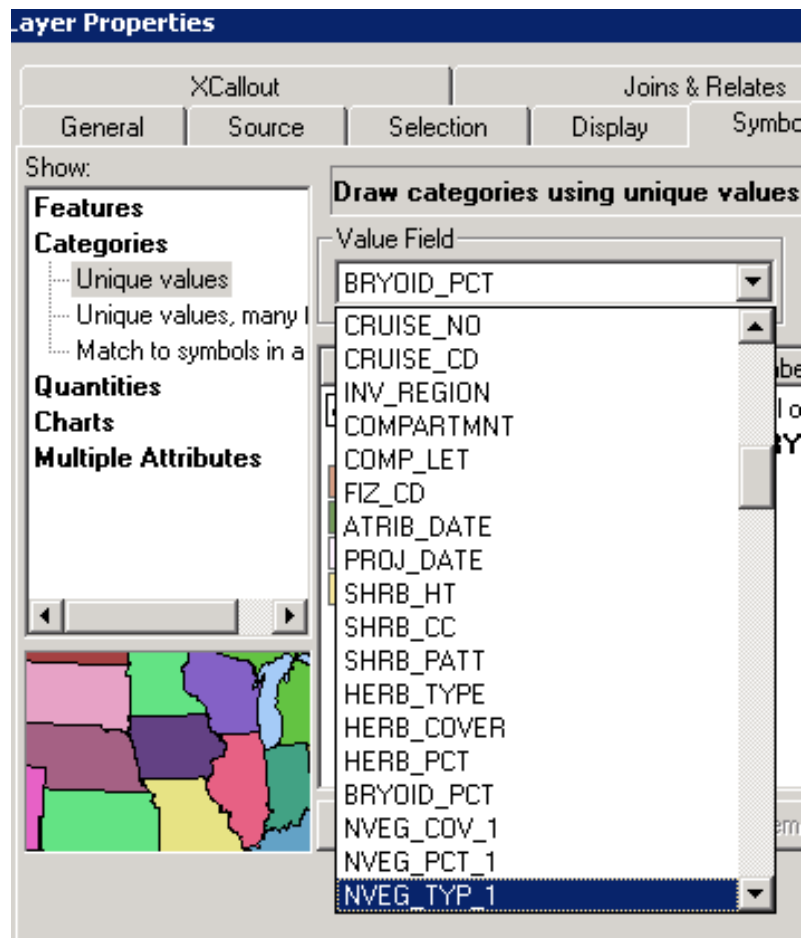
**HUE \***, shape, pattern e.g. soil types, schools versus churches

*\* see upcoming slides*

**Quantitative:** [interval / ordinal]

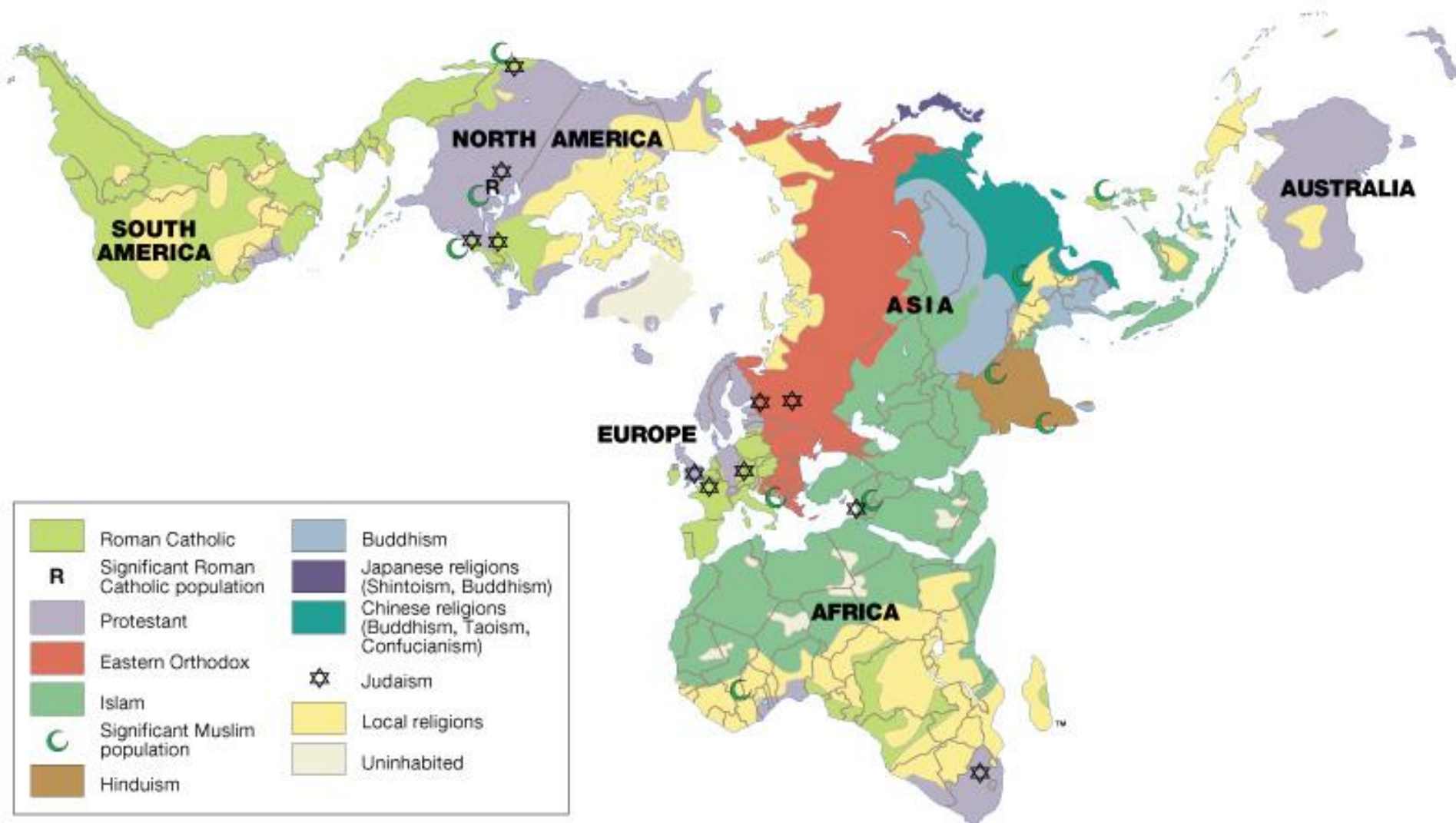
**SIZE**, tone, chroma, value e.g. population densities, city sizes

# ArcGIS - categories v quantities menus





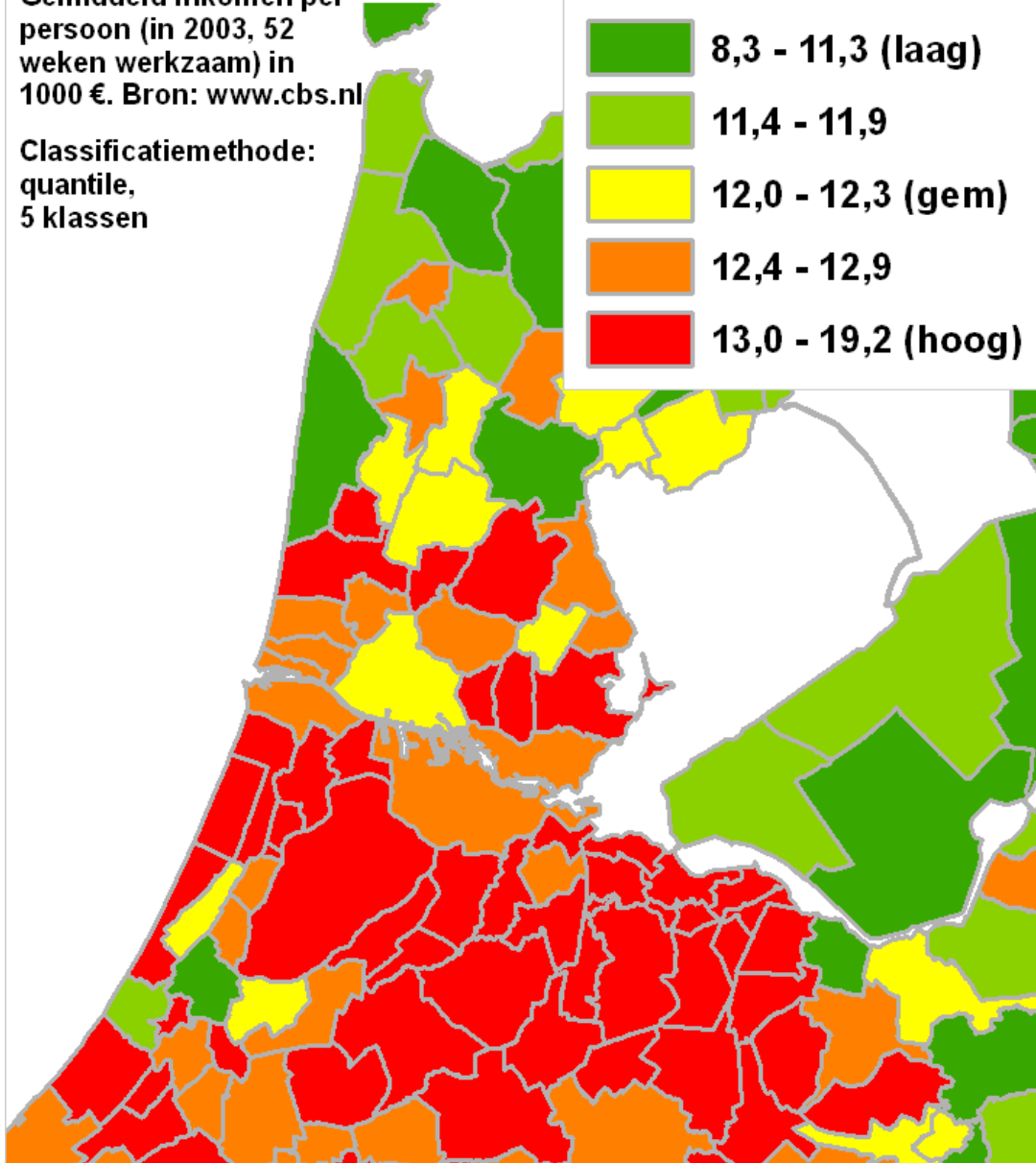
# Qualitative (nominal/categorical) data



# Besteedbaar inkomen per gemeente

Gemiddeld inkomen per  
persoon (in 2003, 52  
weken werkzaam) in  
1000 €. Bron: [www.cbs.nl](http://www.cbs.nl)

Classificatiemethode:  
quantile,  
5 klassen



Colour ramp for  
quantitative data

(good example)

Red = highest  
values

- RED is reserved for importance due to its visual impact
  - as it has the longest wavelength and 'advances' (blue retreats)

**\*\* Red - implies importance: / 'danger' (roads)**

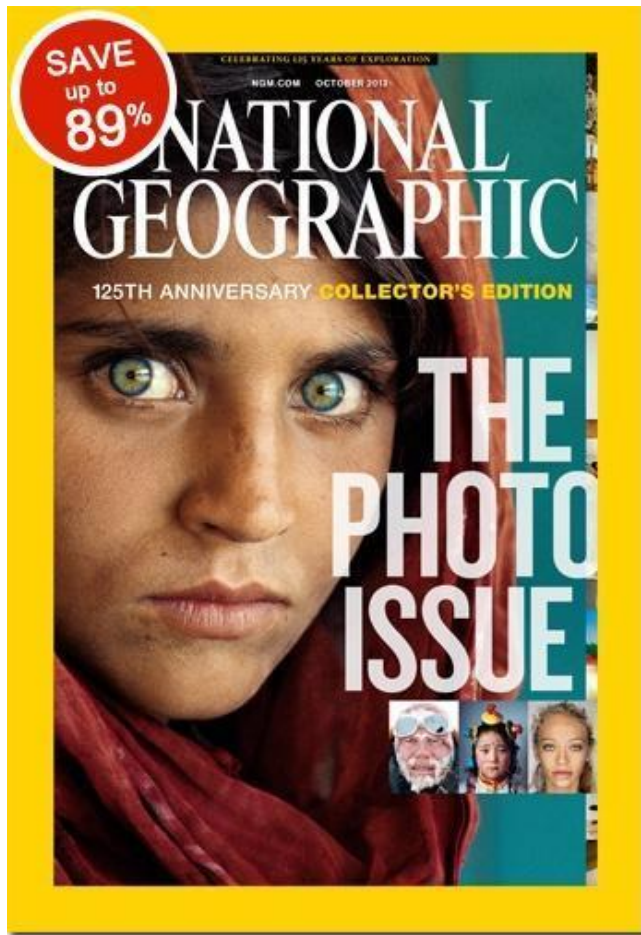


Universal STOP sign



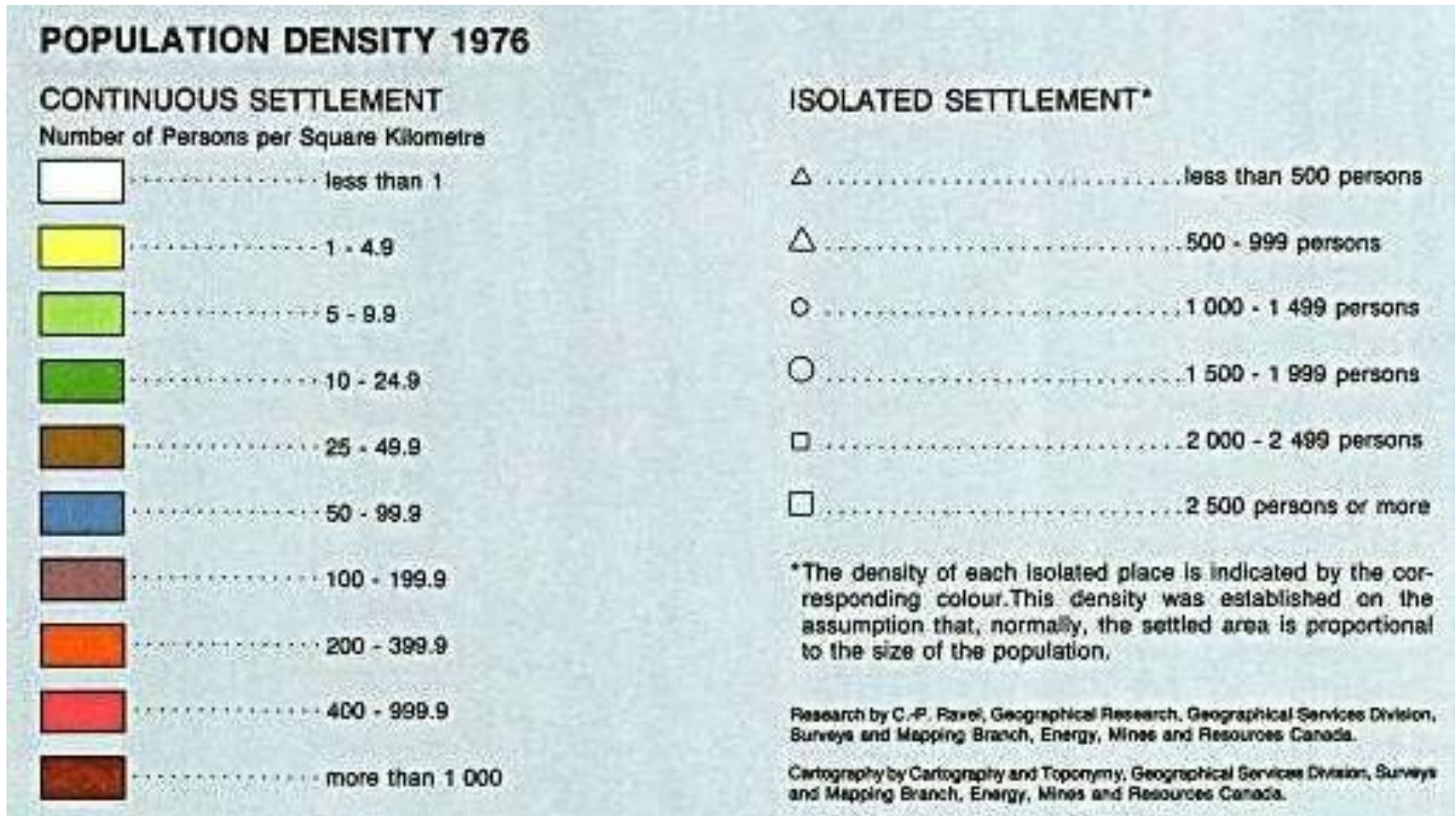


Yellow is next to red in the colour spectrum



2 km

# Poor use of colours, size and shape

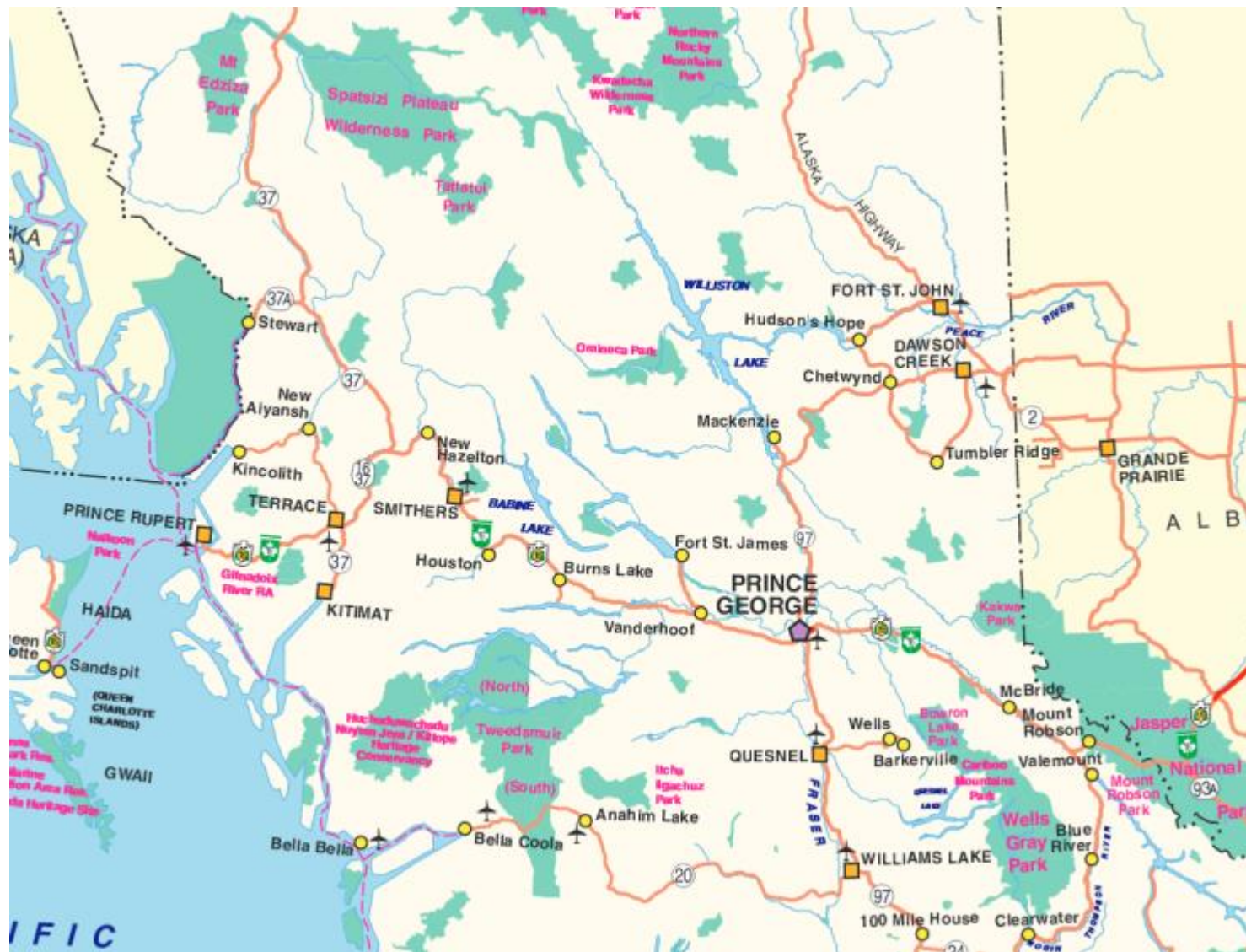


Atlas of Canada .... Shame !

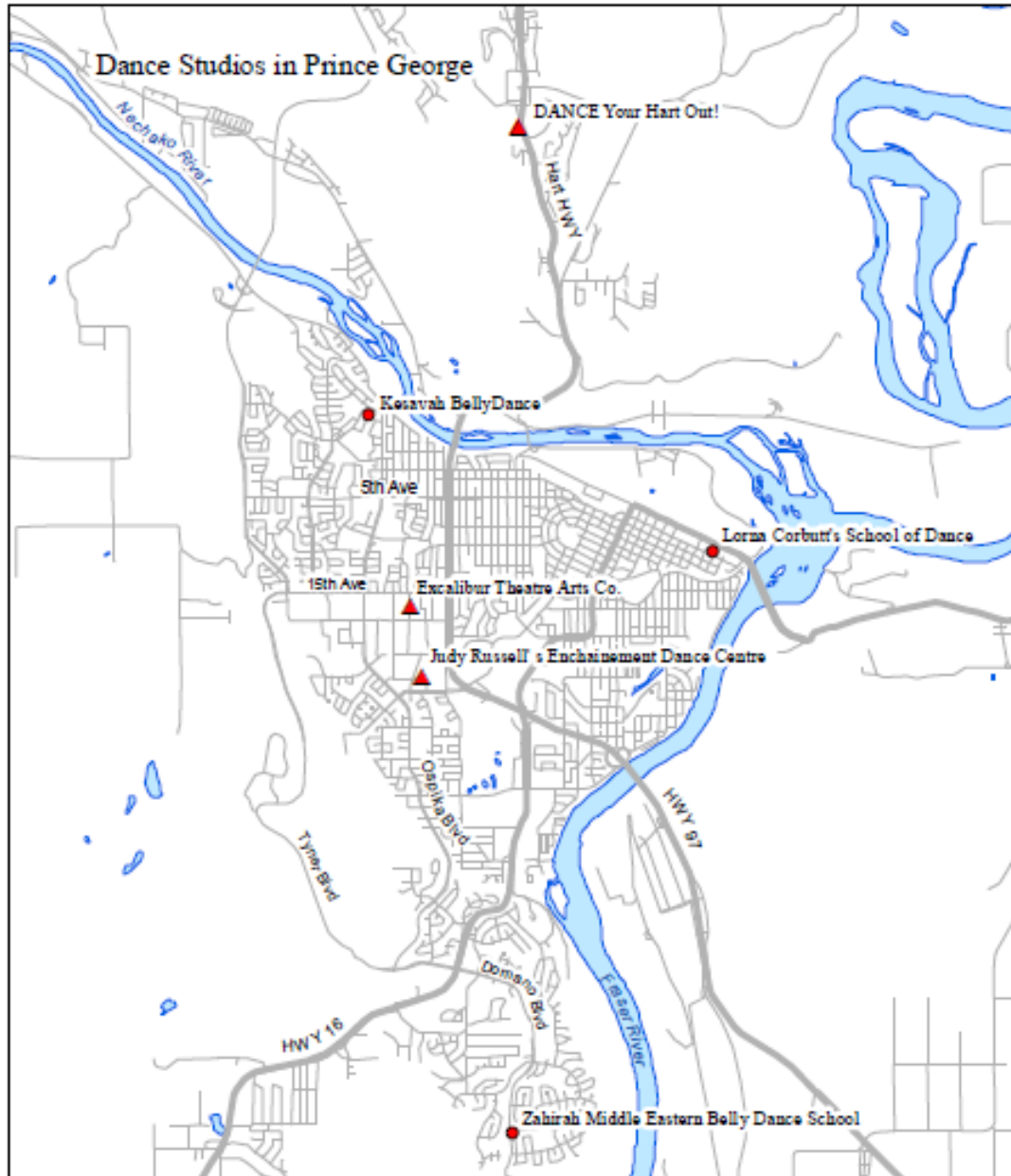


# 3a. Other factors: map purpose

e.g. parks / road map - what features are more important in each case ...



## 3b. Other factors: cost and media



### Colour costs v Monochrome:

- In this case, colour could be avoided if not needed

➤ online no cost

➤ monochrome 1x

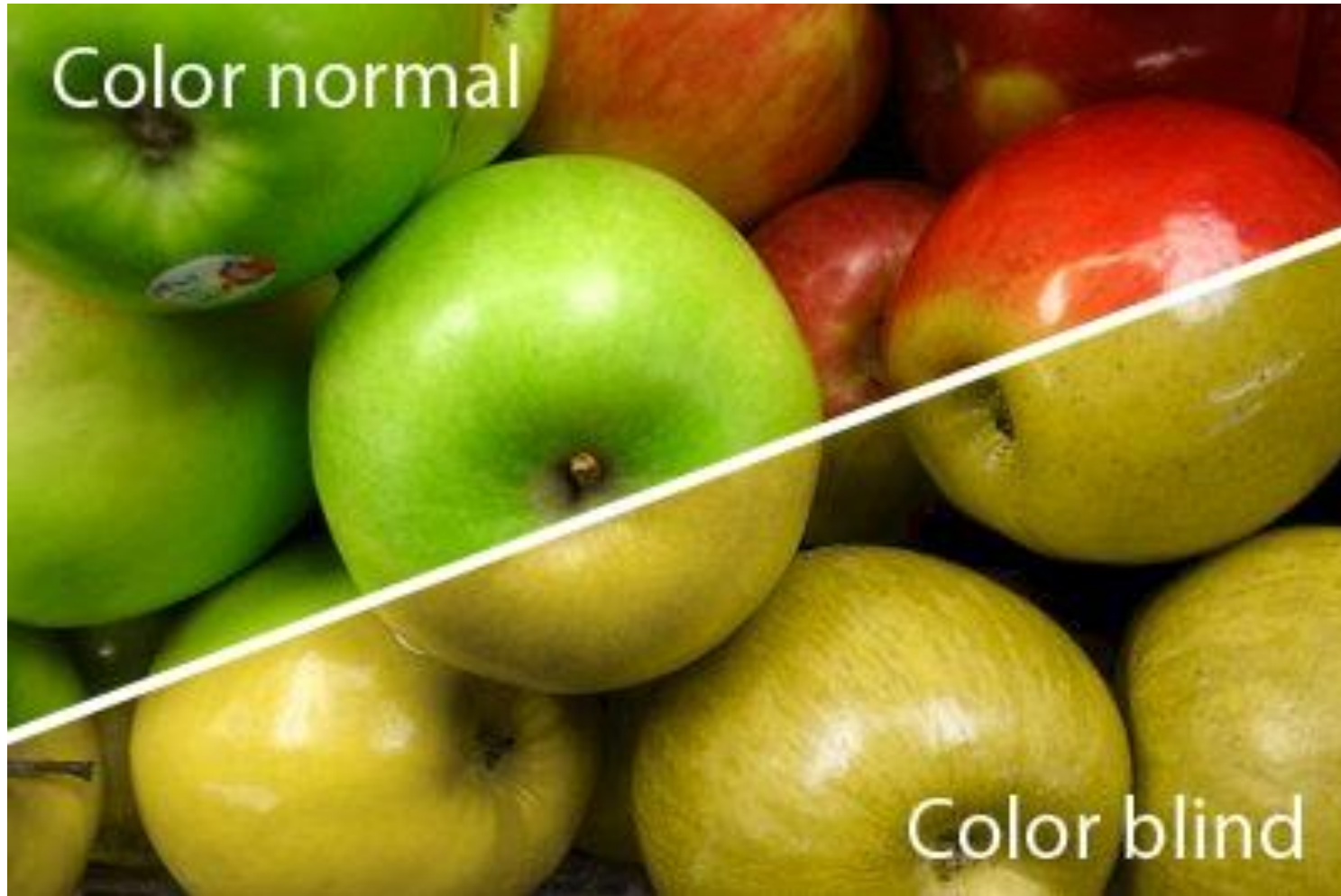
➤ colour photocopy 10x

➤ publication 1000x ?

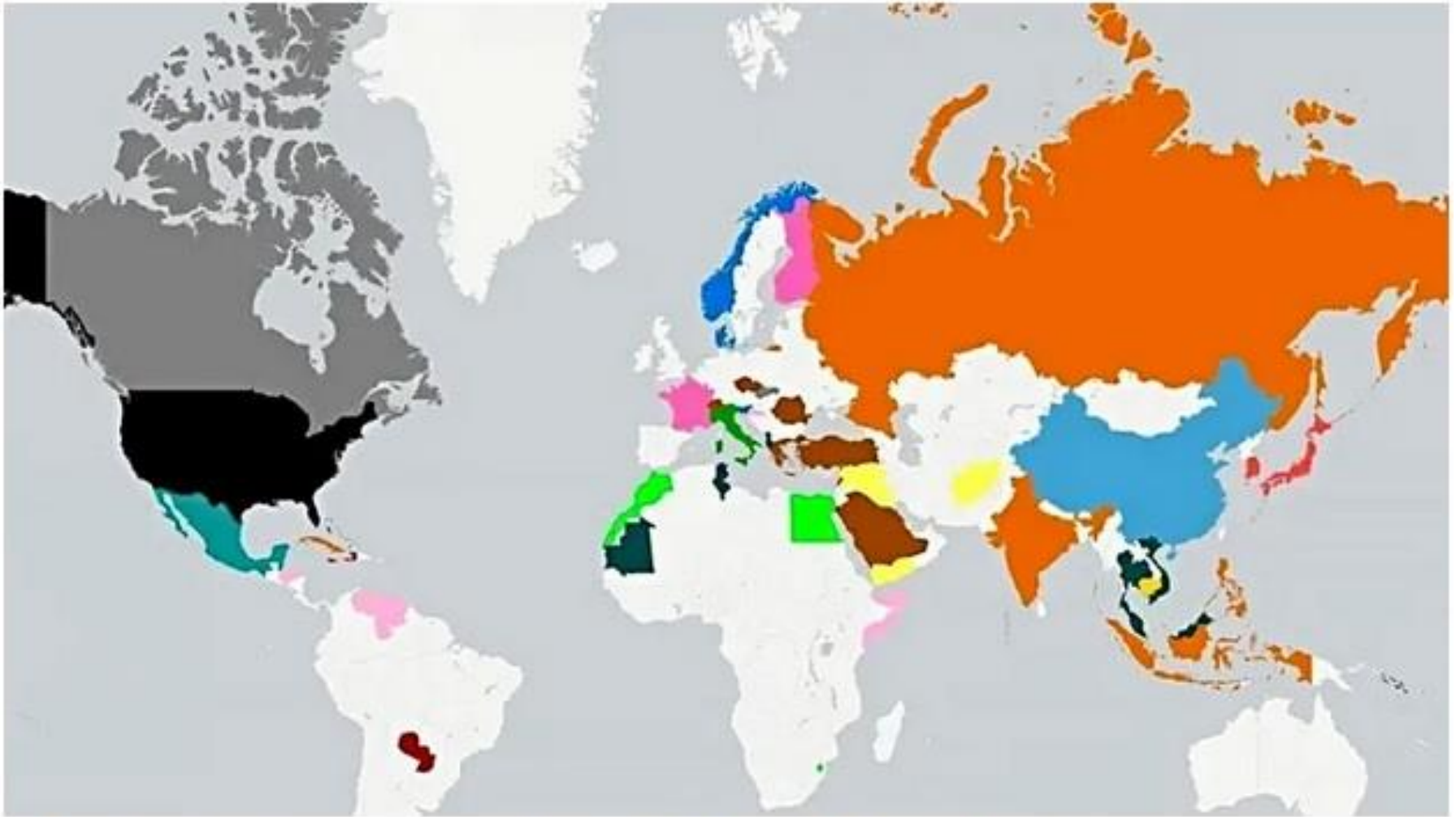
➤ Don't always use colour, just because you can ...  
but in 2024, you often can ...

### 3c. More on colour ....

- colour blindness ~5% men and 1% of women







## The Rudest Countries In The World: Ranked

Can you tell which is #1 from the colours ?

Internet bait: the goal is to lure you in, not to give you the picture at a glance