

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



Print & Play Traffic Signs



Effective easy communication

www.doodlesandjots.com



Symbols: Visual Design Variables

Shape: the detail or outline of a point symbol

Pattern: regular repetition of shapes

Texture: variation of tones or lines

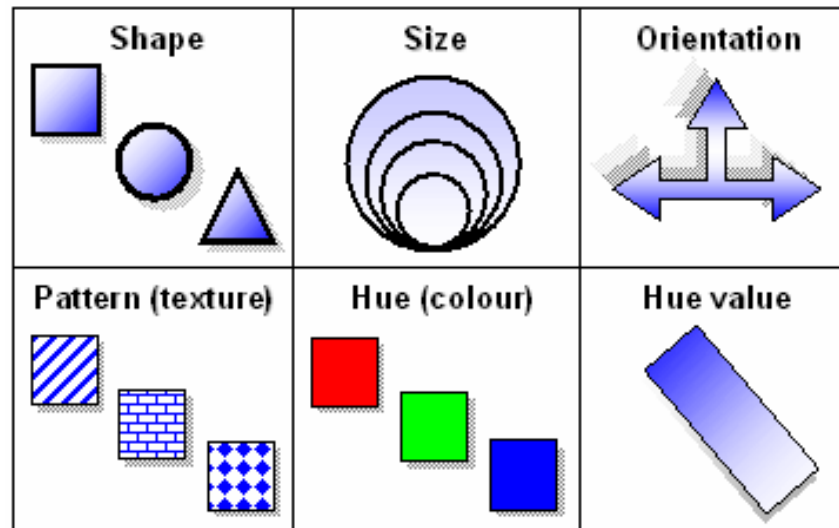
Orientation: direction of symbol element













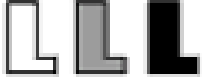









Size: size of a point, width of a line

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

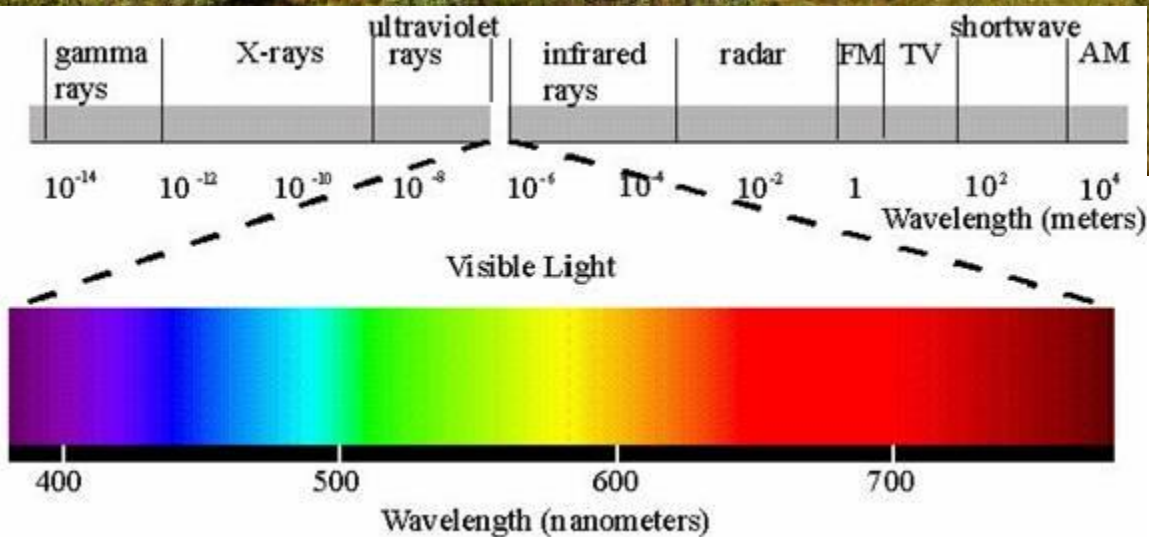
Colour: has three 'dimensions'

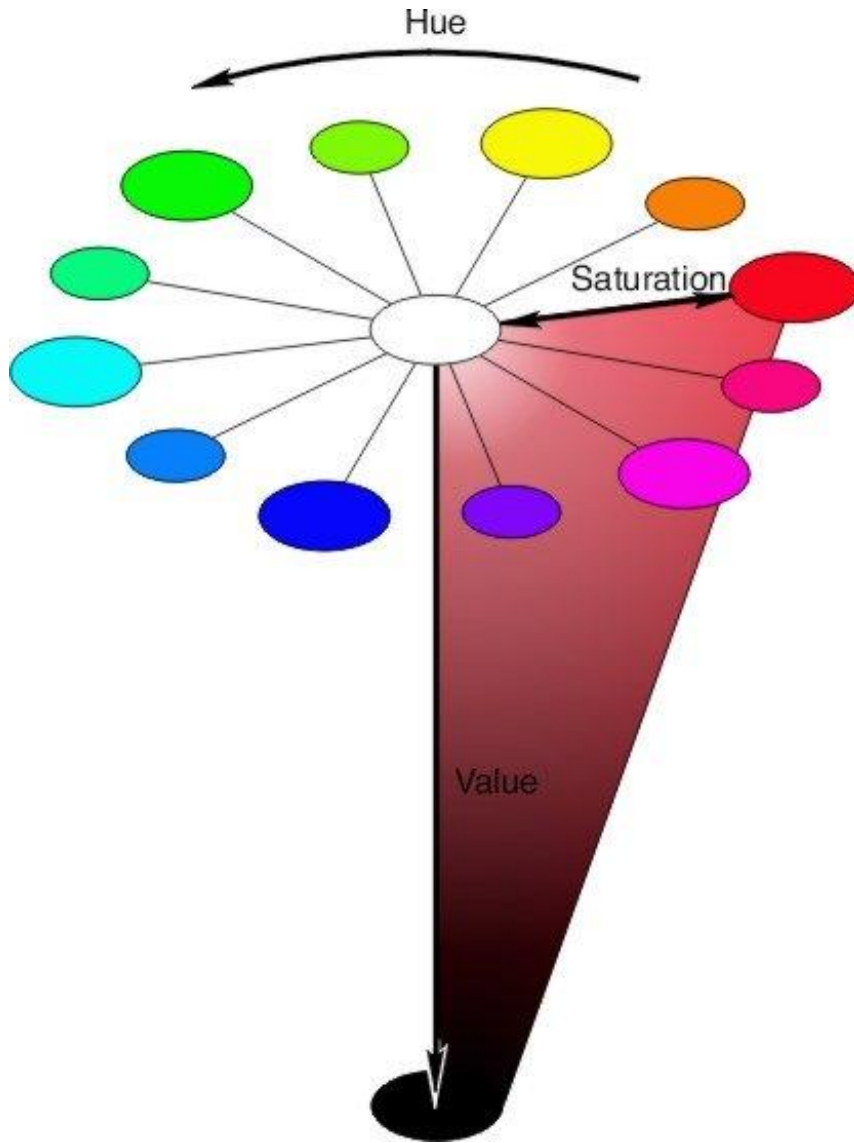
hue (wavelength): "the visual sensations from different wavelengths of light " e.g. red, blue

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

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

The 'electro-magnetic' colour spectrum
the longest wavelengths of light (red) are the least refracted



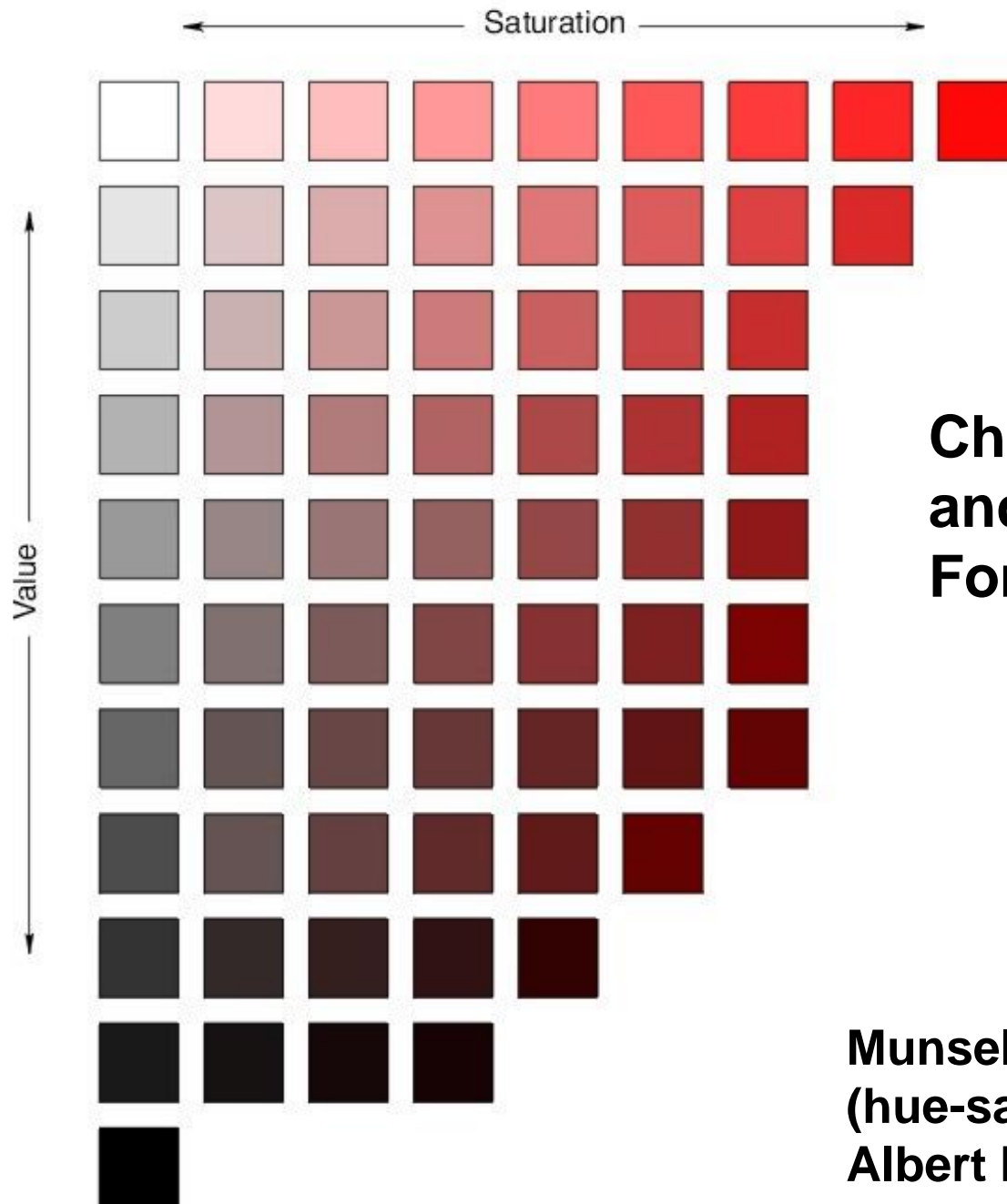


hue - basic visible colour,
e.g. 12 step wheel (RGB mix)

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**

Design criteria: 1. 'Association'

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

Vegetation

green



Contours

brown



(except on ice ...)

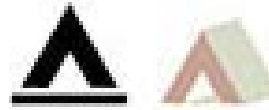
Battlefield



Winter sports



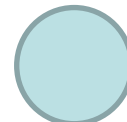
Camping



Railway line



'Abstract': if space is limited



Letters are not used
much except:

H Hospital

P Parking

i Information (or I ?)



Point symbols

Mostly Shape
also colour

Solid or open ?

	ARGENTINA	BRITISH (GSGS)	CZECHOSLOVAKIA	DENMARK	FINLAND	FRANCE	GERMANY	ITALY	NETHERLANDS	RUSSIA	SURVEY OF INDIA	SWEDEN
HOUSES	■		■	■	■	■	■	■	■	ALL SYMBOLS BROWN	■ RED	■
CHURCHES	⊕	⊕	⊕	⊕	⊕	○	⊕	⊕	○	+	⊕ RED	✱
CHAPELS, ETC	⊕	⊕ MOSQUE	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕ RED	⊕
GEMETERIES	⊕	⊕		⊕		⊕	⊕	⊕	⊕		⊕	⊕
FACTORIES	⊕		⊕			⊕	⊕	⊕	⊕		⊕	⊕
WINDMILLS	⊕	⊕	⊕		⊕	⊕	⊕	⊕	⊕	⊕		⊕
WATERMILLS			⊕	⊕	⊕	⊕	⊕		⊕	⊕		⊕
SAWMILLS			⊕	⊕			⊕			⊕		⊕
MINES	⊕	⊕	⊕		⊕	⊕	⊕	⊕		⊕	⊕	⊕
QUARRIES					⊕	⊕	⊕				⊕	
LIGHTHOUSES	⊕	⊕		⊕		⊕	⊕	⊕	⊕	⊕	⊕	⊕
BUOYS						⊕				⊕	⊕	⊕
TRIANGULATION POINTS	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕		⊕	⊕
FORESTRIES			⊕				⊕			⊕	⊕	

Association - Lines

The interface displays a grid of line styles and their corresponding labels. The labels are as follows:

Highway	Highway Ramp	Expressway
Expressway Ramp	Major Road	Arterial Street
Collector Street	Residential Street	Railroad
River	Boundary, National	Boundary, State

On the right side, there is a preview area showing a green line. Below it, the "Options" panel 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
stream →

Association - Lines

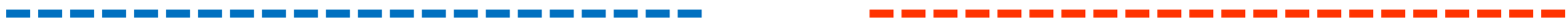
- 'permanent' physical features are shown as solid.

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

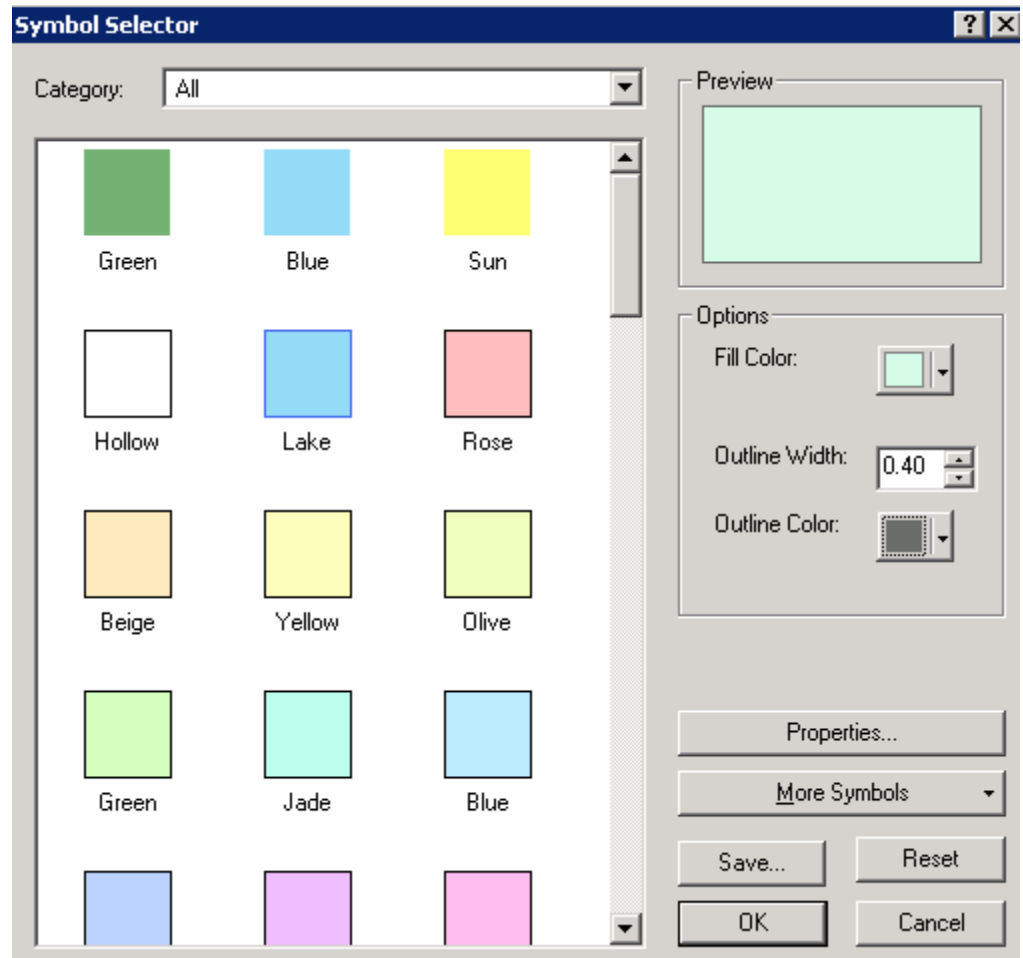
Fill - colour, pattern

Colours should be associative

Avoid really solid colours
(except for small areas)

Outline ? - colour, width

- No polygon outline for
'uncertain' boundaries



More ugly Esri polygon patterns – don't copy defaults, boldly go !

ESRI



Green



Blue



Sun



Hollow



Lake



Rose



Beige



Yellow



Olive



Green



Jade



Blue



Med Blue



Lilac



Violet



Grey



Orange



Coral



Pink



Tan



Lt Orange



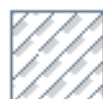
Med Green



Med Yellow



100 Year Flood
Overlay



500 Year Flood
Overlay



Potential Flood
Overlay



Biohazard
Overlay



Chemical
Overlay



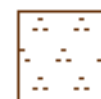
Radiation
Overlay



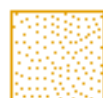
Poison Overlay



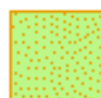
Noise Overlay



Historic Site



Cropland



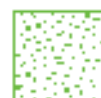
Open Pasture



Orchard or
Nursery



Vineyard



Scrub 1



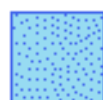
Grassland



Scattered
Trees 1



Sand



Water
Intermittent



Reservoir



Wetlands



Swamp



Mangrove



Glacier



Snowfield/Ice



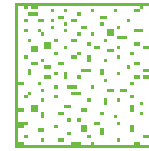
10% Simple
hatch

Areas - patterns (less now, historic holdover)

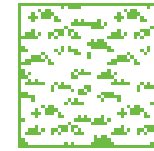
- Visual contrast
- Simple patterns if used
- Patterns may conflict with points
- for small polygons - use colours

Avoid ugly tie stripes !

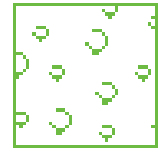
Don't buy into defaults



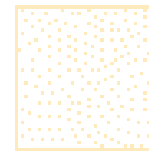
Scrub 1



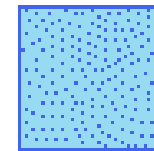
Grassland



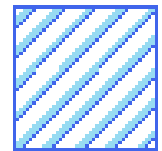
Scattered Trees 1



Sand

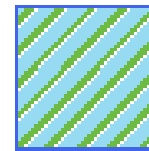


Water Intermittent

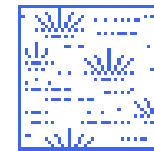


Reservoir

X



Wetlands



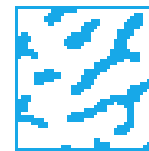
Swamp



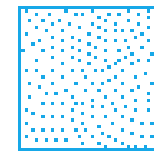
Mangrove



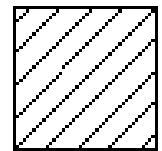
X



Glacier



Snowfield/Ice



10% Simple hatch

Polygons / areas

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

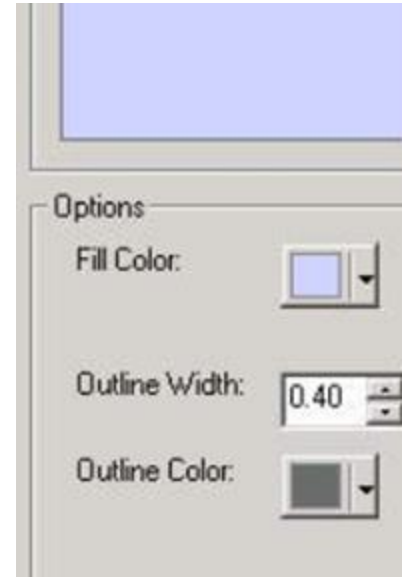
Rivers and lakes: outline (+ colour fill)

Park boundary: outline / no fill ?

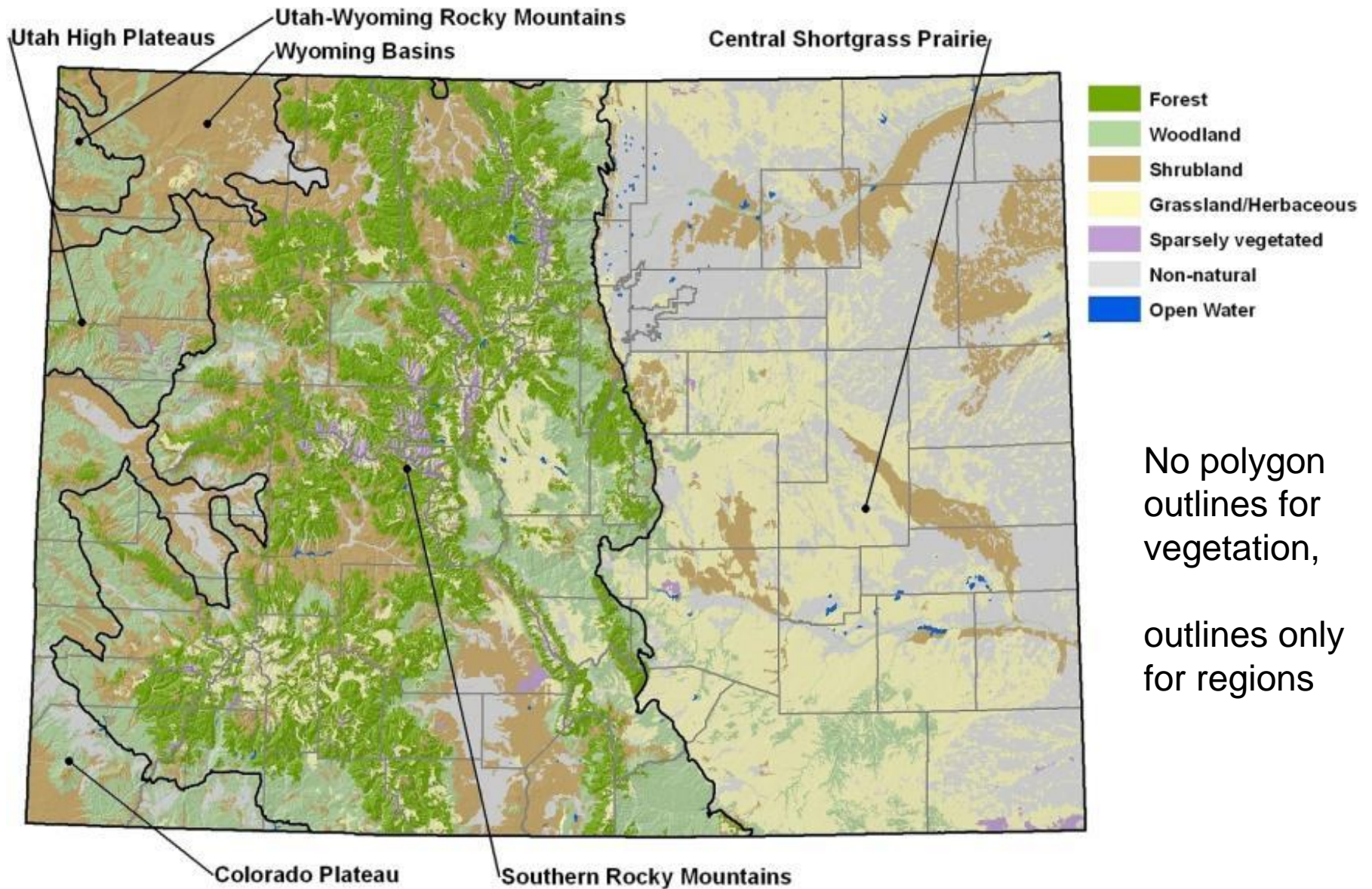
Forest /vegetation: fill only (no outline)

Size: small area - fill (+outline)

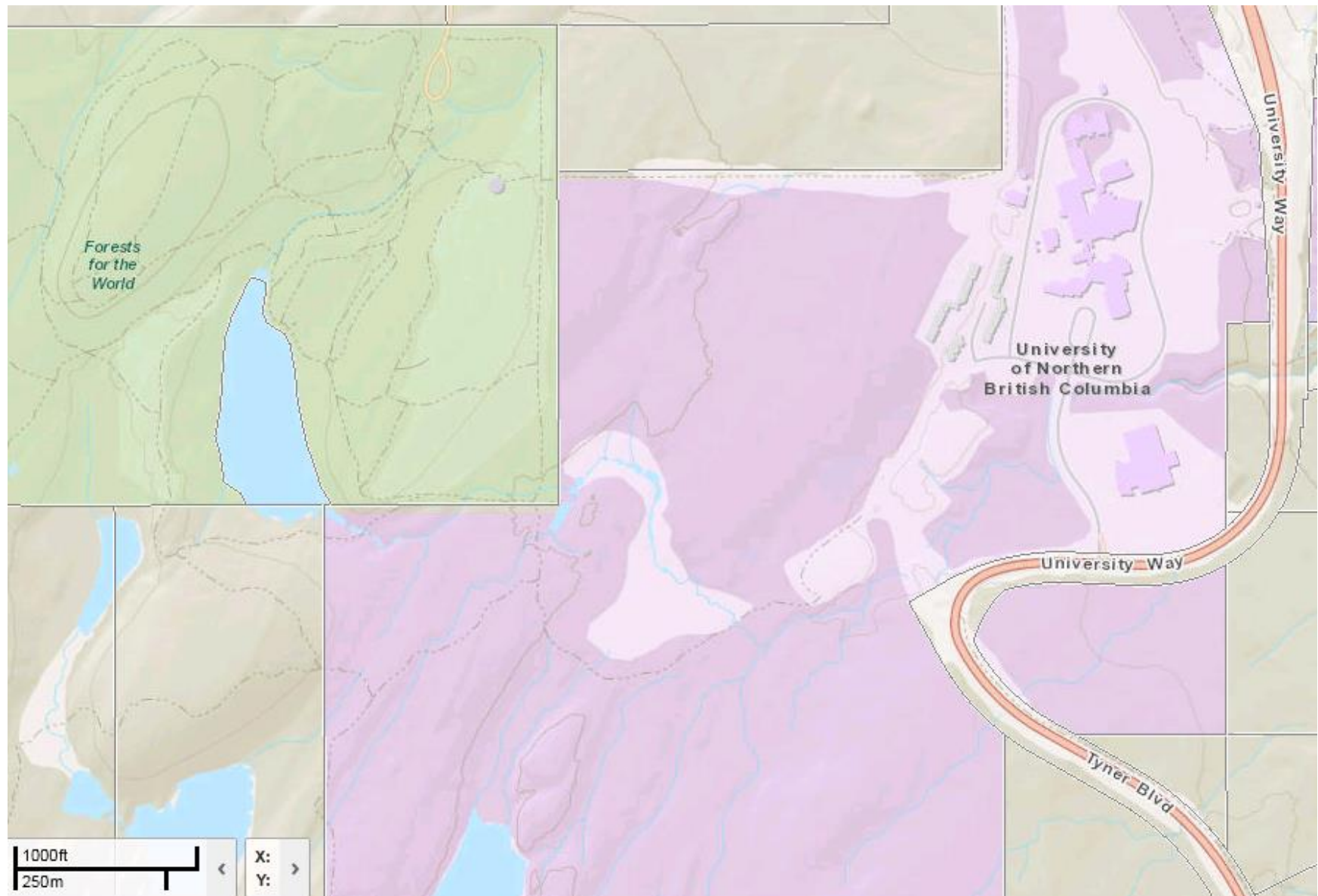
large area - outline only



Example 1



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



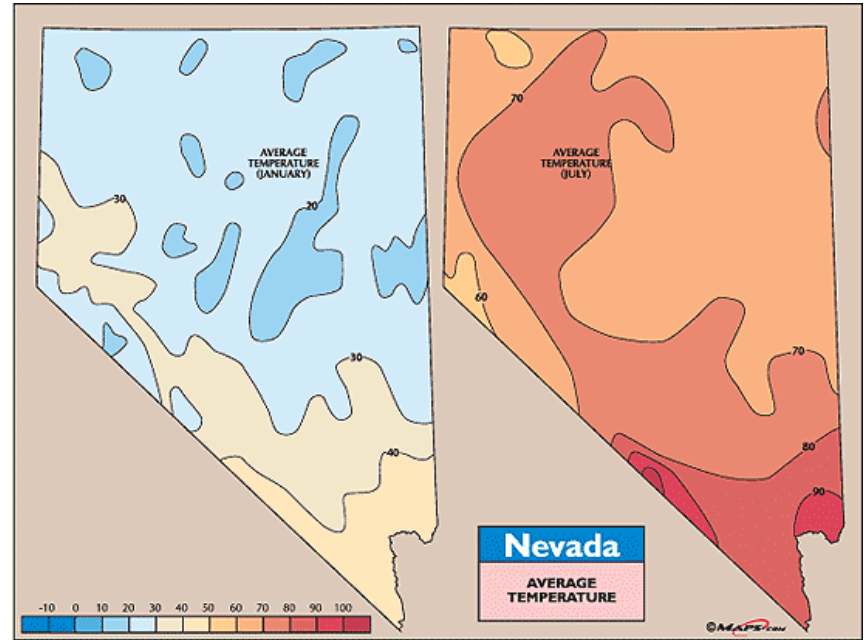
Colour associations: physical and psychological

Yellow - sun, bright (cheery..) ;

Blue - water, calm, cool etc..

Red - heat, danger, blood ?

Green - vegetation, parks, recycling ?

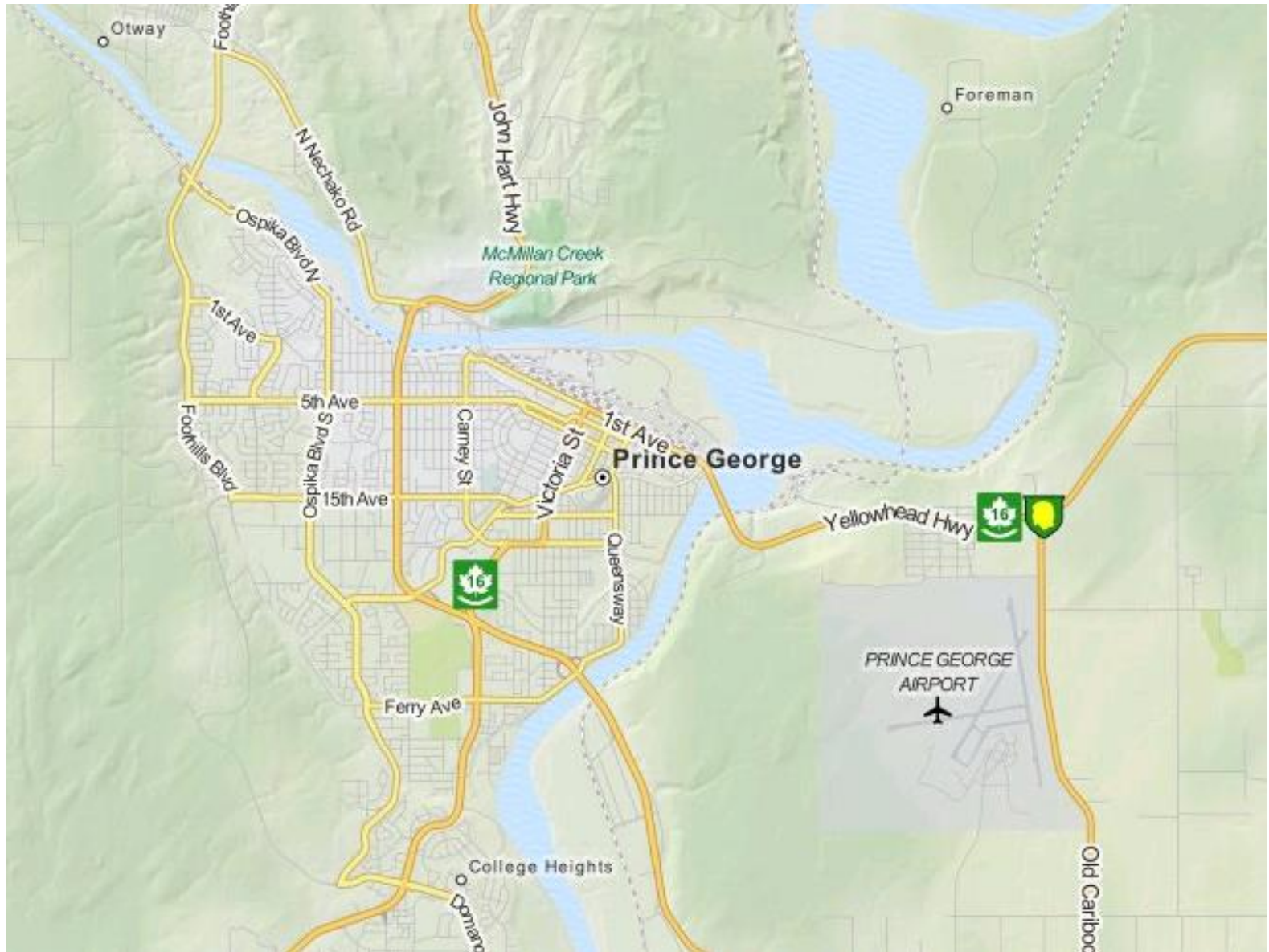


<http://visual.ly/meaning-colour-marketing>



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



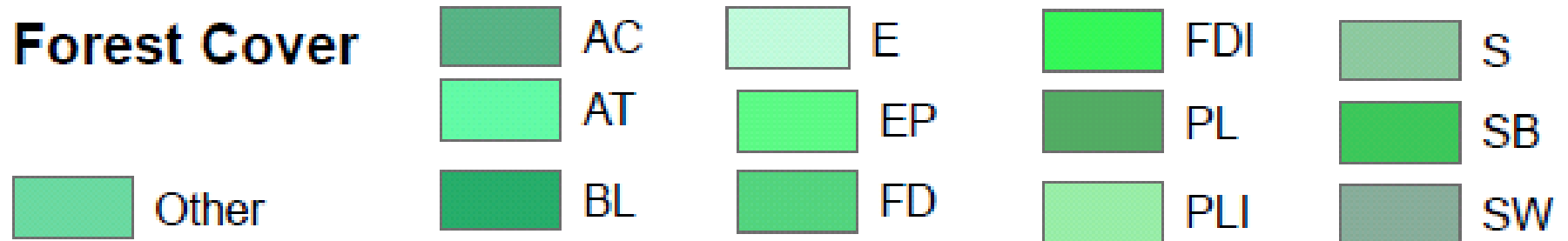
most conventions are based on association e.g. blue for water, while others are less obvious, e.g. pink / orange for urban.



Association taken too far - ensure good contrast

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]

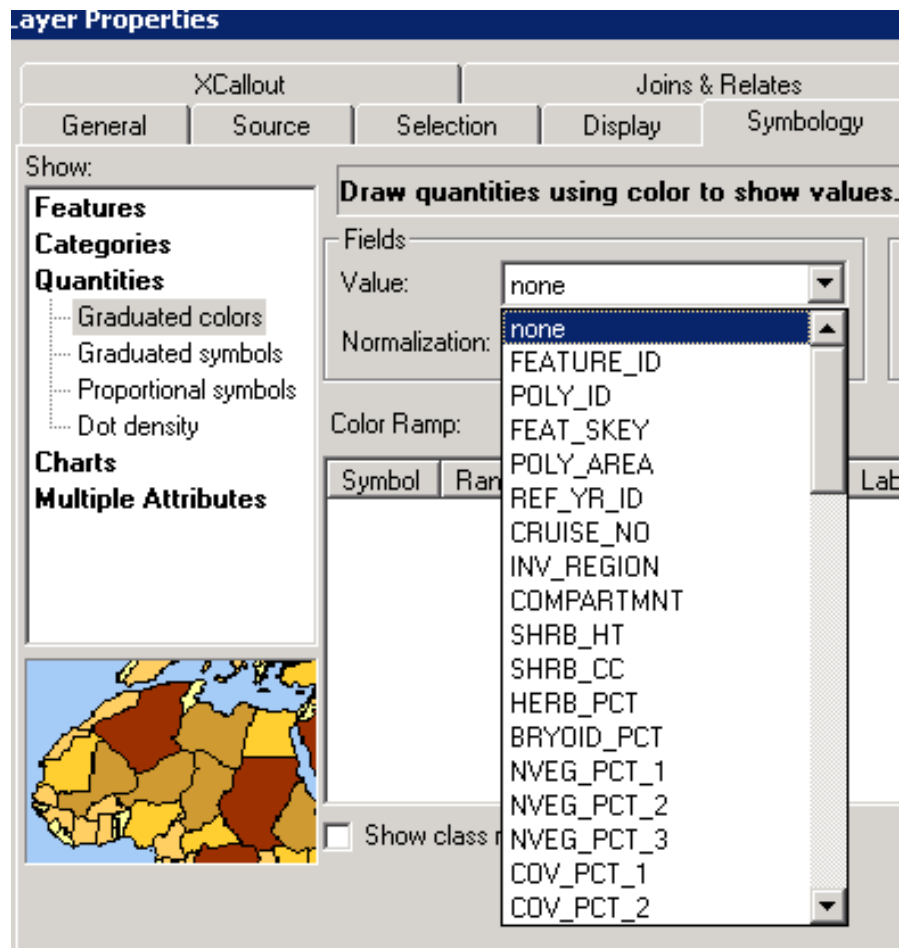
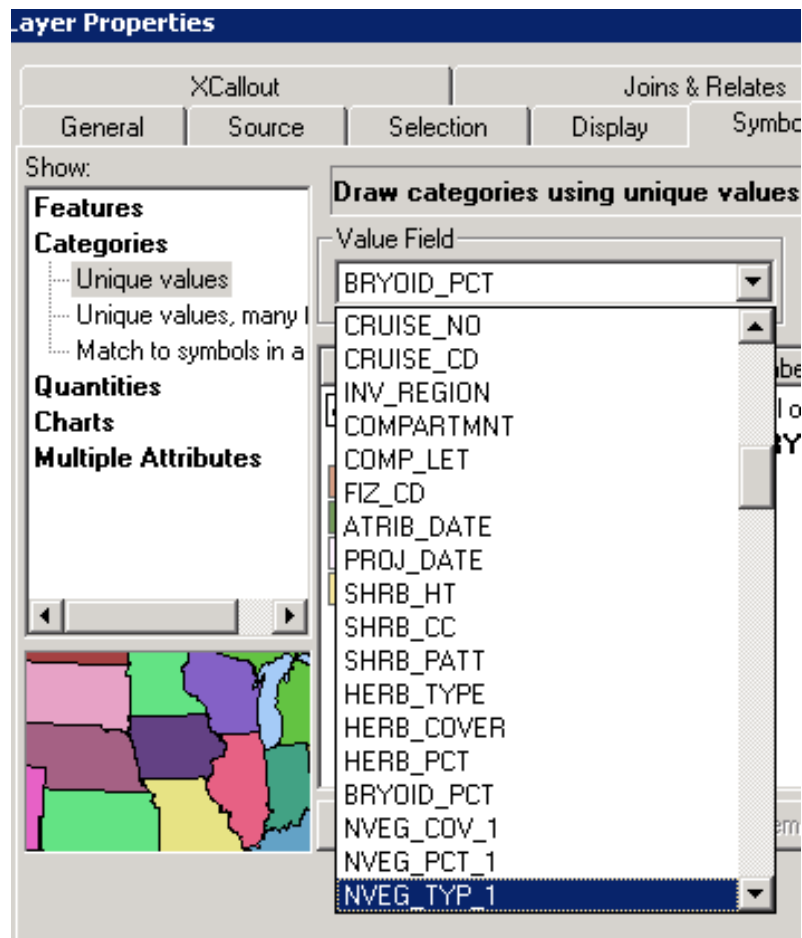
HUE *, shape, pattern e.g. soil types, schools versus churches

** see upcoming slides*

Quantitative: [interval / ordinal]

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

ArcGIS - categories v quantities menus



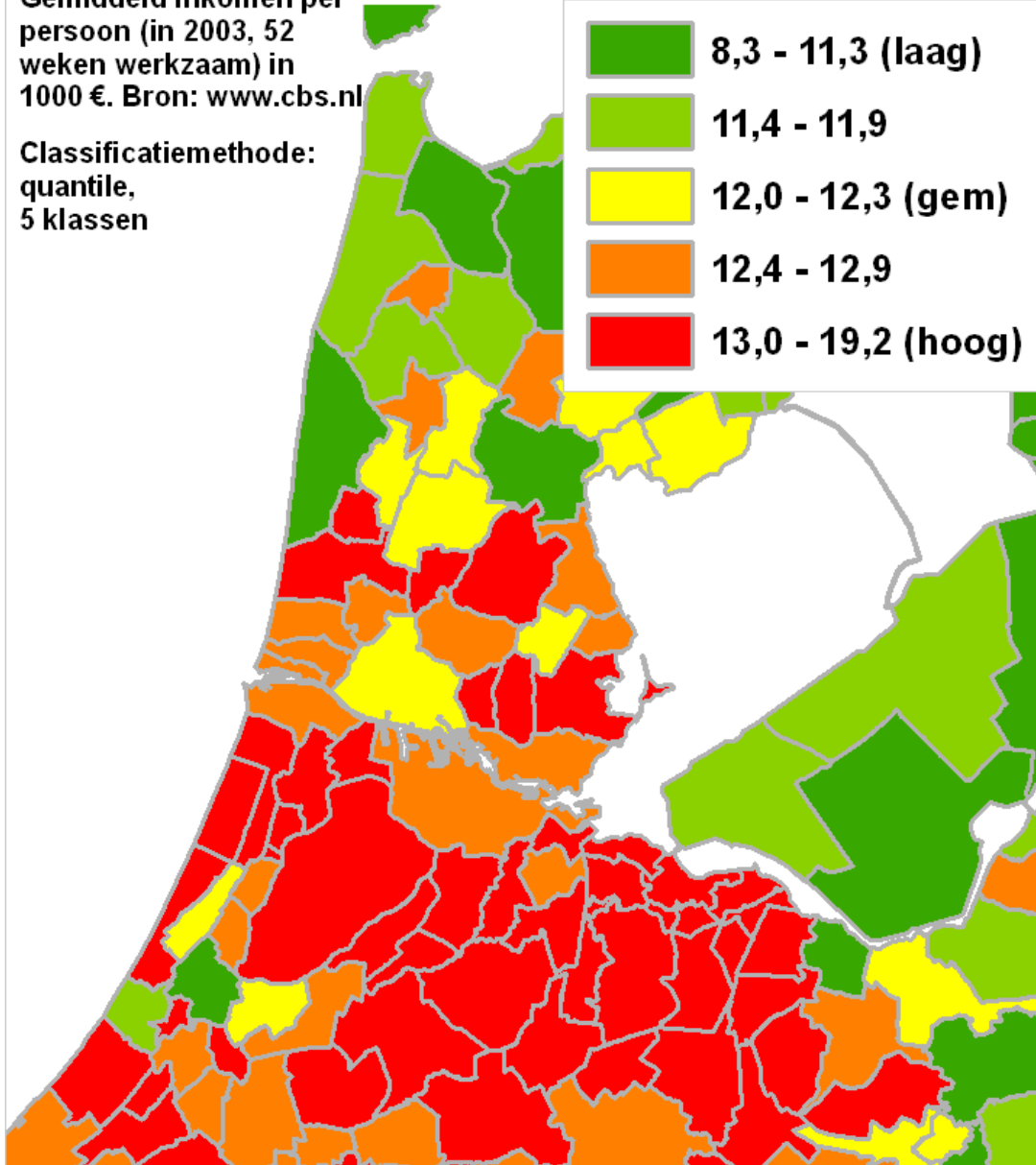
Qualitative (nominal/categorical) data



Besteedbaar inkomen per gemeente

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

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)

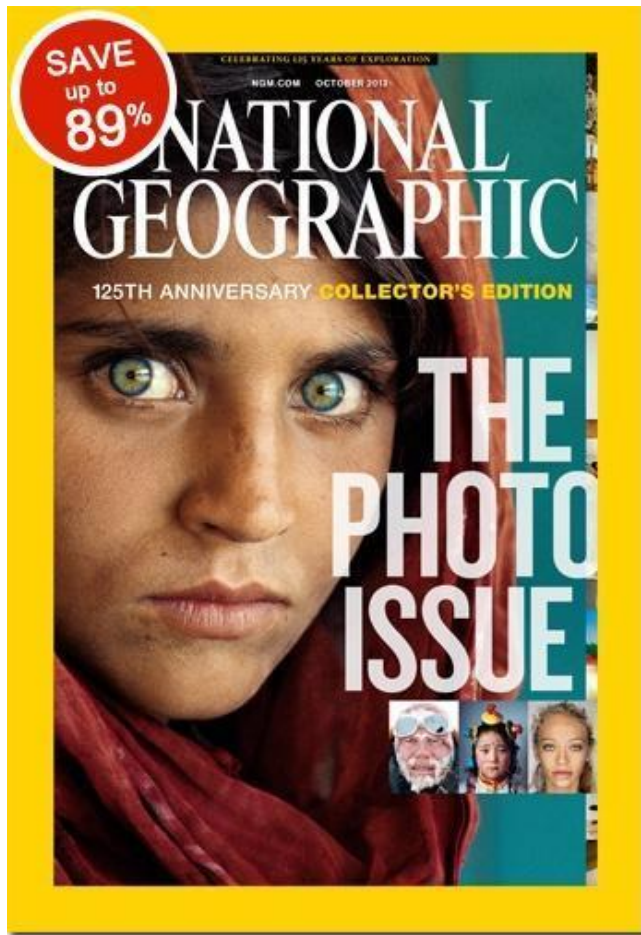
**** Red - implies importance: / 'danger' (roads)**



Universal STOP sign

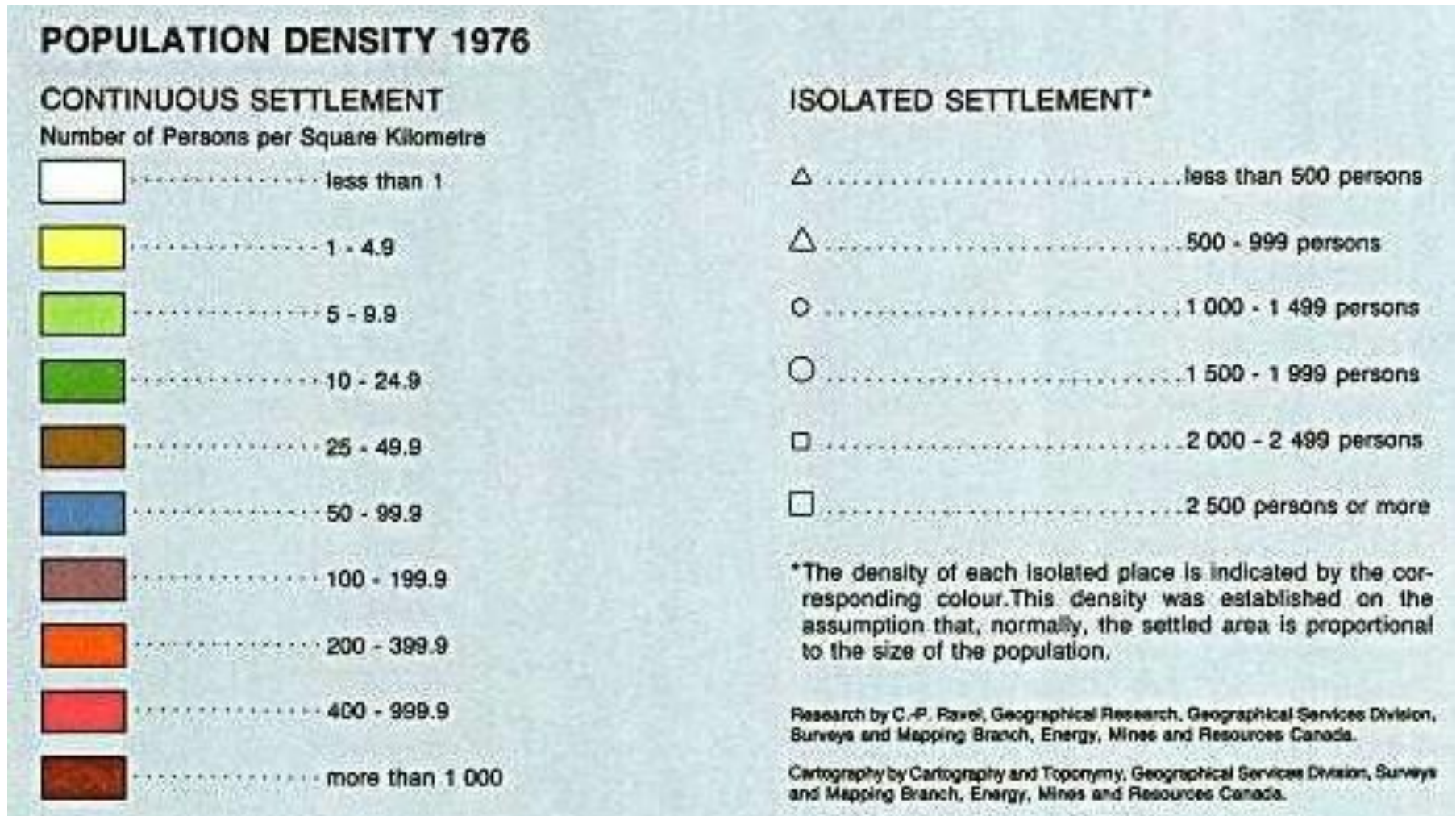


Yellow is next to red in the colour spectrum



2 km

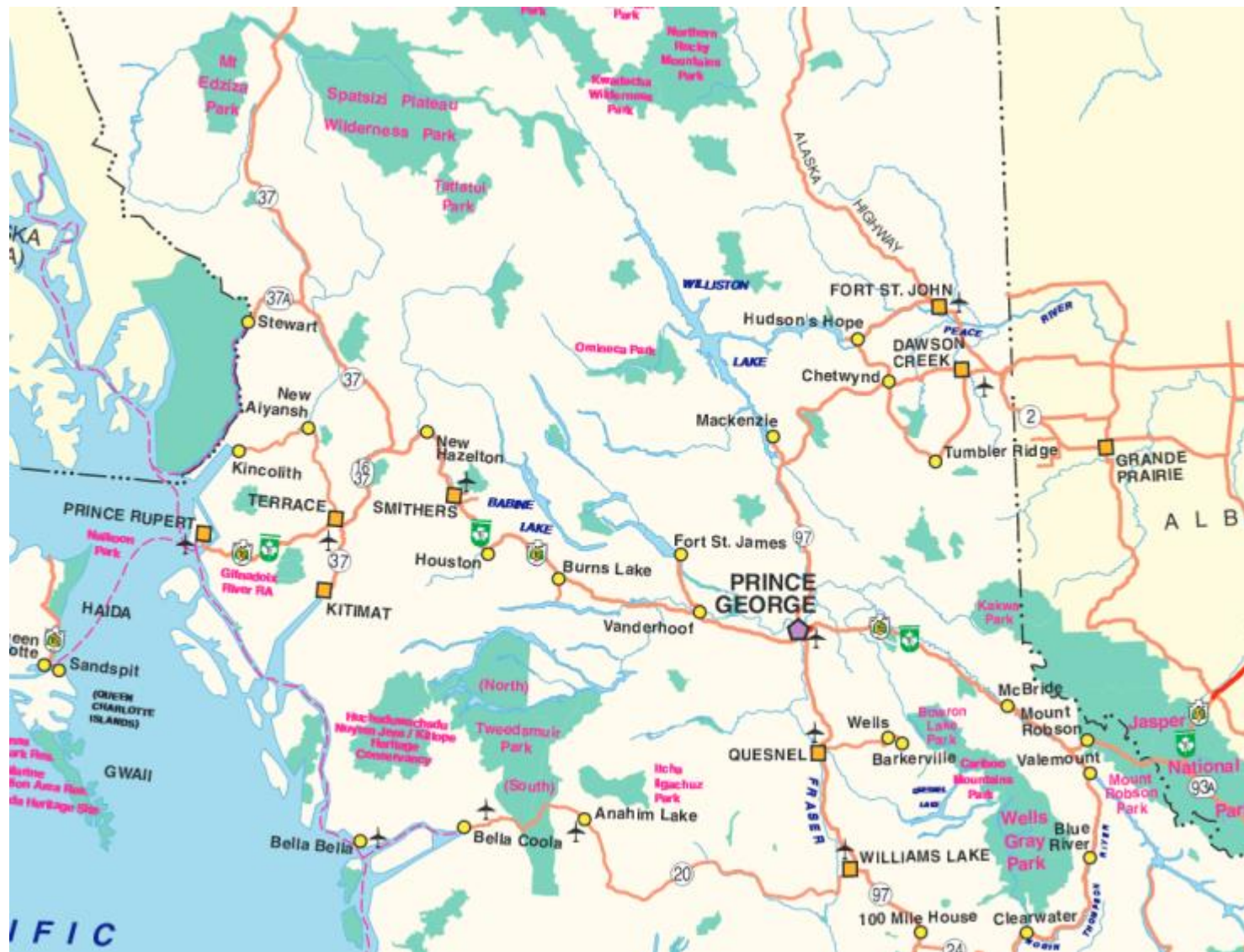
Poor use of colours, size and shape



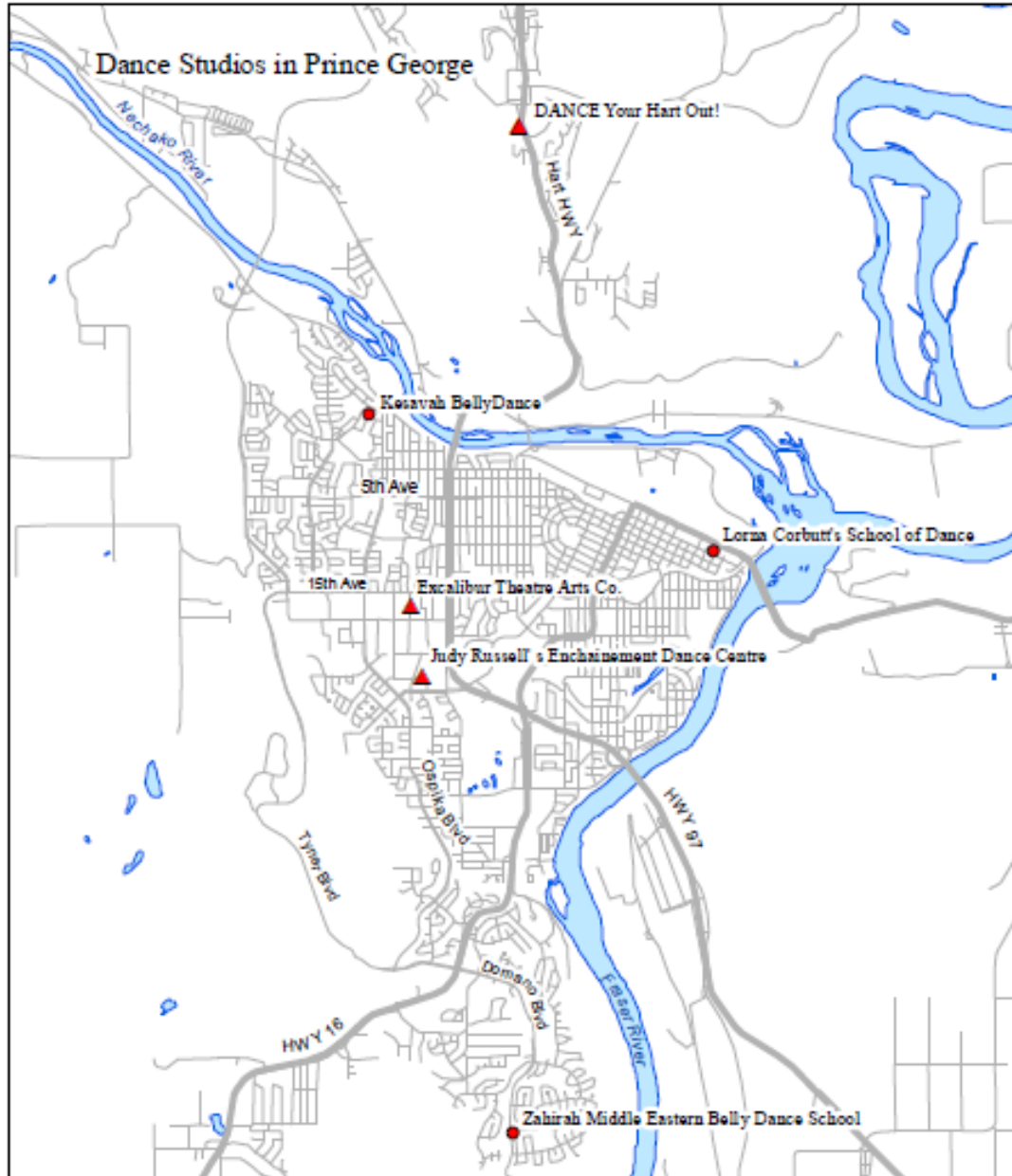
Atlas of Canada Shame !

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

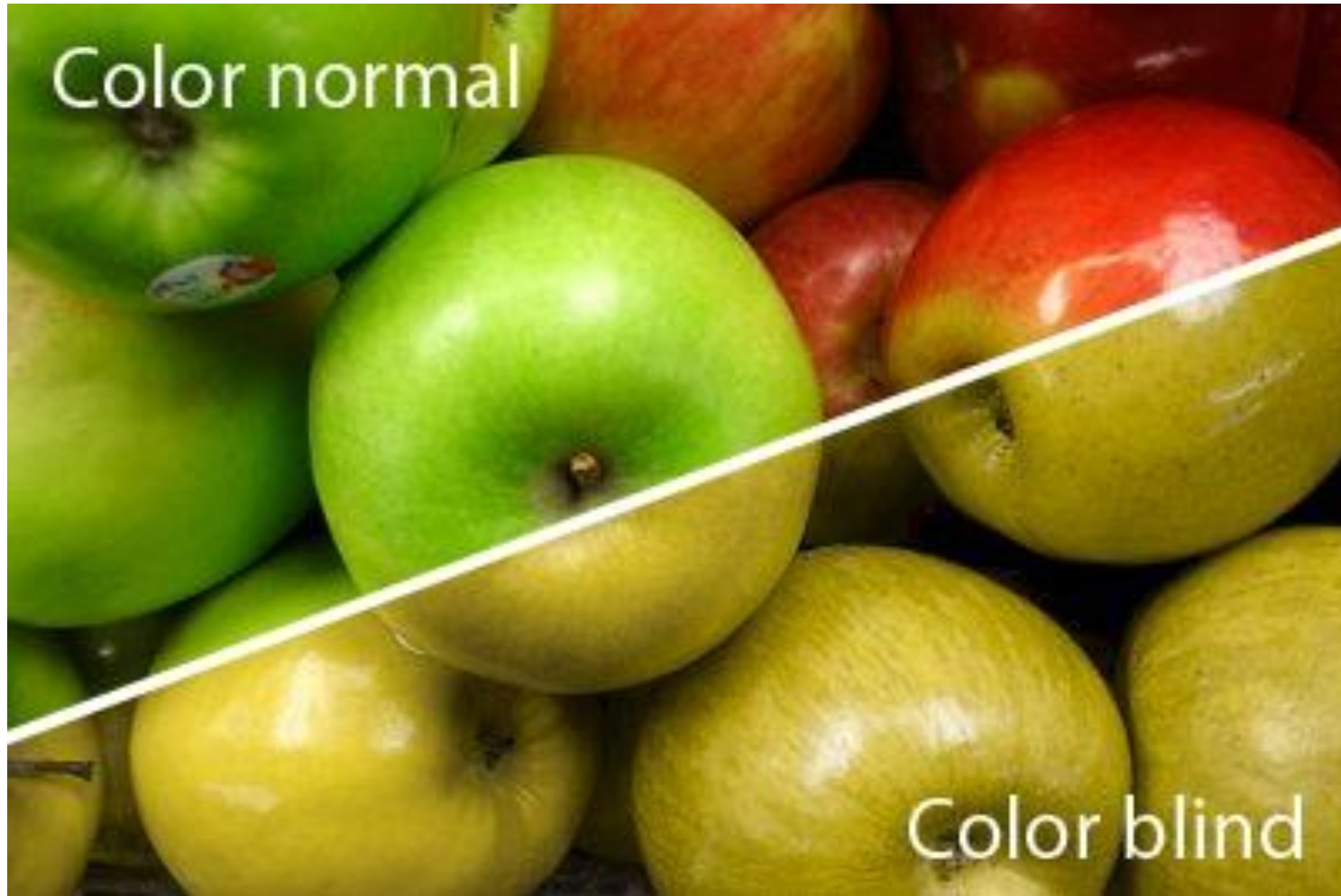
➤ colour photocopy 10x

➤ publication 1000x ?

➤ Don't always use colour, just because you can ...
but in 2023, you often can ...

More on colour

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



Summary on symbol design

Symbols - design variables:

Qualitative

shape, pattern,

colour - hue (except red)

Quantitative

size, tone

colour - chroma / value

Symbols - use of design variables:

1. Association: form, size, colour, convention
2. Qualitative or quantitative data
3. Output purpose, cost and media

Much of this is common sense - design enables good communication