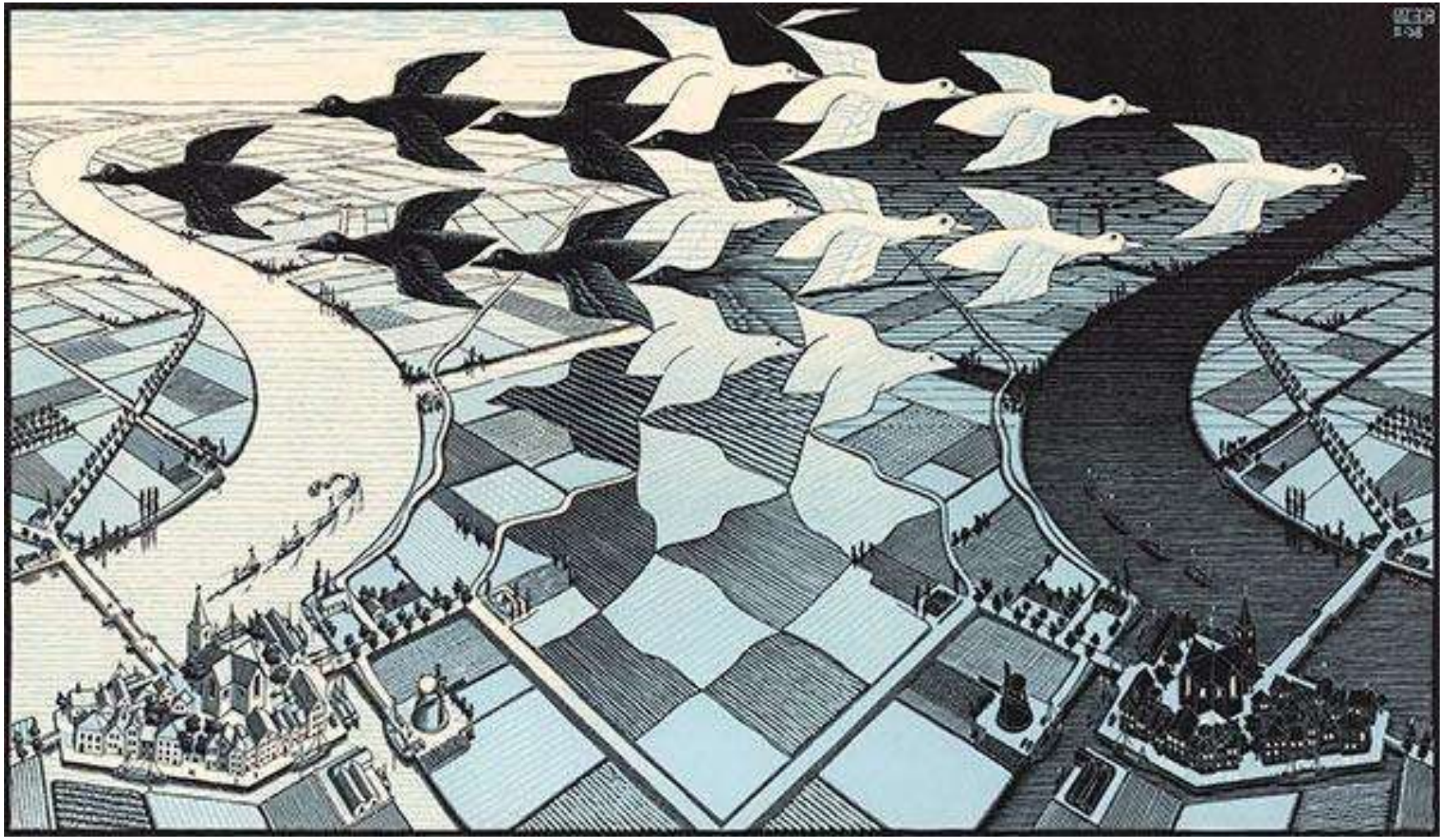
Figure-ground and Cartography (map design)

Any image (e.g. art, map etc..) consists of a foreground figure and formless background

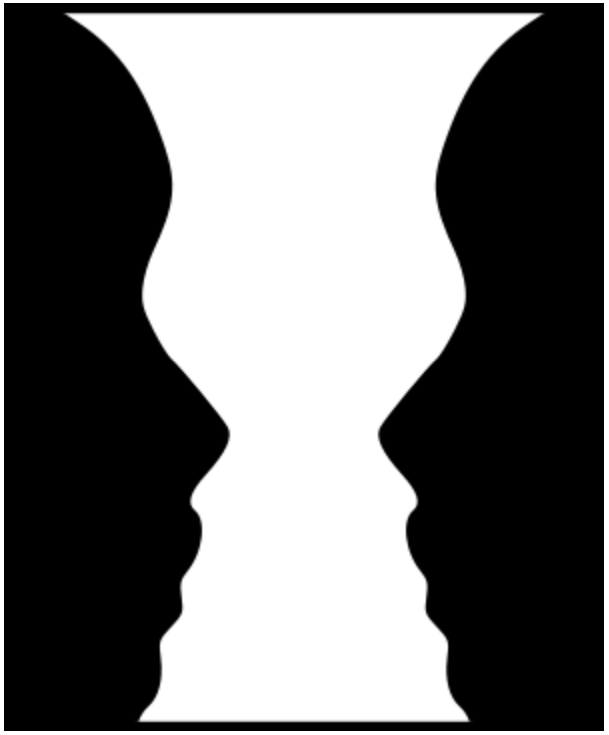


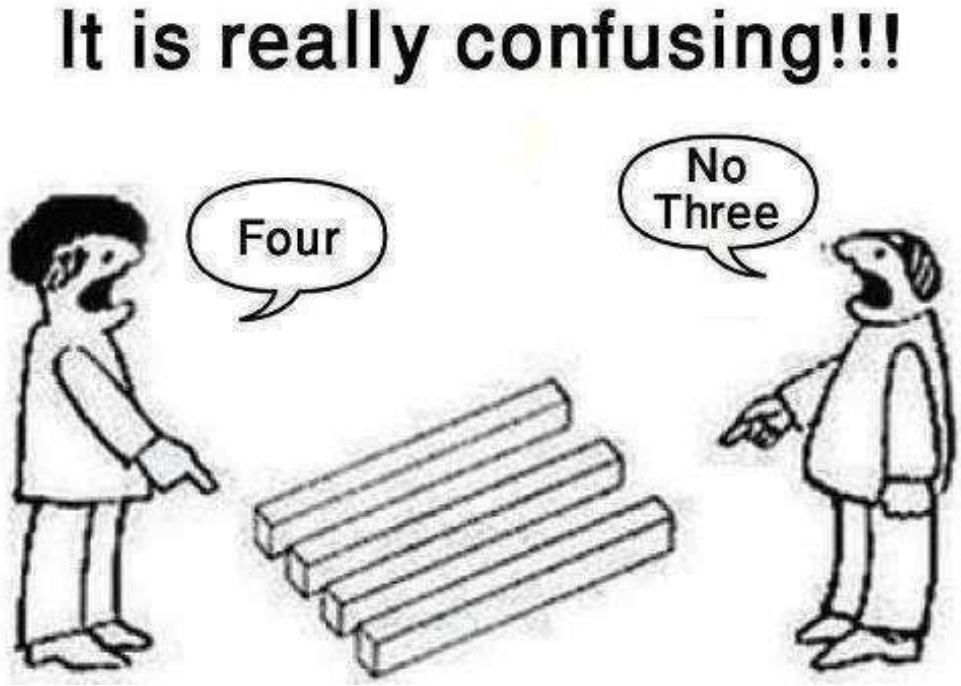
Escher: Day and Night

Figure-ground issues

An image consists of a foreground figure and formless background

..best illustrated through reversible figure-ground examples





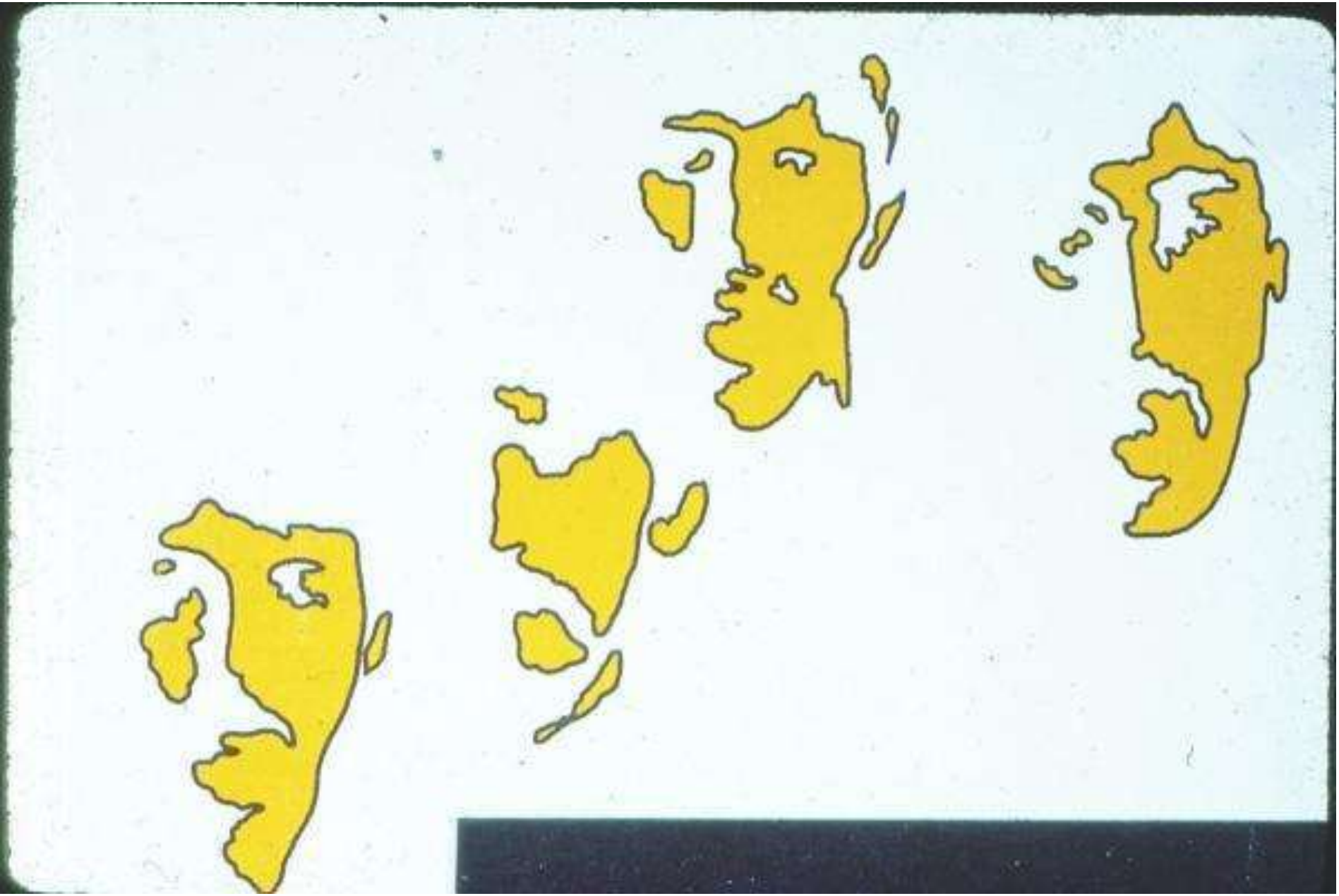
http://en.wikipedia.org/wiki/Figure-ground

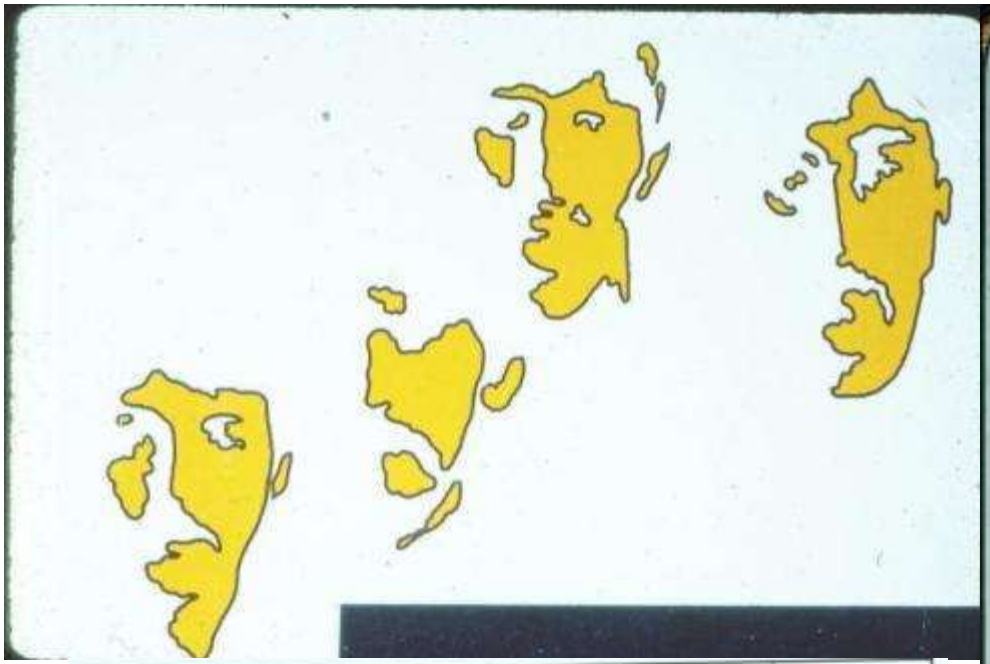
'Enclosure'

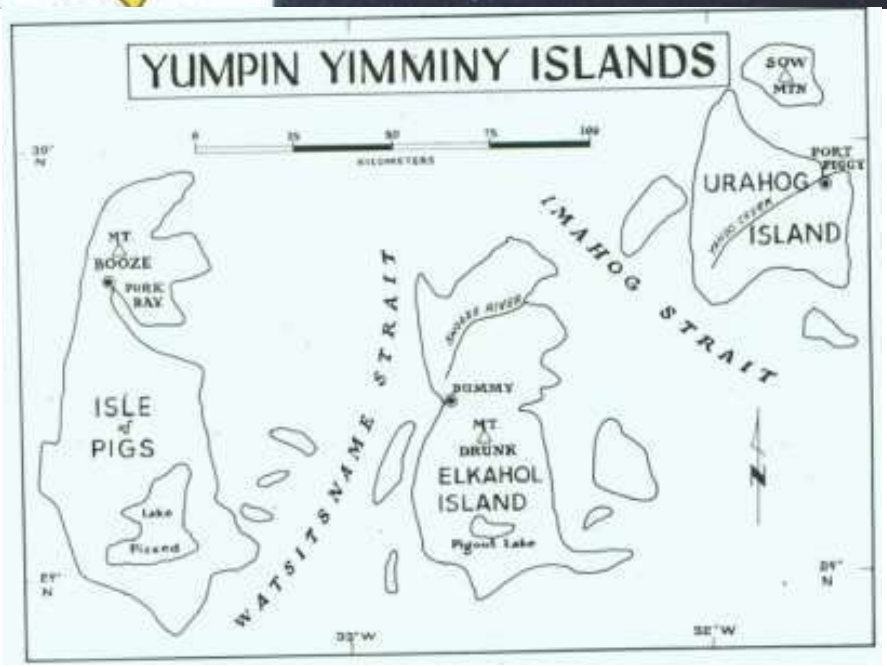
If you see a beach, the ocean sky and stars, you either have the mind of an artist or you need a vacation...

It is actually the bottom of a car door that needs fixing!

My favourite example







Familiarity, context v closure, pattern

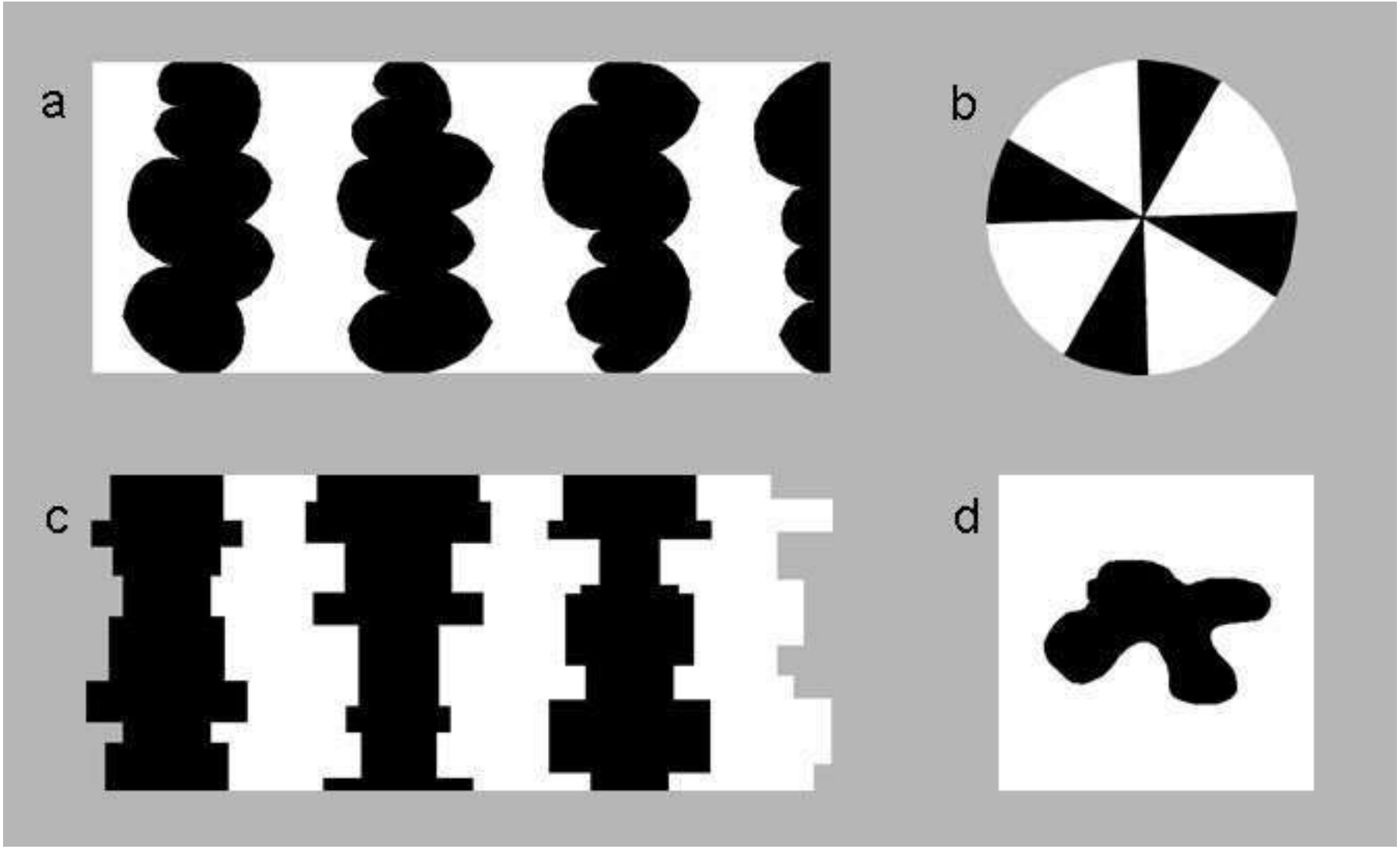


Figure-Ground and Rules of Visualisation

a. Convexity, b. Area, c. Similarity (pattern), d. Enclosure

Also: Continuity, Proximity, Texture, Meaning (context)

What does all this have to do with map design ?

What does all this have to do with map design ?

Good design involves:

Clear figure-ground -> no ambiguity

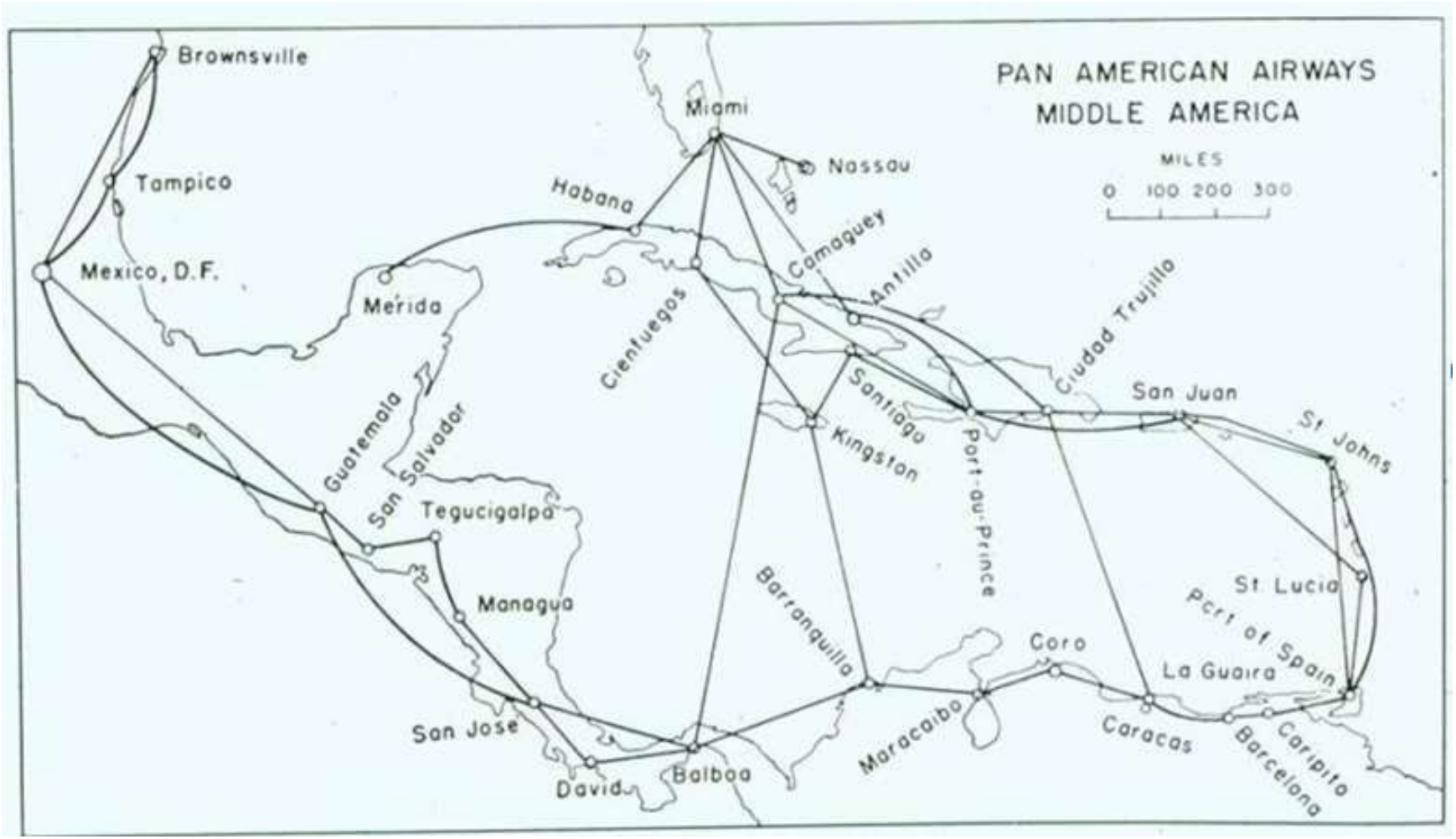
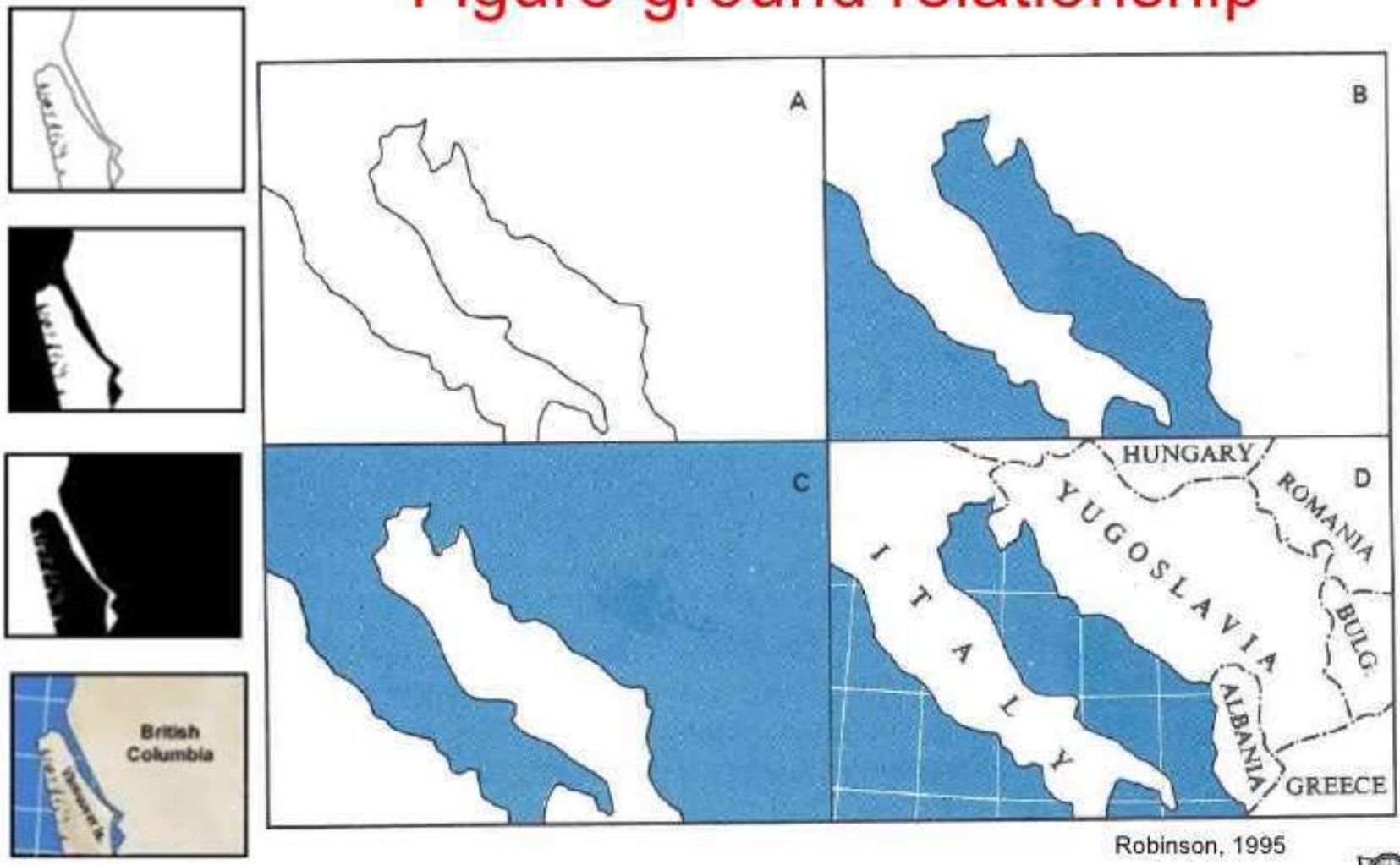
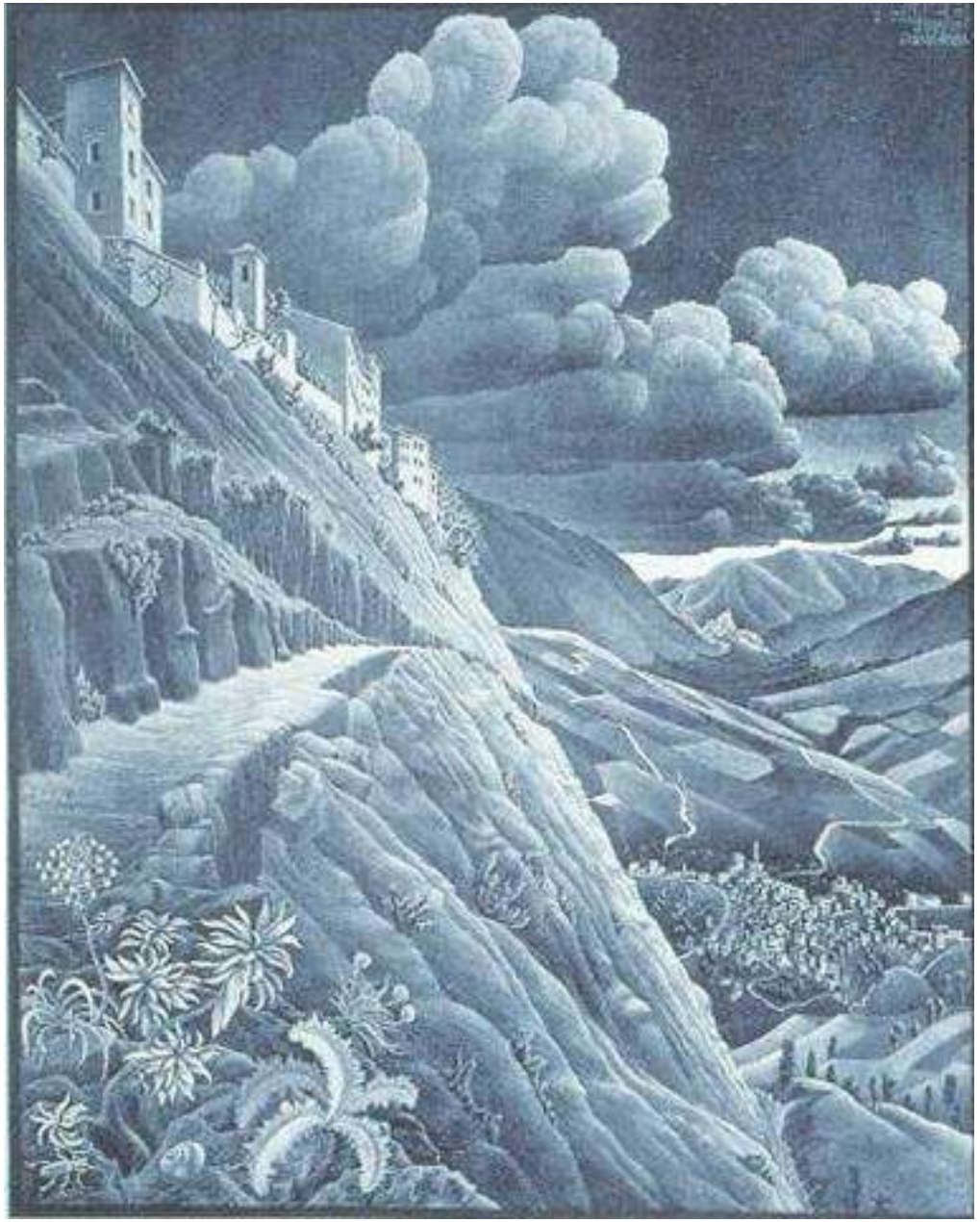


Figure-Ground and land-water



State of the Map conference, 14 July 2007



2. Figure ground - visual hierarchy

graphics – including maps

need clear figure-ground

….. and visual levels

Visual levels make map data layers clear

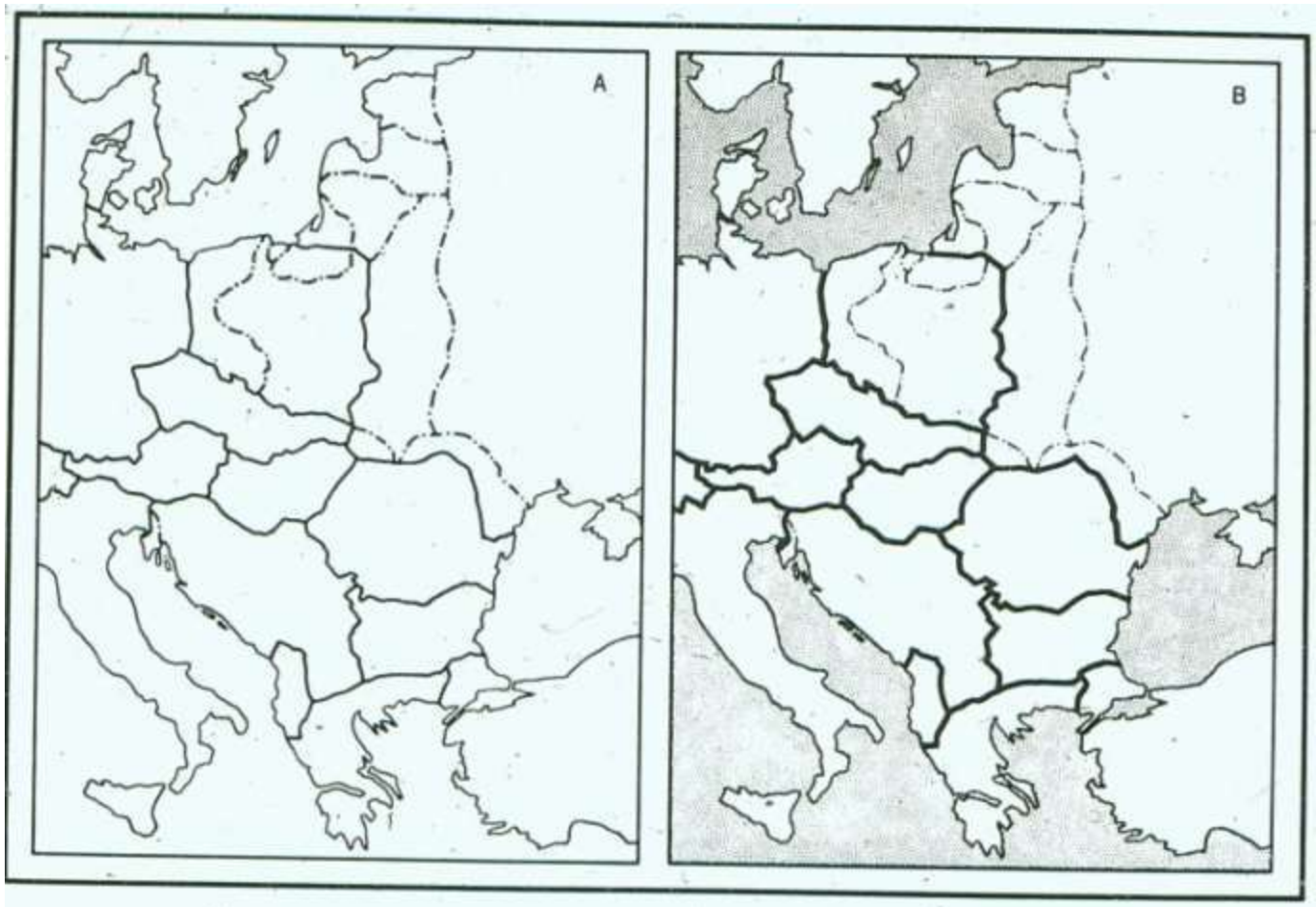
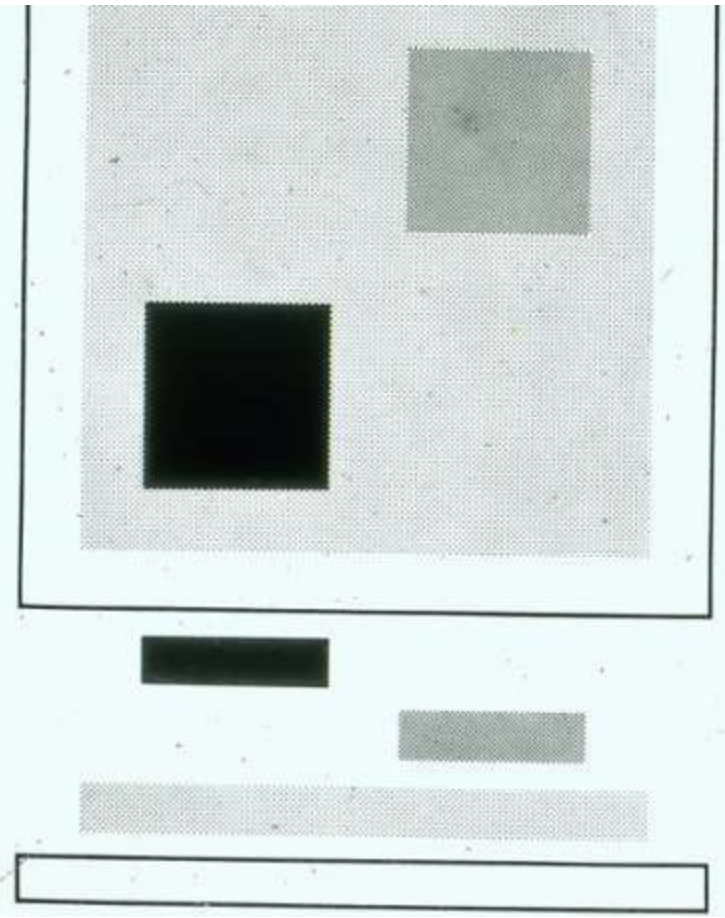
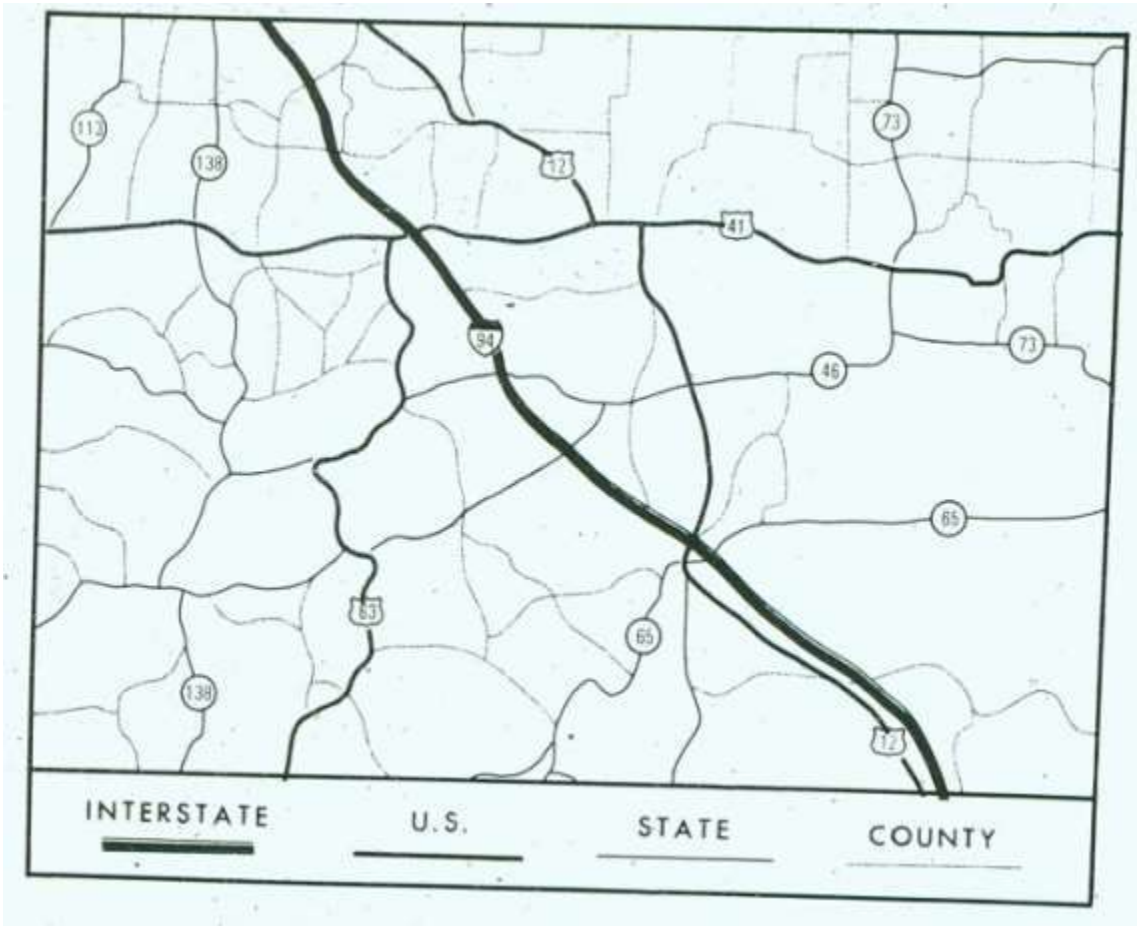


Figure 11.17 All elements in map *A* lie generally in the same visual plane. In map *B* the land has been made to appear above the water, and the more prominent boundaries have been made to rise above the visual plane of the land. Lines of the graticule on the water only would also tend to make the land appear above the water level.

Maps and visual levels: tones and size





Darker / bigger stands higher = more important

http://www.wwu.edu/huxley/spatial/tut/what_all_maps_must_have.htm

9. VISUAL HIERARCHY: a hierarchy of symbology should be used for the lettering, line weights and shading. More important features are typically larger and/or darker, less important/background information should be smaller and/or lighter. At the same time, do not "over weight" or "under weight" features.

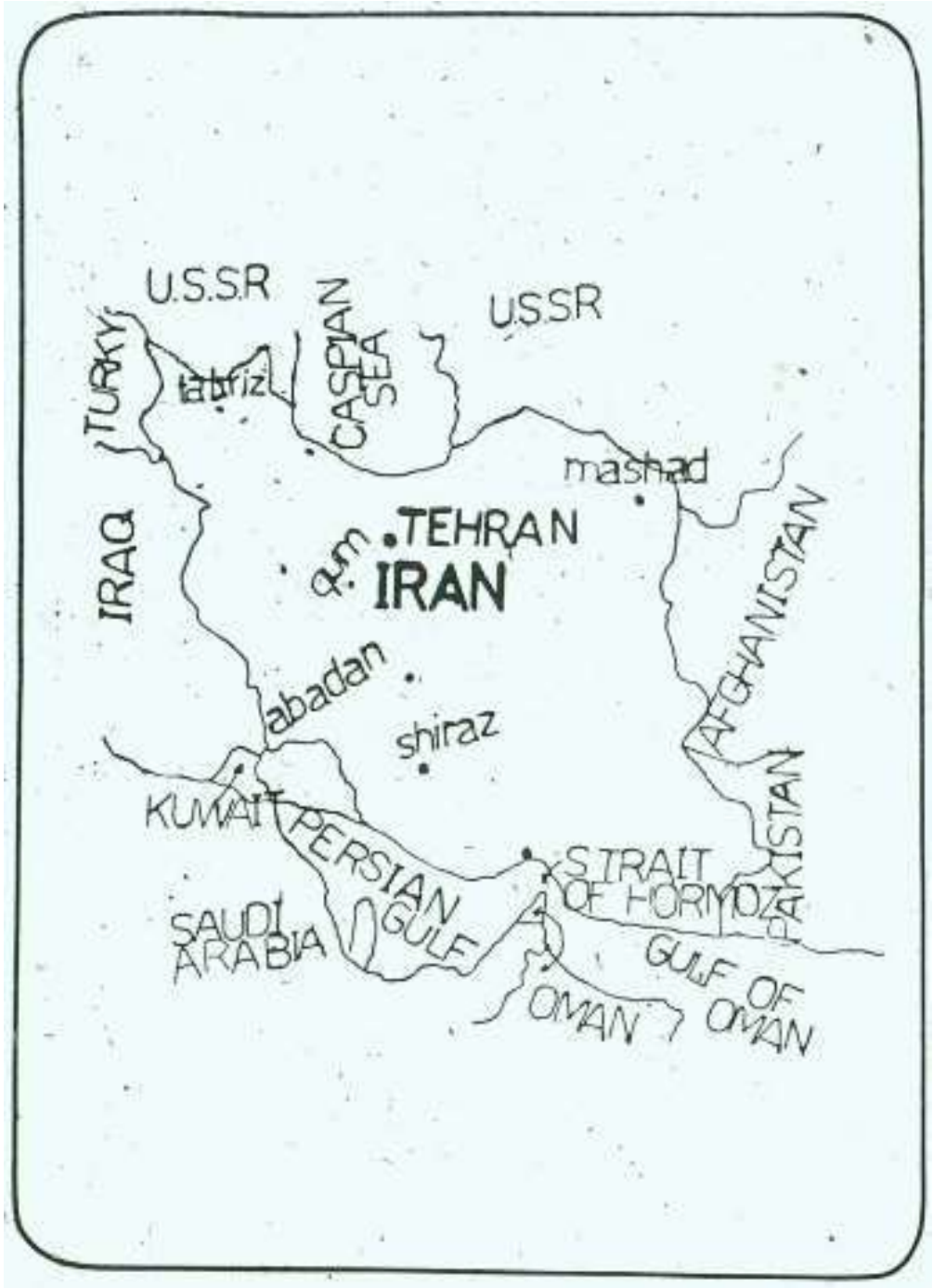
10. **PURPOSE:** All maps have a purpose which should influence every element of the map and the map layout.

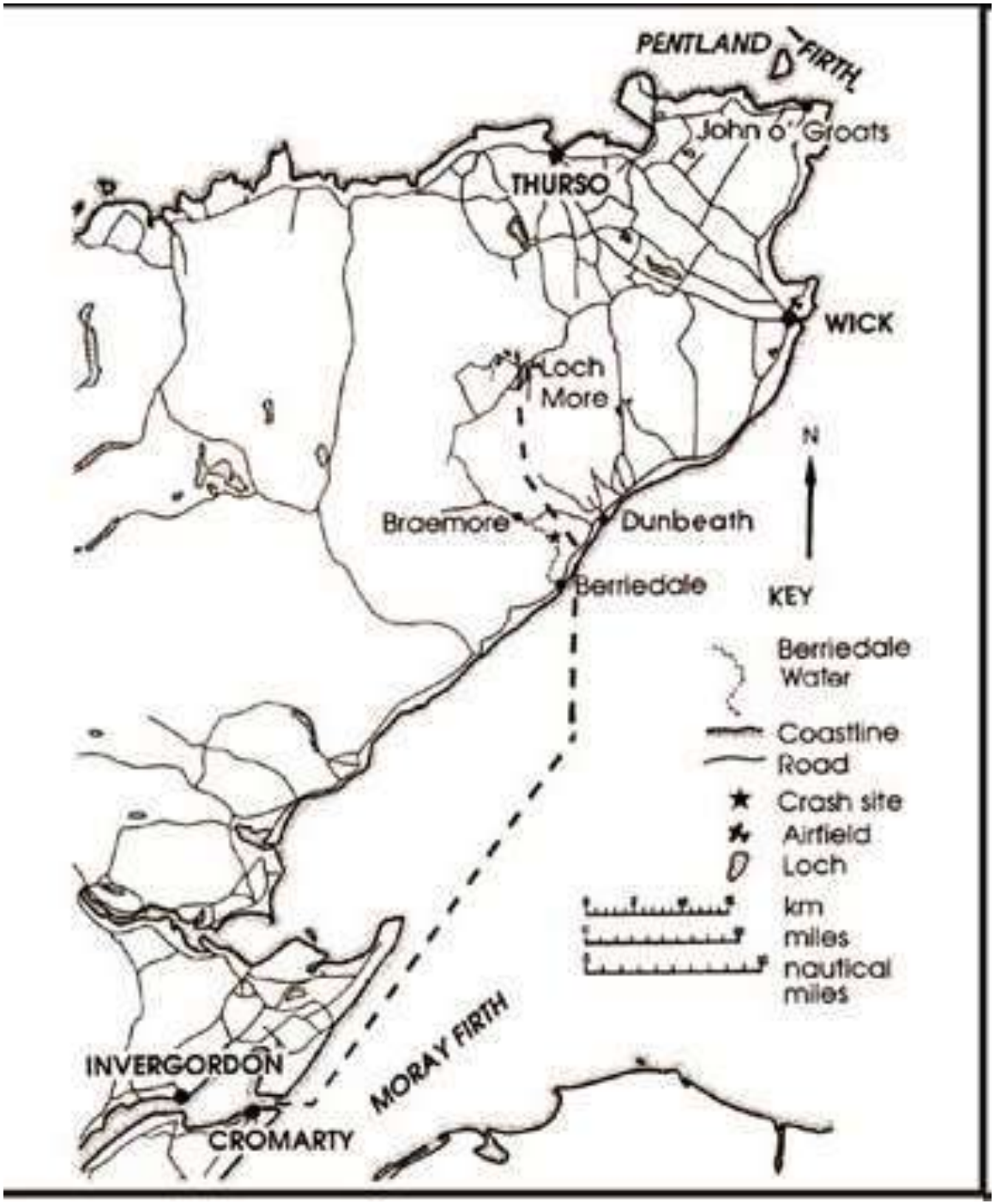
List the errors…

1. Lettering
- Typography and positioning

2. No contrast between ‘layers’

3. No Figure-ground – no visual levels





Local interest map:

The plane crash and death of **Prince George**, 1942 (the Queen's uncle)

The route of the S-25 Sunderland Mk III on 25th August, 1942

The plane crashed on a hillside due to inability of seaplane to climb

(No title) – included within the article
Location of shooting – Quebec, January 29 2017 (The Guardian newspaper)

India demands Pakistan release pilot of downed plane as Kashmir crisis intensifies

Good design involves:

Clear figure–ground -> no ambiguity

Visual hierarchy of layers and elements:

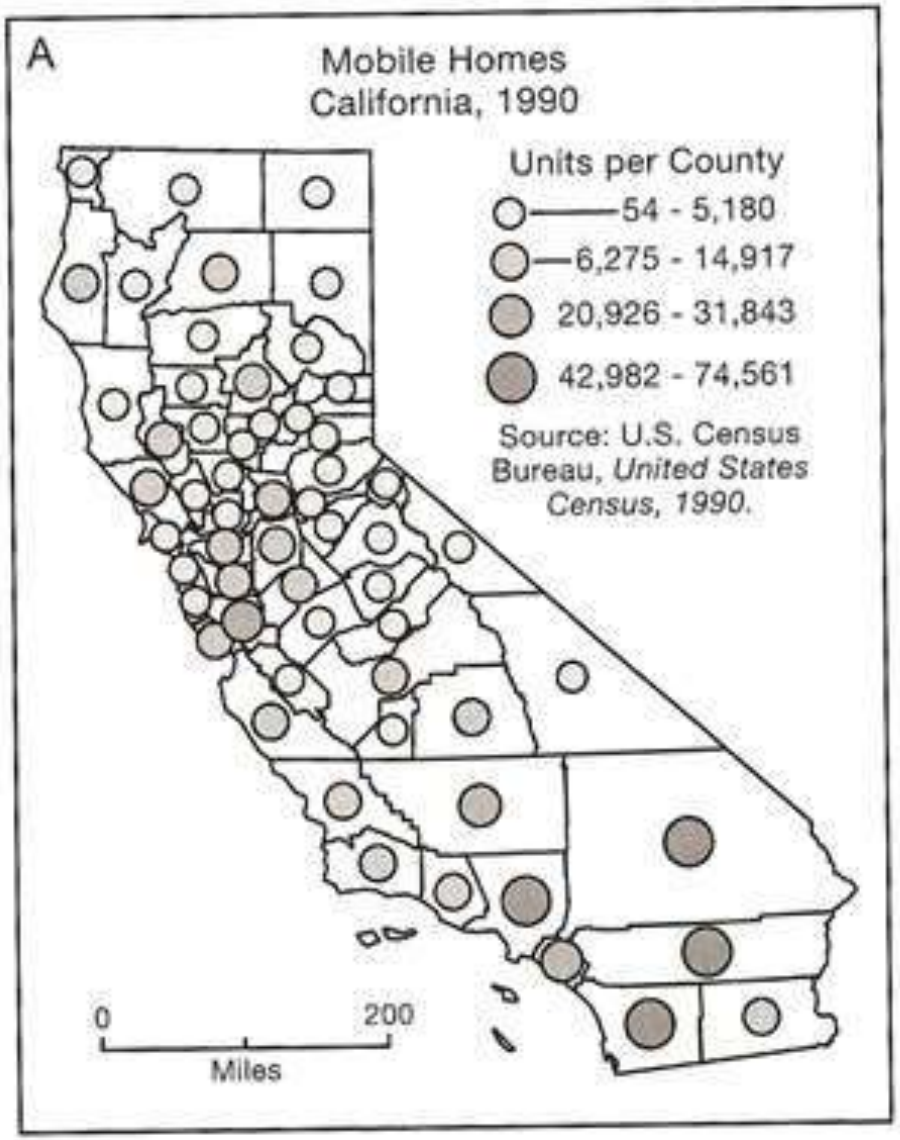
1. Contrast between map layers

2. Map features visually dominant over ancillary info

3. Thematic layers over base layers

4. Important features dominant (based on map purpose)

Contrast between **thematic** and **base** layers for visual levels



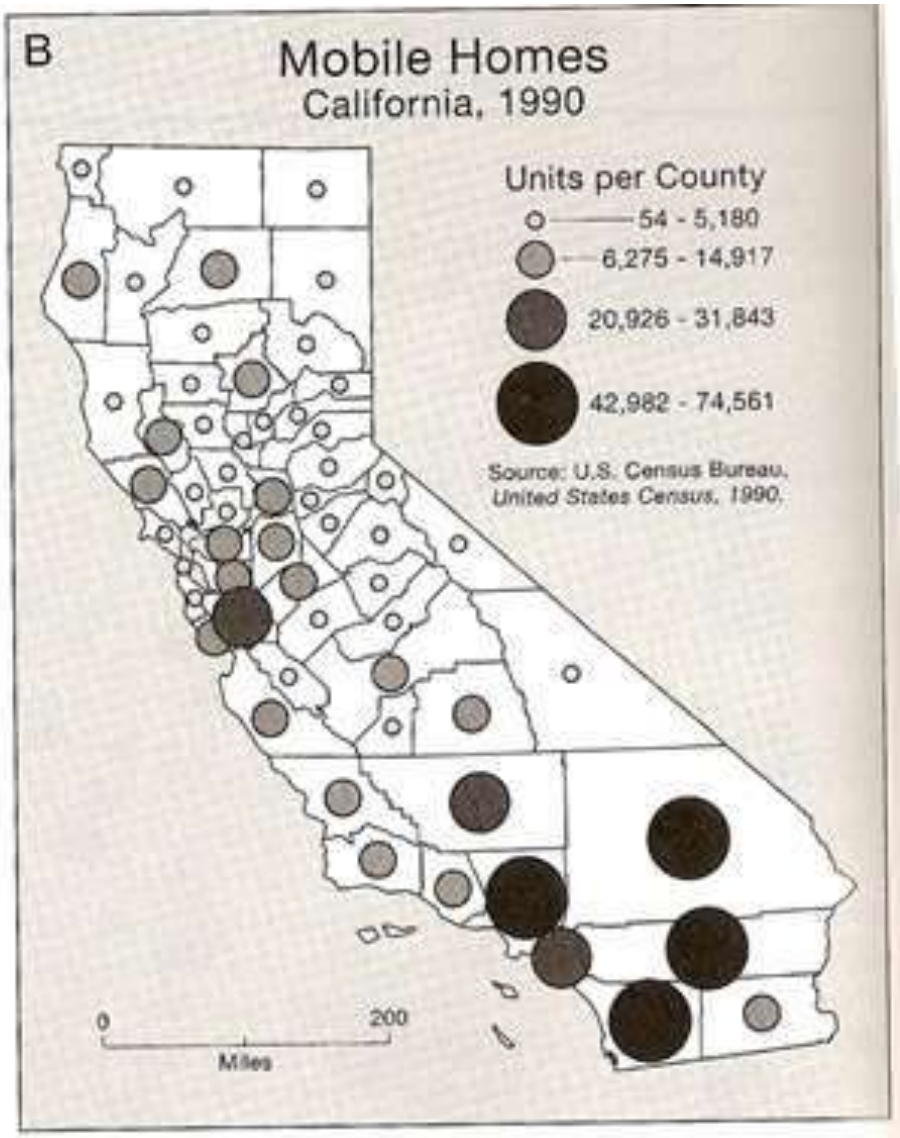
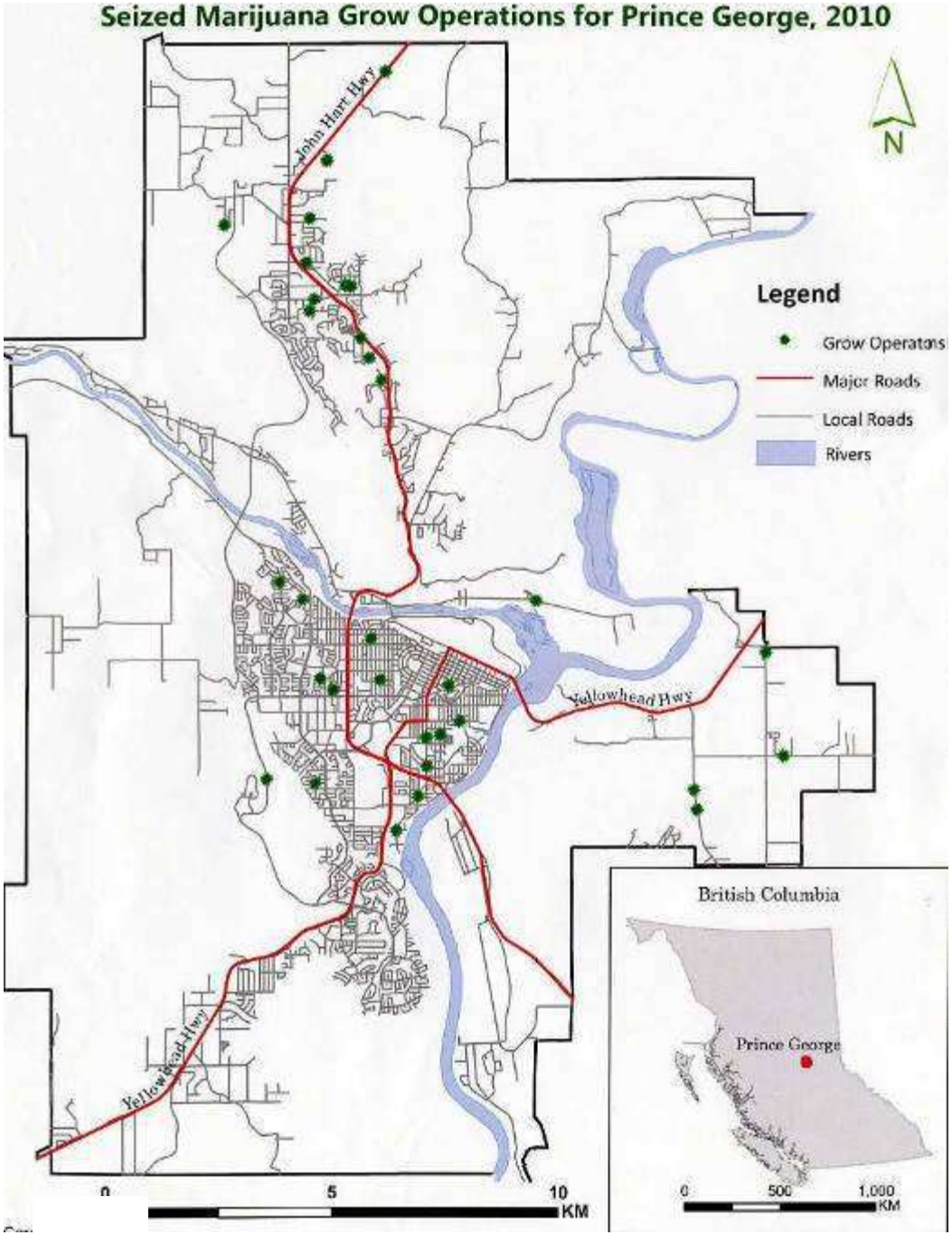


FIGURE 11.31 (A) Insufficient contrast in type size, lightness and size of thematic symbols (circles), line width, and difference between the mapped area and the background. (B) Sufficient contrast in all respects.

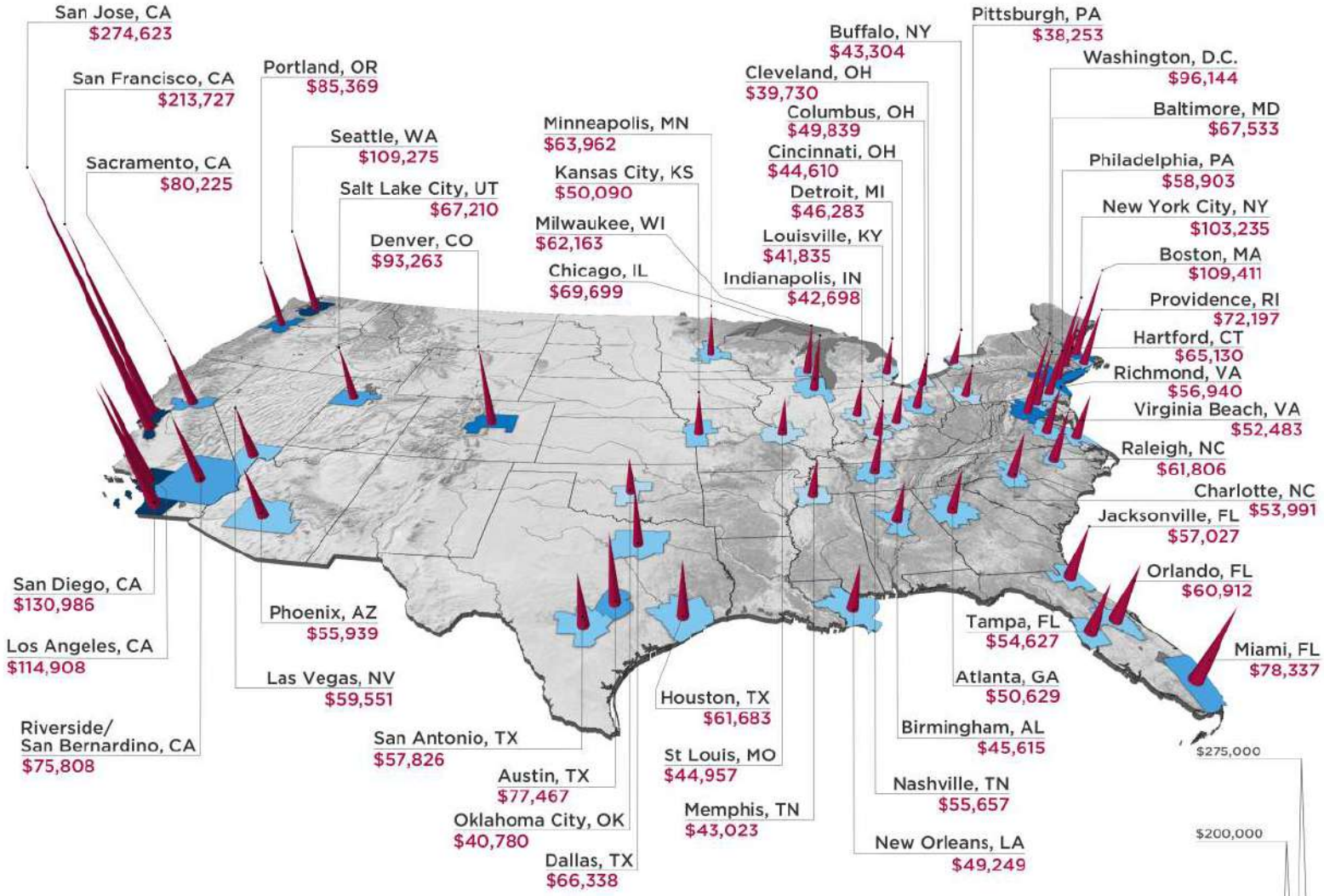


Visual levels

- Water (blue) recedes
- Roads (red) advance
- Green points are solid
- Gray recedes

The Home Buying Map 2018

How Much You Need to Earn Annually to Buy a Home



Methodology:

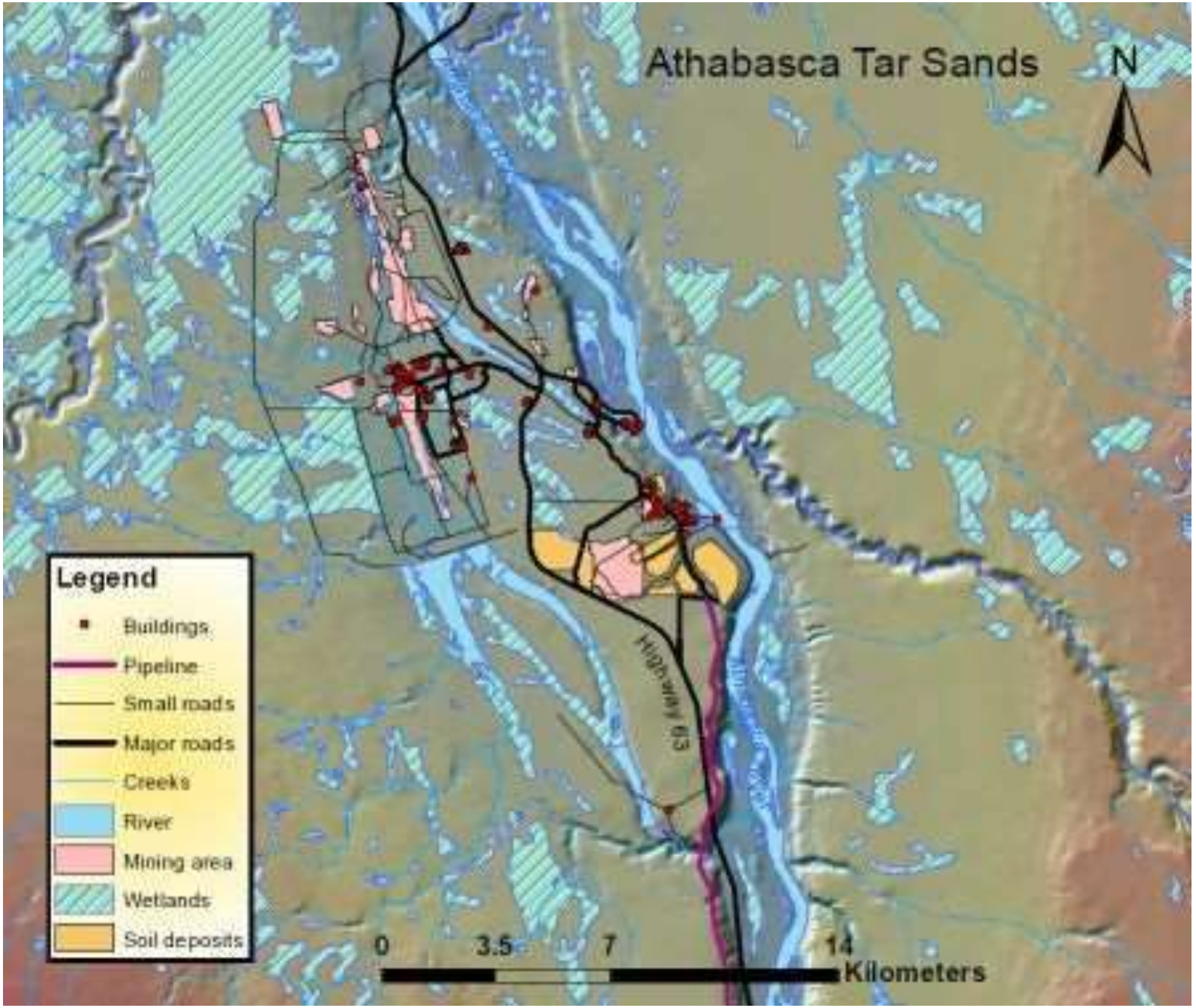
For the calculations, HSH.com uses the National Association of Realtors' 2018 first-quarter data for median-home prices, national mortgage rate data derived from weekly surveys by Freddie Mac and the Mortgage Bankers Association of America for 30-year fixed rate mortgages and available property tax and homeowners insurance costs to determine the annual salary it takes to afford the base cost of owning a home (principal, interest, property tax and homeowner's insurance, or PITI) in the nation's 50 largest metropolitan areas. HSH.com used standard 28 percent "front-end" debt ratios and a 20 percent down payment subtracted from the NAR's median-home-price data to arrive at our figures.

Article & Sources:

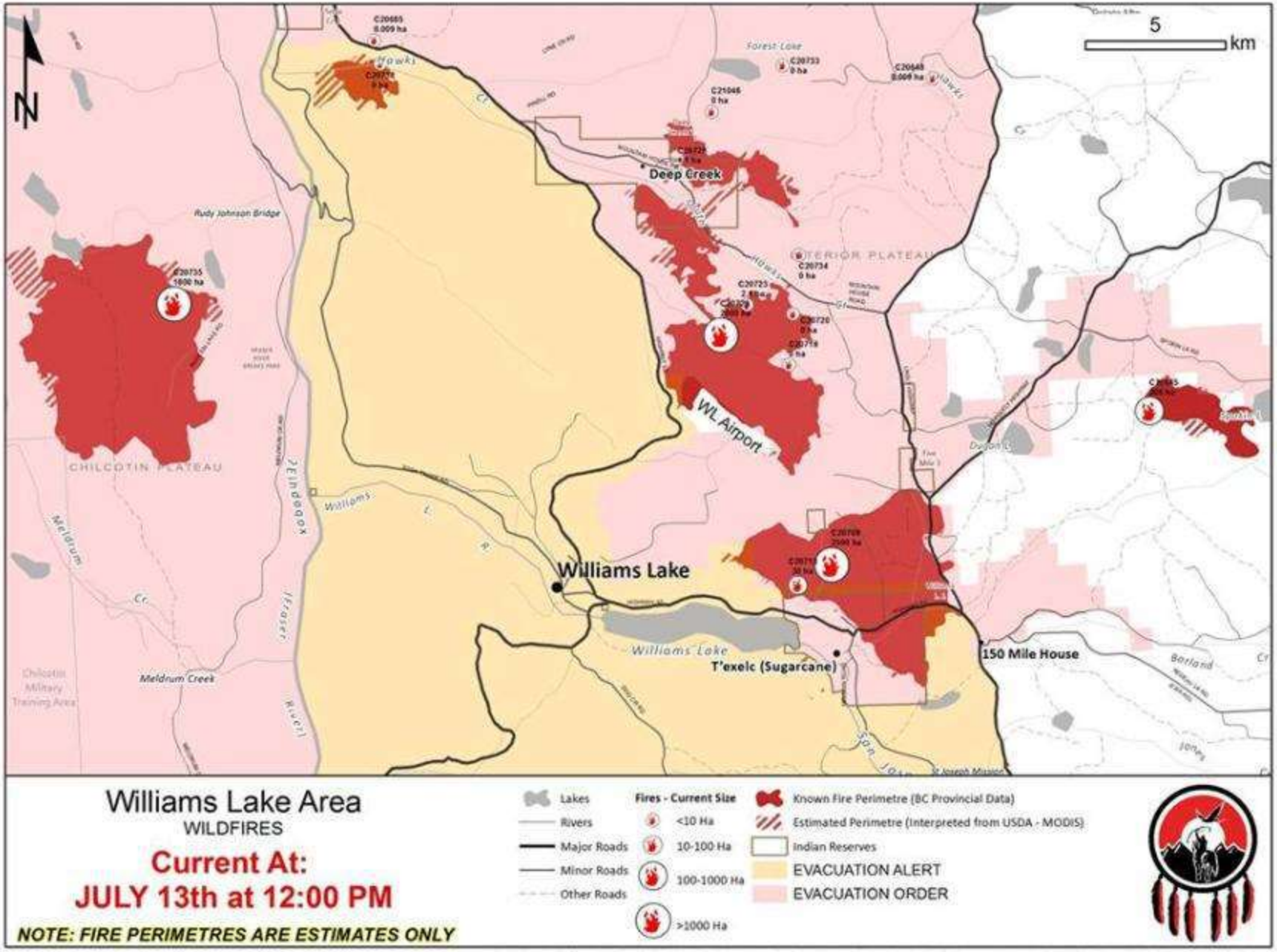
https://howmuch.net/articles/buy-home-50-largest-metro-areas
https://www.hsh.com

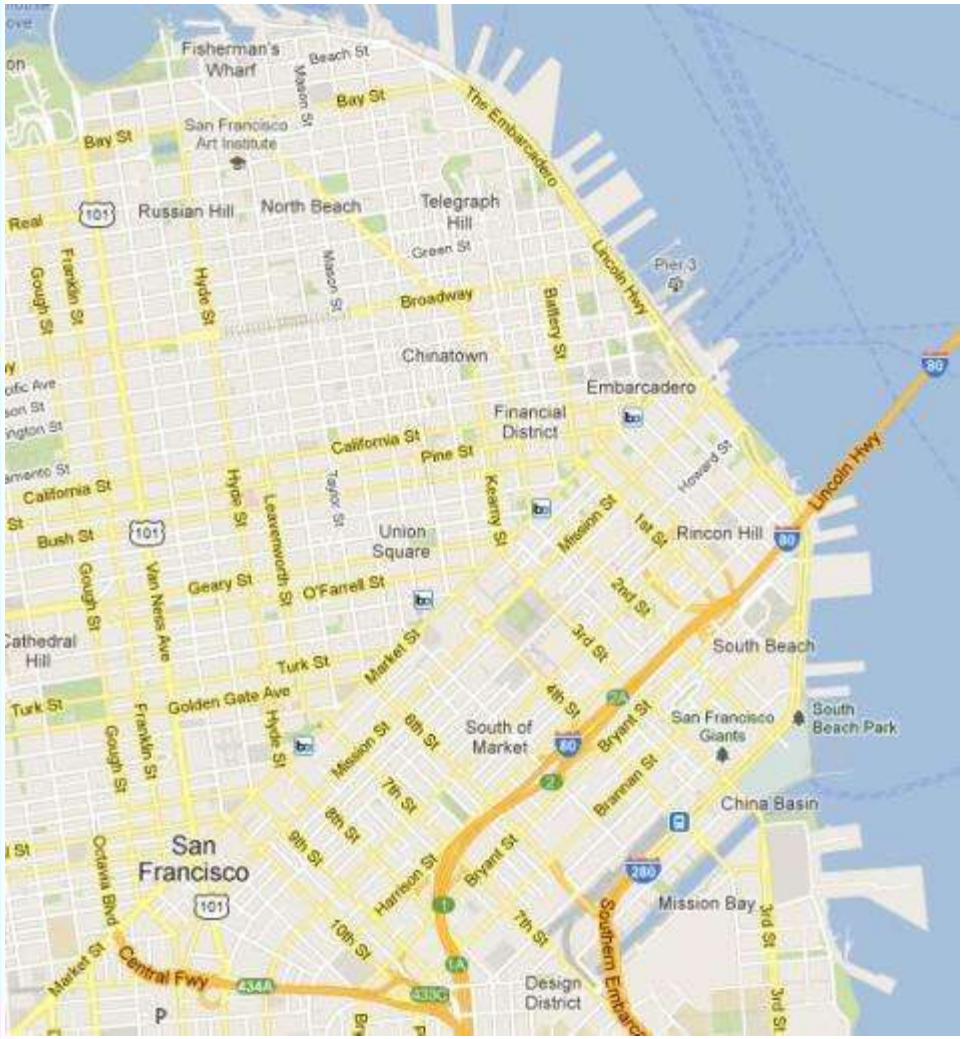
howmuch.net

AAGH
NO !


Athabasca Tar Sands
N
Legend
Buildings
Pipeline
Small roads
Major roads
Creeks
River
Mining area
Wetlands
Soil deposits
Highway 63
0
3.5
7
14
Kilometers

Yes


N
5
km
Deep Creek
Rudy Johnson Bridge
WL Airport
Williams Lake
T'exelc (Sugarcane)
150 Mile House
Meldrum Creek
CHILCOTIN PLATEAU
INTERIOR PLATEAU
Williams Lake Area
WILDFIRES
Current At:
JULY 13th at 12:00 PM
NOTE: FIRE PERIMETRES ARE ESTIMATES ONLY
Lakes
Rivers
Major Roads
Minor Roads
Other Roads
Fires - Current Size
<10 Ha
10-100 Ha
100-1000 Ha
>1000 Ha
Known Fire Perimetre (BC Provincial Data)
Estimated Perimetre (Interpreted from USDA - MODIS)
Indian Reserves
EVACUATION ALERT
EVACUATION ORDER
COMPILED BY SHANE DODDRIDGE AT TNG - CONTACT FOR MORE DETAILED MAPS AND INFORMATION AT 250-392-3918



More clear layering in the google map

http://maps.unomaha.edu/Peterson/Cartadesign/5Hierarchy/index.html

Summary use of visual variables
Higher visual levels / = Figure

✓More shape / texture

✓Bigger size (points, line width)

✓Darker tone / values

✓Saturated chroma

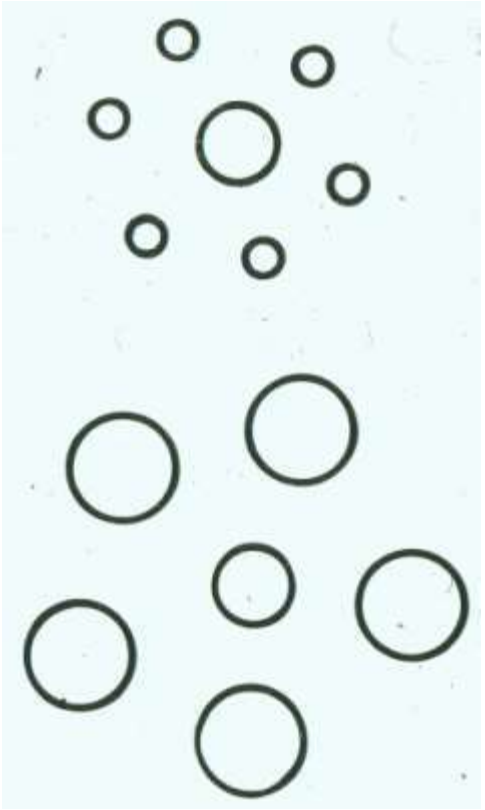
✓Hue – colour spectrum Blue-> **Red**

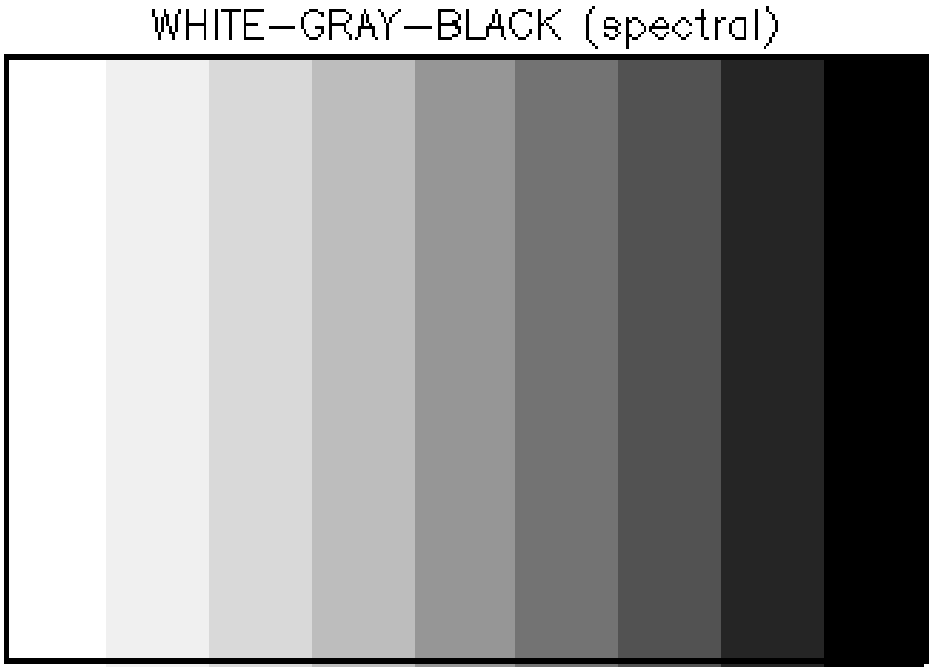
https://blogs.esri.com/esri/arcgis/2011/02/15/graphic-design-principles-for-mapping-figure-ground-organization/

3. Figure–Ground and 'Gestalt' Psychology

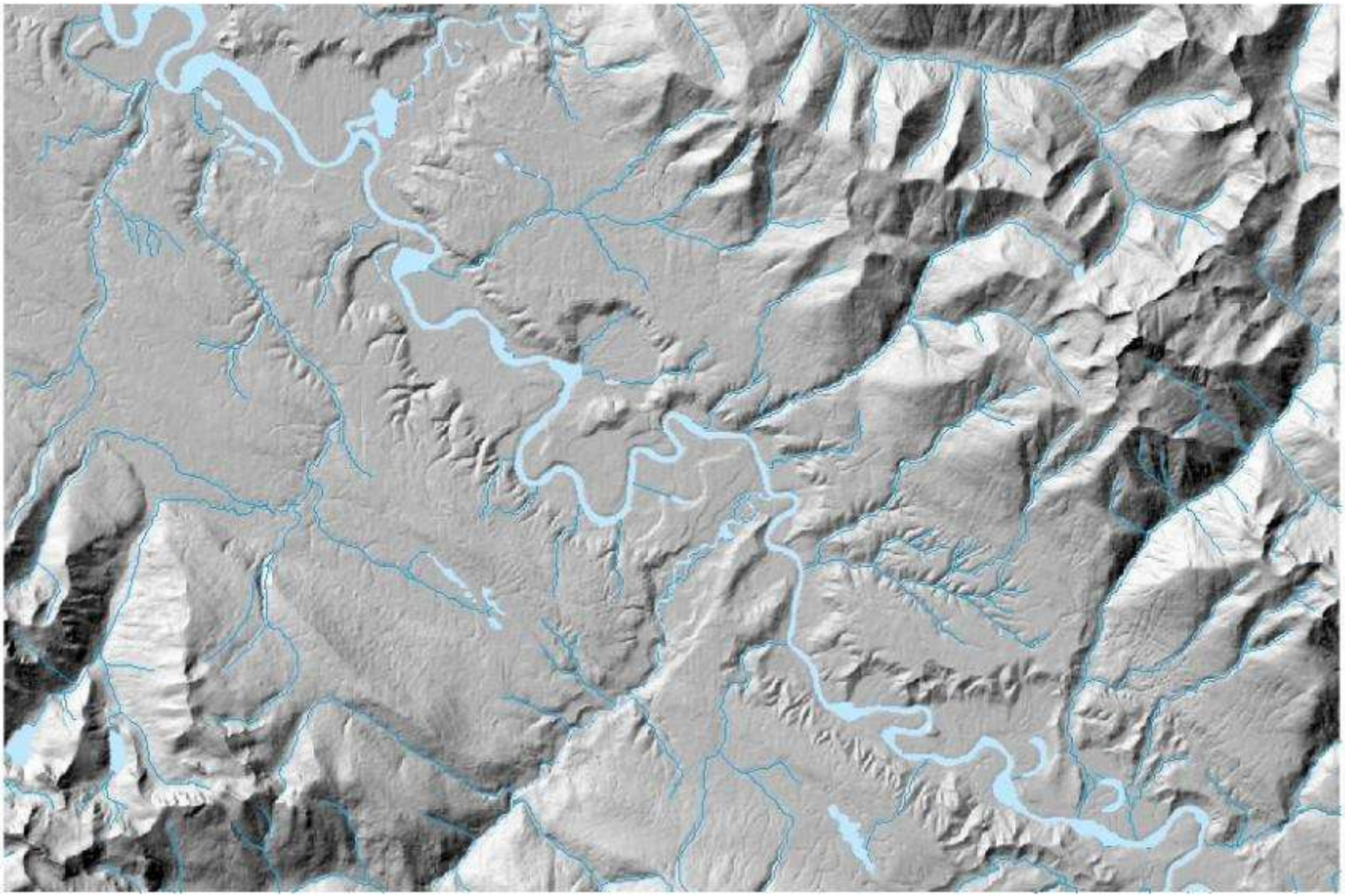
Gestalt: "The whole is greater than the sum of the parts"

i.e. Display elements must be considered together
– they are affected by each other

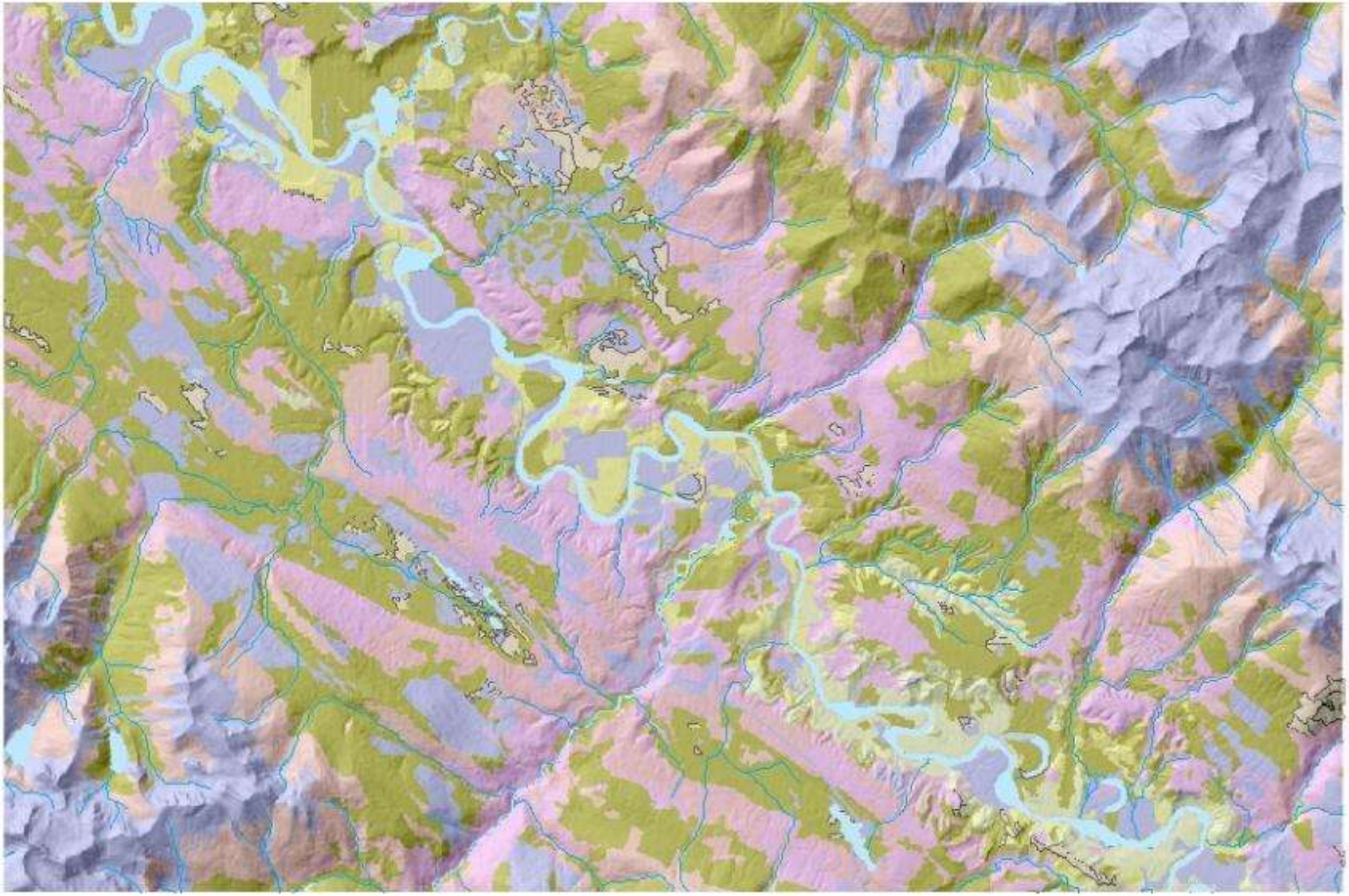




Part of the BC hillshade layer - Goat River – as a raster = ‘figure’ or ‘ground’ ?



Using transparency to show terrain and forest cover



Shaded relief can form an effective ground layer to underlay other elements
Viewable via peripheral vision …. But it may modify polygon colours

Contour lines encode elevations but as vectors, require focal attention ‘figure’

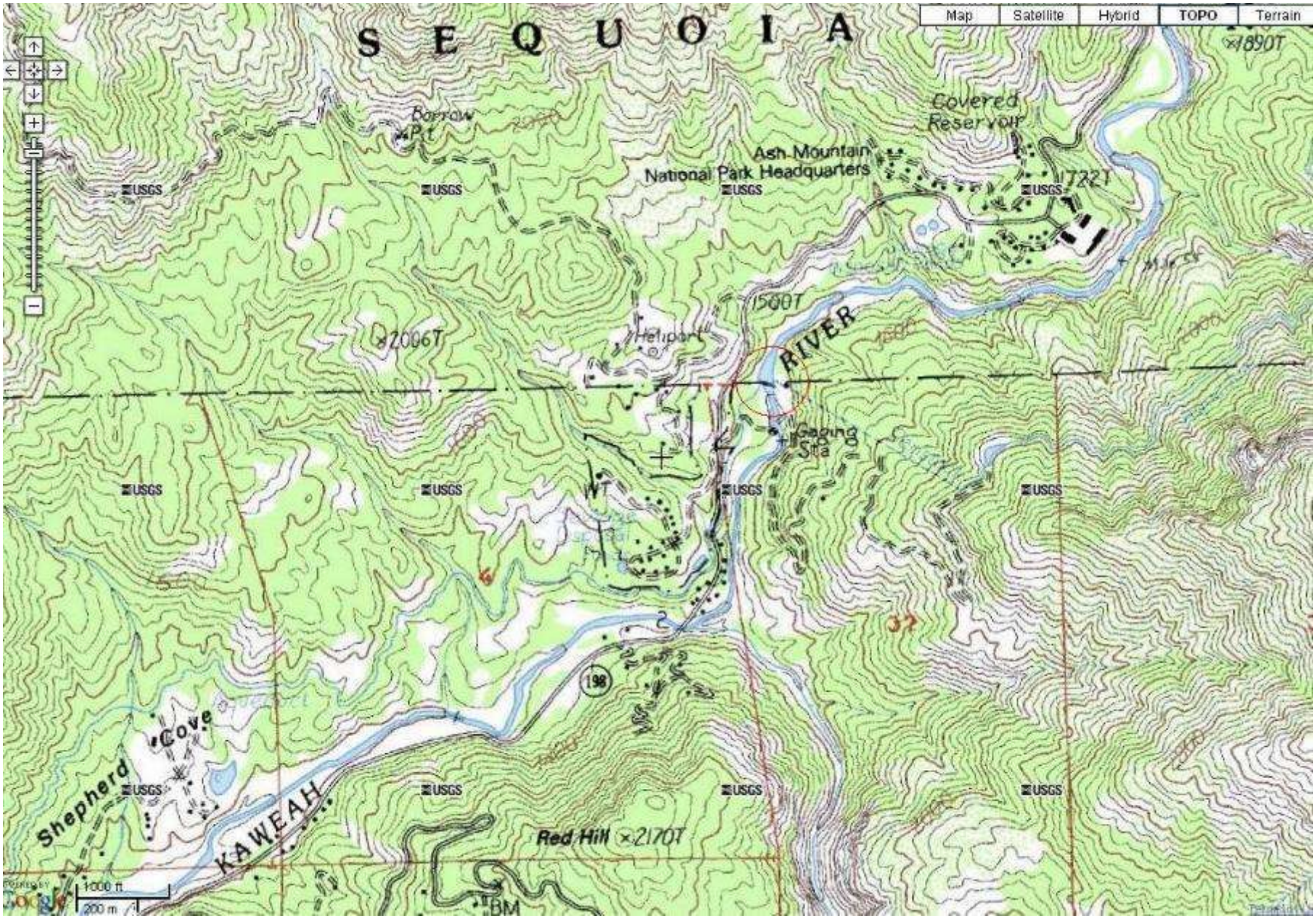
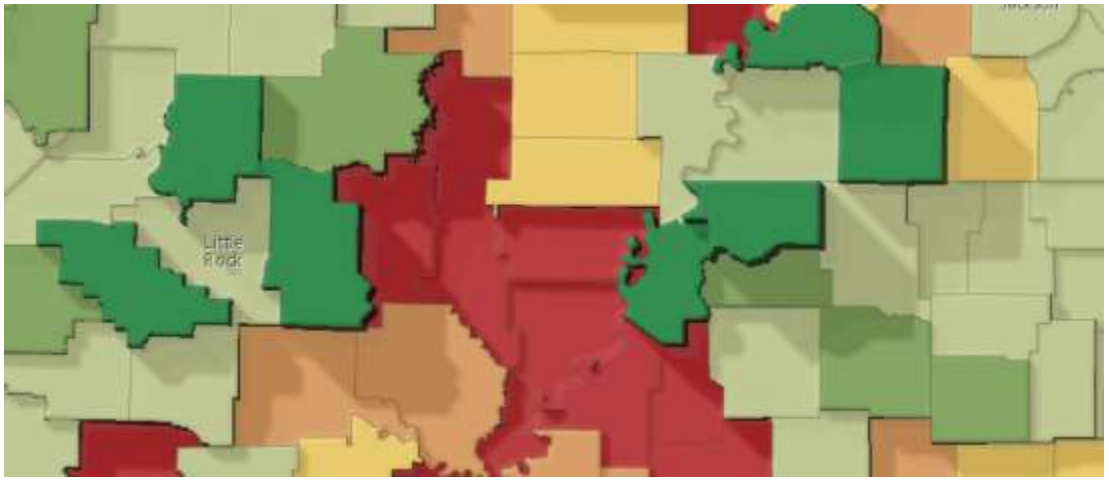


Figure-ground: ArcMap Drop shadow

http://blogs.esri.com/esri/arcgis/2011/11/04/figure-ground-drop-shadow

ArcMap terrain tools
3D choropleth maps



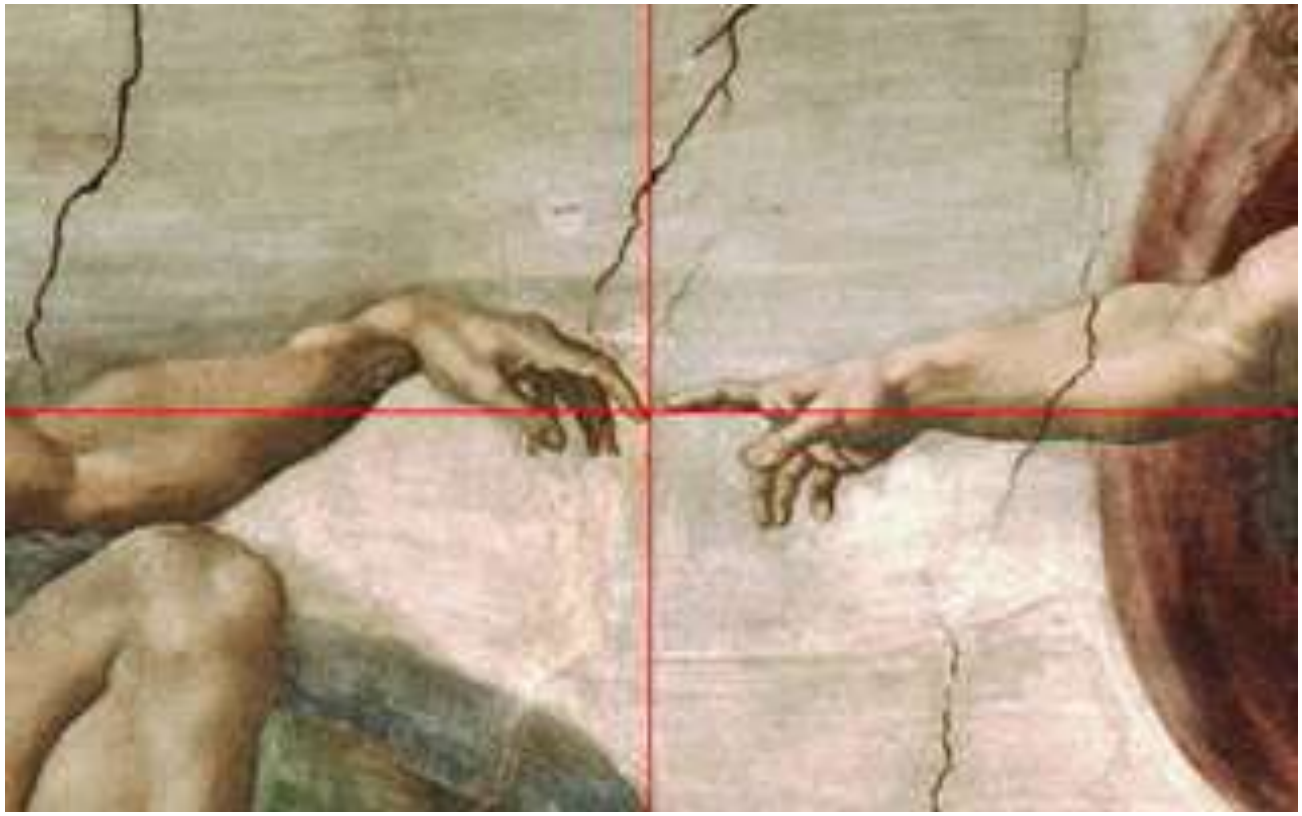
4. Map Layout and overall shape

Graphics: postcards, photos, art, maps, screens etc..
have followed the Golden Ratio ~ 1.618 (the Greek letter Phi)

1.618

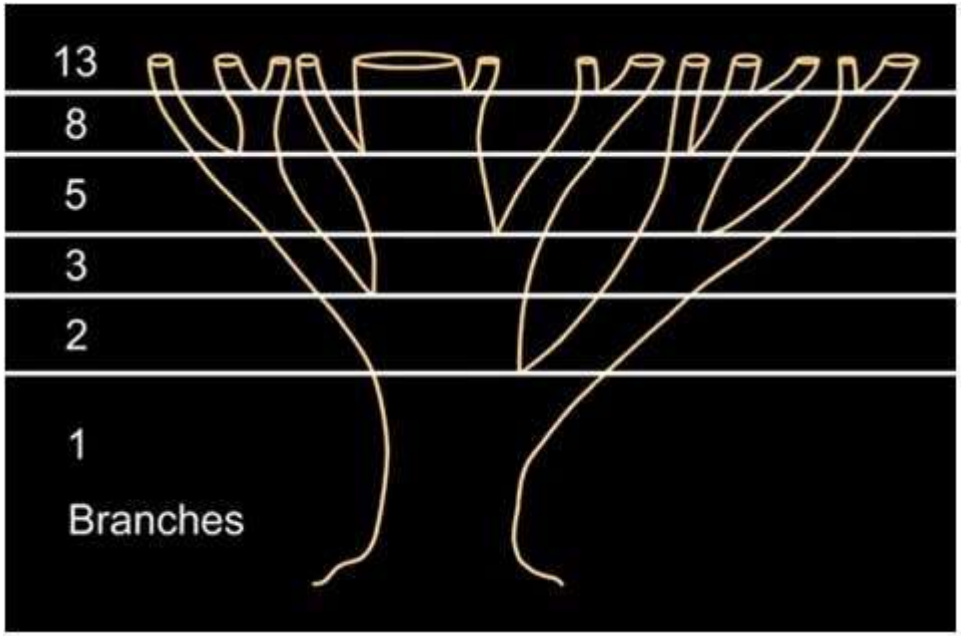
φ

1



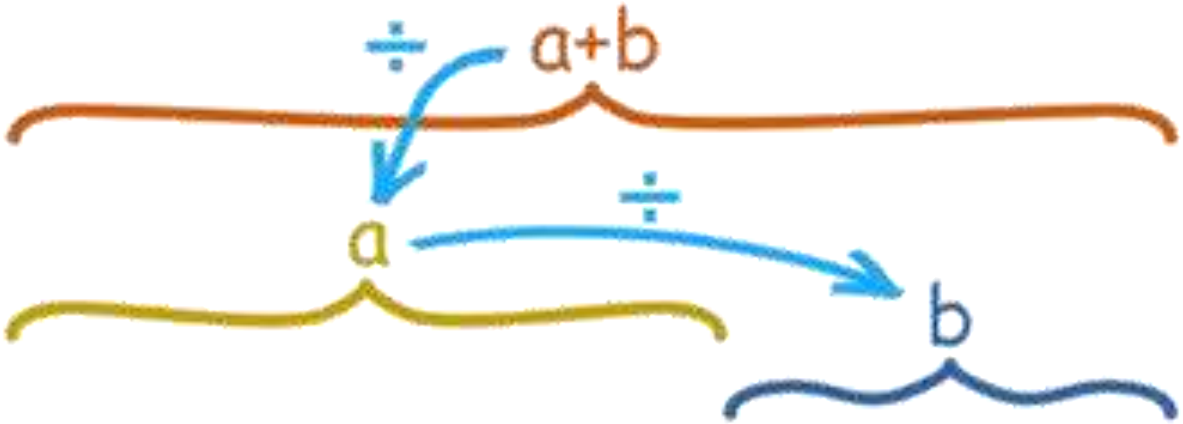
- **Tabloid page format (11 x 17) is close to this value**
- **New monitors and TV screens (16 x 9, 42 x 21) don't follow this rule ....**

The golden ratio is connected to the **Fibonacci numbers**
in the sequence 0,1,1,2,3,5,8,13... where each number is the sum of the previous two, and the ratio approaches **1.618**
These numbers appear frequently in nature

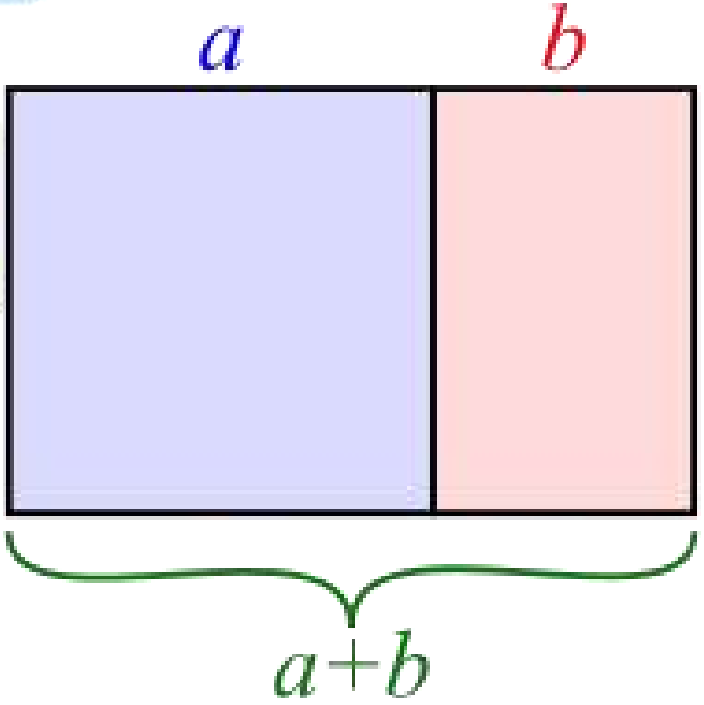


Tree branches

Read about it in your reading break !



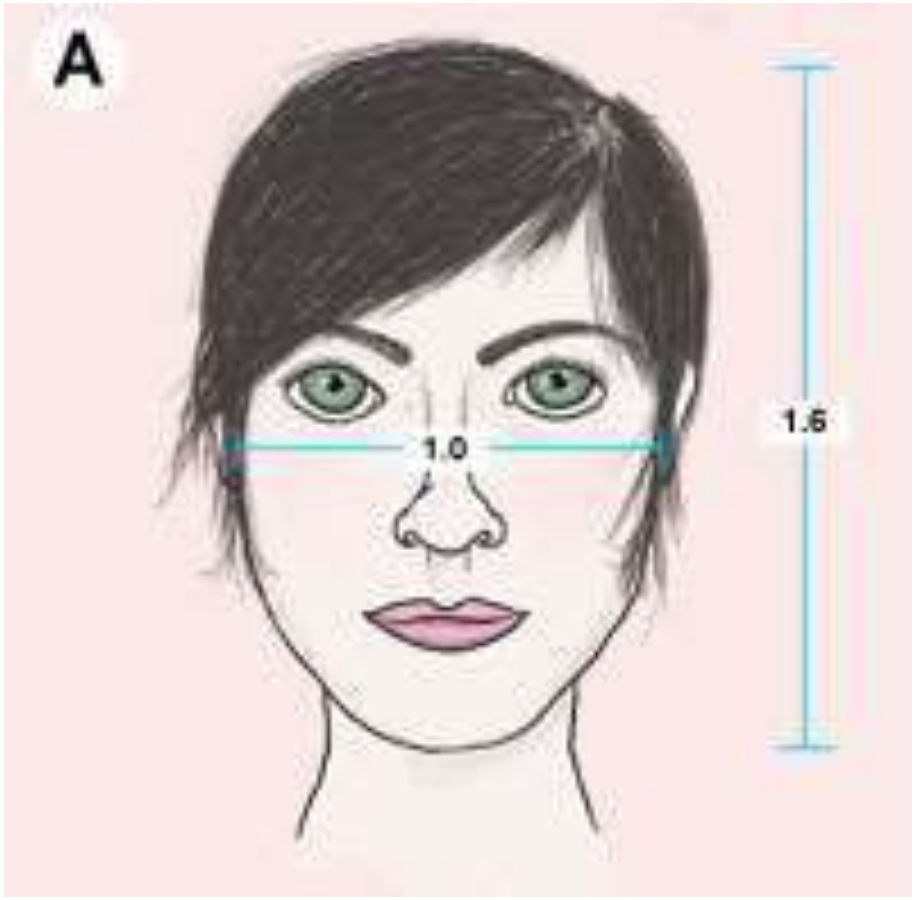
$$\frac{a+b}{a} = \frac{a}{b} = 1.618\ldots = \varphi$$



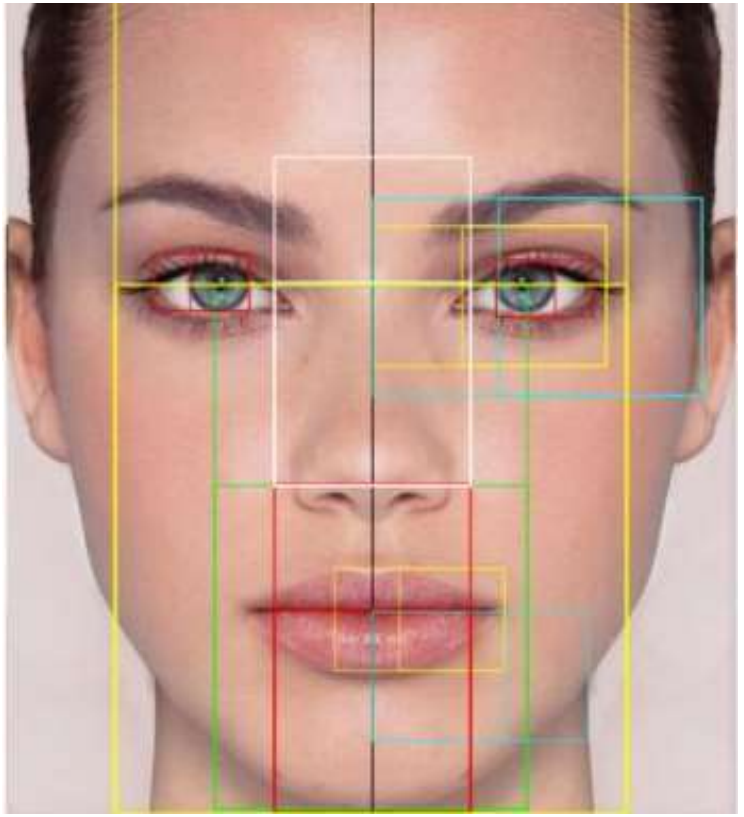
The Golden Ratio:
and map shape

Map shapes can follow this ‘golden rule’ – not always, rectangles are better than squares

The Golden Ratio and Facial attractiveness

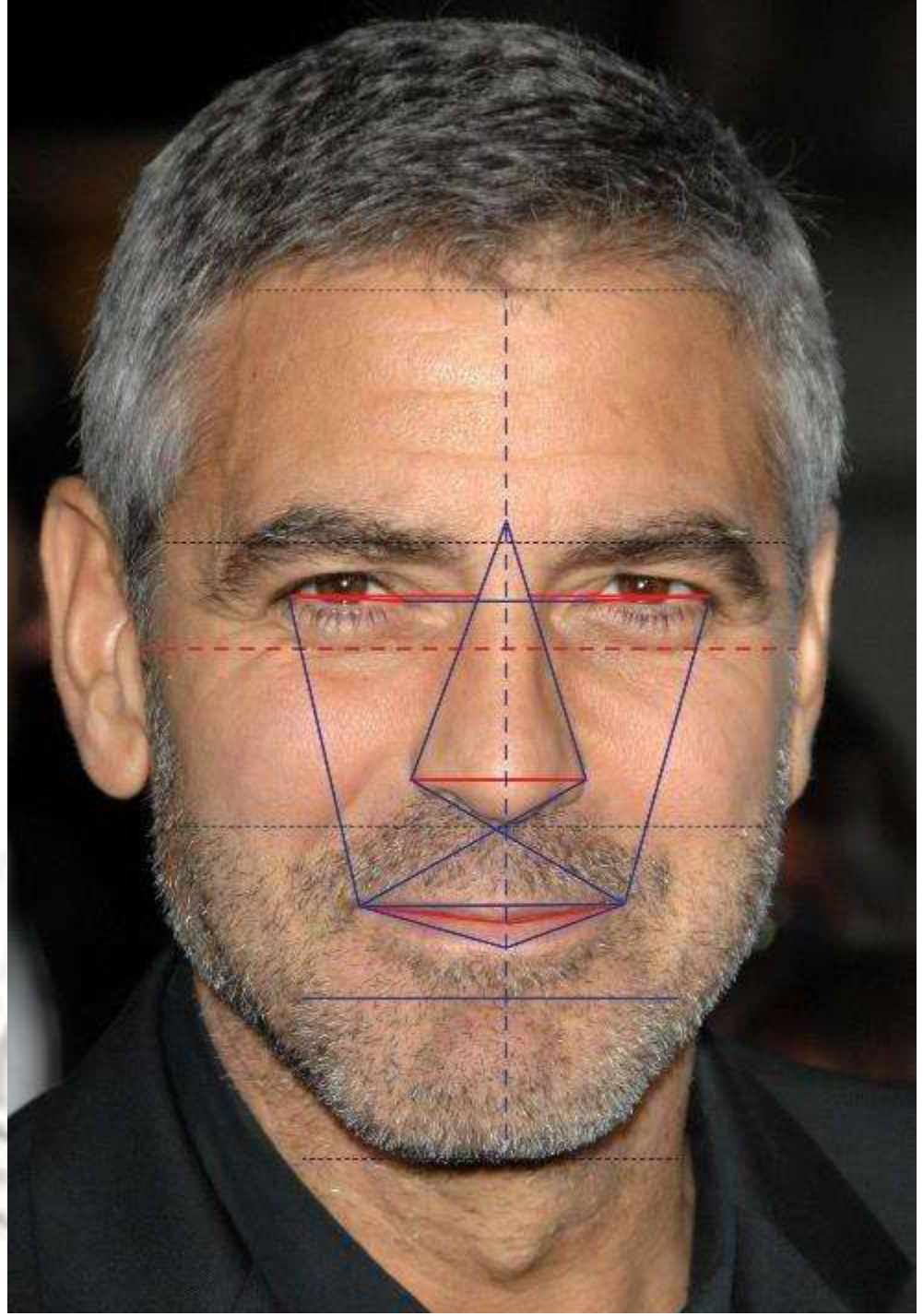


First, measure the length and width of the face. Then, divide the length by the width. The ideal result—as defined by the golden ratio—is roughly 1.6, which means a beautiful person's face is about 1 1/2 times longer than it is wide.



Most people score 40-60%;
no one has been a perfect 100.

George Clooney 92%
Brad Pitt 93%



GEOG205: Midterm exam on Friday 18th

Covers all lectures including today – will upload today's recording shortly

In-class 5-154 students: I'll handout hardcopy versions – you circle multiple choice and write in spaces between answer questions.

Virtual students: I'll email the exam (word .doc) ~10.25am. You download and underline the correct multiple choice answer / type in short answers in the .doc (save often) and email back to me ~11.20
(I'll allow up to 11.30 for saving/sending).

Did I forget anything ?

I'll be reading 36 +12 exams ..