

Visual Variables

Characteristics of visual symbols
How we distinguish between them

Visual variables - attributes

position

- changes in the x, y (z) location



size

- change in length, area or repetition



shape

- infinite number of shapes



value

- changes from light to dark



orientation

- changes in alignment



colour

- changes in hue at a given value



texture

- variation in pattern



motion

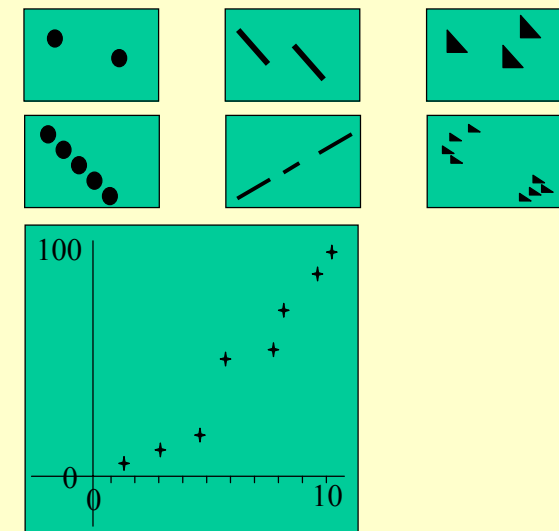
Visual variables - characteristics

Different variable attributes may be:

- **selective**
is a change enough to allow us to select it from a group?
- **associative**
is a change enough to allow us to perceive them as a group?
- **quantitative**
is there a numerical reading obtainable from changes in this variable?
- **order**
are changes in this variable perceived as ordered?
- **length**
across how many changes in this variable are distinctions perceptible?

Position

- ✓ selective
- ✓ associative
- ✓ quantitative
- ✓ order
- ✓ length

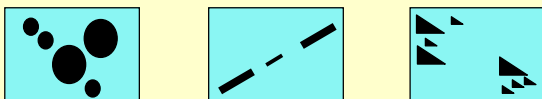


Size

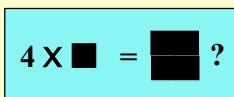
✓ selective



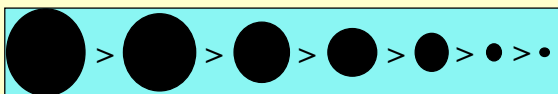
✓ associative



≈ quantitative



✓ order



✓ length

- theoretically infinite but practically limited
- association and selection ~ 5 and distinction ~ 20

Shape

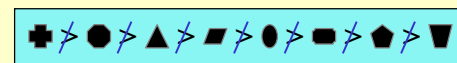
≈ selective



≈ associative



≠ quantitative

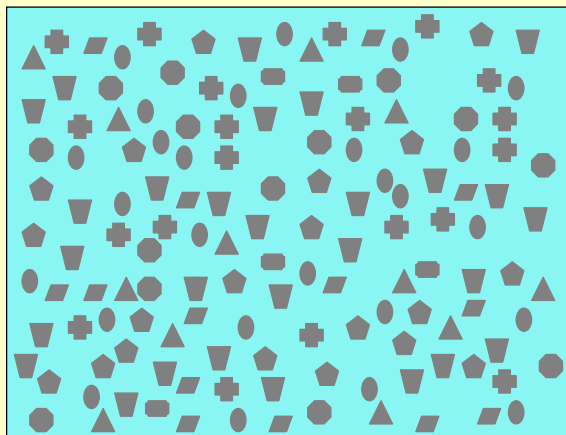


≠ order

✓ length - infinite variation



Shape



Value

✓ selective

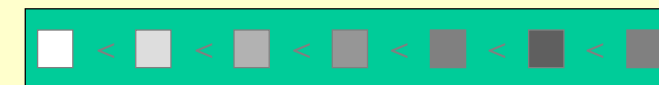


✓ associative



≠ quantitative

✓ order



✓ length

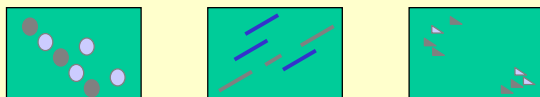
- theoretically infinite but practically limited
- association and selection ~ < 7 and distinction ~ 10

Color

✓ selective

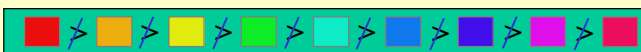


✓ associative



≠ quantitative

≠ order

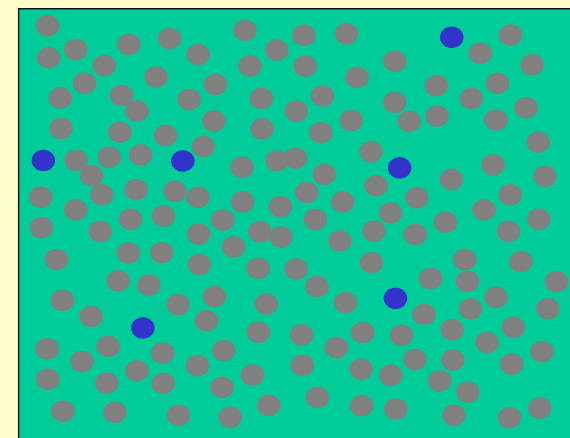


✓ length

- theoretically infinite but practically limited
- association and selection ~ < 7 and distinction ~ 20



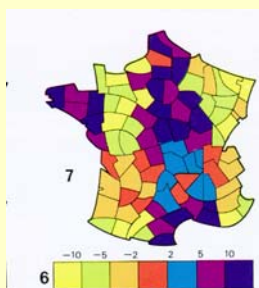
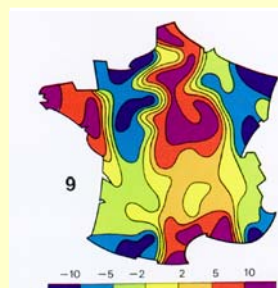
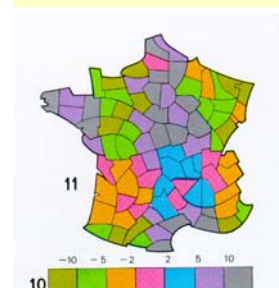
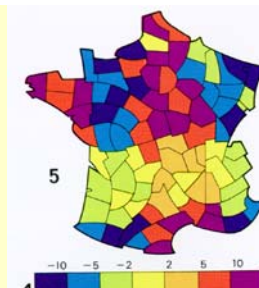
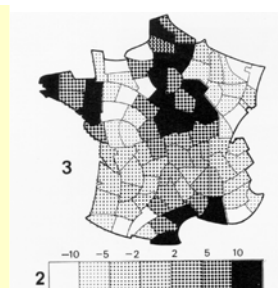
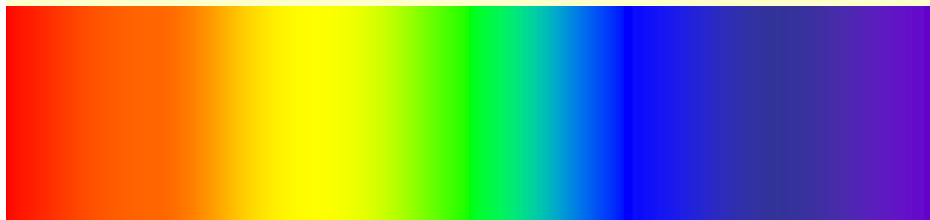
Color

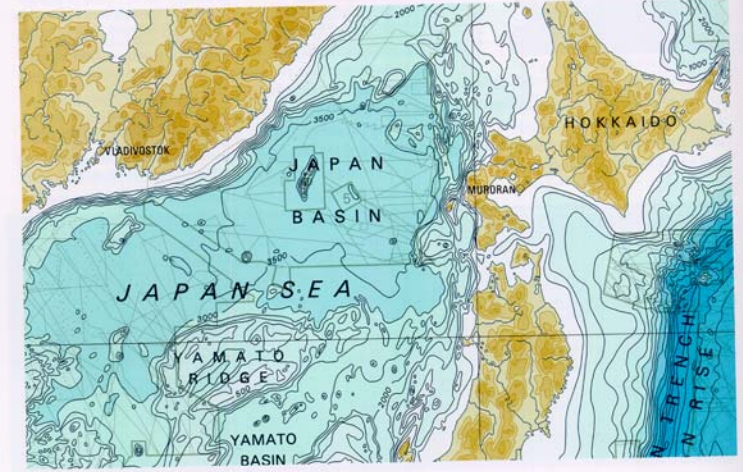
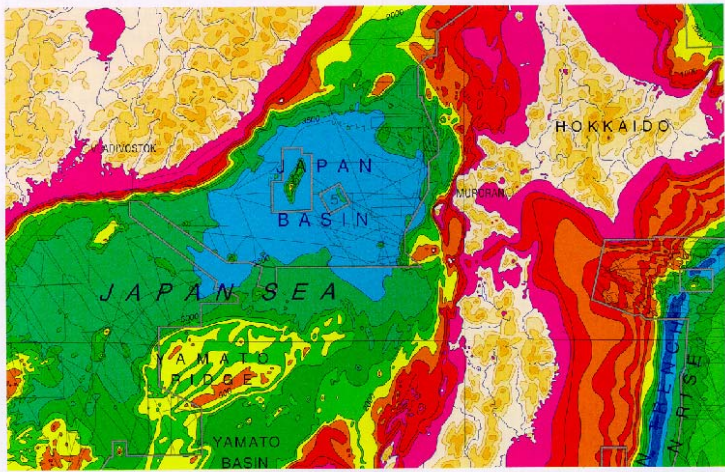


Encoding color

Common advice says use a rainbow scale

- Marcus, Murch, Healey
- problems with rainbows





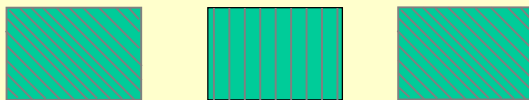
General Bathymetric Chart of the Oceans, International Hydrographic Organization (Ottawa, Canada, 5th edition, 1984), 5.06.

Orientation

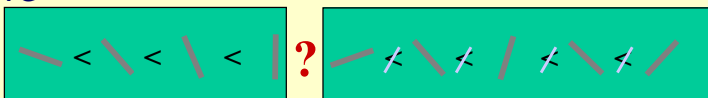
✓ selective



✓ associative



≠ quantitative



≠ order

✓ length

- ~5 in 2D; ? in 3D

Texture

✓ selective



✓ associative



≠ quantitative

≠ order

✓ length

- theoretically infinite



Textures

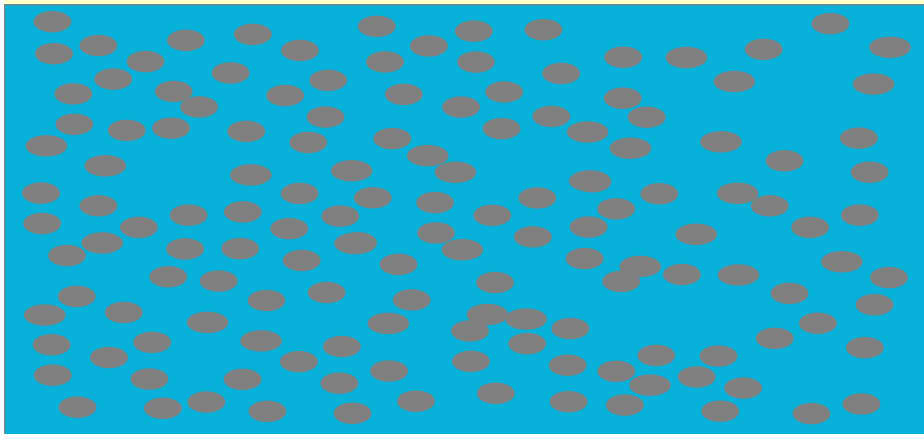


Saul Greenberg

Motion

- ✓ selective
 - motion is one of our most powerful attention grabbers
- ✓ associative
 - moving in unison groups objects effectively
- ≠ quantitative
 - subjective perception
- ≠ order
- ? length
 - distinguishable types of motion?

Motion



What you know now

Attributes of visual variables

- | | |
|---------------|--------|
| - position | size |
| - shape | value |
| - orientation | color |
| - texture | motion |

Characteristics of visual variables

- selective
- associative
- quantitative
- order
- length

Saul Greenberg