Visual Variables

Human Computer Interaction

Based on slide deck
Part 4: Designing and building visual interfaces. Visual Variables
Human Computer Interaction I: Principles and Design
by
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*The new slides are marked with a **

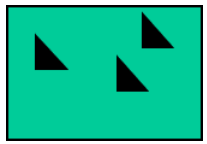
Visual Variables

Attributes of visual symbols
Characteristics of the attributes of visual symbols
How we distinguish between them

Visual variables - attributes

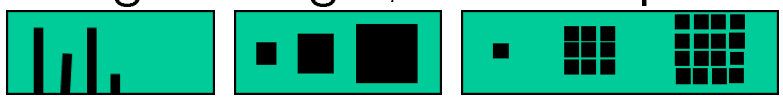
position

- changes in the x, y (z) location



size

- change in length, area or repetition

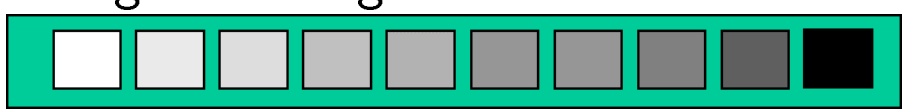


shape

- infinite number of shapes

value

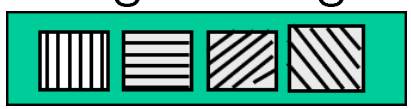
- changes from light to dark



Visual variables - attributes

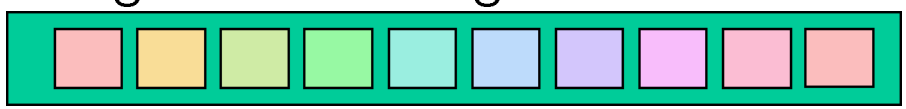
orientation

- changes in alignment



colour

- changes in hue at a given value



texture

- variation in pattern

motion

Visual variables - characteristics

- **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**

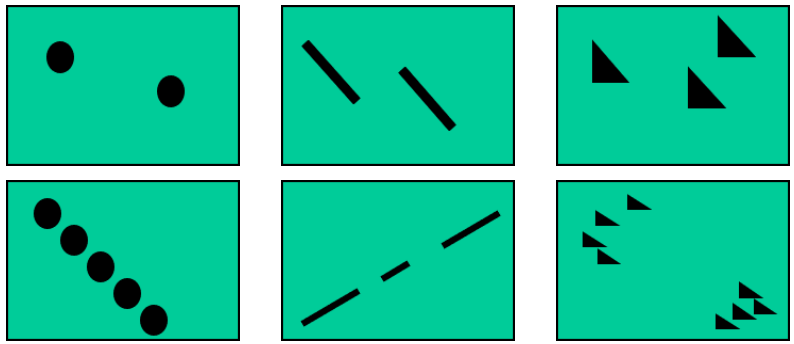
  are changes in this variable perceived as ordered?

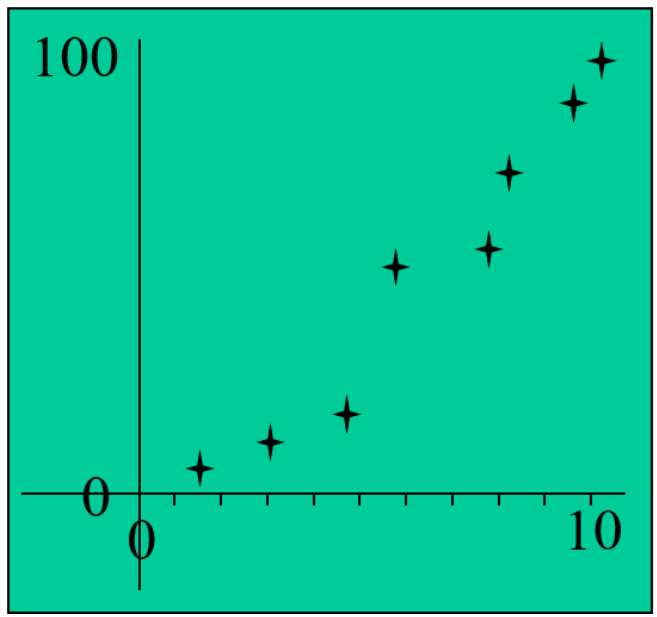
- **length**

  across how many changes in this variable are distinctions perceptible?

Position

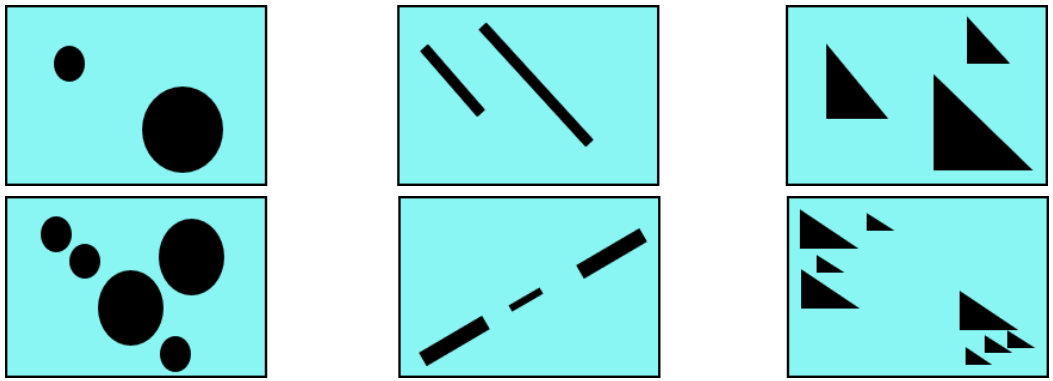
- ✓ selective
- ✓ associative
- ✓ quantitative
- ✓ order
- ✓ length

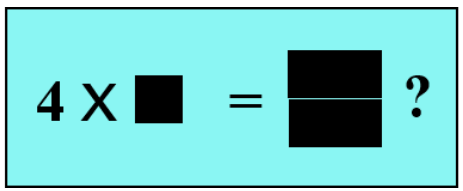


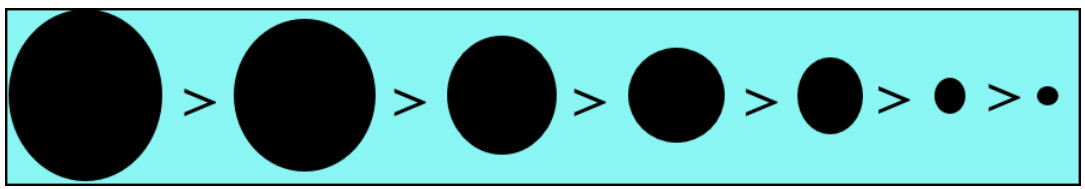


Size

- ✓ selective
- ✓ associative
- ≃ quantitative
- ✓ order
- ✓ length
  - theoretically infinite but practically limited
  - association and selection ~ 5 and distinction ~ 20

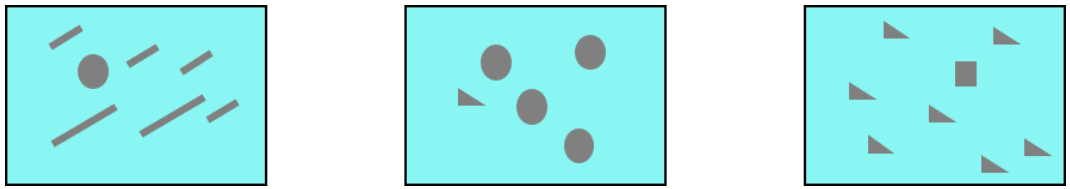




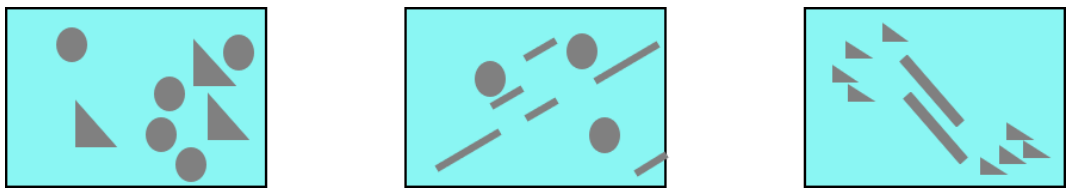


Shape

$\simeq$ selective

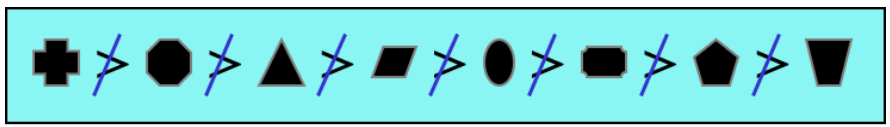


$\simeq$ associative



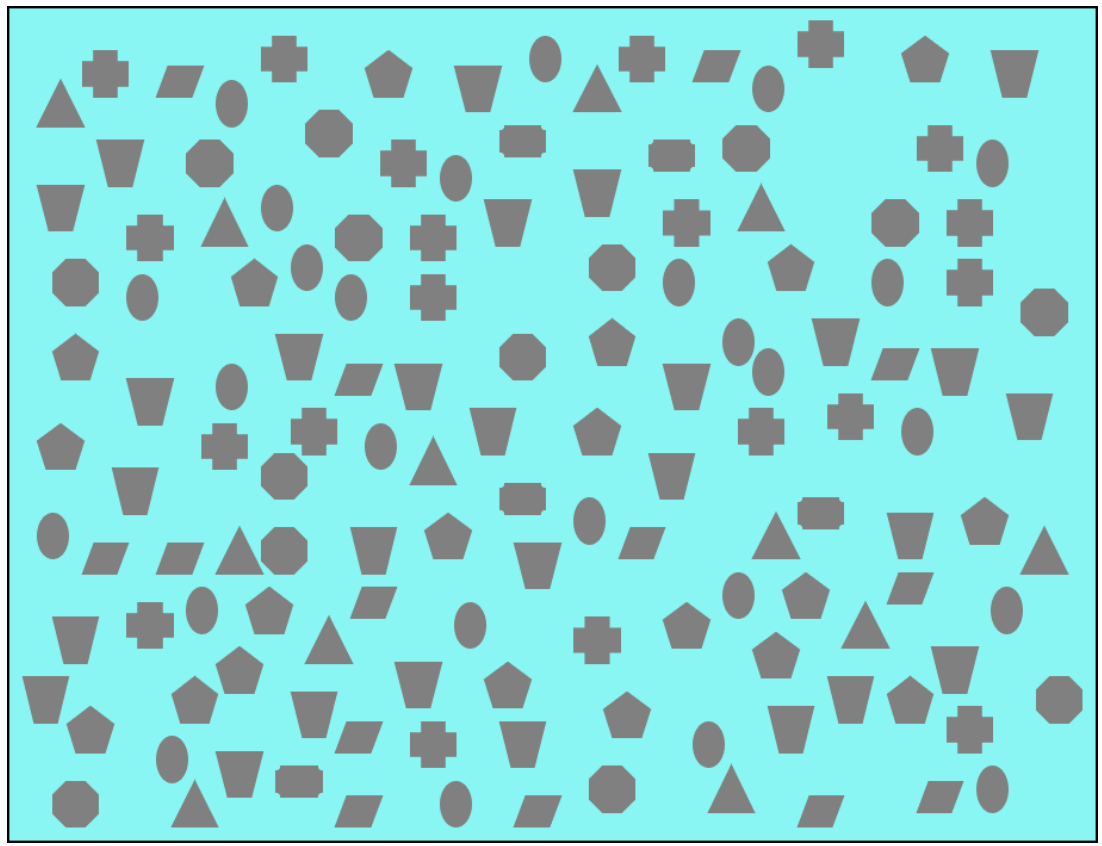
$\neq$ quantitative

$\neq$ order



✓ length - infinite variation

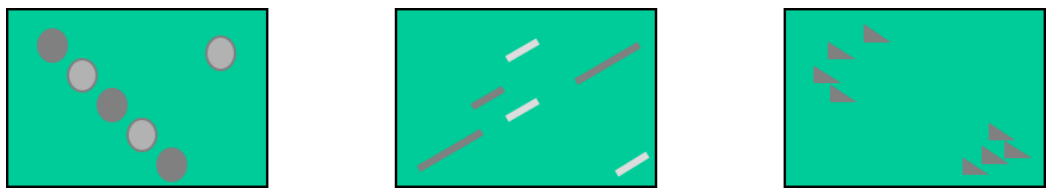
Shape



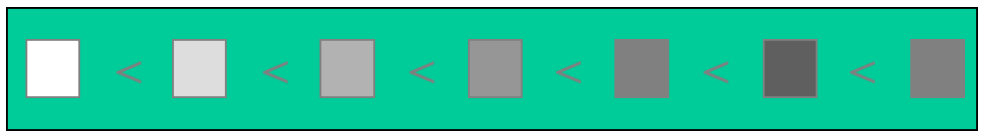
Value

✓ selective

✓ associative



≠ quantitative



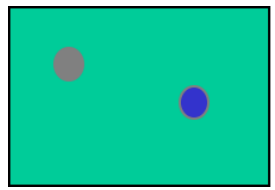
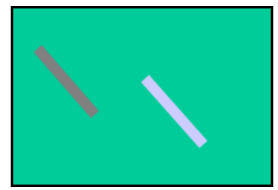
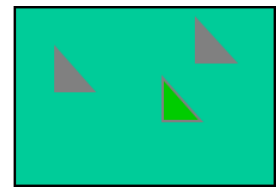
✓ order

✓ length

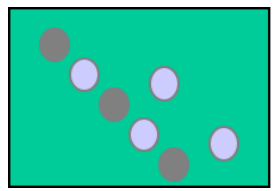
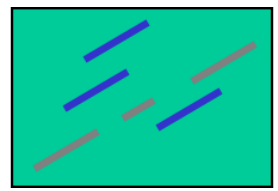
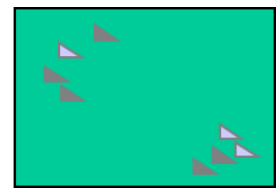
- theoretically infinite but practically limited
- association and selection $\sim < 7$ and distinction ~ 10

Color

✓ **selective**

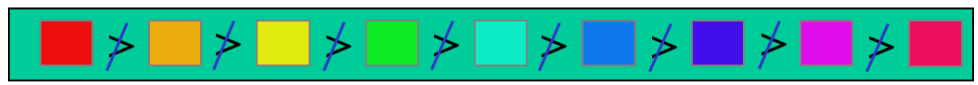




✓ **associative**

≠ **quantitative**

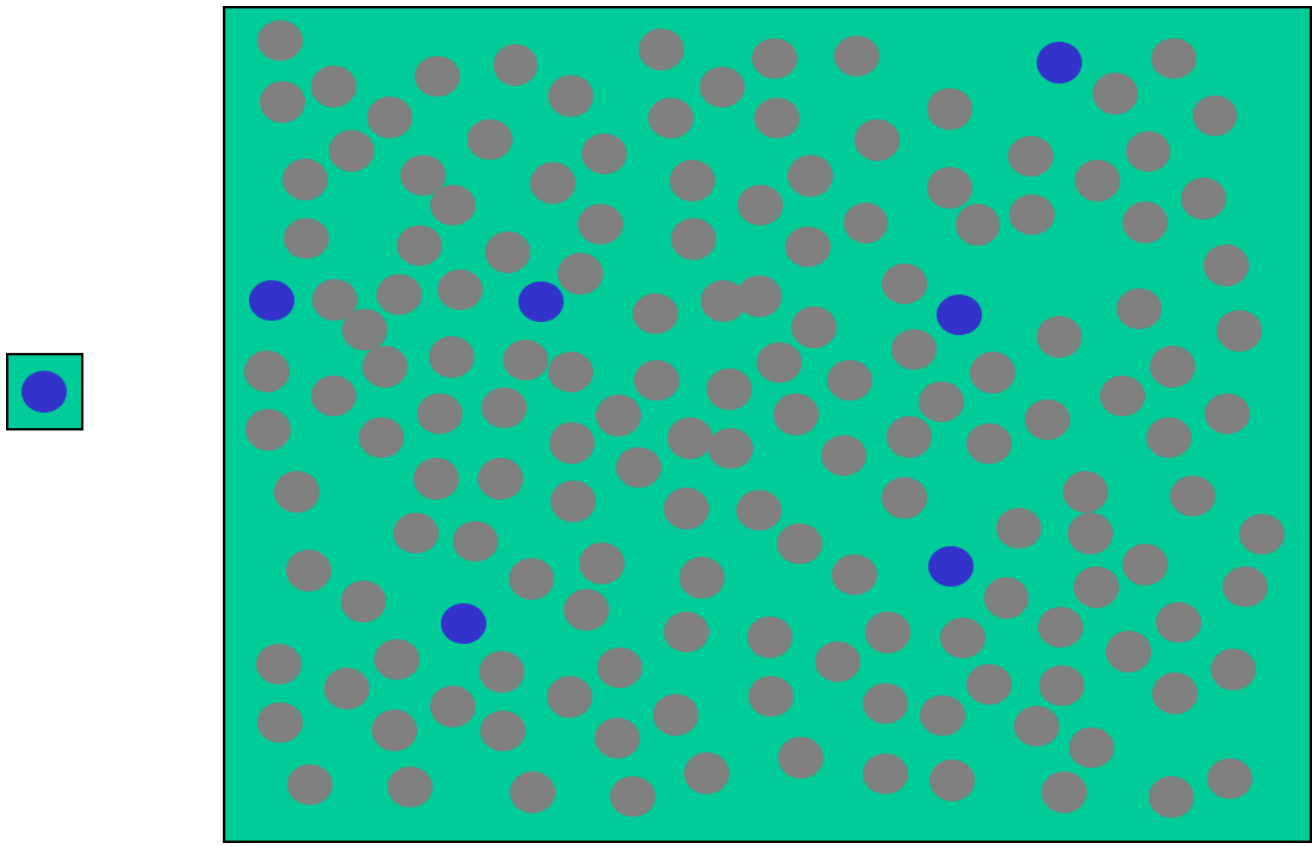
≠ **order**



✓ **length**

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

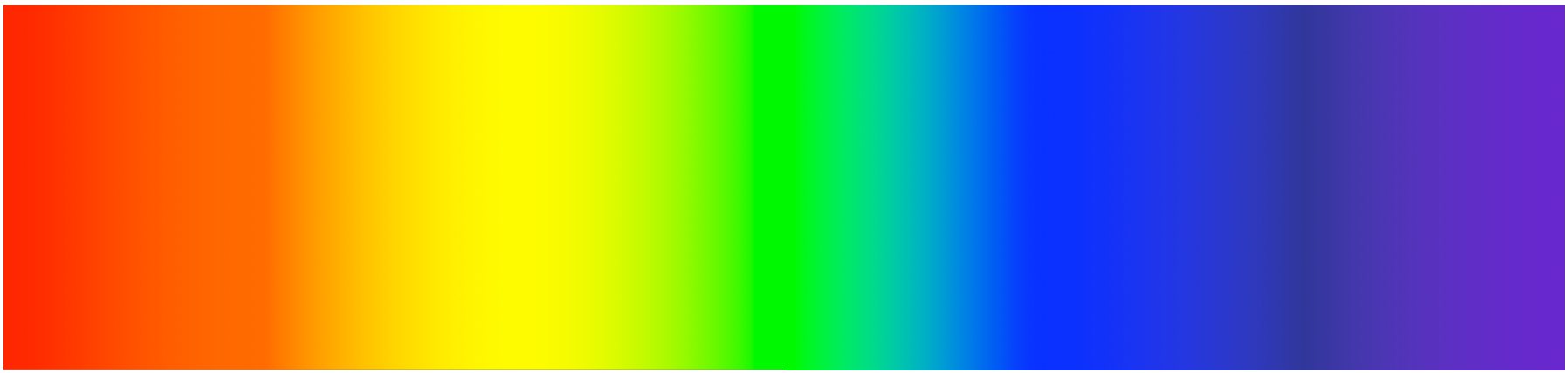
Color



Encoding color

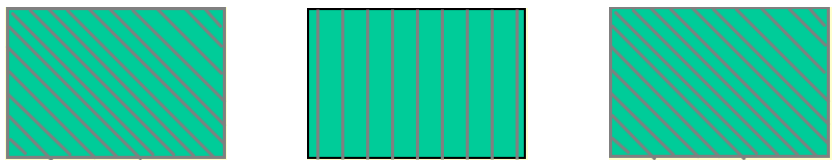
Common advice says use a ranibow scale

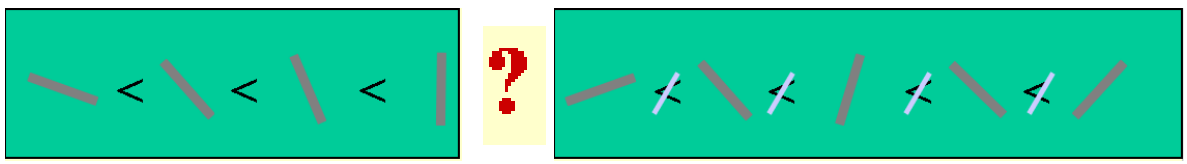
- Marcus, Murch, Healey
- problems with rainbows



Orientation

- ✓ selective
- ✓ associative
- ≠ quantitative
- ≠ order
- ✓ length
  - 5 in 2D; ? in 3D





Texture

- ✓ **selective**

- ✓ **associative**

- ≠ **quantitative**
- ≠ **order**

- ✓ **length**
  - theoretically infinite

Motion

✓ **selective**
- motion is one of our most powerful attention grabbers

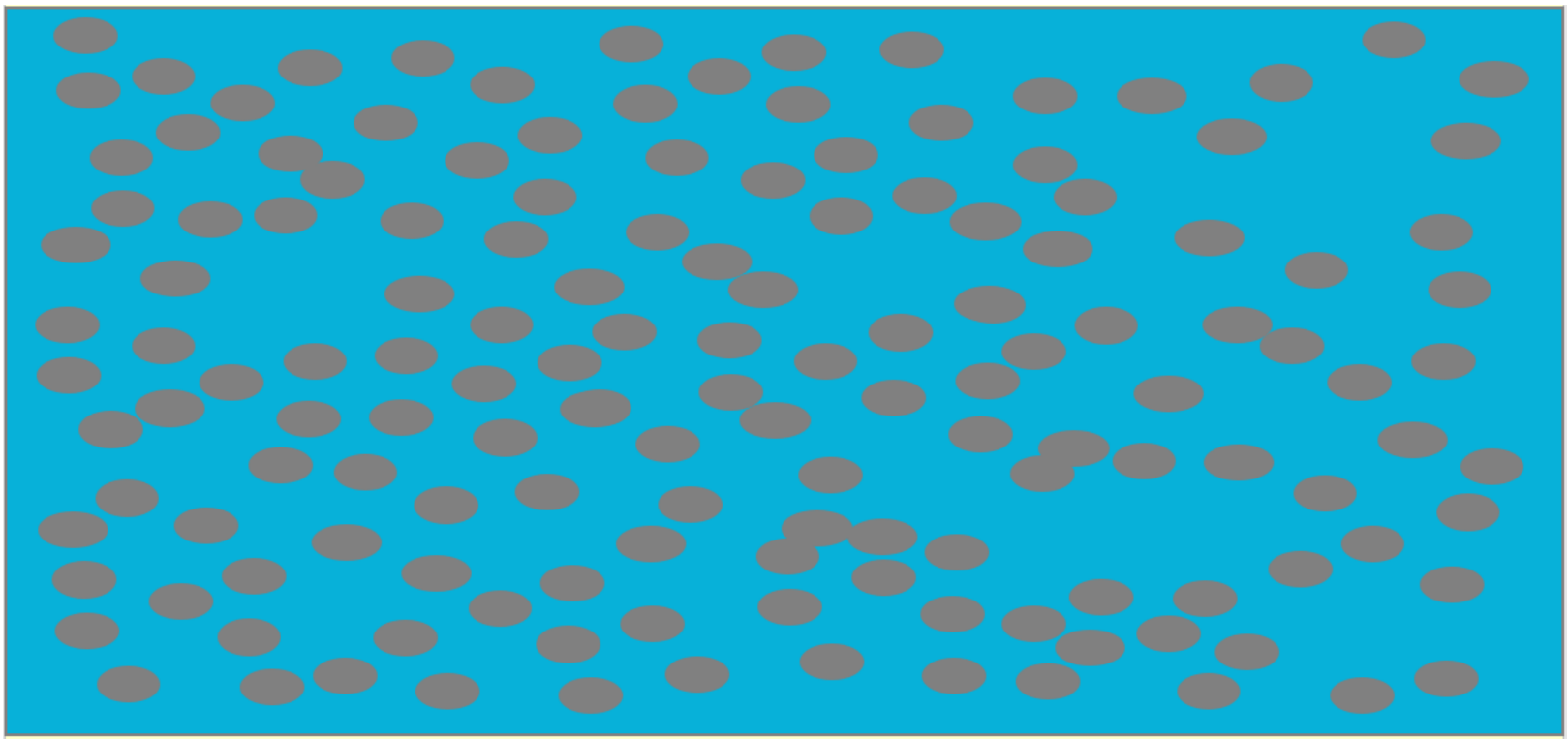
✓ **associative**
- moving in unison groups objects effectively

≠ **quantitative**
- subjective perception

≠ **order**

? **length**
- distinguishable types of motion?

Motion



What you know now

Attributes of visual variables

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

Characteristics of visual variables

- selective
- associative
- quantitative
- order
- length

*Bibliography

- Saul Greenberg, **Designing and building visual interfaces. Visual variables**, University of Calgary, Canada
  `http://pages.cpsc.ucalgary.ca/~saul/481/`