PERCEPTION

Sensation vs. Perception

- What's the difference?
  - Sensation → what the senses do
  - Perception → process of recognizing, organizing and interpreting information.

What is Sensation?

- The process whereby the physical input from the environment is coded into neural responses

What is Perception?

- The way in which you interpret or internally represent incoming sensations.

Proximal vs. Distal

- **Distal Stimulus:**
  - Actual stimulus as it is in our environment
    - a plane
- **Proximal Stimulus:**
  - The representation of the stimulus in our system.
    - light reflected from the plane that falls on our retina

Perception: Basics

- Shape Constancy
- Size Constancy
- Depth Perception
- Perceptual Organization

Shape Constancy

- Perception of the stimulus stays constant even though the sensation changes.

Size Constancy

Depth Perception

- How do we perceive depth?
- Some cues help us:
  - Pictorial Cues
    - Interposition
    - Size
    - Texture gradient
    - Linear perspective
  - Motion Cues
  - Binocular Cues

Interposition

- When one object blocks the other, we see the blocked object as further away.

Relative Size

- The smaller object is perceived as further away

Texture Gradients

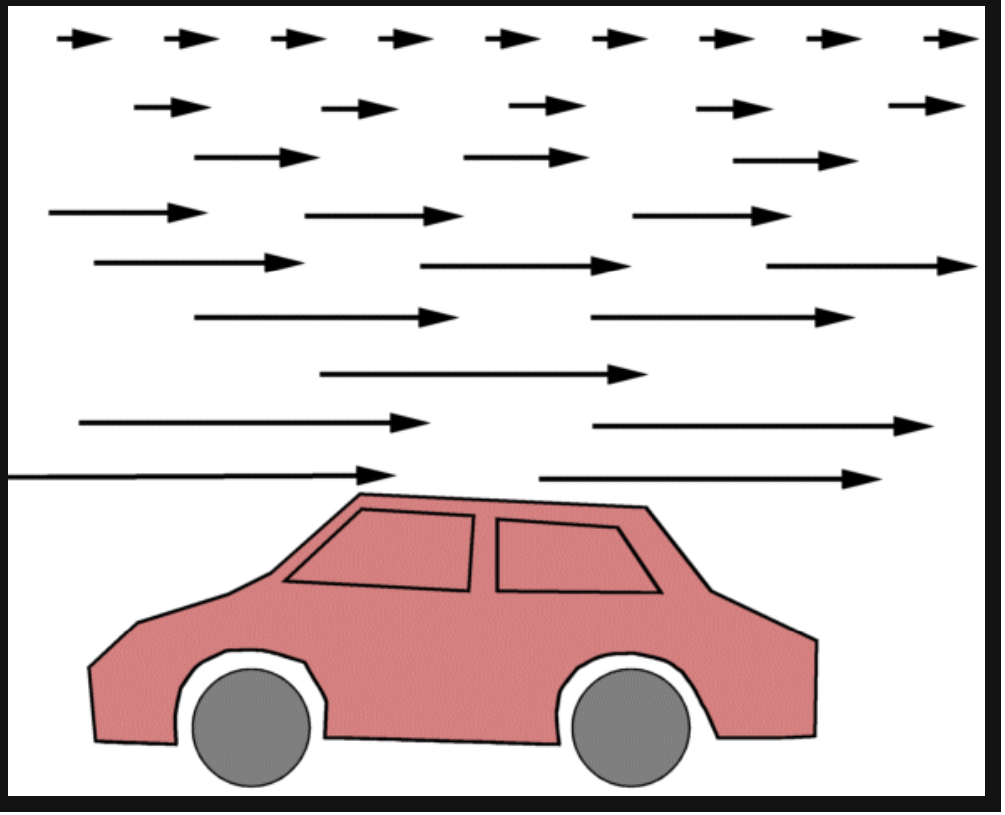
As the surface gets farther away from us this texture gets finer and appears smoother

Linear Perspective

Parallel lines that recede into the distance appear to get closer together or converge.

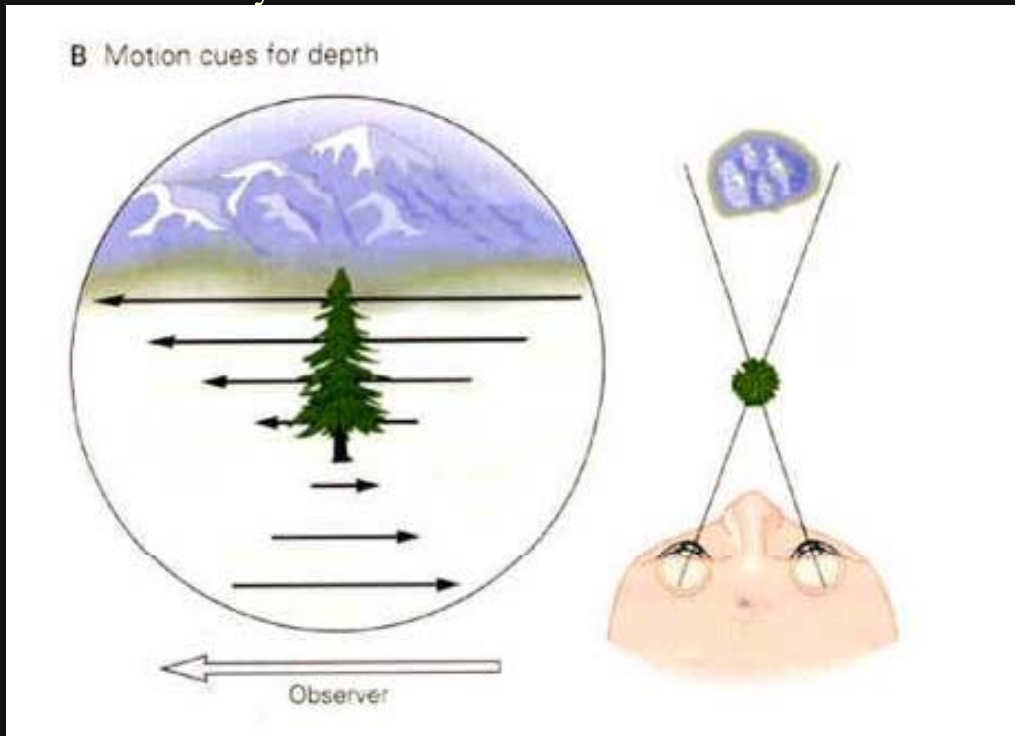
Motion Parallax

- As we move, objects that are closer to us move farther across our field of view than do objects that are in the distance.



Movement Cues

- Focus on an object at an intermediate distance. Things closer to you than the focused object will appear to move in the opposite direction of your head movement whereas things farther away from you than the focused object will appear to move in the same direction as your head movement.



Binocular Cues

- Binocular disparity - The eyes are offset by about 6 cm. creating two slightly different views of the world. The images combine to form a 3-D scene

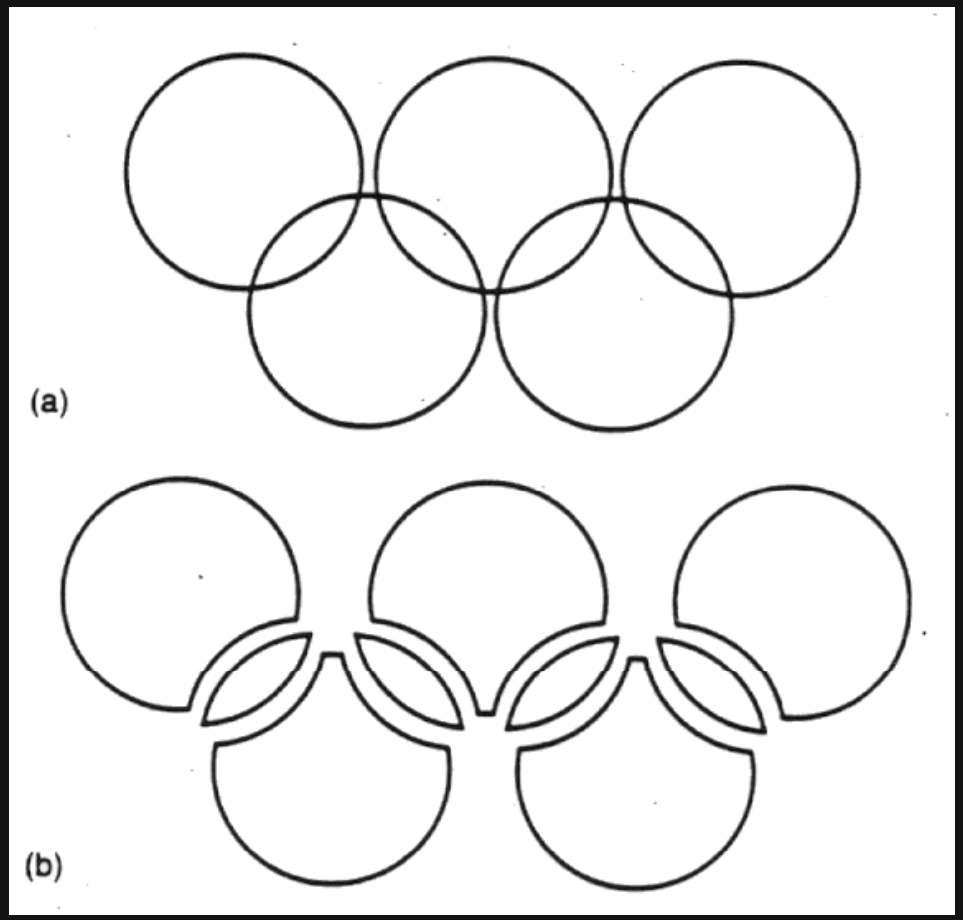
Retinal Disparity

- The difference between the images of an object seen by left and right eyes resulting from the eyes' horizontal separation.

Organization in Visual Perception

- **Gestalt Psychology**
  - Humans have a tendency to see patterns rather than random arrangements
    - exp: clouds, wallpapers, mosaic flooring…
  - We tend to organize what we see.

The Law of Pragnanz

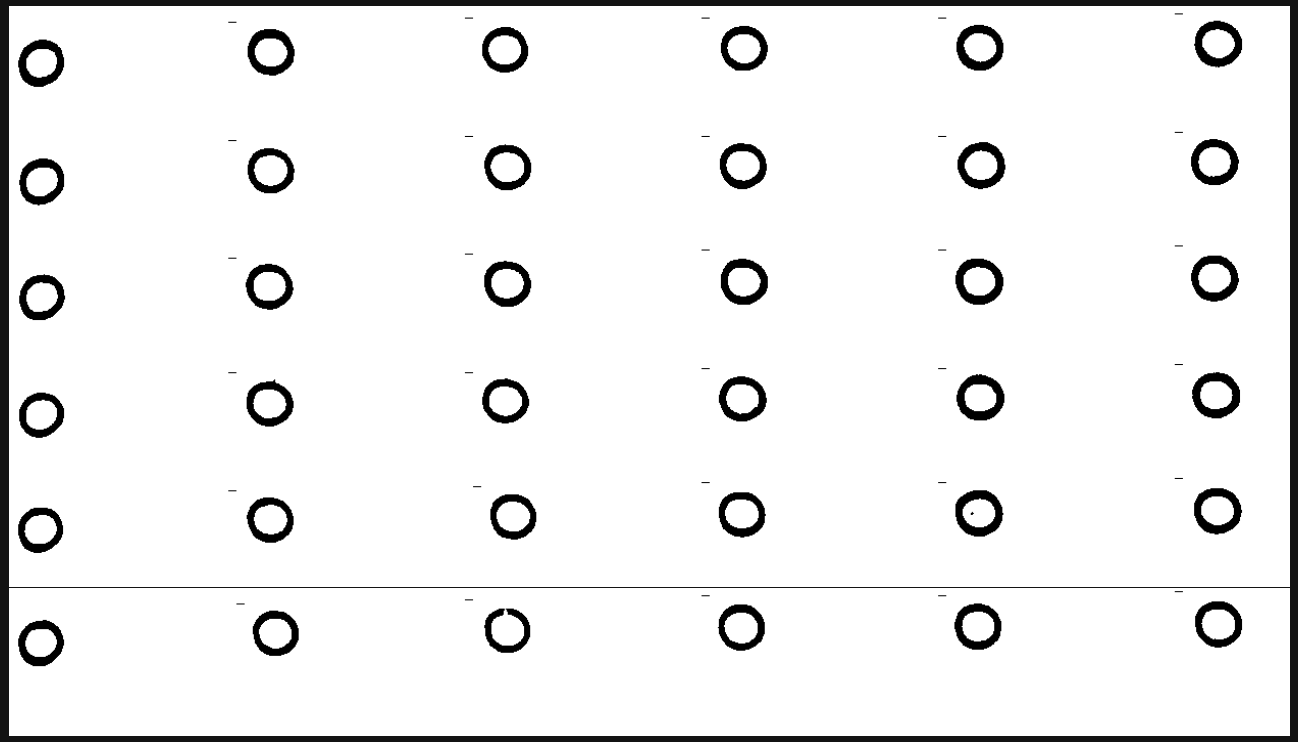


Gestalt Laws of Grouping

- Proximity
- Similarity
- Good continuation
- Closure
- Common fate

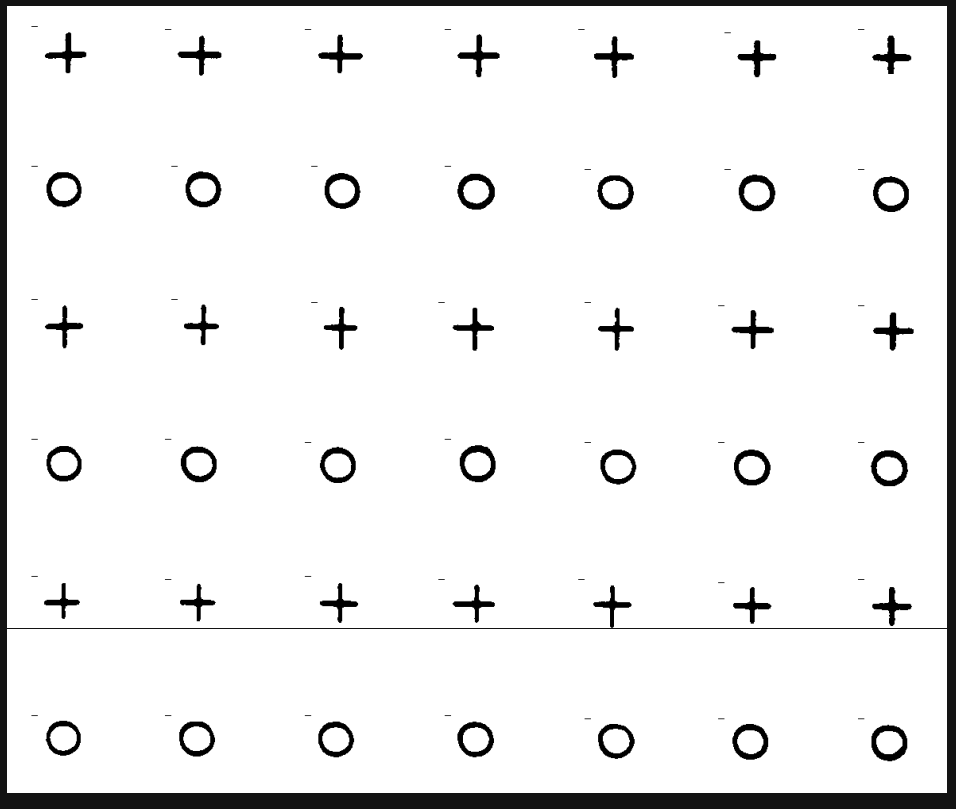
Gestalt Laws of Grouping

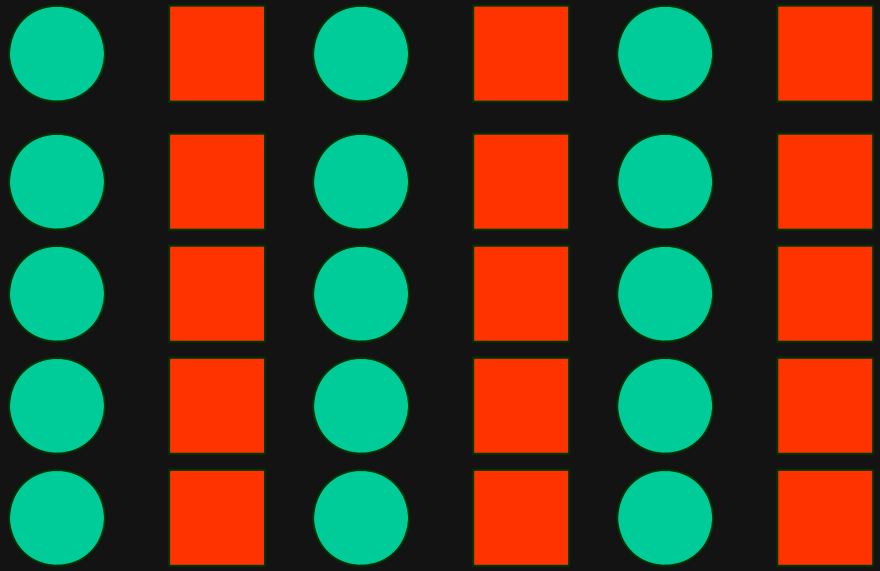
- **Proximity** - Objects near each other tend to be processed as a unit.



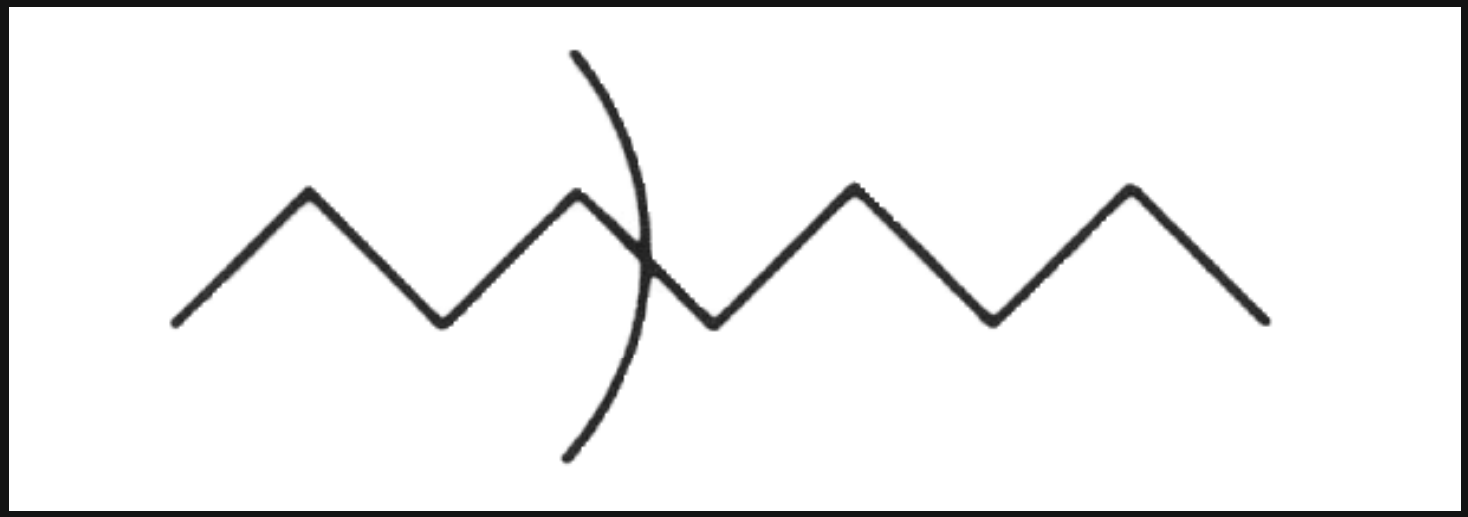
Gestalt Laws of Grouping

- **Similarity** - Objects similar to each other tend to be processed as a unit.



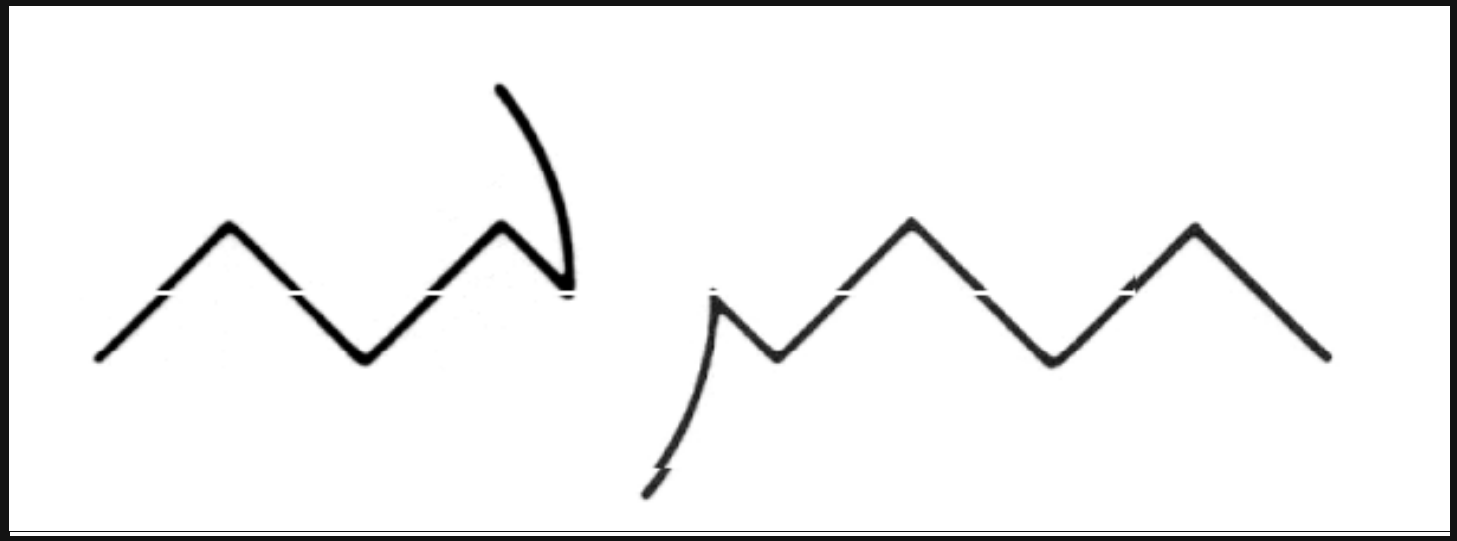


Gestalt Laws of Grouping



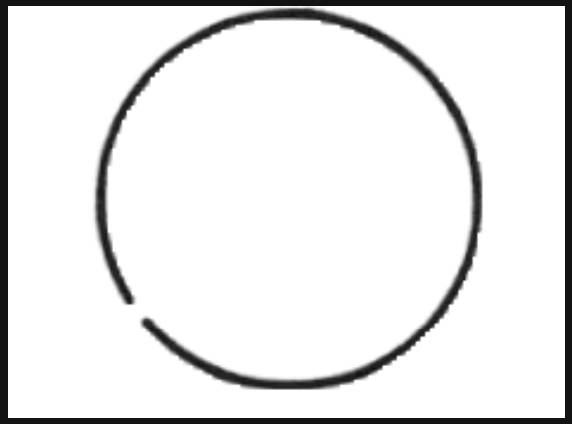
Gestalt Laws of Grouping

- **<u>Good continuation</u>** - Objects arranged in a straight line or curve tend to be seen as a unit.



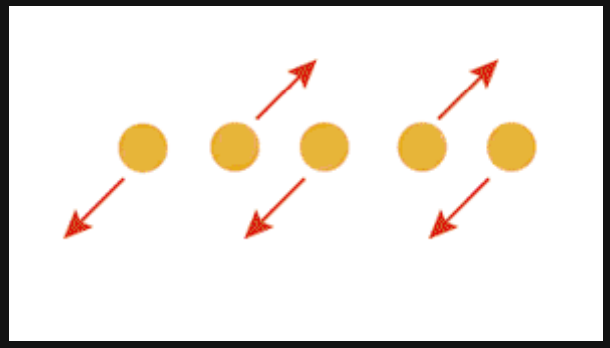
Gestalt Laws of Grouping

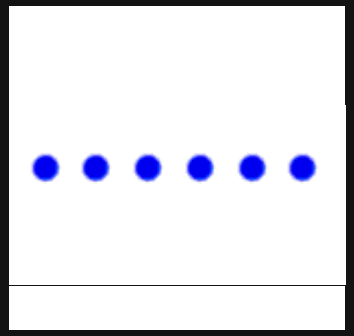
- **Closure** - When a figure has a gap, we tend to see it as a completed figure.



Gestalt Laws of Grouping

- **Common fate** - Objects that move in the same direction tend to be seen as a unit. (ultrasound)





- Perception is a constructive process
  - Information is integrated, put together

When construction fails

- Perceptual illusions

Theories of Object Recognition

- Template-Matching Theory
- Feature-Analysis Theory
- Recognition-by-Components Theory

Template-Matching Theory

- You try match each and every stimulus you encounter with a set of templates in your memory.
- You recognize the object, when there is successful match.

Template Theory

- Basics of template theory
  - Multiple templates are held in memory
  - To recognize the incoming stimuli, you compare it to templates in memory until a match is found

Template Theory

- Weakness of theory
  - Problem of imperfect matches
  - Cannot account for the flexibility of pattern recognition system

Template-Matching Theory: Problems

- Very inflexible
- Cannot account for complexity in visual processing.
- Not parsimonious.

Feature-Analysis Theory

- We divide each stimuli into different components that are called *distinctive features*.

- Then we encounter a stimulus we compare the features.

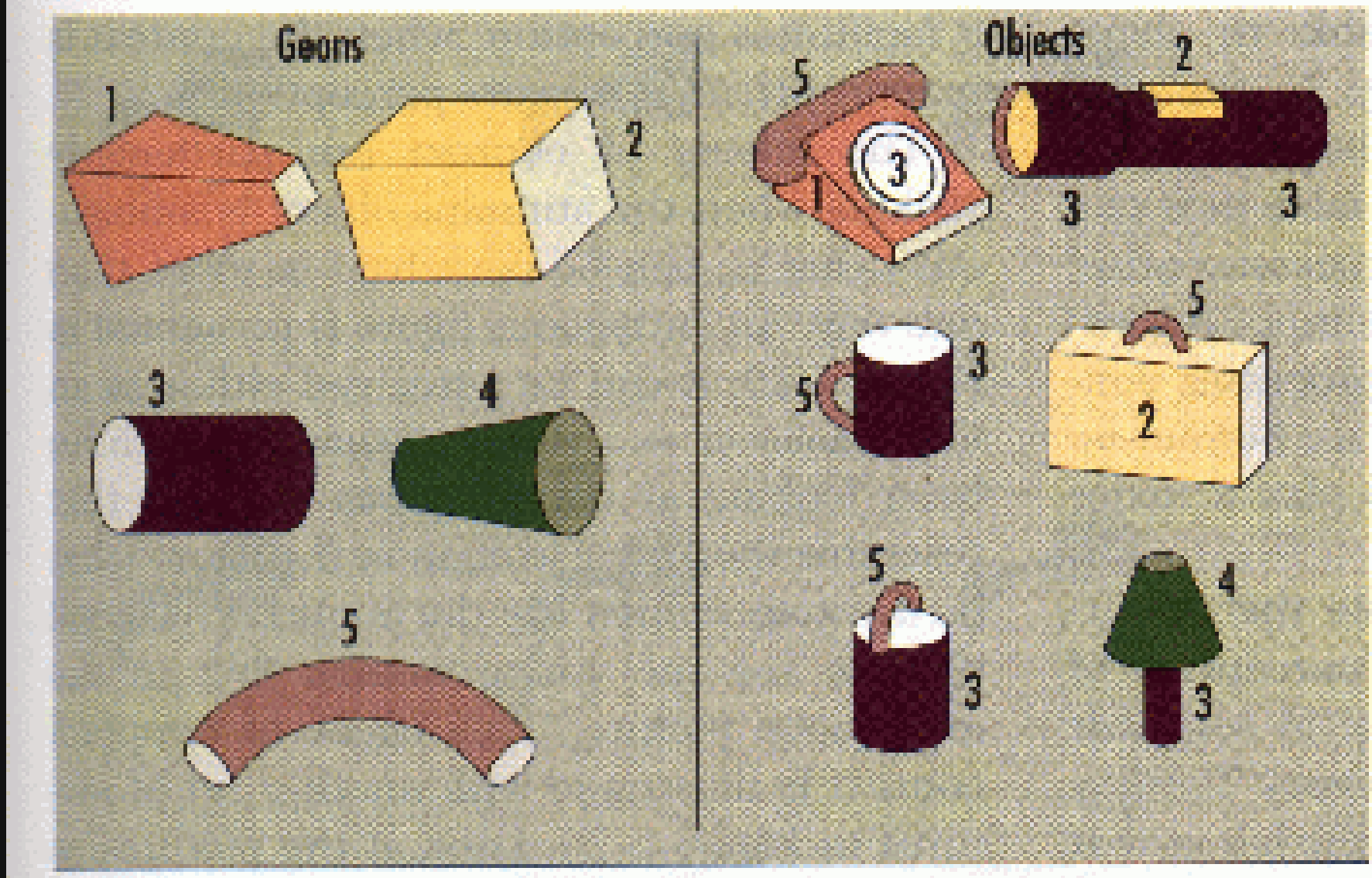
Feature-Analysis Theory : Problems

- Cannot account for complexity in visual processing.
- Not parsimonious enough

The Recognition-by-Components Theory

- Explains how we recognize 3-D shapes

- **Geons:** simple 3-D shapes…*atoms* of object recognition.
- All objects are made up of geons.


Geoms
1
2
3
4
5
Objects
5
3
1
2
3
3
5
5
3
2
5
3
4
3

Bottom-Up vs. Top-Down Processing

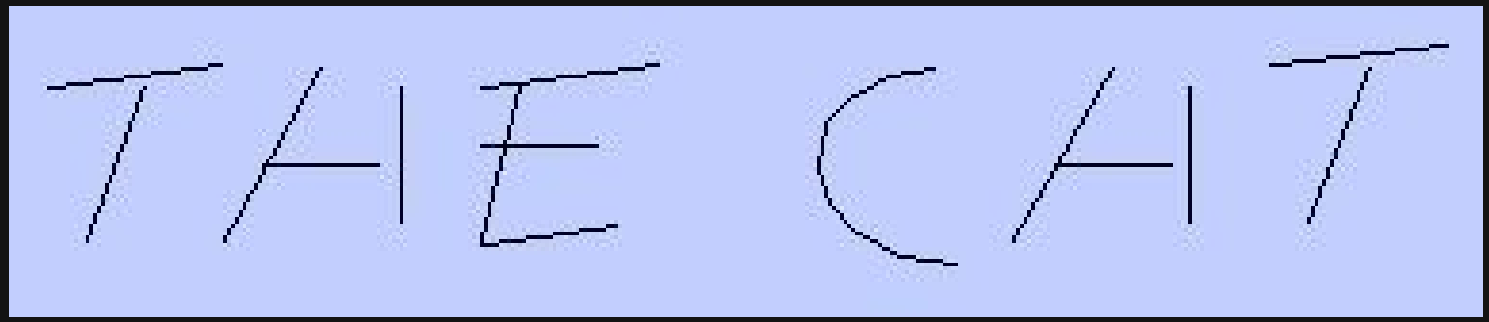
Bottom-up:

- Perception begins with input of very low-level stimulus information which is passed along to higher-order processes
- perception is dependent on the basic from the environment.

Top-down:

- Higher order processes influence how the input is perceived.
- perception is dependent on expectations and context effects

Context Effects



Viewer
THE END