Maps

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Outline

- Vision as Process
- Maps

Vision as a Process

- Vision is modular
- Understanding representation and processes will help us to understand how our cognition react to stimuli

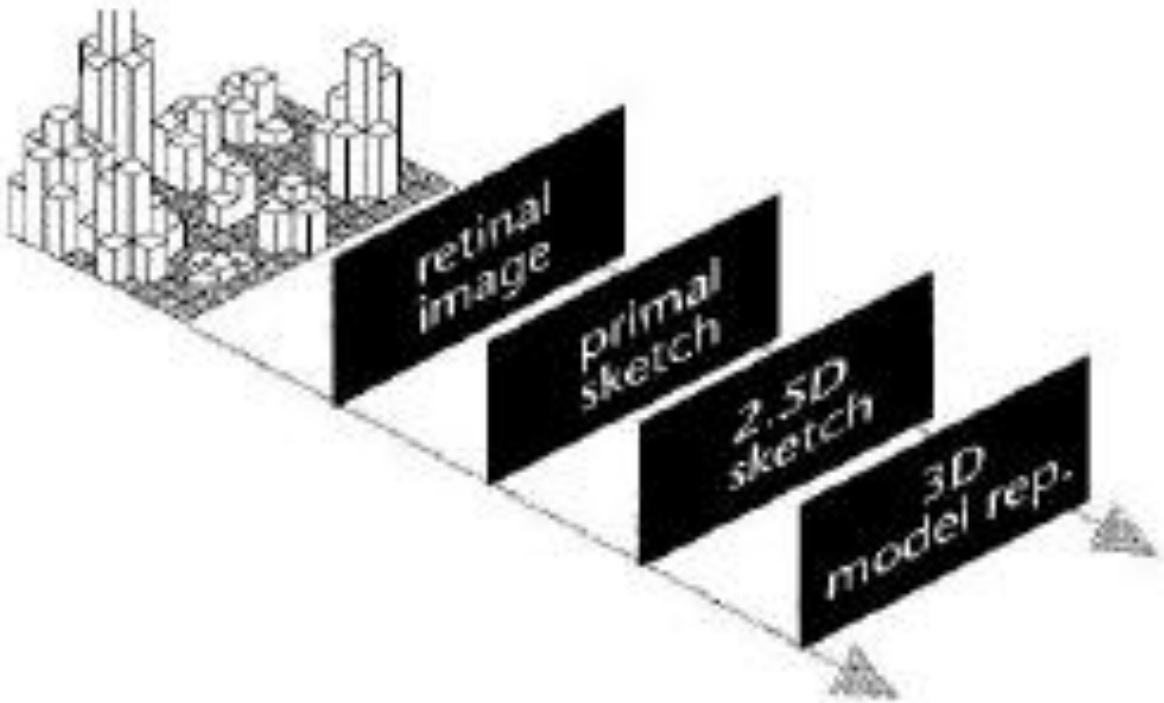
MaRR's Approach

- Computational Theory
- Representation and Algorithms
- Hardware Implementation

MaRR's Approach

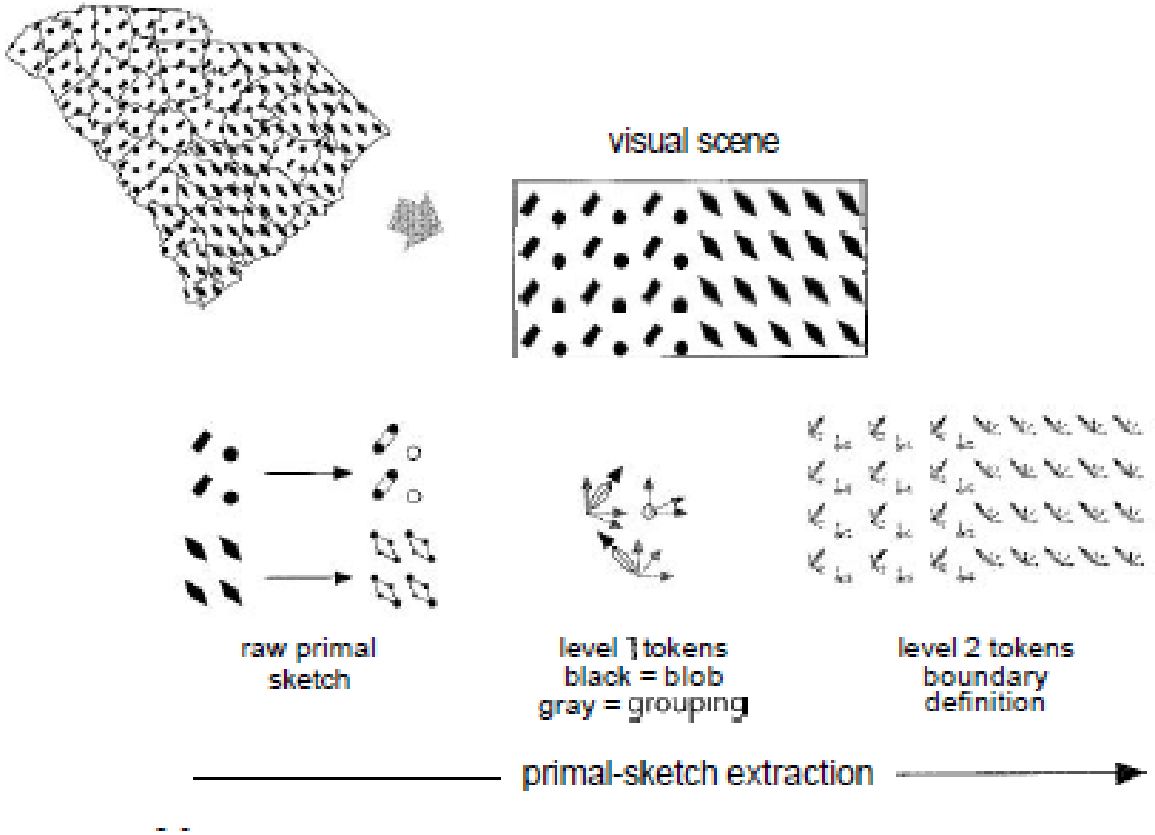
- Vision: "The process of discovering from images what is present in the world and where it is"

MaRR's Approach



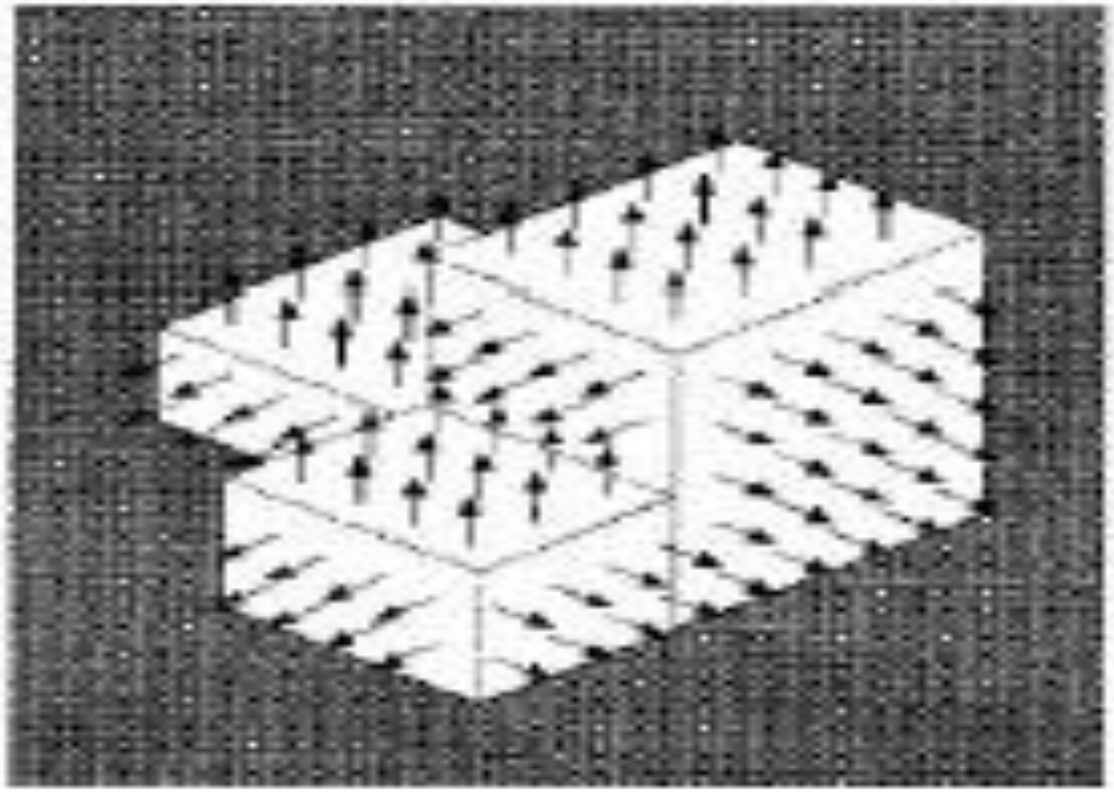
MaRR's Approach

- Primal sketch



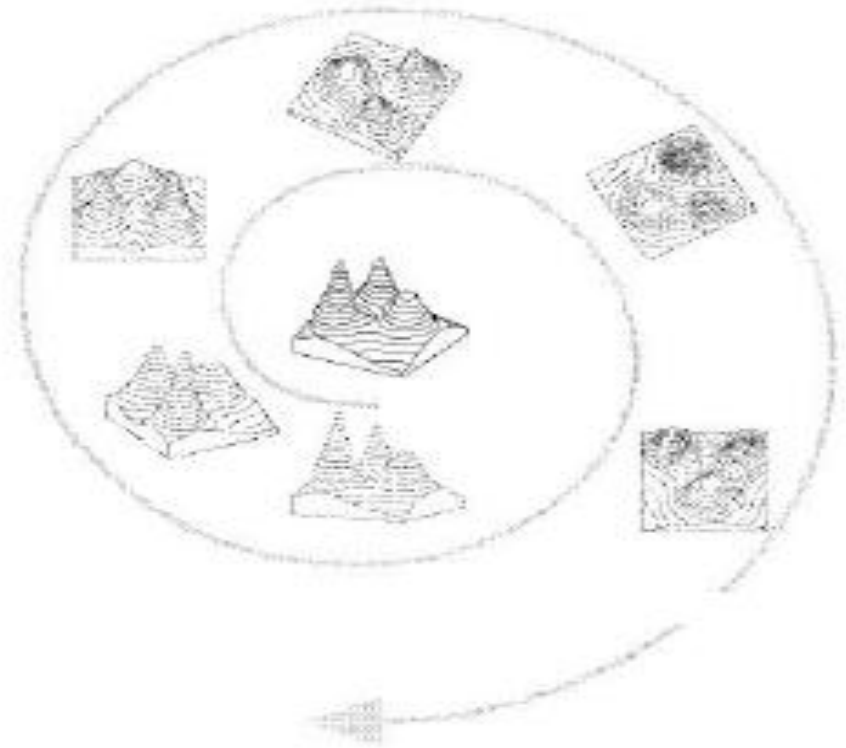
MaRR's Approach

- $2\frac{1}{2}$ D sketch



MaRR's Approach

- 3D model representation



Visual Cognition

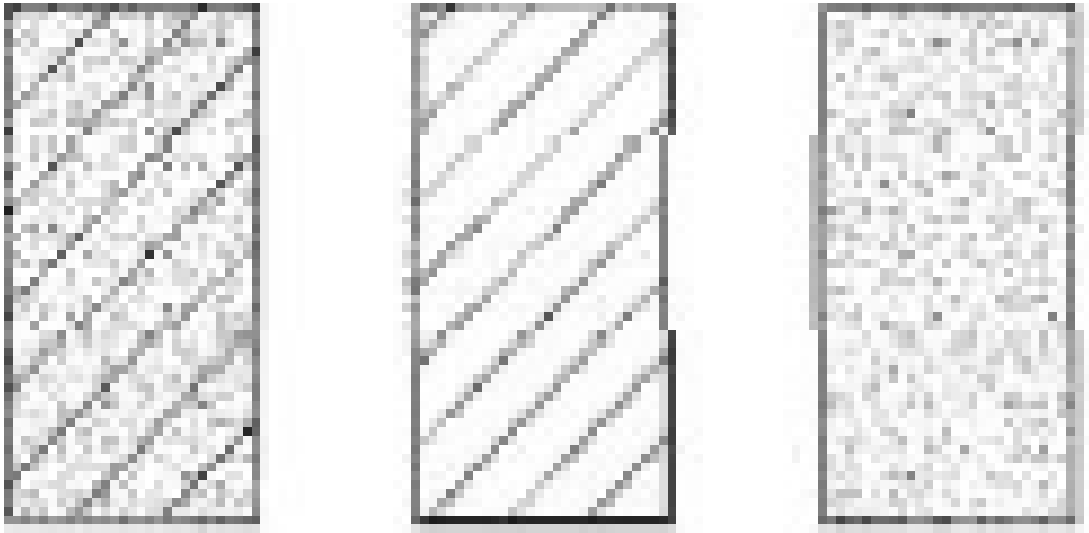
- Pinker's theory:
  - Bertin's task:
    - Identify conceptual or real world referenced
    - Identify the relevant dimensions of variations
    - Use level of each visual dimention to draw conclusion

Visual Description

- Visual description
  - Indispensable attributes (time, space)
  - How atomic perceptual units will be integrated into coherent percept (Gestalt laws)
  - Mental representation of magnitude
  - Coordinate system used

Visual Description

- Indispensable attributes

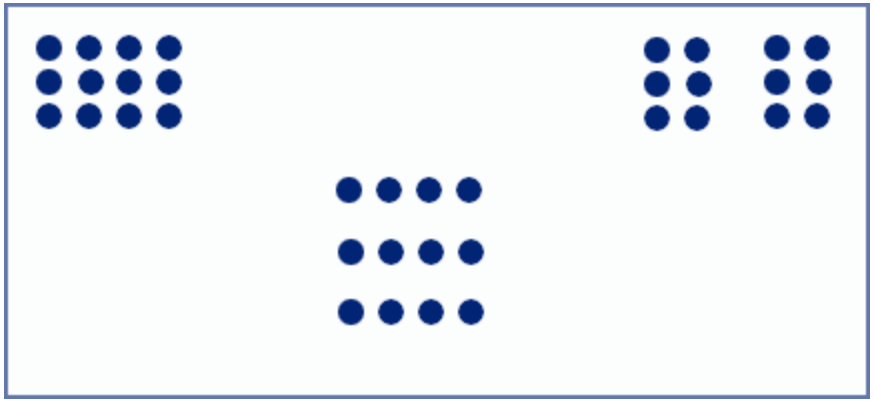


Visual Description

- The Gestalt Principles
  - Similarity
  - Continuation
  - Closure
  - Proximity

The Gestalt Principles

- Proximity



Visual Description: The Gestalt Principles

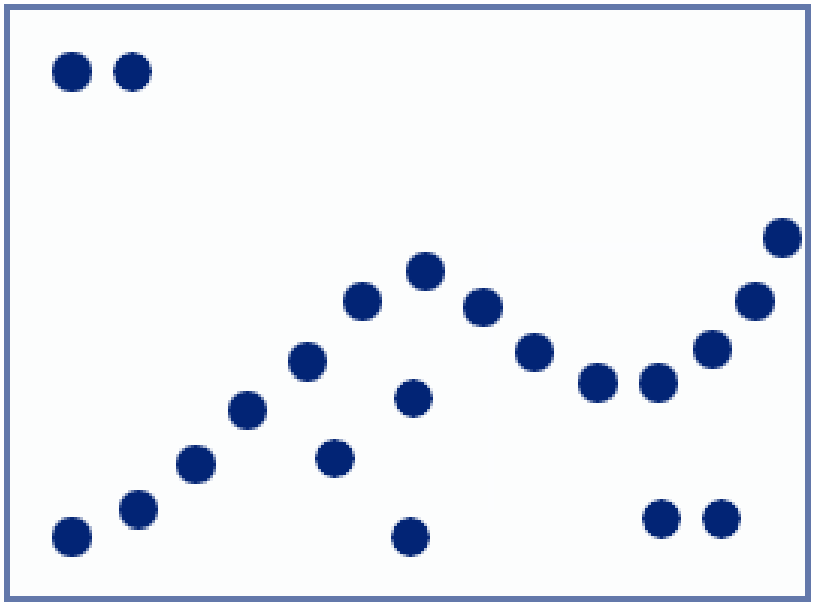
- Closure

Visual Description: The Gestalt Principles

- Similarity

Visual Description: The Gestalt Principles

- Continuation



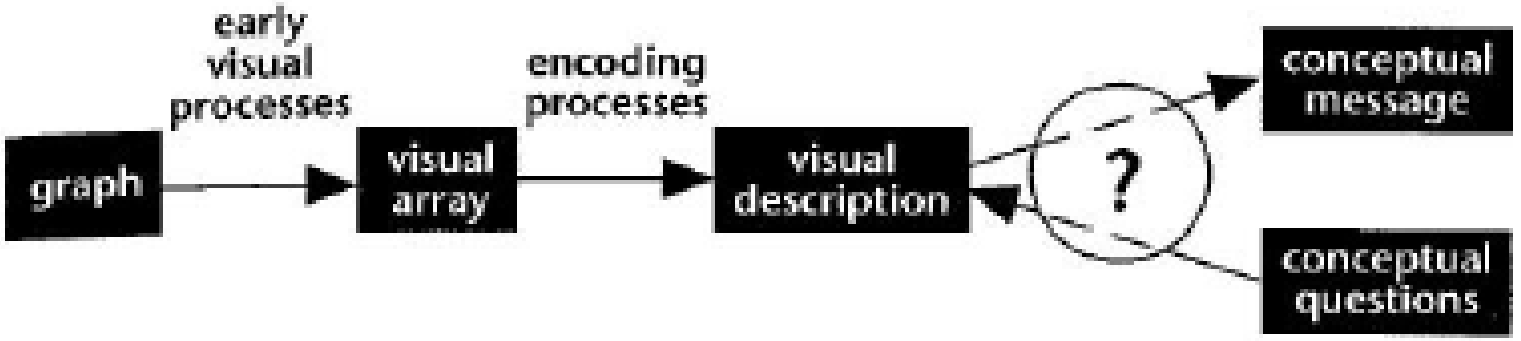
Visual Description

- Default: constructed exclusively from bottom up process
- Elaborate: starts from default visual description use top down process

Graph schemata

- Specify translation between visual description and conceptual messages
- Query interpretation

Vision Process



Outline

- Vision as Process
- **Elements of Maps**

Element of Maps

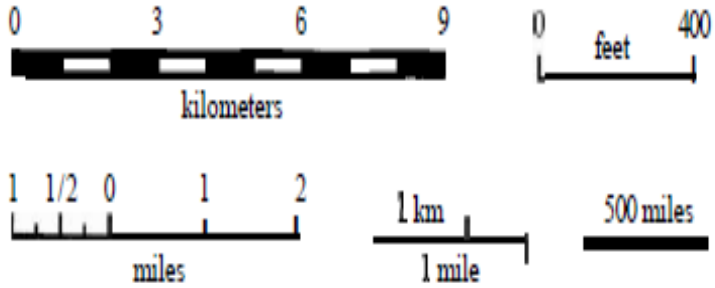
- Scale
- Projection
- Symbols

Scale

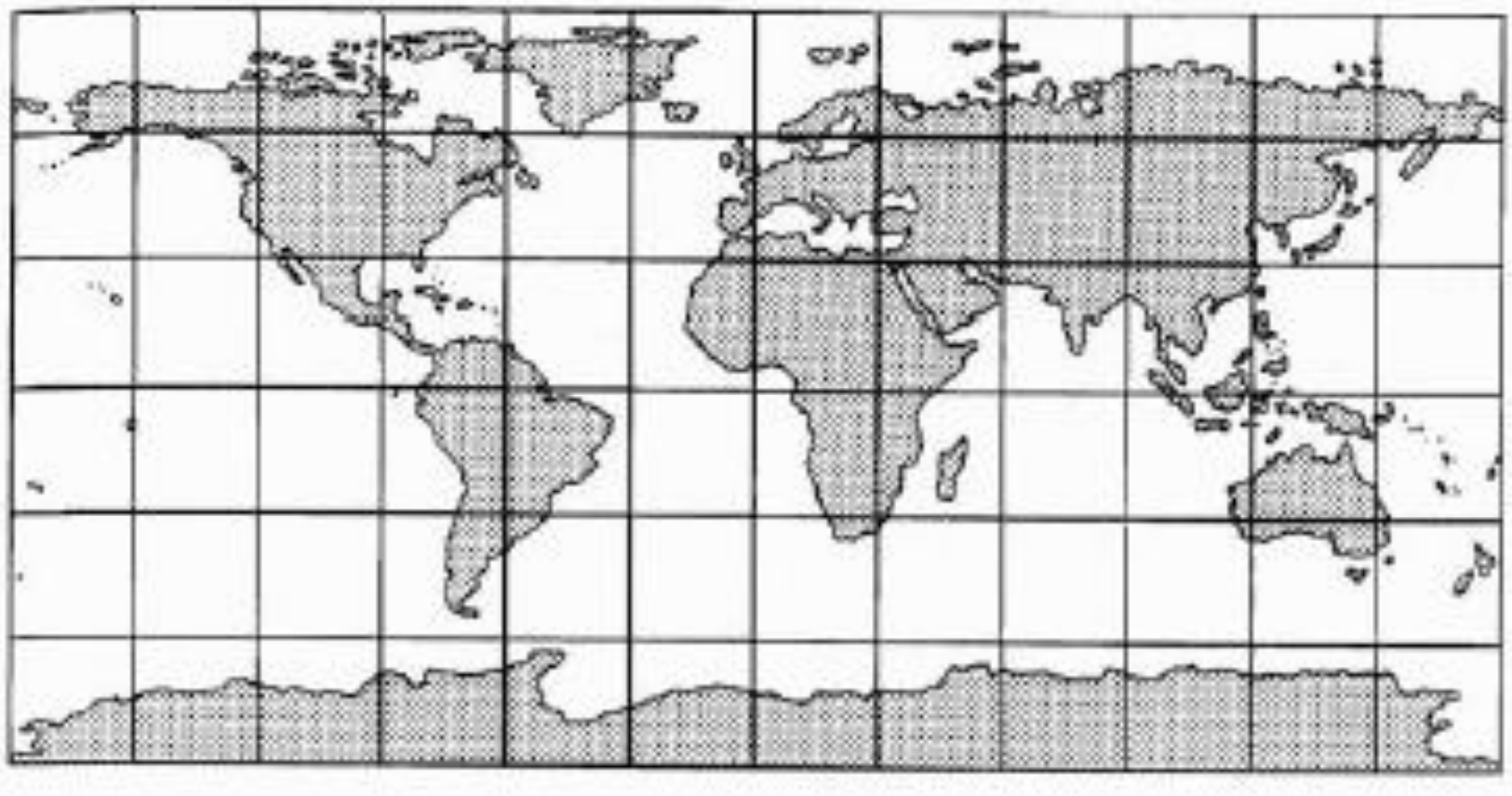
- Ratio
- Short Sentence
- Graph

Ratio Scales	Verbal Scales
1:9,600	One inch represents 800 feet.
1:24,000	One inch represents 2,000 feet.
1:50,000	One centimeter represents 500 meters.
1:250,000	One inch represents (approximately) 4 miles.
1:2,000,000	One inch represents (approximately) 32 miles, one centimeter represents 20 kilometers.

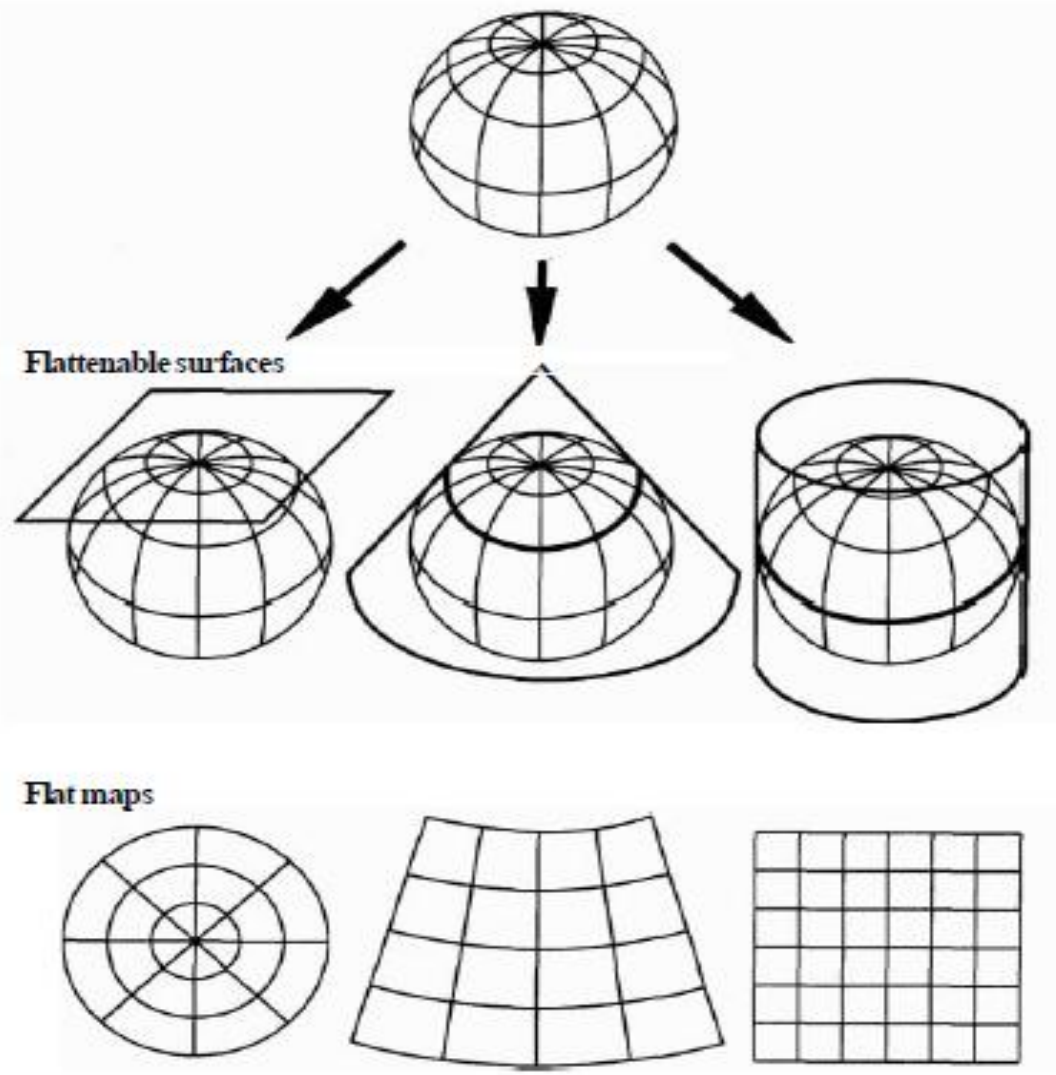
Graphic Scales



Projection



Projection

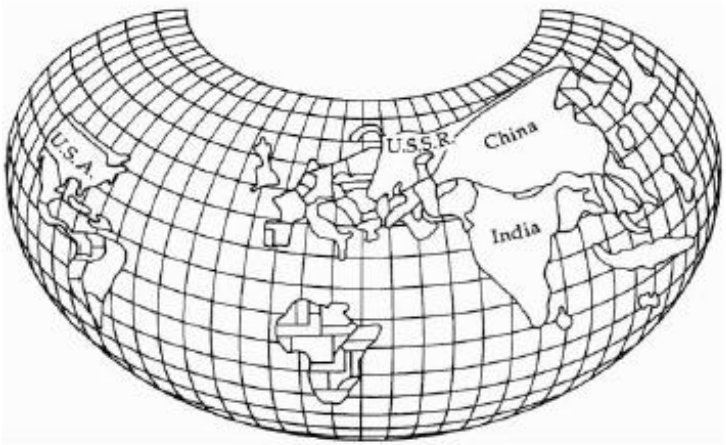


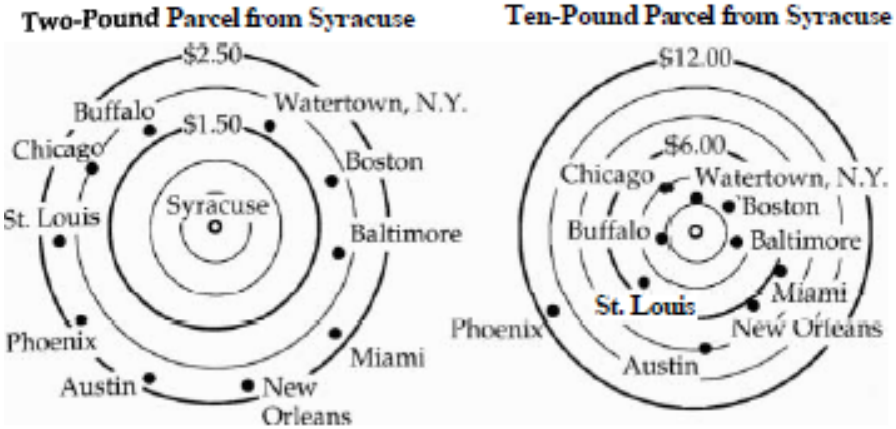
Projection

- Equivalent (preserves area ratios)
- Conformal (preserves local angles)

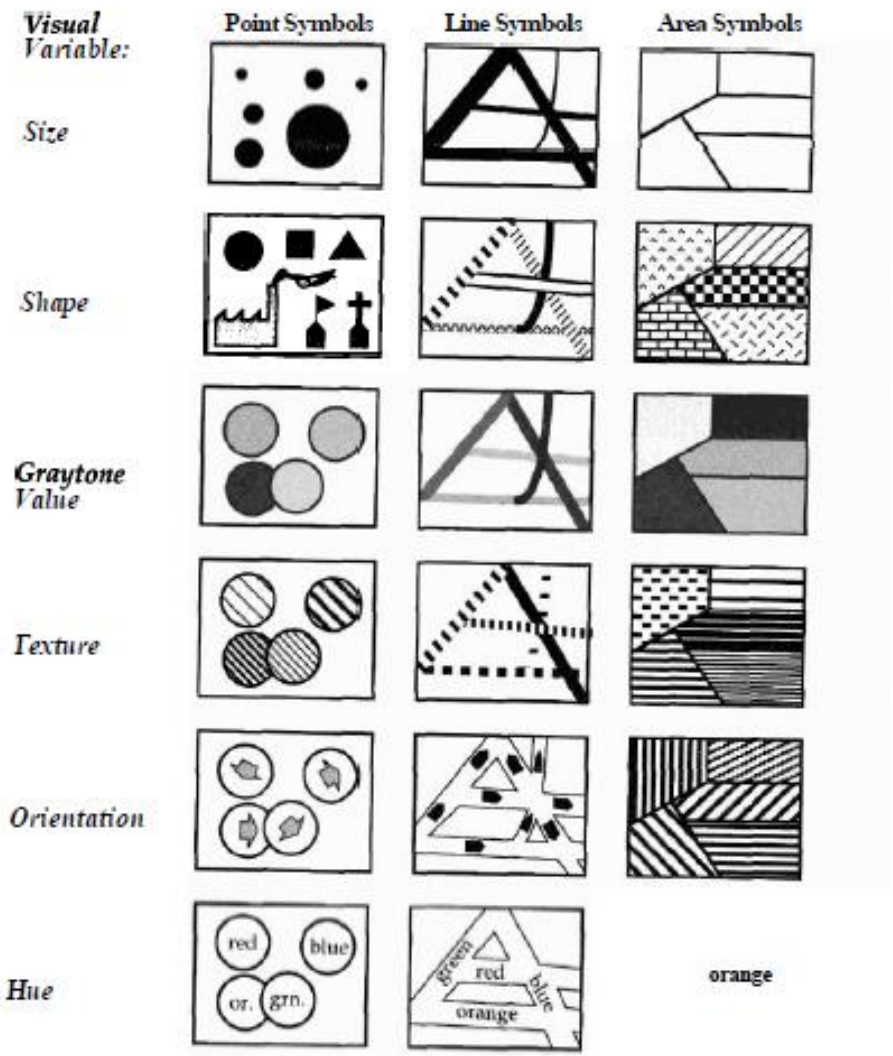
Projection

- Cartograms:



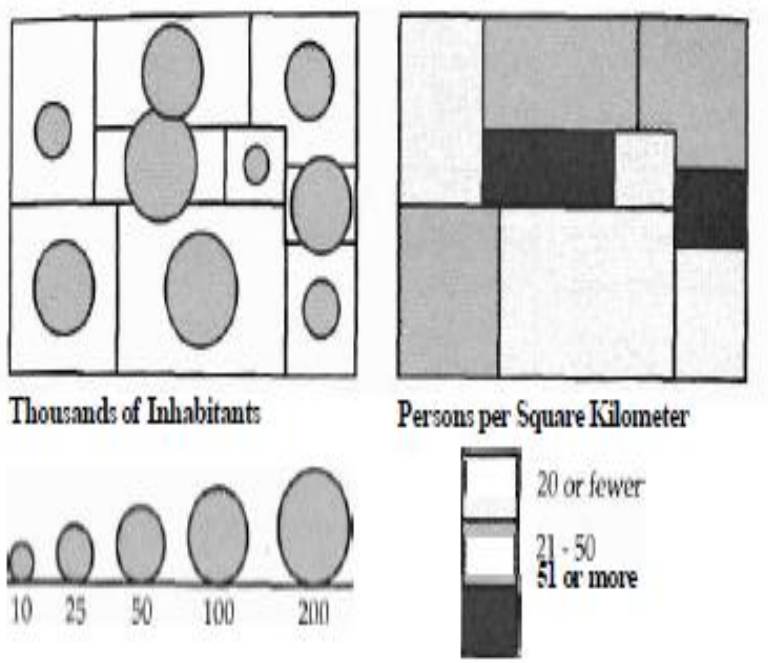


Symbols

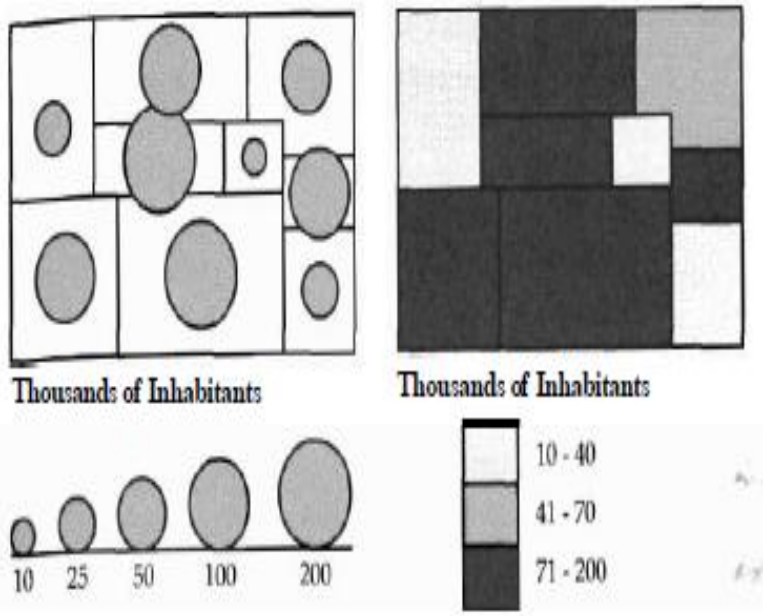

Visual Variable:
Point Symbols
Line Symbols
Area Symbols
Size
Shape
Graytone Value
Texture
Orientation
Hue
red
blue
or.
grn.
green
red
blue
orange
orange

Symbols

Correct usage



Misuse

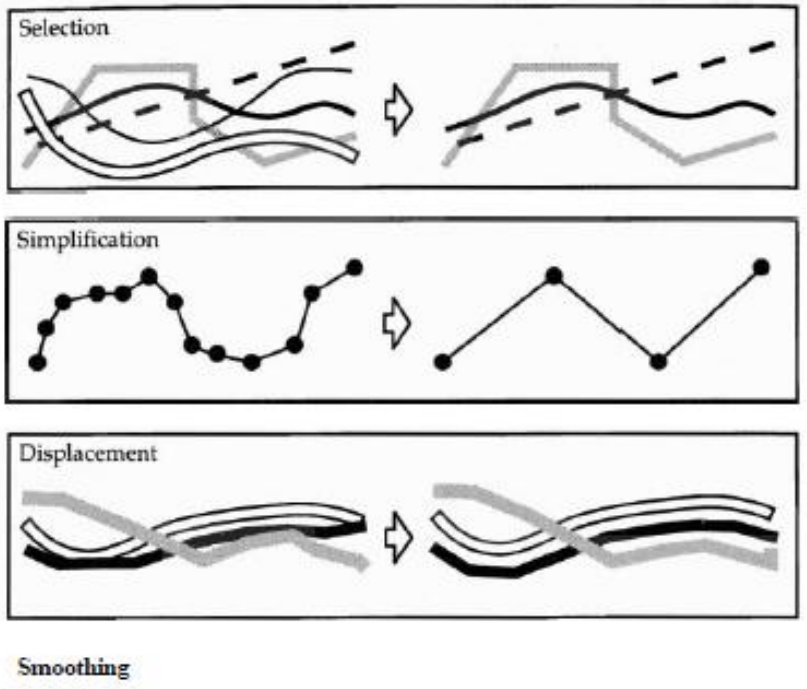


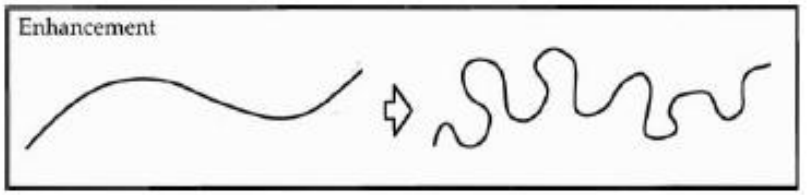
Generalization

- White lies
- Point, line and area require different generalization

Line Generalization

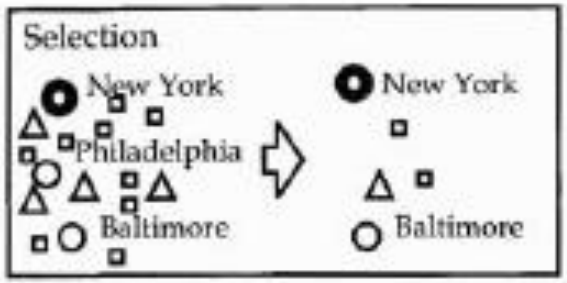
- Selection
- Simplification
- Displacement
- Smoothing
- Enhancement

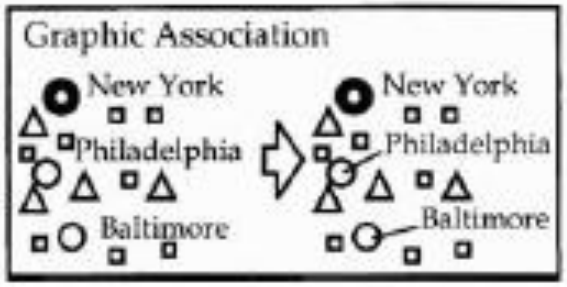


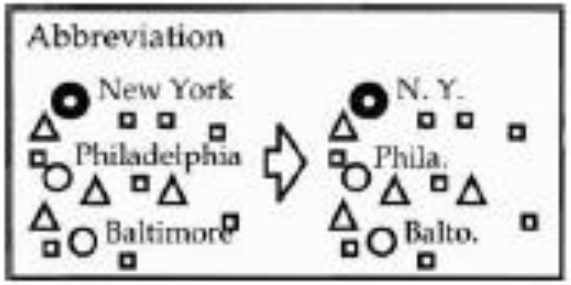


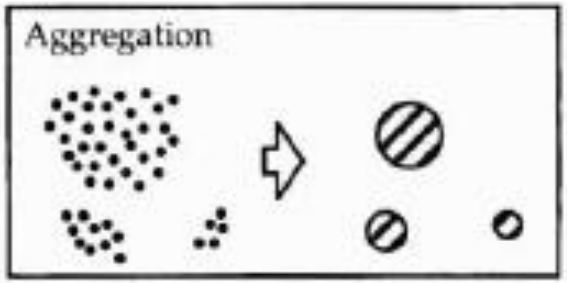
Point Generalization

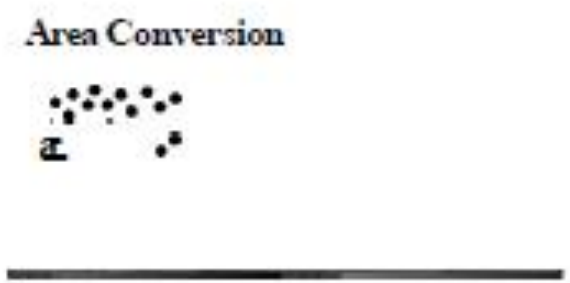
- Selection
- Displacement
- Abbreviation
- Aggregation
- Area conversion
- Graphic association





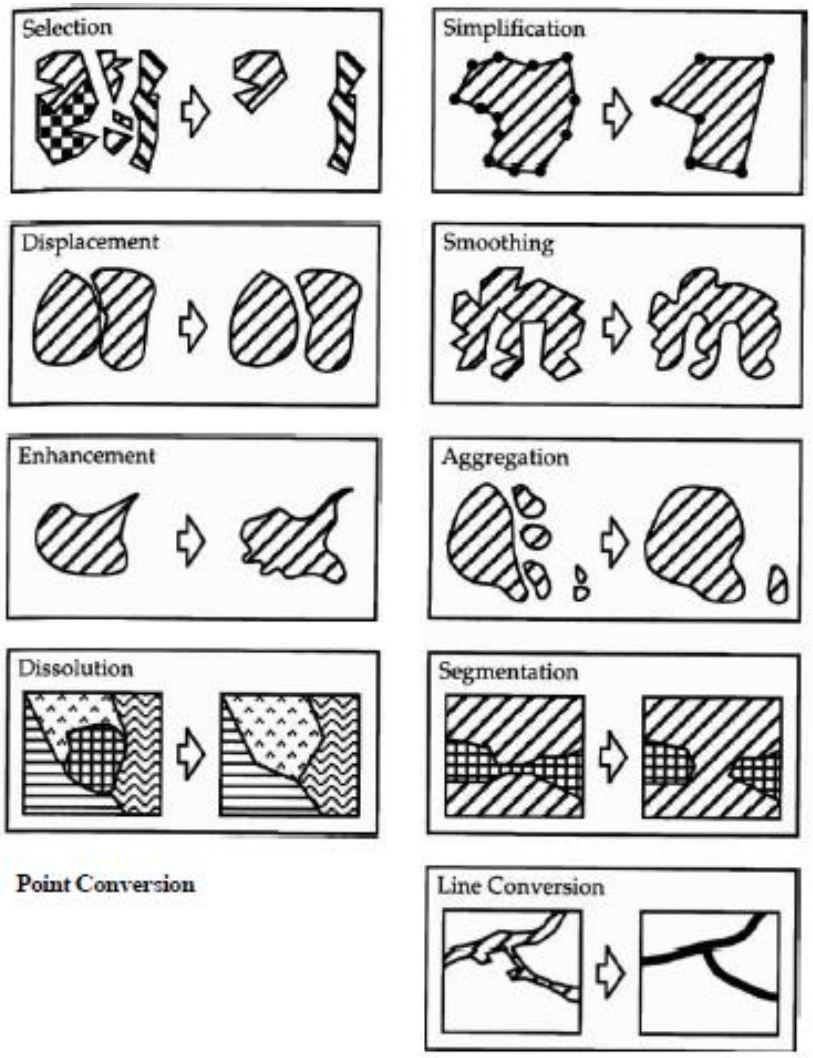






Area Generalization

- Selection
- Simplification
- Displacement
- Smoothing
- Enhancement
- Aggregation
- Dissolution
- Segmentation
- Point conversion
- Line conversion



Content Generalization

- Selection
- Classification

Summary

- Vision is a hierarchical process
- It is affected by both bottom up and to down processes
- Maps have limited space
- Different maps serve different purposes

Thank You!