Biological Vision and Applications
Module 04-01: Feature Integration Theory

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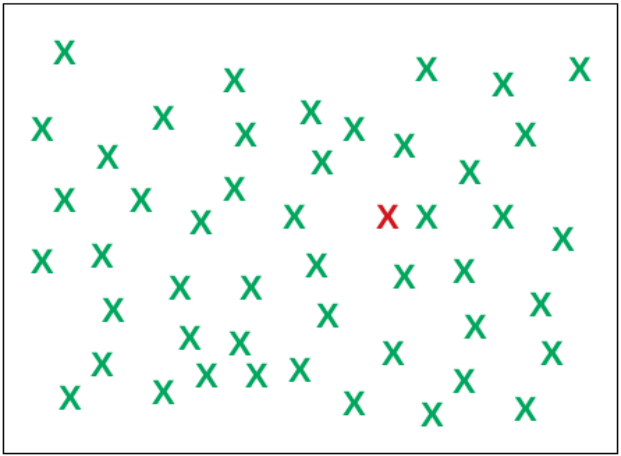
Experiment in visual Search

- You will have to find the red X in the figures in the next two slides
  - There is exactly one red X in each of the figures

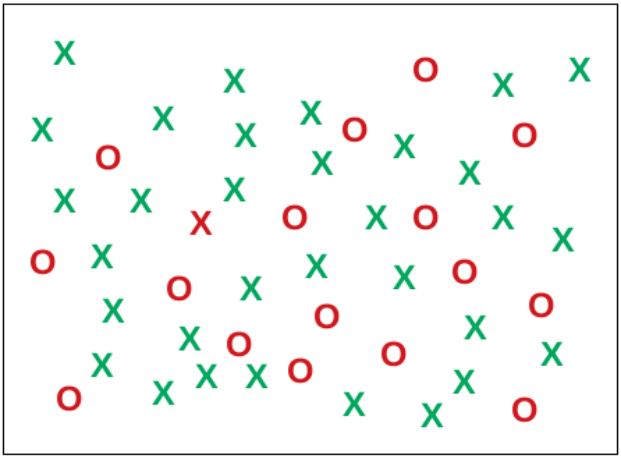
Experiment in visual Search

Find the red X in the figure



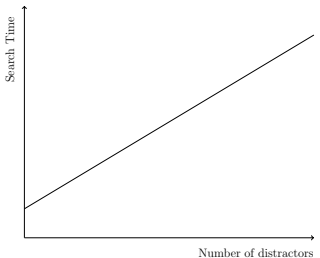
Experiment in visual Search

Find the red X in the figure



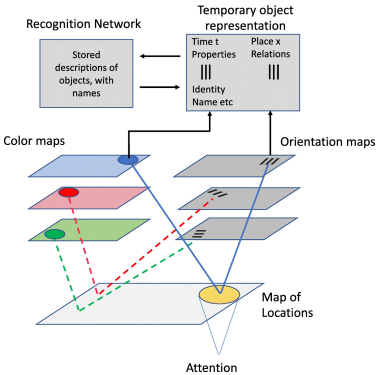
Observations

- When the target is distinguished by color alone, search is almost instantaneous
- When the target is distinguished by color and shape, search takes longer
  - It increases linearly with the number of targets



Triesman's Feature Integration Theory (1980)

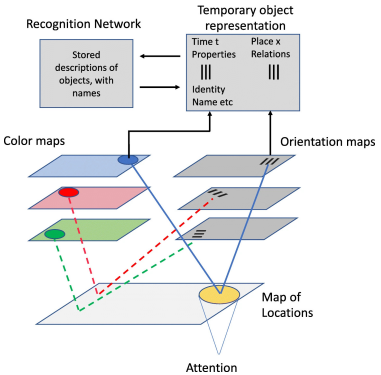
A very simple but elegant theory



- Perceptual process is hierarchical
- **Stage I.** Pre-attentive (early) vision
  - Visual scene encoded on feature dimensions
    - "Automatic"
    - Without any cognitive effort
    - In parallel
  - The locations of objects and mapped
    - "Where" and Not "what"

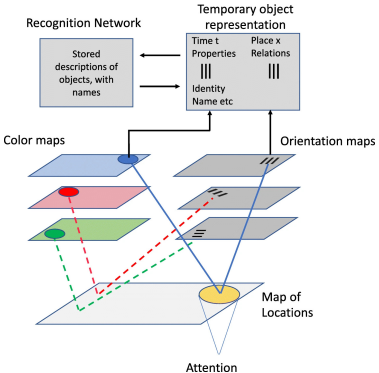
Triesman's Feature Integration Theory (1980)

contd.



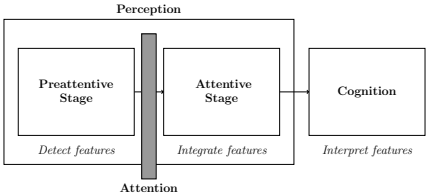
- **Stage II.** Attentive (late) vision
  - Attention "glues" the features together
    - Required for localization
  - Such integrated entities came to be called "visual objects"
    - Conjunction of properties
    - Limited capacitry
    - Features within same attentional focus can be encoded as belonging to the same object

Cognitive process follow perception



- Visual objects compared with descriptions of real objects
  - Objects are detected and localized
- A “scene” is a spatial organization (interaction) of objects
- Events are temporal sequence of scenes (objects and interactions)
  - Within finite temporal bounds (episode)

Vision pipeline



- Are the stages strictly sequential and independent of each other ?
  - Total processing time should be the sum of the individual stages
- Later experiments prove otherwise
  - Relationships between perception, attention and cognition are more complex

Quiz

No quiz for module 04-01
But, we have advance quiz for the next module

End of Module 04-01