**Chapter 4 study guide**

**Middle vision- organizing elements of visual scene into groups that we can recognize as objects.**

**Summarized in 5 principles:**

1. **Bring together that which should be brought together (gestalt grouping principles and relatability heuristic**
2. **Split asunder that which should be split asunder- figure-ground mechanisms**
3. **Use what you know- occlusion borders, knowledge of physics**
4. **Avoid accidents- accidental viewpoints, etc**
5. **Seek consensus and avoid ambiguity**

* Gestalt psychology
  + What is it? What are key points about it?
    - Gestalt theory said that the perceptual whole was more than the sum of its sensory parts. Figured out set of grouping rules for describing which elements in an image will appear to be grouped together
* Know all of the Gestalt group principles and what they look like (examples)
  + Illusory Contours- edges of objects that are perceived despite an almost complete lack of physical evidence for them.
  + Gestalt features- help us find edges using heuristics (basically guesstimates) to group info. If it is ambiguous we favor just ONE interpretation.
  + good continuations- too elements will tend to seem grouped together if they lie on the same contour. Ex. Intersecting lines,
  + occlusion- if part of an object is missing the brain assumes that something must be blocking the view. One objects occluding the other.
    - We use relatable shapes- the degree to which two line segments appear to be part of the same contour, and non-accidental features such as T-junctions, Y-junctions and arrow junctions.
* Texture segmentation (not gestalt) and grouping gestalt)
  + Texture segmentation- the portion of an image with a coarser texture is separated from the rest of the image (this concept is not gestalt, but it is very similar to it.
  + similarity- two features that have similar features will seem to be grouped together
  + proximity- two things that are closer together will seem to be grouped together
  + connectedness- if two items are connected they will seem to be grouped together
  + parallelism- if two items are parallel or have similar contours they will seem to be grouped together.
  + common fate- elements that move together will seem to be grouped together
  + common region- if two features appear to be part of the same larger region they will seem to be grouped together.
* Selfridge’s committee rules: you should honor physics and avoid accidents.
  + Ambiguous figure- a visual stimulus that gives rise to two or more interpretations of its identity of structure
    - example would be the Necker cube which has an outline that is perceptually bi-stable. The two interpretations continue to battle for perceptual dominance.
  + Accidental viewpoint- a viewing position that produces some regularity in the visual image that is not present in the world.
    - Example would be the image shown in class of the two people next to each other with their arms up, and they appear to be one long arm because they line up perfectly.
  + Figure/Ground: what is usually perceived as figure or ground- which image is the foreground and which is the background. How do we do this?..
    - Surroundedness- if one region is entirely surrounded by another it is likely that the surrounded region is the figure
    - Size- the smaller region is likely to be the figure
    - Symmetry- a symmetrical region is more likely to be the figure
    - Parallelism- regions with parallel contours are more likely to be the figure
    - Extreme edges- which seems closer based on the edges
    - Relative motion- how surface details move relative to an edge
* Object recognition
  + Hoffman and Richard
    - Noted that when one blob is pushed into another, a pair of concavities is created in the silhouette of the resulting two-part object. Figured out that we are more likely to valleys rather than bumps are used to mark part boundaries.
  + Tarr and pinker
    - Trained observers to recognize letter-like objects. These objects were always shown upright, and then they were randomly asked to recognize rotated versions f the objects. The more the object was rotated, the loner it took for the observers to name it. This showed that subjects may have stored a template-like representation of the object during the training phase and then recognize the objects in the rotated phase by mentally rotating the misoriented objects back to upright views.
  + Gauthier et al.
    - Made novel objects named greebles out of geonlike parts. Recognition of these novel objects appears to have a viewpoint dependent component
    - He thought that objects were identified by identies and relationships of the parts.
    - Viewpoint invariance- a property of an object that does not change when observer viewpoint changes or a class of theories of object recognition that proposes representations of objects that do not change when viewpoint changes.
* Object recognition models
  + Naive Template Theory
    - The proposal that the visual system recognizes objects by matching the neural representation of the image with a stores representation of the same shape in the brain. The problem with this is we would need way too many templates!!
      * Ex: if we needed a new template for every letter in every position and orientation, we’d run out of brain before we’d run out of alphabet.
      * How are you going to possibly recognize a PERSON using this method?
  + Recognition by component- biederman’s model of object recognition, which holds that objects are recognized by the identities and relationships of their component parts.
    - Geons- geometric ions. Specified collections of nonaccidental features. You just take the pieces (geons) and combine them to create a wide variety of object representations.
  + Multiple recognition committees- recognition does not seem to be a single act. We can recognize objects in multiple ways.
    - Ex: Pierre Jolicoeur: you see two birds, one is a sparrow and one is a finch. “bird” is the entry-level category, then at a subordinate level you see “sparrow”
  + structural description- a basic description of how the object is composed.
    - Ex: the letter A is three lines, two flanking lines and one connecting line
* Disorders of perceiving and recognizing objects
  + Balint’s syndrome- (simultanaganosia)- individuals with this syndrome report only being able to see one object at a time. They are unable to track the location of multiple objects. This is caused by a bilateral brain injury. (problem with the “where” system) visual segmentation intact, object recognition intact, can identify things as long as they segment them.
  + Prosopagnosia- individuals that have difficulty recognizing faces but can recognize objects. This is due to damage to the temporal lobe.
  + Associative agnosia- a form of visual agnosia. Individuals that have this agnosia have trouble recognizing or assigning meaning to a stimulus.