**Chapter 8 in the book, chapter 7 in the powerpoint slides: Attention and Scene Perception**

What is attention

* Attention: Any of the very large set of selective processes in the brain. Basically there is too much input from the world and we need a way to deal with it. So, the nervous system evolved ways to restrict processing to subsets.
  + What does it consist of?
    - Reaction time- a measure of the time from the onset of a stimulus to a response.
      * Used often in cueing experiments (Posner). Have a subject fixate on a central point and after a delay a test probe will appear prompting the subject to hit a response key. The Reaction time is the amount of time between the point when the probe appears and the point when the subject hits the response key.
    - Cue- a stimulus that might indicate where (or what) a subsequent stimulus will be. Cues can be valid (correct info, causes RT to decrease), invalid (incorrect info.), or neutral (uninformative).
* Types of attention?
  + Overt- Directing the fovea to look at an intended target.
  + Covert- Looking out of your periphery or “corner of your eye.”
  + Divided attention- Focusing on more than one task at the same time. Ex: watching TV and doing homework.
  + Sustained attention- Watching the pot for the moment it starts to boil. Listening for the microwave to beep.
  + Selective attention- the ability to pick one (or a few) out of many stimuli. Ex: where’s Waldo.
* Searches and search elements
  + Spotlight attention
    - Visual search- looking for a target in a display containing distracting elements.
      * Distractors- any stimulus other than the target.
      * Target- the goal of a visual search.
      * Set size- the number of items in a visual display.
      * Salience- how vivid the target is compared to the distractors
      * Types of visual searches:
        + Feature search (parallel).

Search for a target is defined by a single attribute, such as a salient color or orientation.

The search time is independent of the distractors

These are efficient



* + - * + Conjunction search (serial).

Search for a target is defined by the presence of two or more attributes.

The slope is steeper when the target is absent as the search would be exhaustive: looking at one item at a time until you find the one you’re looking for. Between efficient and inefficient.



* + - * + serial self-terminating- a search from item to item, ending when a target is found. This is inefficient.
        + Guided search- a search in which attention can be restricted to a subset of possible items on the basis of information about the target items basic features.

feature integration theory- Anne Treisman’s theory of visual attention

**THINK about examples of this. There are some in the book as well.**

a limited set of basic features can be processed in parallel pre-attentively but other properties, like the correct binding of features to objects, require attention.

Illusory conjunction- a false combination of the features from two or more different objects.

* Problems and phenomenon
  + Attentional blink- When presented with a sequence of visual stimuli in rapid succession at the same spatial location on a screen, a participant will often fail to detect a second salient target occurring in succession if it is presented between 150-450 ms after the first one.
    - Basically, in layman’s terms, you’re sitting in a chair looking at a computer screen and someone is showing you random numbers one after another, and tells you to push a button when you see a letter. The first letter you see it will be obvious and you will push the button, then if the second letter comes within 150-450 ms after the first one you’ll probably miss it.
      * “1-5-2-8-4-G-3-6-L-2-1-0-3-T-6-9”
  + Repetition blindness- A failure to detect the second occurrence of **THE SAME** letter, word, or picture in a rapidly presented stream of stimuli when the second occurrence falls within 200-500 ms of the first.
    - The difference here is that the second target is IDENTICAL to the first target.
      * 1-3-5-3-1-A-2-A-6-8-2-A-6-4-3-2-0”

\*\*\* both repetition blindness and attentional blink are detected using an experimental procedure called rapid serial visual presentation (RSVP) in which stimuli appear in a stream at one location at a rapid rate.

* + Neglect: this is a visual field defect. The ina6bility to attend to or respond to stimuli in the contralesional visual field. Neglect of the left field after right parietal damage or neglect of half of the body or half of an object.
    - Egocentric neglect: miss contralesional side of scene (common after right injury)
    - Allocentric neglect: miss contralesional side of objects.
  + Extinction- the inability to perceive a stimulus to one side of the point of fixation in the presence of another stimulus in a comparable position in the other visual field.
  + Balint syndrome (simultagnosia)- Bilateral lesion of Parietal lobe. Inability to perceive more than one object at a time.
    - Spatial localization reduced - hard time reaching for objects
    - Don’t move eyes much when focusing attention.
* how do neurons respond during response enhancement? 3 ways response of a cell can be changed by attention:
  + Response enhancement- when a neuron responding to an attending stimuli gives a bigger response.
  + Sharper tuning-the effect of attention on the response of a neuron in which the neuron responds more precisely.
  + Altered tuning- when you attend to one stimulus the cells sensitivity is enhanced around that location, if the attention is shifted to another location the receptive field shifts too.
* What is spatial layout and covert attentional shift?
  + Spatial layout (non selective pathway)
    - Green and Oliva (2009) found that it takes only 19ms for an individual to determine scene difference using spatial layout
    - Spatial Layout - the “gist” of the scene. Description of the structure but not any specific details.
    - The “openness” and “closeness” are easily determined based on horizontal components
  + Covert attentional shift- a shift of attention in the absence of corresponding movements of the eyes.
* Areas of the brain that are used attention and scene perception (i.e: FFA, EBA, parahippocampal place area, striate cortex)
  + Fusiform face area- area in the fusiform gyrus of human extra striate cortex that responds preferentially to faces.
  + Parahippocampal place area- region in the cortex in the temporal lobe that responds with strength to images of places as opposed to isolated objects
  + Extrastriate body area- area in the extrastriate cortex that responds preferentially to human bodies.
  + Parietal lobe- people with legions here have problems directing attention.