Attention

Types of Attention

- Focussed/selective attention: Auditory/visual
- Divided attention: Processing multiple inputs
    - Can reduce processing on one element e.g. eating while watching TV subdues taste of food
- Internal attention
- Control of attention

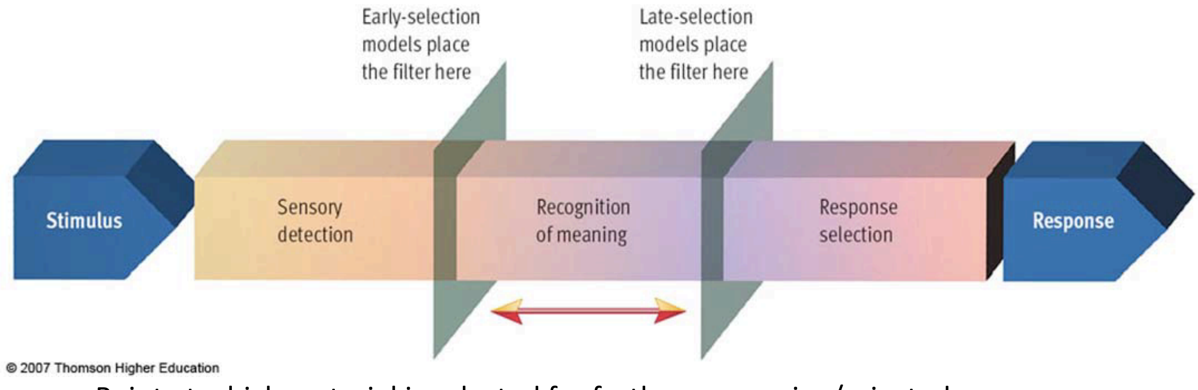
Auditory Attention

- Commonly tested by dichotic listening task
- Applies to selective hearing in a room with multiple messages/voices

Dichotic Listening Task

- Each ear has separate auditory channel i.e. different messages simultaneously
    - Diff message in diff ears
    - Diff language in unattended ear
    - Diff sounds
    - Similar message but staggered
- Shadowing: Repeating out loud the message in the attended ear
- Cherry's findings:
    - Selection is possible
    - Crude processing of info from unattended ear e.g. sex of speaker, speech/noise w/ little complex info coded (cannot even distinguish switch in language)
    - Difficult to distinguish if voices are physically similar

Locus of Selection



- Point at which material is selected for further processing/rejected
    - Early: Selection based on physical characteristic → unattended stimuli not processed on meaning, just physical characteristics
    - Late: Selection based on meaning → all stimuli processes on meaning
- Broadbent's Filter theory: Early locus of selection
    - Multiple inputs coded in parallel
    - One input selected based on physical attributes
    - → Lack of processing of unattended stimuli

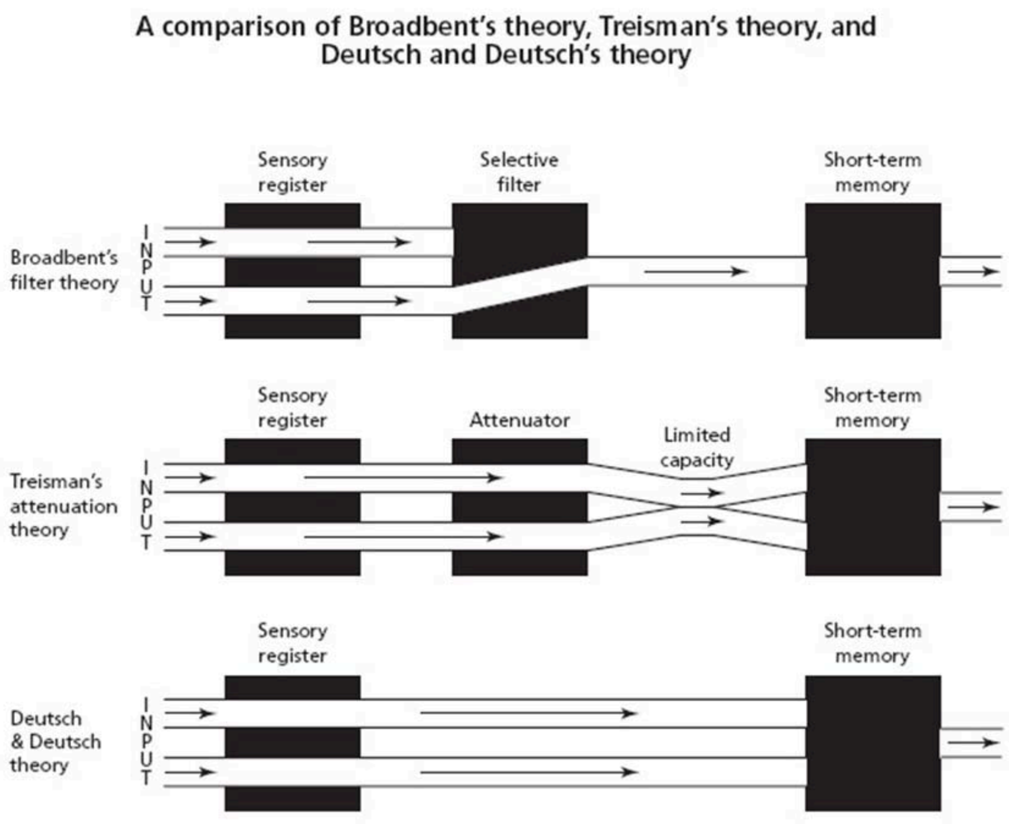
        - Explains why people report information by ear rather than by sequence e.g. 79 (left) 8 10 (right) instead of 789 10
            - Filter each ear separately
        - Problem: Information from unattended ear is processed as well

Switching

- Switching = attending to unattended ear
- Breakthroughs: Info from unattended ear is shadowed accidentally
- Moray: Instructions to switch attended ear given in unattended ear
    - Information not followed most of time (~10%)
    - Information followed more if preceded by listener's name (~33%)
        - Cocktail party phenomenon (can detect someone saying name in a large crowd)
        - More likely if the P has low WMC, possibly due to low attentional control
        - Still chance percentage
- Treisman: Switching occurred when the messages switched ears but p's quickly switched back

More Theories of Attention

- Treisman's Attenuation theory: Late locus of selection
    - Attenuator <u>reduces</u> (but does not prevent) processing of unattended message due to limited resources but still processed at a basic level
    - Explains 'breakthroughs' because certain messages have lower threshold to be processed more deeply e.g. name, fire, expected words which fit w/ message from attended ear
    - Priming: Expected words which agree with content from attended ear are more likely to be processed
    - Evidence that unattended ear is processed:
        - Switching during task when messages switch ears
        - Pairing of word in unattended ear w/ electric shock → classical conditioning w/ physiological response when presented w/ word
- Deutsch and Deutsch: All stimuli processed to a large degree but selection based on importance
- Johnston and Heinz: Flexible locus of selection – Selection occurs as early as possible to free attentional resources
    - Particularly important when stimuli are complex as they cannot all be processed due to limited resources
    - Uncertainty → processing of irrelevant stimuli



Leaky Filter vs Slippage

- Leaky filter: Filter is leaky so unattended ear is processed to a degree
- Slippage: Due to inability to focus attention → attention shifts to unattended channel
  - Priming effects disappear if prime presented for <50ms, which is time taken for attention to shift
  - i.e. suggests priming effect is due to attentional shift rather than processing of unattended ear (late selection theory)
  - Priming: Quicker to decide that a letter string formed a word if word prime presented in unattended ear just prior

Flexible Locus of Selection

- Lavie's load account: Focus of attention depends on perceptual load
  - High perceptual load: No attentional resources spare to be distracted → less distraction, early locus of selection
  - High cognitive load i.e. executive functions e.g. WM → increased distraction, late locus of selection

Visual Attention

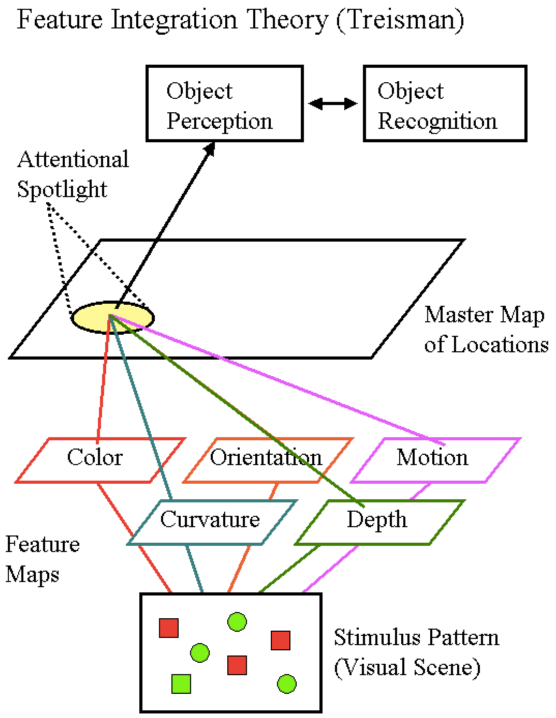
Types of Searches

- Feature search: Target 'pops out' as it differs from distractors on one dimension/feature
  - E.g. red circle target w/ blue circle or red square distractors
  - Simple, does not require attention
  - i.e. preattentive

- Conjunction search: Target differs from distractors on a conjunction of 2 features/dimensions e.g. red circle target w/ red square and blue circle distractors
    - Effortful, requires attention
- Texture segregation: Division of objects by distinct features/conjunction e.g. shape, colour, orientation

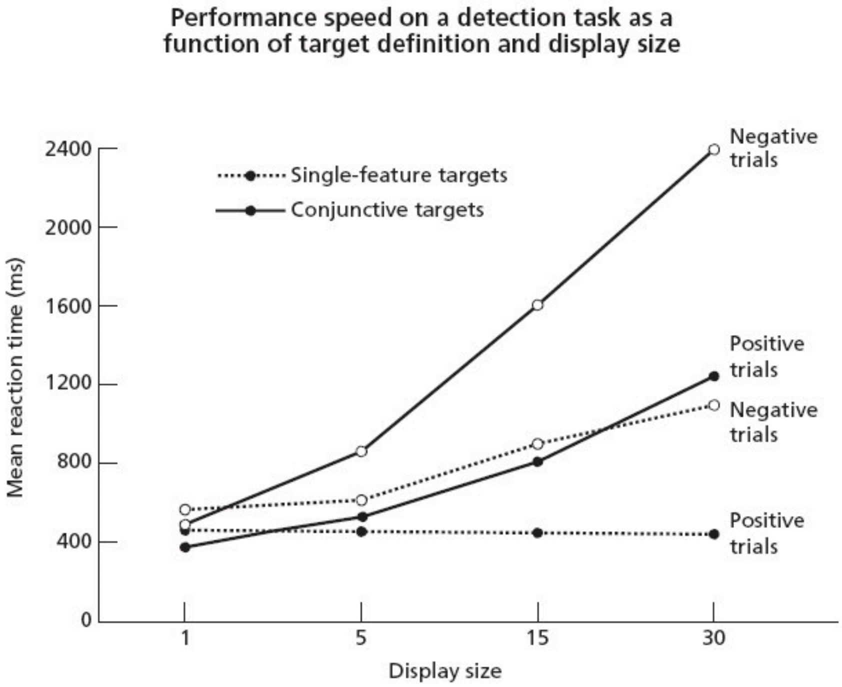
Feature Integration Theory (Treisman & Gelade, 1980)

1. Fast initial parallel processing of features (pre-attentive)
    - Generation of feature maps for visual scene e.g. feature map for 'red' identifies locations of red in scene
2. Slow, serial combining of features together to form representation of object (attentive)
    - Attentional spotlight to particular area → integration of feature maps at that point



- Evidence:
    - Targets in feature search found faster (flat search slope) than in conjunction searches (rising search slope)
        - Feature search: Target 'pops out' as it differs from others based on dimension of one feature e.g. colour → single location on feature map
        - Conjunction search: Target differs on two features → need to integrate feature maps at each possible location (serial search)

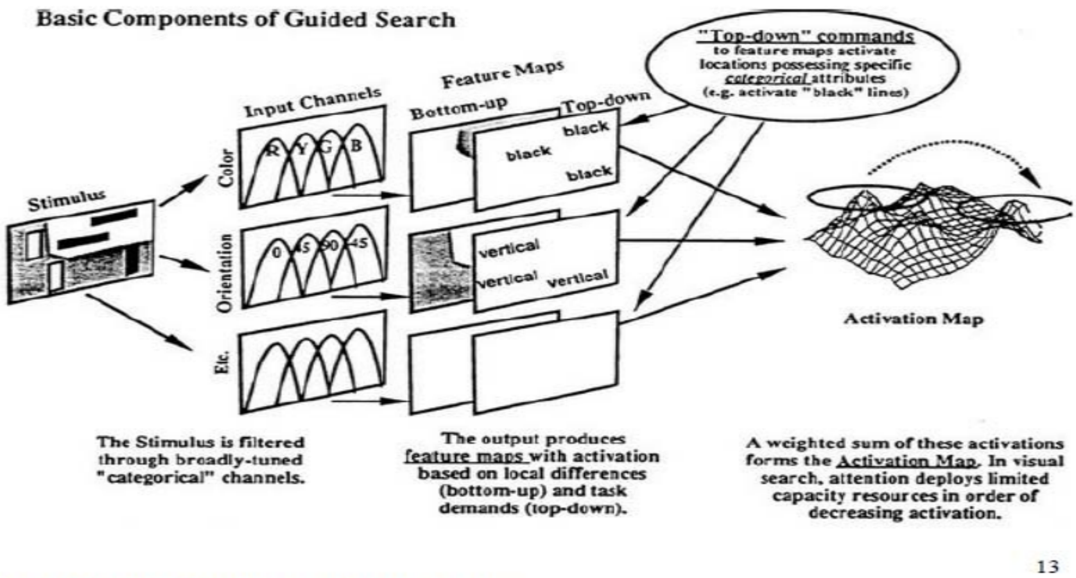
        - Flat search slope: Same time for feature search regardless of number of distractors → parallel search
        - Rising search slope: Increased time taken for conjunction search w/ more distractors → serial search



- Texture segregation easier with distinct features
  - E.g. Division by shape: Red and blue circles segregated from red and blue squares
  - Easier than division by conjunction of shape and colour: Red circles and blue squares segregated from red squares and blue circles
- Illusory conjunctions: Mistaken conjunctions of features e.g. remembering seeing red circle and blue square instead of red square and blue circle

- Problems with theory:
  - Homogeneity of distractors in feature search → grouping and rejection, but heterogeneity of distractors in conjunction search → more difficult to group and find target (Duncan)
    - Time diff not necessarily due to serial 'integration'
  - No clear distinction between parallel and serial searches in data i.e. not completely flat slopes for 'parallel' + search times w/ increasing set size do not increase as much as expected for 'serial' (Wolfe)
    - Guided search theory
  - Conjunction search may be slower because targets share features w/ distractors → less easy to discriminate (Palmer)
    - Decision integration hypothesis

Guided Search Theory (Wolfe)



Wolfe (1994) from Psychonomic Bulletin and Review

- Stimulus filtered through categorical channels e.g. colour, shape → production of feature maps based on these dimensions
  - Feature maps have areas of higher/lower activation depending on bottom-up (local differences in stimulus)/top-down processing (dependent on task)
- Weighted sum of feature maps → activation map w/ different 'peaks'
- Attention goes to area of highest activation, and moves through
- Predicts faster search times for conjunctions based on more dimensions/features
  - Due to greater differentiability of target and distractors on more dimensions
  - → Produces more effective activation maps, with greater activation at area with desirable target features
  - *Compared to FIT which predicts longer time due to more serial searches + integration