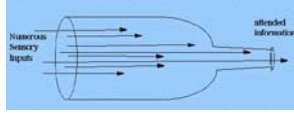


Attention

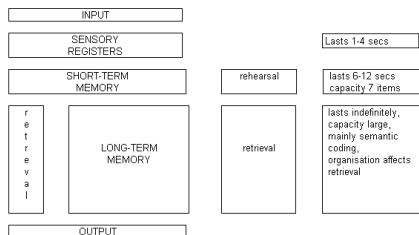
- Process of focusing mental effort on particular task or stimulus
 - Selective
 - Shiftable
 - Divisible
 - Limited



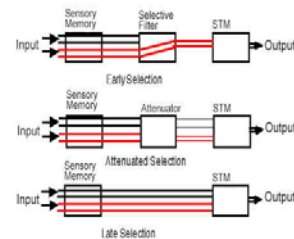
Issues in Attention Research

- What happens to unattended information?
- What factors affect our ability to divide our attention?

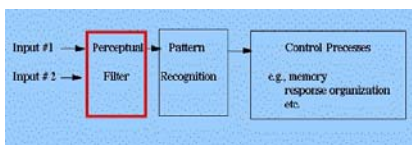
IP Psychology



Selective Attention Models



Selective Attention Models



- Early Selection Models
 - Attention determines nature of info that goes into working memory (short-term store)
 - Selection occurs “early”, before info enters working memory

Studies of selective attention (e.g. Cherry, 1953)

- subjects are presented with 2 or more stimuli at the same time
 - this is called **dual-task** performance
- for **selective attention** tasks, subjects are instructed to attend to one input only

Dichotic listening task

- 2 simultaneous messages
 - one to each ear
- each message has different meaning
 - like listening to TV & radio at same time
- Subjects must **shadow** one ear only
 - **repeat** the message from one ear only
- Experimenter then asks about unattended ear!
 - Listeners extract only certain info from unattended ear

So what do we notice?

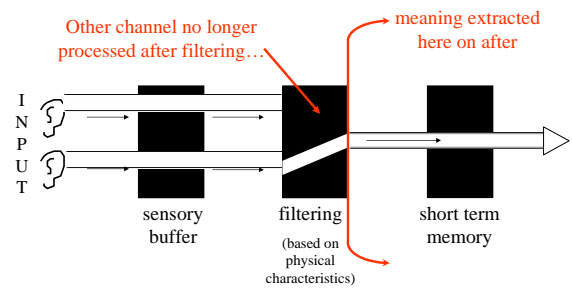
- Listeners are **good** at detecting physical info
 - could tell whether unattended channel was...
 - ✓ • Male vs. Female
 - ✓ • Speech vs. Buzzing
- Listeners are **bad** at detecting meaning info
 - couldn't identify any word/phrase
 - couldn't tell whether unattended channel was...
 - ✗ • Forward vs. Backward
 - ✗ • English vs. German
- So, attention is
 - sensitive to physical properties
 - **insensitive** to meaning

Broadbent's Filter Model of selective attention

- sensory information (speech) is received in **channels**
 - channel = ear!
- Info goes first to **buffer** (=temporary store)
- Then **filter** selects attention (chooses 1 of the channels) based on physical characteristics (e.g. voice tone)
- This single channel is now the **focus of attention**
- Ignored (=unattended) info can be recalled from the buffer but this **decays rapidly!**

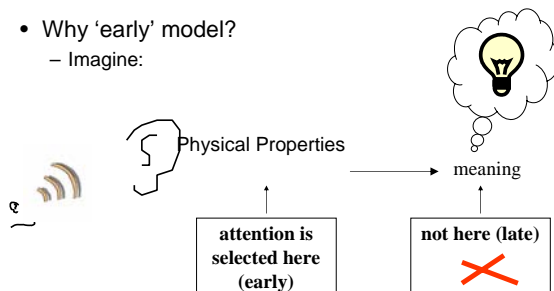
- We can only attend to one channel at a time
- Switching attention between channels requires effort

Broadbent's Filter Model of selective attention



Broadbent's Filter Model of (early) selective attention

- Why 'early' model?
 - Imagine:



Evidence for the model

- The **split-span procedure** Broadbent (1954).
 - 6 digits presented in 3 pairs
 - 1 member of each pair simultaneously presented to each ear:
- Subjects must report what they heard, either:
 - A) **pair-by-pair** 48, 95, 62
 - OR
 - B) **ear-by-ear** 496, 852
- Participants perform better ear-by-ear

L	4	9	6
R	8	5	2

Why?

✗ pair-by-pair 48, 95, 62

requires switching back and forth between ears. Model says this requires lots of effort

VS.

✓ ear-by-ear 496, 852

Only need 1 switch... therefore less effort... therefore we're better!

While we're reporting the left ear (496) we hold the right ear info (852) in the temporary buffer

Evidence Against

- Cocktail Party Effect (Moray)
 - Shadow 1 Channel
 - Report Salient Words from Un-shadowed Channel
 - e.g. Own Name
 - Fire!

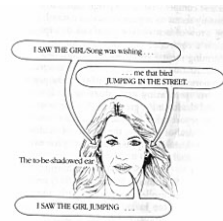


Switching Ears (Moray, 1959)

- Shadow left, until “switch ears” signal
- Attended (yes) Unattended (no)
- “Bill switch ears”
 - Attended (yes)
 - Unattended (yes)

Errors in Shadowing

- Treisman (1964)
- Subjects sometimes report mixtures of things from both ears

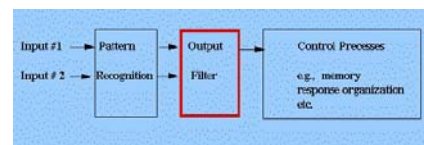


Galvanic Skin Response



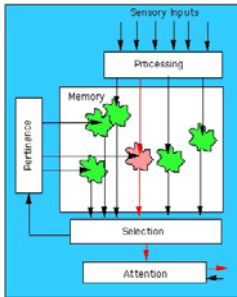
- GSR -- indicates increased arousal
- Training: shock for certain words
- Later: present to unattended ear during shadowing
- Emotional response to word (alho not aware of hearing it!)

Attention Models



- Late Selection Models
 - All info gets into working memory (short-term)
 - Unattended info rapidly forgotten
 - Selection doesn't occur until after recognition

Norman's Model



- Late Selection
 - All stimuli processed to recognition
 - Bottleneck after recognition just before the formulation of response
- Selection (pertinence) based on importance
- Memory devoted to selected inputs

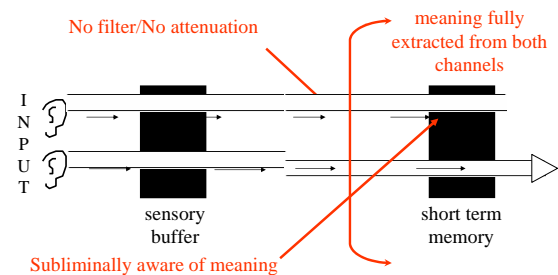
Norman's model & the data

- Cocktail Party Effect
 - Name gets into STM just long enough to be recognized
 - Because important, gets extra processing
- Contextual Errors in Shadowing
 - Info from both ears gets into STM
 - Contextually relevant info gets extra processing because pertinent

Deutsch & Deutsch Model of (late) selective attention

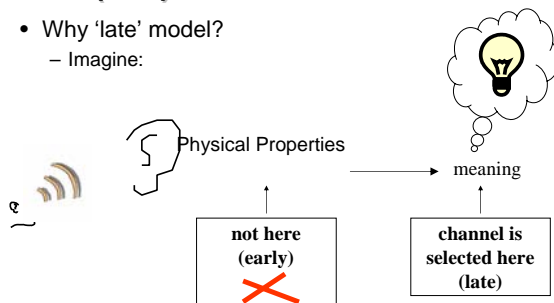
- ALL stimuli are analysed for meaning but only SOME are *selected for response*
 - unattended message may be recognised but not pass into *awareness*
 - allows for *subliminal* perception;
 - processing inputs with no conscious awareness
- Non-attended inputs are noticed only if their relevance exceeds the relevance of the attended channel
 - allows for *breakthrough*

Deutsch & Deutsch Model of (late) selective attention



Deutsch & Deutsch's Model of (late) selective attention

- Why 'late' model?
 - Imagine:



Evidence for the model

- Sophisticated meaning analysis of unattended channel
 - Mackay (1973).
 - They threw stones towards the bank
 - money
 - or
 - river
- QUESTION:** what does the sentence mean?
- Subjects favoured the interpretation of the sentence suggested by the unattended word.

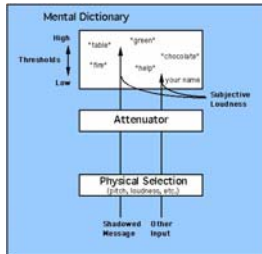
Treisman & Geffen (1967)

- Method
 - Task 1: shadow message in one ear
 - Task 2: tap pencil when you hear the target word “green”
- Results
 - Tapping to *green* in shadowed ear: 87%
 - Tapping to *green* in the other ear: 8%

Contra Late Selection

- Treisman & Riley (1969)
 - Although meaning analysis is good on unattended channel, it's **BETTER** on attended channel.
- 👂 7 9 4 6 1 4 ... ← Shadows this. Stop when you hear a letter.
- 👂 3 8 6 3 1 B ...
- We're much better at detecting the letter on the attended channel (7 9 4 6 1 B ...)!
 - Therefore...the unattended channel is NOT fully processed.

Attenuator Model

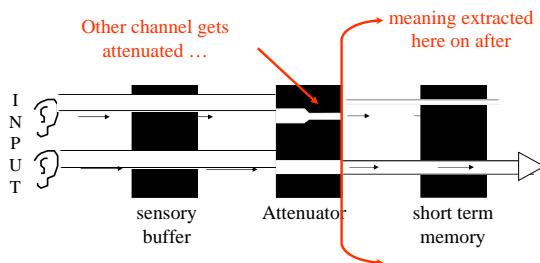


- Attenuator affects “subjective loudness”
 - Pay attention – increase loudness
 - Shadowed msg “louder” than non-shadowed
- Concepts in Dictionary differ in loudness threshold
 - Name always low
 - Thresholds change w/goals

Treisman’s attenuation theory

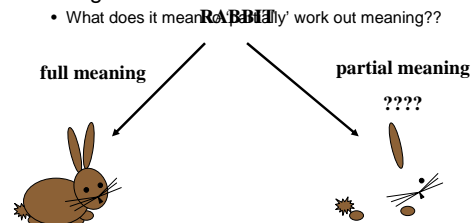
- a filter **attenuates** unattended input rather than “turning it off”
- so non-attended meaning *does* pass on, but in a weaker form.
- because it's weaker (**attenuated**) we can ignore it
- stimuli that are **emotionally important** (our name) or **biologically relevant** (“sex”) are pre-set and so not attenuated
 - allows for breakthrough

Treisman’s Attenuation Model of selective attention



Problems with the model

- What is an attenuated processing of meaning???



Early or late selection?

- We understand at least some meaning on the unattended channel. SO Early selection models are *not satisfactory*.
- But we still get more meaningful info from the attended (vs. unattended) channel. SO Late selection models are *not satisfactory*
- Perhaps an attenuated theory... But what is attenuated meaning processing???

Perhaps we need an alternative approach?

Johnston & Heinz's Hybrid Model

- We filter out channels *either...*
 - EARLY (based on physical characteristics)
 - OR
 - LATE (based on meaning)
- EASY**
- HARD**

Johnston & Heinz's Hybrid Model

- Evidence: Dual Task
 - Task 1.
 - 🔊 **Blah blah blah ...** ← **Attend to this.**
 - 🔊 **Blah blah blah ...**
 - Task 2. Watch screen. Say when a light appears.



"NOW!"

Johnston & Heinz's Hybrid Model

- Results
 - Task 1.
 - 🔊 **Blah blah blah ...** ← **Attend to this.**
 - 🔊 **[different voice] ...**
 - Task 2.



"NOW!"

FAST

Johnston & Heinz's Hybrid Model

- Results
 - Task 1.
 - 🔊 **Blah blah blah ...** ← **Attend to this.**
 - 🔊 **[different meaning] ...**
 - Task 2.



"NOW!"

SLOW

Summary: Selective Attention

- Early models
 - select attention based on physical characteristics
 - Late models
 - select attention based on meaning
 - Attenuation models
 - have 'attenuated' meaning on unattended channel
 - Hybrid model seems most satisfactory
 - Can do both early and late selection - Early selection is easier
- Unattended channel: we **don't** know meaning
- Unattended channel: we **do** know meaning