

General

Sensation - how stimuli in the outside world are detected by our senses e.g. *the patterns you see*.
Biological.

Perception - what happens to information after it has been sensed e.g. *what the image you see represents*.

Attention - a cognitive process, which influences what we perceive. It operates between what is sensed & what is perceived.

Attentional Processes

Sensation -----> Perception

Cognitive approach to attention - **information processing approach** - metaphor of the mind as if it were a computer - but does not consider how the brain actually implements the process.

Medical imaging advances have led to cognitive neuroscience - a way of 'seeing' inside the 'black box' of the mind. Provides integration between biological and cognitive theories of perception.

Information from the senses is **bottom-up** - interpreted by information from LTM - **top down processing**.

Conscious perception - awareness of the environment
Unconscious perception - automatic processing

The task of driving to work uses **semantic memory** - general knowledge of the journey & what usually happens & **episodic memory** - a specific instance of the journey. Typically, little episodic memory of any one journey - aware, just not 'paying attention' (correct term - **selective attention**).

Method note - cognitive psychologists uses lab experiments like behaviourists, but the results are used to make inferences about mental processes

Bk 1, Ch 6: Perception & Attention

Attention - James - defined attention as a process of **selection**. The process by which cognitive resources are allocated. Some sensory information is selected, but the rest is not attended to - i.e. you do not consciously use all of the information available to you from the senses.

Change blindness study - Simons & Levin

'Ecologically valid' version of a similar lab experiment using differences in photographs. Interrupt a direction giver and change the enquirer. Most direction givers don't notice. If the social group of the enquirer is different to the direction giver, the change is noticed even less often. It shows that we do not (cannot?) process everything presented though the senses.

That we only attend to limited amounts of information is theorised by **Kahneman** - the brain is a limited capacity processor, which arousal may increase.

Dual Task Studies - Posner & Boies

Provide support for limited pool of attentional resources. (Task - presentation of letter, press button while listening for a tone - press a different button)

However, **McLeod** found no difference in reaction times by modifying the auditory response to saying 'Bip' => more than one pool of attentional resources that **Navon & Gopher** postulated. Would explain why interference between the tasks does not occur in this case.

Attention therefore acts like a filter - Posner - attentional spotlight - works for both vision & hearing.

Lavie - attentional tunnelling - e.g. when driving.

Involuntary shifts of attention - **exogenous system**
Voluntary shifts of attention - **endogenous system**

Bottleneck Theories suggest we filter according to the content or type of information - studies in WWII by **Broadbent** on auditory attention suggest this.

Broadbent suggests the **filter operates early** in the process - as shown by the **split-span procedure**:

Sequences of numbers to both ears - easy to attend to either the left or right; difficult to take one number from each in sequence. But, if the filter operates early, how do you decide what information not to attend to?

Treisman suggests that people switch attention if unattended information means something to them.
Deutsch & Deutsch assume no resource limitations - opposite view to **Kahneman & Broadbent**.
Who's right? - it depends on the perceptual load.

Lavie found that the perceptual load of a task determines if early or late filtering takes place.
Experiment - **Flanking letters round a target letter**. (If flankers from same set then response times faster - **flanker compatibility effect**).

High perceptual loads - early filtering
Low perceptual loads - late filtering

Automatic & Controlled Processing
- **Two Process Theories**

Schneider & Shiffrin - division between automatic processes (few attentional resources needed) vs controlled processes (high demands on attention)

Illustrated by - **Stroop** test. Automatic processes are computationally efficient but, the **cost** is that they can interfere with controlled processes.

Processes are on a continuum - e.g. reading & driving start out as controlled processes and become automatic over time. **Gopher** suggests that attention is a skill that can be learnt - e.g. focussing on just the first letter of a word in the Stroop test helps most people.

Cognitive Neuroscience (MacDonald) supports the idea that different areas of the brain are involved in controlled and automatic processes. fMRI used. Roles of DLPFC & ACC studied on modified Stroop test - DLPFC not active for automatic tasks; is for controlled tasks. ACC monitors for errors. Higher activity in DLPFC = lesser Stroop effect. Higher ACC activity = more errors.

Cognitive Neuropsychology - looks at what happens when a region of the brain stops working. e.g. **Agnosia** (inability to link sensory data to appropriate knowledge) - **Sack's Dr. P** - could describe a glove in detail, suggest things that it might be used for, but could not recognise it as a glove. Related to **unilateral spatial neglect** - full range of sensory information available but will ignore items on one side - e.g. draw all the numbers down one side of a clock face.

Theories of Perception

1. Gregory - Constructivist

Our perception of the world comes from incomplete information - so we use what we already know (stored knowledge) to help us make sense of it - by forming a series of **perceptual hypotheses**. (**Gregory** can be criticised for underestimating the richness of sensory info - plus not a dynamic enough process).

Explains the *Müller-Lyer* illusion (size constancy, looks like the corner of a room, evidence from people who live in the rain forest are less susceptible to the illusion - **Segall**) - but, it also works in haptic forms and modified visual forms too, which are difficult for this theory to explain. **Day** suggests instead the illusion is the result of perceptual compromise and that everything that is needed to understand the illusion is in the stimulus - i.e. no need for stored knowledge. This fits in with:

2. Gibson - Direct Perception

Everything needed for perception is already in the sensory information. Perception is **dynamic**. Illusions are simply artefacts - the result of moving from the natural world into a lab setting.

Bruce provides support - frog catching a fly is reaction to the senses, rather than it forming a perceptual hypothesis. However - visual illusions do occur (Cow - Moo!) that do rely on stored knowledge to be explained. Probably a **continuum** between **Gregory & Gibson** in reality - theories are not mutually exclusive.

3. Husserl - Phenomenological Approach

Phenomenological experience is about who we are (past history), our current understanding & the present context. A phenomenological approach rejects the idea that perception can be fully explained by sensations and cognitive processes.

Concerned with what the experience of perception is and what it feels like to perceive something.

Intentionality - the action of the mind reaching out to the stimuli that make up the world and interpreting them in terms of our own personal experience.

e.g. A cube is 3D, but we 'see' all of the sides at once. What the cube means (e.g. a dice to a gambler) also affects our perception as the context has changed.

Illusion of the vase/two faces - perception changes as what we regard as the (back)ground and figure. Perception therefore has a **directional focus**.

4. Gestalt Psychology - challenges attentional spotlight

Emphasises the importance of identifying whole objects within a scene as an essential part of perception. We use our knowledge of the properties that link component parts of objects (movements in common, groupings, nearness etc).

Both Gestalt & Phenomenological psychology suggest that one goal of perception is to define & interpret objects in terms of what we already know.

Driver & Bayliss showed attention could be directed to items grouped by common movement even if not spatially contiguous - contrasts with the idea of the attentional spotlight of **Posner**.

Biological links between Perception & Attention

Cog. Neuroscience - **Mansell & McAdams** showed some neurons in monkeys react when attending to patterns of one orientation but not another. Therefore, directing att. to a stimulus like tweaking the contrast of pattern.

Cognitive Processes in Everyday Life

LBFS Accidents

Cole & Hughes - sensory conspicuity is not enough - attentional conspicuity is also very important. If you don't expect to encounter a motorcyclist at a junction, you may fail to perceive they are there.

Langham - found LBFS accidents (vigilance task, not a failure of visual search) did occur:

29 incidents, conspicuity enhancers on police cars, good driver, accident was collision with police car, no other plausible explanation, independent witness, driver said he didn't see the police car he hit.

Most occurred in line, rather than across the lane
62% accidents within 15km of home
All drivers > 25 years old

Video clip research showed experienced drivers react less quickly if the car is in line rather than echelon.

Supports experimental hypothesis that experienced drivers have LBFS because they aren't expecting it - driving has become an automatic process, fewer attentional resources deployed.

Eco validity? **Ebbesen** found that accidents happened in 9% of driving simulator tests c.f. none observed in real conditions. Suggests you can't be any more sure about results obtained in the real world than in a simulator - accidents do happen!!

Perception is therefore not just about sensation and the application of stored knowledge - we make judgements about the whole situation we find ourselves in.

Perceived risk influences behaviour - the idea of **risk homeostasis** - **Wilde** suggests we operate at constant risk - the bigger the car we have, the more dangerously we feel we can drive!

(LBFS & simulator driving shows cognitive psychology tries to solve everyday, practical problems).