



History of
ATTENTION

William James (1890)

- attention is taken possession of mind in clear and vivid form of one out of what seem several simultaneously possible objects or trains of thought
- -involves focalization, concentration
- -cannot easily attend to more than one thing at a time

Behaviorist movement

- Watson, Holt, Weiss and others abandoned use of concepts of attention and consciousness during this time after James

Lindsey

- a pioneer of cognitive neuroscience, stated attention and
- consciousness seem to reside in shifting processes and states within the central nervous system, some of which are detectable through changes in electrical potentials recorded indirectly and diffusely from the brain, or directly and focally in certain regions of the brain.

Gestalt psychologists

- another reason for neglect of attention, was their great influence on contemporary thinking
- -they emphasized intrinsic Gestalt laws as central determinants of our percepts leaving no role to attention in perceptual organization.

Comeback of attention

- seems to be pinpointed during World War II when rapid technology development and constant demand on human performance required attention concepts

Attention Concepts

- complexity of objects of attention can vary from simple physical attributes, such as tonal frequency or the locus of origin of a sound, to complex stimuli and stimulus combinations, even to subtle semantic aspects of the stimuli.

Voluntary Attention

- can be directed to past or future events
- 3 types
 - Selected
 - Sustained
 - Divided

Selective Attention

- -attend to one of the concurrent streams of input such as voice of a certain speaker, either in a crowd or alone in order to get the message
- -can attend to voice of speaker but listen to it as an acoustic phenomenon, without caring about the message
- -can have a broad or narrow focus

Divided Attention

- -when subject monitors simultaneously two or several input sources such as to listen to two dichotically presented stories, one in each ear.
- -capacity limitations: when performance decrement in one task occurs due to performing the other task, performance in the second task is often used as a measure of spare capacity left over by the primary task in which the performance may remain at a steady level, due to "resource allocation".

Sustained Attention

-interest is in long-term performance decrement, mainly in detecting infrequent and unpredictable weak signals

Involuntary Attention

- only operates in present time
- Types:
 - Passive and Distraction

Passive Attention

- when events attract our attention away from the task we are performing, such as, a loud noise
- -orienting reflex or response is elicited, which is an overt body change
- to investigate sound (was once called investigatory reaction by Ivan Pavlov)

Distraction

- when we try to concentrate on some demanding mental task, and occasional sounds and other irrelevant stimuli are regarded as distraction.
- -increased effort is usually needed to complete task and ignore stimuli

Past Attention

- ex. We can attend to a sound that occurred 2 seconds ago by attending to its representation in echoic memory

Future-directed Attention

- when we concentrate on responding as fast as possible to a visual signal to be delivered in the immediate future (simple reaction time) or to a certain one of three visual stimuli delivered in random order (go/no-go or choice reaction time); this form of attention could be called expectant or anticipatory

Motor Domain

- A difficult motor performance needs strong concentration of the mind in order to succeed.
- -such performances are based on motor programs stored in the CNS and their adequate selection and release often require total involvement of the mind in its performance
- -ballistic movements: performance is so short that once started no chance of correcting

Thinking

- has a definite goal or directed thinking or another term Mental work
- the ability to maintain the mental focus and to shift according to change in mental environment
- Goal directed thinking is another form of directed central activity

Automaticity

- Criteria: three for process to be purely automatic
- process occurs without intention, involuntary
- process occurs without giving rise to any conscious awareness
- process occurs without producing interference with other ongoing mental activity

Automaticity Produced by Extended Training

- -fast, inflexible, difficult to suppress once learned, and not limited by short-term memory capacity or attention
- -after a process has become automatized, it is rigid and inflexible
- -varied-mapping conditions: when targets and distractors are chosen from the same set of items and thus exchange roles over trials, it is not possible for the subject to consistently map stimuli to responses

Task Processing

- Task-independent processing: this is predominantly of inborn nature, and mainly involves certain basic sensory-analysis and storing functions
- Task-dependent processing: refers to processing that is specific to a task and does not occur without it.



Theories of

ATTENTION

Feature-Integration Theory of Visual Attention

-different basic features of visual stimuli such as color, form and orientation are analyzed in parallel by the preattentive feature-detector systems; and the role of attention is to glue the outcomes from these different separate analysis systems together to make possible a perception of an object

Texton Theory of Preattentive Vision

- -proposes a preattentive visual analysis system that resembles that suggested in the feature-integration theory but allows automatic processing of some feature conjunctions
- -cannot process complex forms but can, almost instantaneously, without effort or scrutiny, detect differences in some local conspicuous features, regardless of where they occur.

Paradigms of Selective-Attention Research

- 2 main types
- -filtering: rapid often continuous presentation of relevant and irrelevant stimuli usually differing in some physical attribute, most popular dichotic listening
- -selective-set: selecting between messages arriving on different channels, that is, selecting one channel usually defined on the basis of spatial origin or some other distinctive feature

Automatic Processing in Audition

- -physical features of auditory stimuli are probably extensively
- processed even in the absence of attention, as far as sensory information for percepts, that is, creating initial stimulus representations is involved.

3 types of fully automatic processes

- 1. Sensory processes providing sensory feature-specific information for perception
- 2. transfer of sensory information to sensory memory
- 3. processes leading to an attention switch
- ****It is controversial whether stimuli automatically cause semantic activation.**

Early Selection Theories

- -allow much less automatic processing
- -strong versions excepting no semantic processing of the unattended input at all because the rejection of the irrelevant input occurs before the input reached the mechanisms of semantic analysis
- -most theories hold that even unattended stimuli are extensively processed with regard to their physical features; on these theories, processing of physical stimulus features would be automatic but processing of semantic features would not

Late Selection Theories

- -propose even semantic processing is automatic
- -role of attention is only to select inputs for consciousness, memory and response

- *both early and late selection theories agree on the presence of an attentional bottleneck beyond which the parallel processing capacity is limited; the question is the level of processing at which bottleneck is located

Processing-Capacity theories

- -thought by many to represent more modern views on attention
- -to have replaced the early- and late-selection theories
- -proposes a special status for spatial location in visual processing

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Broadbent Theory

- -original version proposed, all stimuli are briefly stored and analyzed
- in parallel for their elementary physical properties (the preattentive level or the S-system) this stage followed by a higher-level processing stage (P-system) into which only a subset of stimuli, allowed by filter enter
- -based on dichotic-listening results
- -these results suggest existence of sensory-buffer type of memory
- -Broadbent later realized he should of included "response set" into his theory, this was explained as "a set to make certain responses, rather than a set to react to stimuli from a certain source"

Sperling

- briefly exposed their subjects to a display containing visual letters or similar items, and instructed them to report the items appearing
- it was found that subject was able in this "partial report" condition to report considerable more items than could be expected on the basis of his or her performance in the "whole report" condition
- advantage of partial report: 1) there indeed was a preattentive large-capacity visual sensory store; 2) it was possible by means of the spatial location to choose items within this store (that is, effectively to pay selective attention to a certain subset of items defined on the basis of spatial criteria (stimulus set attn))
- the fast disappearance of the partial-report advantage (within approximately 250 msec) indicated that the visual sensory store rapidly decayed after the offset of the visual display

"Break-through of the unattended"

- resulted in Treisman's modification in 1960 of the first version of Broadbent's filter theory
- this occurs when a subject sometimes responded to the occurrence of his or her own name or to the meaning of some other significant item in the message to be ignored
- According to Treisman, the meaning of semantic stimuli is analyzed by the system by matching the incoming sensory inputs with a "dictionary store" of known words and there is a permanent response set kind of selective facilitation state in this system continuously increasing the probability of certain meanings, such as one's own name, to become activated and hence perceived