Definitions	
Selective Attention	Definition: Focusing on one stimulus while ignoring others.
	Example: Roger focuses on his math homework and ignores the people talking nearby.
Distraction	Definition: When an irrelevant stimulus interferes with the processing of a current task.
	Example: While playing a game on his phone (less demanding), the conversation becomes distracting
Divided Attention	Definition: Paying attention to more than one thing at once.
	Example: Roger consciously eavesdrops on the conversation while playing the game
Attentional Capture	Definition: A sudden, involuntary shift in attention caused by a salient stimulus.
	Example: A loud noise from an overturned book cart draws Roger's attention
Visual Scanning	Definition: Actively moving the eyes to search for or attend to different visual information.
	Example: Roger looks from face to face trying to identify people involved in the commotion.
Attention	Attention is the mental process of selecting certain stimuli while ignoring others, allowing us to process relevant information efficiently.
	It's not a unitary concept—attention has multiple forms and underlying processes.
William James	"My experience is what I agree to attend to... It implies withdrawal from some things in order to deal effectively with others"
Broadbent's Filter Model:	We filter incoming stimuli early in processing.
Treisman's Attenuation Theory:	We don't completely block ignored stimuli; we just turn down their "volume."

Definitions (cont)

Late Selection Models:	All info is processed somewhat before selection occurs.
Cocktail Party Effect:	Even in a noisy environment, we can tune in to one conversation while filtering others

Types of Attention

Attention	Definition	Example
Selective Attention	Focusing on one stimulus while ignoring others.	Roger solving math problems while ignoring people talking nearby.
Divided Attention	Paying attention to multiple stimuli/tasks at the same time.	Listening in on a conversation while playing a game on the phone.
Sustained Attention	Maintaining focus on a task over an extended period of time.	Reading a textbook for an hour without getting distracted.
Alternating Attention	Shifting focus back and forth between tasks.	Checking a text message and then returning to writing an essay.
Attentional Capture	When attention is involuntarily drawn to a sudden stimulus.	A loud crash from a fallen book cart pulls Roger's attention from the conversation.
Visual Attention	Focusing on objects/locations in the visual field.	Scanning faces across a room to find someone you recognize.
Auditory Attention	Focusing on specific sounds in the environment.	Tuning into one voice at a noisy party (cocktail party effect).
Exogenous Attention	Attention driven by an external stimulus (bottom-up).	A flashing light or sudden noise grabbing your attention automatically.
Endogenous Attention	Attention directed by internal goals or intentions (top-down).	Intentionally looking for your friend in a crowd.
Focused	Concentrating on a single task with high precision.	Solving a tough math problem without any background noise or interruptions.
Executive Attention	Controlling attention to manage conflict or distractions; often tied to executive functions.	Ignoring a pop-up while trying to submit an online exam.

Attention as Information Processing

Attention as Information Processing (cont)

Spotlight Model of Attention (cont)

Modern attention research began in the 1950s.

One of the first influential models: **Broadbent's Filter Model (1958)**.

Based on **dichotic listening experiments**, especially those by **Colin Cherry and Neville Moray**.

☐ Key Background: Dichotic Listening

Dichotic listening: Different auditory messages are presented to each ear.

Participant is instructed to focus on one ear only (the attended ear) and shadow the message (repeat it out loud).

☐ Findings:

Participants could shadow the attended message easily. They could identify the gender of the voice in the unattended ear. But they couldn't recall content of the unattended message. Even a word repeated 35 times in the unattended ear went unnoticed

Broadbent's Filter Model of Attention (1958)

A theoretical model that explains how we attend to one message and filter out others.

Stages of Processing

Sensory Memory: Holds all incoming info for a fraction of a second (like a buffer) and sends it to the filter.

Filter: Selects the attended message based on physical characteristics (e.g., pitch, tone, speed, accent). All other input is filtered out.

Detector: Analyzes the meaning of the filtered/attended message. Higher-level processing happens here.

Short-Term Memory (STM): Receives output from the detector. Holds info for 10–15 seconds, and can pass it on to Long-Term Memory (LTM).

☐ Key Characteristics of Broadbent's Model

Early selection model: Filtering happens before meaning is processed.

Only the attended input reaches meaningful analysis; the rest is completely blocked.

Very structured and linear model of attention.

☐ Why This Model Matters

Introduced the "flow diagram" approach to cognitive psychology.

Foundation for future attention models like Treisman's attenuation theory and Deutsch & Deutsch's late selection model.

Helps explain selective attention and why we miss information we're not focusing on.

Spotlight Model of Attention

Definition	Proposed by Michael Posner (1980). Describes visual attention as functioning like a spotlight beam. We can mentally "illuminate" a region in our visual field to process information more efficiently—even without moving our eyes.

Types of Attention in the Spotlight Model

Type	Description
Overt Attention	Attention where the eyes move to focus on an object or location.
Covert Attention	Attention is shifted mentally without moving the eyes (e.g., eavesdropping or "looking without looking").

Key Features of the Model

Enhancement:	Things inside the spotlight are processed faster and more accurately.
Limited scope:	Only a small area is enhanced at any one time—like a narrow beam.
Shiftable:	The spotlight can be moved voluntarily or automatically to different parts of the visual field.
Precedes action:	Often, attention shifts before eye or body movements occur.

Key Experiment: Posner Cueing Task (1980)

Goal:	To study how attention shifts even without eye movement (covert attention).

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Spotlight Model of Attention (cont)

Procedure:	Participants fixate at the center of a screen. A cue (arrow or flash) indicates where a target is likely to appear. After a brief delay, the target appears either where the cue pointed (valid) or in another location (invalid).
Findings:	Faster reaction times for validly cued locations. Slower responses for invalid cues.
Conclusion:	Attention enhances processing even without eye movement—supporting the spotlight idea.

Bottom-Up vs Top-Down Spotlight Shifts

Type of Shift	Triggered By
Bottom-Up	Stimulus-driven (salient color, motion, etc.) A bright light grabs your attention.
Top-Down	Goal-directed or expectation--based You search for your friend in a crowd.

Spotlight Model of Attention (cont)

Applications	Driving: Anticipating where a car might come from. Gaming: Rapid shifts of covert attention to track enemies off-screen. Sports: A player focusing attention on multiple elements without shifting gaze.

Feature Integration Theory

Proposed by Anne Treisman (1980).
Explains how we perceive objects as unified wholes rather than separate features.

Core Idea
Perception happens in two stages:

Stage 1: Preattentive: Automatic, fast, parallel processing of basic features (e.g., color, shape, size, orientation). Happens without attention.

Stage 2: Focused Attention: Attention is used to bind features together into a coherent object. This stage is slower and serial (one item at a time).

Key Experiments:
Treisman & Gelade (1980):
Participants searched for a target (e.g., red "O") among distractors. Feature search: target differed by one feature—fast & automatic.
Conjunction search: target shared features with distractors—slower, needs attention.

Feature Integration Theory (cont)

Key Concepts:
Feature Search: One distinct feature; pops out; parallel processing.
Conjunction Search: Multiple shared features; requires focused attention; serial.
Illusory Conjunctions: Errors where features from different objects are incorrectly combined—happens when attention is limited.

Why It Matters
Explains how we make sense of complex visual scenes.
Supports attentional bottleneck theory—limited capacity for integration.
Useful in fields like UI design, security scanning, and understanding ADHD.

Modified Early Selection Models of Attention

☐ Broadbent's Original Model Recap (1958)

Type: Early Selection Model

Filter based on: Physical characteristics only (e.g., pitch, speed).

Unattended info: Fully filtered out before reaching meaning analysis.

Problem: Couldn't explain how some unattended info (like your name) gets noticed.

☐ Neville Moray's Findings (1959) – Challenge to Broadbent

Experiment: Dichotic listening + shadowing task.

Result: 1/3 of participants noticed their own name in the unattended ear.

Implication: Unattended info can be processed for meaning, not just physical features.

Real-world parallel: Cocktail party effect (hearing your name across a noisy room).

Modified Early Selection Models of Attention (cont)

☐ **"Dear Aunt Jane" Experiment (Gray & Wedderburn, 1960)**

Set-up: Mixed message split across ears:

Attended ear: "Dear 7 Jane"

Unattended ear: "9 Aunt 6"

Result: Participants reported "Dear Aunt Jane".

Conclusion: They switched attention based on meaning (semantic processing).

This shows: Use of top-down processing (expectations, context influence attention).

Broadbent vs Treisman Model

Feature	Broadbent (1958)	Treisman (1964)
Filter type	Rigid, all-or-nothing	Flexible attenuator
Unattended info	Completely blocked	Weakened but still analyzed
Message selection	Based only on physical traits	Based on physical, language & meaning
Explains cocktail party effect	✖ No	✔ Yes
Top-down influence	✖ No	✔ Yes (semantic analysis possible)

Lavie's Load Theory of Attention

Lavie proposed that attention and the ability to filter out distractions depend on two main factors:

☐ 1. Processing Capacity:
This refers to the total amount of cognitive resources a person can use at one time.
Everyone has limited processing capacity—our brain can only handle so much information at once.
When too many stimuli compete for attention, some are inevitably ignored.

☐ 2. Perceptual Load:
This refers to how demanding a task is on our cognitive system.
Low-load tasks: Simple or well-practiced tasks (e.g., identifying a letter among all Os)
Use less cognitive capacity
Leave spare attention to process other (even irrelevant) stimuli
High-load tasks: Complex or unfamiliar tasks (e.g., identifying a letter among a mix of different letters)
Use more cognitive capacity
Leave no spare attention, so irrelevant stimuli are filtered out
☐ Interaction: The more demanding the task (high load), the less likely irrelevant information will be processed.

☐ Experimental Support – Forster & Lavie (2008)
☐ Task: Visual search for a target letter (X or N)
Easy condition: Target surrounded by identical letters (e.g., all "o"s) → low load
Hard condition: Target surrounded by a mix of different letters → high load

☐ Manipulation: A distractor, like a cartoon character, appears briefly

Lavie's Load Theory of Attention (cont)

Findings:
In low-load tasks, the distractor slows down reaction time.
In high-load tasks, distractor has little or no effect.
Why?
Because low-load tasks don't exhaust processing capacity, there's leftover attention that "spills over" to irrelevant stimuli.

☐**The Stroop Effect** – A Special Case Described by J.R. Stroop (1935)

Task: Name the color of the ink a word is printed in
Easy: Shapes or colored patches → simple color-naming
Hard: Words printed in incongruent ink colors (e.g., "RED" printed in blue ink)

Why the Stroop Effect Occurs:
Reading is a highly automatic process.
The meaning of the word (e.g., "RED") competes with the goal (saying the ink color "blue").
Even when we try to ignore the word, it's processed automatically, causing interference.

☐ Key Point: Even in high-load tasks, well-practiced or highly salient distractions (like reading words) can still interfere.

☐ Everyday Application:
☐ Everyday Application
Playing an easy phone game → get distracted by people talking nearby.
But: a sudden fire alarm or someone saying your name grabs your attention regardless of the task.

Kahneman's Capacity Model of Attention

Proposed by Daniel Kahneman (1973)
Describes attention as a limited resource—like mental energy.
We can perform multiple tasks only if total demand doesn't exceed capacity.

Key Features of the Model

Limited Capacity: There's only so much cognitive "fuel" or mental effort available.

Effort: Attention is linked to how much effort a task requires.

Allocation Policy: Attention is distributed based on factors like arousal, intentions, and task demands.

Arousal: Higher arousal increases available capacity up to a point (Yerkes-Dodson Law).

Automatic vs. Controlled: Automatic tasks use less attention; controlled tasks use more

Allocation of Attention Depends On:

nduring Dispositions: Involuntary attention (e.g., loud noises, your name being called)

Momentary Intentions: What you're currently trying to do (e.g., studying, driving)

Evaluation of Demands: System judges how much effort is needed per task and allocates attention accordingly

Why It's Important

Highlights how mental effort is limited and how tasks compete for attention.
Helps explain multitasking, mental fatigue, and task prioritization.
Applied in areas like cognitive load theory, human factors, and ergonomics.

Treisman's Attenuation Model of Attention (1964)

Type: Early Selection Model (but more flexible than Broadbent's)

Also called: Leaky Filter Model

Goal: To explain how some unattended information (like hearing your name) still reaches awareness—even when attention is directed elsewhere.

☐ Why Treisman Proposed This Model

Broadbent's Model said unattended info is completely blocked after physical filtering.

But experiments (e.g., Moray's) showed people sometimes hear their name or switch attention based on meaning.

Treisman suggested that unattended info isn't fully blocked, just weakened.

☐ How Treisman's Model Works – Step-by-Step

☐1. Attenuator (Instead of a Filter)

Analyzes input on 3 levels:

Physical characteristics (pitch, speed, tone), Language (grouping into words/syllables), Meaning (semantics, logical flow)

Selection is based on what's needed:

If physical differences are enough (e.g., male vs female voice), attention uses that.

If physical cues aren't enough, the system uses meaning to separate messages.

✓ Attended message → passes through at full strength

☐ Unattended messages → are attenuated (weakened), but not completely filtered out.

☐2. Dictionary Unit

Treisman's Attenuation Model of Attention (1964) (cont)

Contains stored words and meanings (in long-term memory).

Each word has a "threshold":

☐ Low threshold: needs little input to be activated (e.g., your name, "fire")

☐ High threshold: needs stronger signal (e.g., uncommon or unimportant words)

Even a weak signal from the attenuated stream can activate low-threshold words.

Real-World Example

You're at a party, focused on a friend's story (attended message). Suddenly you hear your name from a nearby conversation (unattended message). ➡ According to Treisman: Your name had a low threshold and got through the attenuator, activating your attention.

Late Selection Model of Attention

Late selection models propose that all incoming information is processed to the level of meaning, and only after this full processing is a message selected for conscious awareness or response.

☐ Core Idea: Selection doesn't happen at the sensory or physical level (as in early models), but after semantic processing.

☐ MacKay's (1973) Experiment – Key Evidence

Setup

Participants were asked to shadow (repeat aloud) sentences in one ear (attended channel).

Example attended sentence:

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Late Selection Model of Attention (cont)

"They were throwing stones at the bank." (Ambiguous: "bank" could mean riverbank or financial bank)

Simultaneously, a biasing word was presented in the unattended ear: ➢ "money" or "river"

Results

Later, participants were asked to choose which sentence matched the one they had heard:

"They threw stones at the side of the river"

"They threw stones at the savings and loan association"

Choice reflected the meaning of the biasing word from the unattended ear:
Heard "money" → chose the bank = financial institution
Heard "river" → chose the bank = riverbank

Participants were unaware of the biasing words.

☐Conclusion:
Even unattended input was processed semantically (for meaning).
Attention occurs after meaning is processed—thus, late selection.

☐ Foundational Theorists
Deutsch & Deutsch (1963): Proposed that all stimuli are fully analyzed for meaning, but only one response is made.
Norman (1968): Added the idea of relevance or importance boosting some inputs into awareness.

☐ Implications of MacKay's Findings:
Our brain processes more than we're consciously aware of.
Unattended information can influence decisions, judgments, and behaviors.
Challenges the assumption that attention is necessary for understanding.

Late Selection Model of Attention (cont)

☐ Shifting Perspectives: Early vs Late Depends on the Context
There's no single answer to whether attention is early or late.
It depends on:
☐ Cognitive resources available
☐ Task difficulty
☐ Nature of distracting stimuli

Inattentional Blindness&Change Blindness

Inatte-ntional Blindness (IB)	A failure to notice a fully visible but unexpected object because attention is engaged elsewhere. Occurs when attention is focused on a specific task or object, so other stimuli go unnoticed.
Famous Study	Simons & Chabris (1999) – The "Gorilla" Experiment Task: Count basketball passes. An actor in a gorilla suit walks through the scene. Many participants don't notice the gorilla. Shows how focused attention=blindness to the unexpected.

Inattentional Blindness&Change Blindness (cont)

Key Points	Caused by selective attention. Object is right in front of you, but you miss it. Not due to visual problems—it's cognitive.
Real-life Examples:	Not noticing a cyclist while texting and walking. Missing a pedestrian while driving and checking GPS.
Change Blindness (CB)	A failure to notice changes in a visual scene, especially when changes happen during a visual disruption (e.g., blink, cut, saccade). Even large changes can go unnoticed without focused comparison.

Inattentional Blindness&Change Blindness (cont)	
Famous Study	Simons & Levin (1998) – Door Study A man asks for directions. While distracted, he's replaced by a different person. Many people don’t notice the swap. Shows how we don’t store detailed representations of scenes.
Key Points	We don’t compare pre- and post-change images effectively. Visual memory is limited. Depends on attention to detail and continuity.

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