

COGNITIVE ERGONOMICS

**DR. ANKUR GUPTA
IIT BHUBANESWAR**

**PERCEPTION &
ATTENTION
RESOURCES**

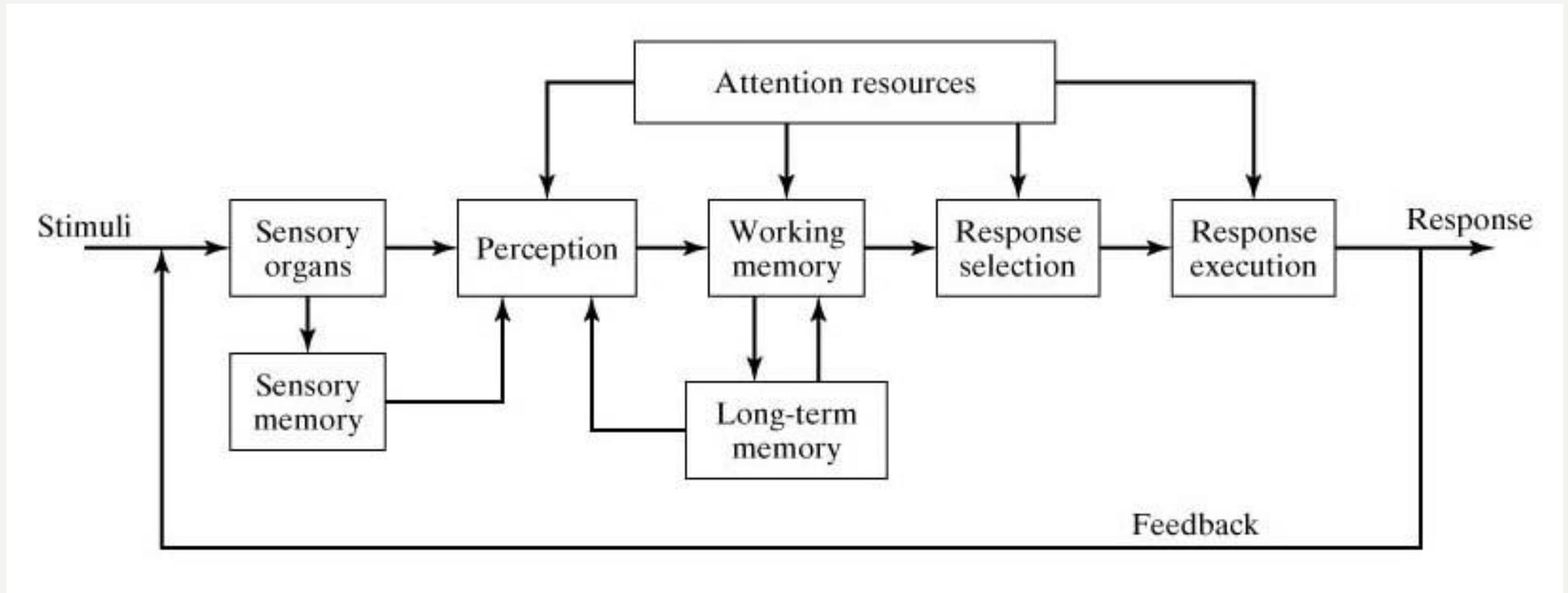
LECTURE OUTLINE

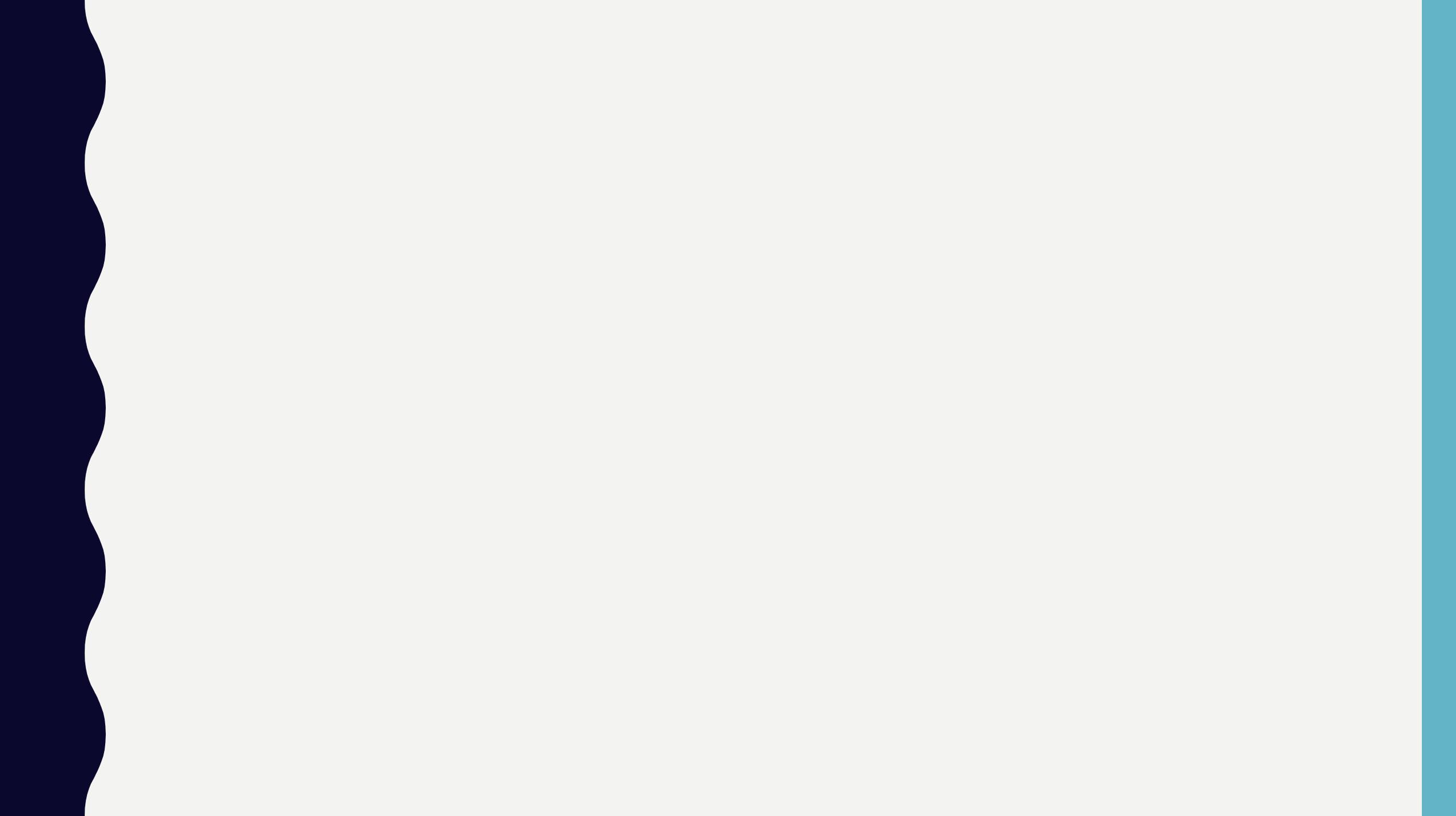
- Perception
- Steps of perception



PERCEPTION

HUMAN INFORMATION PROCESSING MODEL



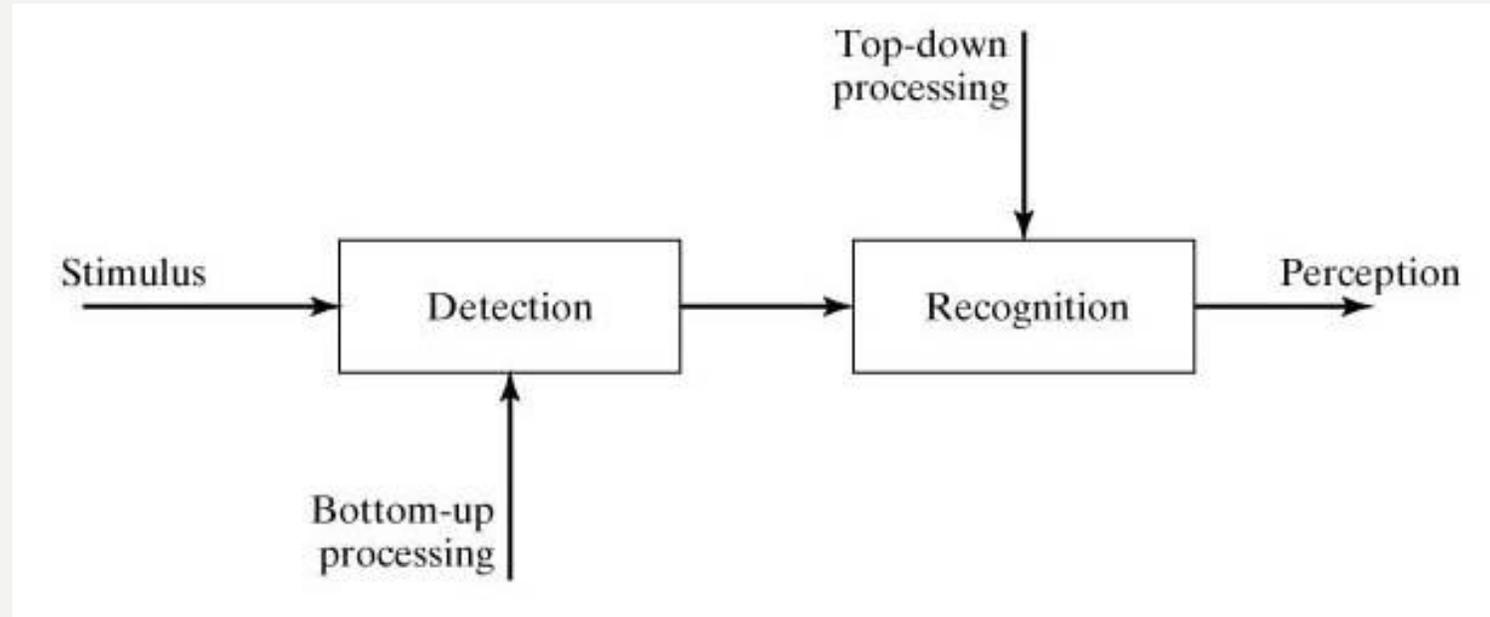


PERCEPTION

Stage of cognition in which the human becomes aware of the sensation caused by stimuli and interprets it in the light of his or her experience and knowledge

- Consists of two steps:
 1. Detection - human becomes aware of the stimulus of interest, which may be mixed with other stimuli
 2. Recognition - human interprets the meaning of the stimulus and identifies it in the context of previous experience

TWO STEPS OF PERCEPTION



BOTTOM-UP AND TOP-DOWN PROCESSING

- Bottom-up processing - stimulation of the senses by external sources
 - Concerned with the detection step in perception
- Top-down processing - information processing activities of perception that are based on a human's knowledge, experience, and expectations
 - Concerned with the recognition step in perception



**LECTURE
CLOSING**

A BRIEF HISTORY OF COGNITIVE PSYCHOLOGY & ERGONOMICS

19th CENTURY

Sir Frances Galton (1822-1911)

- Galton is considered the founder of eugenics which is controlled breeding to improve the condition of mankind. Galton did not believe the environment determined human character. He was interested in a small portion of the population, the exceptional. Galton published Hereditary Genius which "proposed to show that a man's natural abilities are derived by inheritance". Galton's statistical methods made possible the comparisons of individuals. He devised a number of important methods used today. He was the first to systematically apply statistics to psychological data, and he invented the correlation coefficient. He also did substantial research about the debate of Nature vs. Nurture, and invented the free-association technique.

Edward Titchener (1867-1927)

- Born in 1867, Edward Titchener was a follower of the psychological teachings of Wilhelm Wundt. Titchener's view was based on his belief that all consciousness was capable of being reduced to three states: sensations, which are the basic elements of perception; images, which are the pictures formed in our minds to characterize what is perceived; and affections, which are the constituents of emotions. By 1915 Titchener had formulated his context theory of meaning. According to his theory, core referred to raw experiences such as sensations of light, sound, touch, and smell; context consisted of associations brought on by raw experiences. Context is what gives meaning to the core. Titchener also believed that emotions are intensified feelings arising from sensations inside the body. Titchener died in 1927.

GRAFFITI



"Here is my proposal for making our department more productive. The proposal contains my best cognitive distortions."

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THANK YOU ...



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LECTURE



COGNITIVE ERGONOMICS

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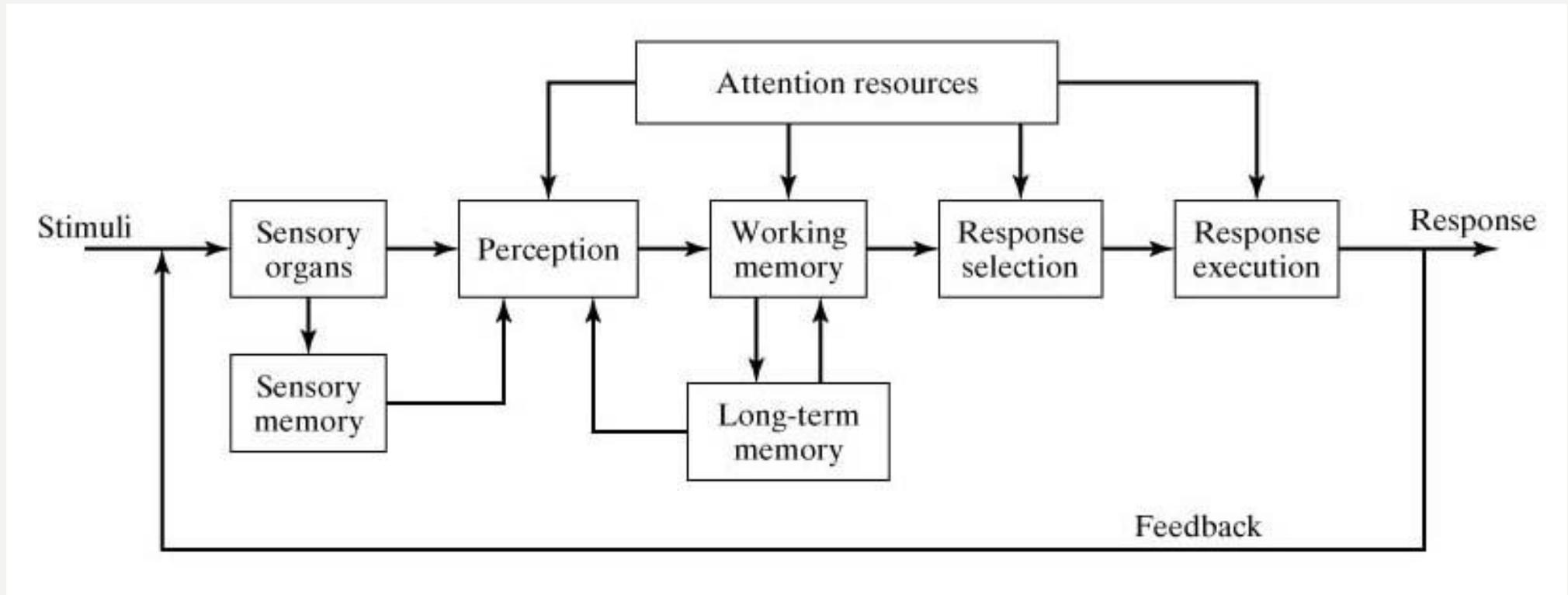


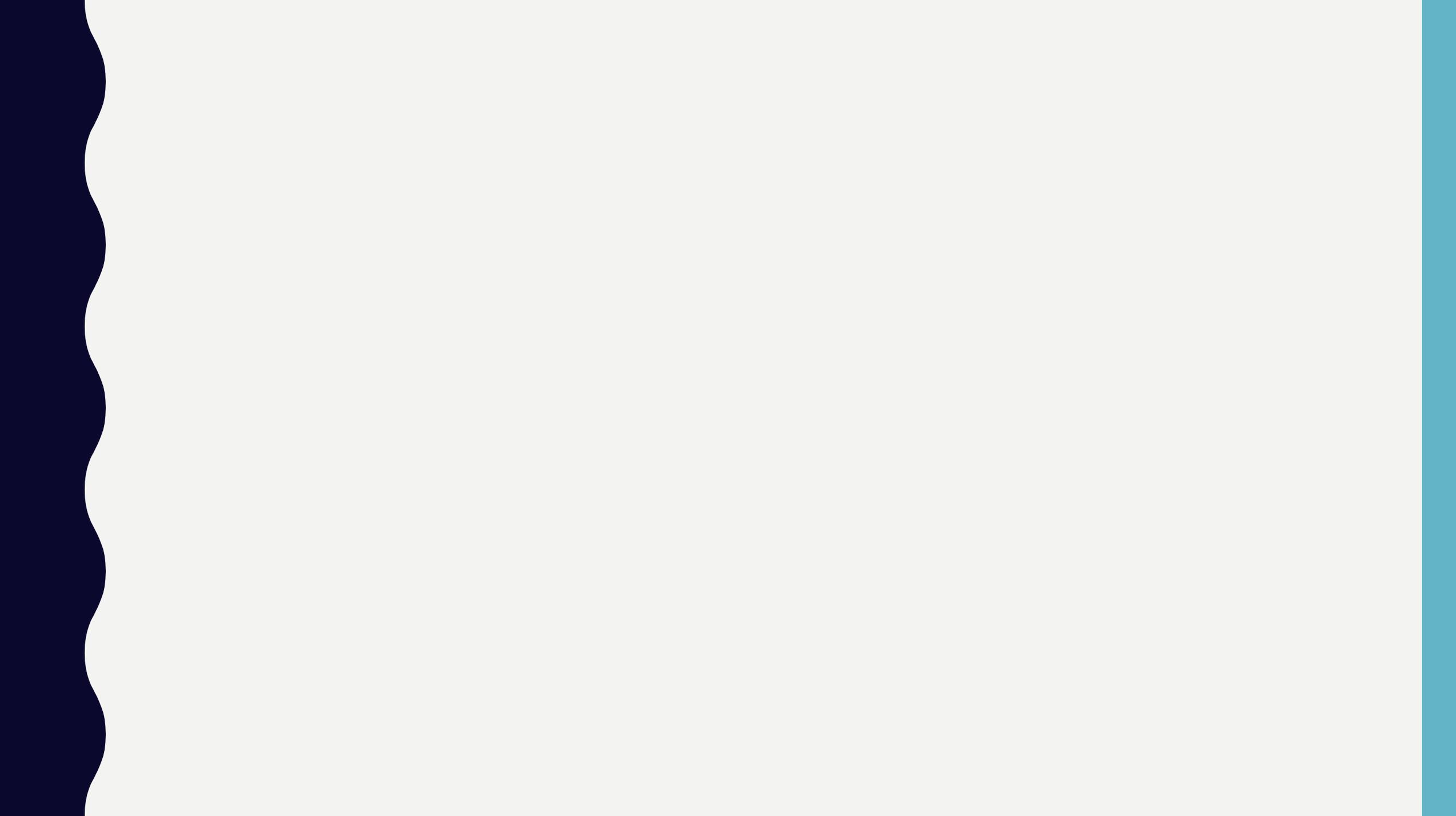
ATTENTION RESOURCES

SUMMARY OF PREVIOUS LECTURE

- **Perception**
- **Types of perception**

HUMAN INFORMATION PROCESSING MODEL





ATTENTION RESOURCES

Attention means keeping one's mind on something

- Involves mental concentration and readiness for such concentration
- Types of attention:
 - Selective attention
 - Focused attention
 - Divided attention
 - Sustained attention
 - Lack of attention, sometimes caused by boredom



TYPES OF ATTENTION RESOURCES

SELECTIVE ATTENTION

Refers to a situation in which a person needs to monitor multiple sources of information in order to perceive irregularities or opportunities

- Involves filtering out certain channels of information in order to focus on one channel that is deemed important
- Examples:
 - Pilot checking gauges, looking for readings that might explain airplane's erratic behavior
 - Football quarterback watching other team's defensive line to exploit weaknesses

MORE ON SELECTIVE ATTENTION

- Person must select which channels to give attention to and which to ignore
- Factors that influence this selection process:
 - *Expectancy* - the person expects a certain channel to provide the information and pays more attention to it
 - *Saliency* - stimulus that stands out among the other channels
 - *Value* - if the channel is deemed important, more attention will be paid to it

FOCUSED ATTENTION

Refers to situations in which a person must cope with multiple input channels but focus on only one channel for a sustained period of time

- Person pays attention to one stimulus and is not distracted by others ("noise")
- Examples:
 - Conversing with a friend in a crowded room full of people who are also talking
 - Reading a book in an airport lobby
 - Fighter pilot landing an airplane on the deck of an aircraft carrier during rough seas

MORE ON FOCUSED ATTENTION

- Factors affecting one's ability to focus attention on one stimulus
 - Proximity - distance of the stimulus source from the person trying to focus attention
 - Separation - refers to stimuli arriving from different directions
 - Easier to focus attention on a source directly in front of a person
 - Background noise - (e.g., visual clutter, auditory noise) affects one's ability to focus on a desired stimulus

DIVIDED ATTENTION

Refers to situations in which there are multiple stimuli, but multiple tasks must be performed together

- Examples:
 - Driving a car while talking on a cell phone with someone
 - Doing income tax return while watching television
 - Machine operator attending several machines in a machine cluster

SUSTAINED ATTENTION

Refers to situations in which a person must watch for a signal of interest over a relatively long period of time, and it is important to avoid missing the signal

- Also known as *vigilance*
- Examples:
 - Inspector looking for defective products moving along a conveyor line
 - Radar operator monitoring a radar screen for incoming aircraft

LACK OF ATTENTION AND BOREDOM

- Lack of attention - not concentrating on task
- Usually caused by boredom - state of being weary and restless due to lack of interest
- Factors leading to boredom on the job:
 - Short cycle times
 - Low requirements for body movements
 - Warm environment
 - Lack of contact with other workers
 - Low motivation
 - Low lighting levels in workplace



**LECTURE
CLOSING**

DID YOU KNOW.....?????

- People with anxiety perceive the world differently, their brain lumps both safe and unsafe things together and labels them all unsafe



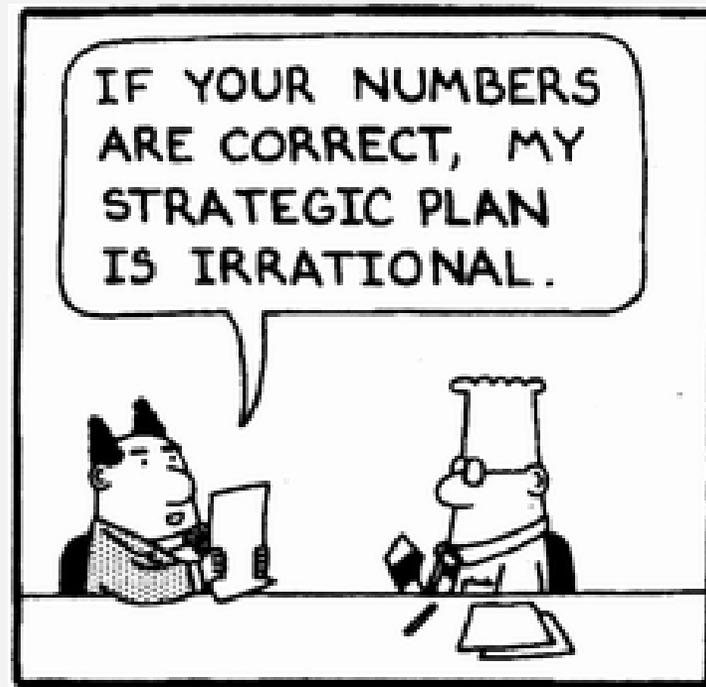
A BRIEF HISTORY OF COGNITIVE PSYCHOLOGY & ERGONOMICS

19th CENTURY

William James (1842-1910)

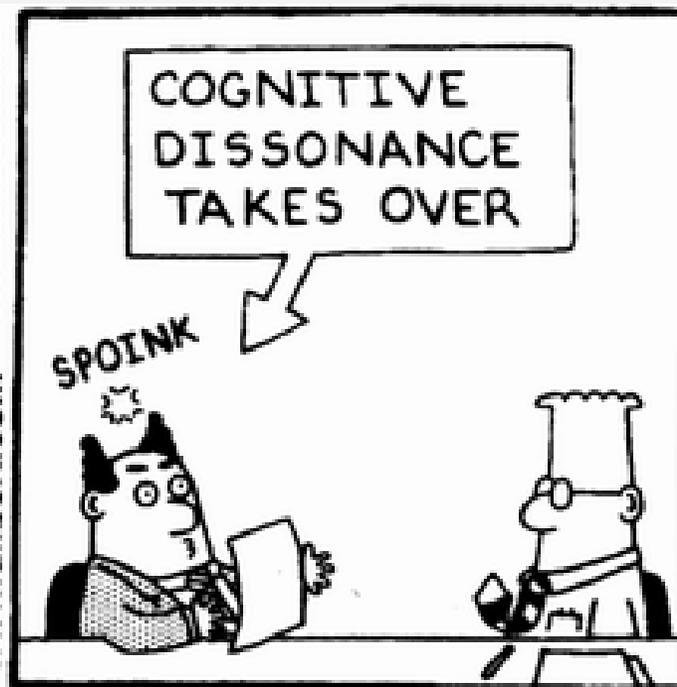
- William James wrote the first psychology textbook, *Principles of Psychology*, which was the central work of his career. The concept of functionalism is expressed in James' psychology which he treats as a natural science. Functionalism is the adaptation of living persons to their environment. James also contributed to the James-Lange theory. This theory states that we feel an emotion because of the action in which we choose to engage. For example, we infer we are afraid because we run.

GRAFFITI

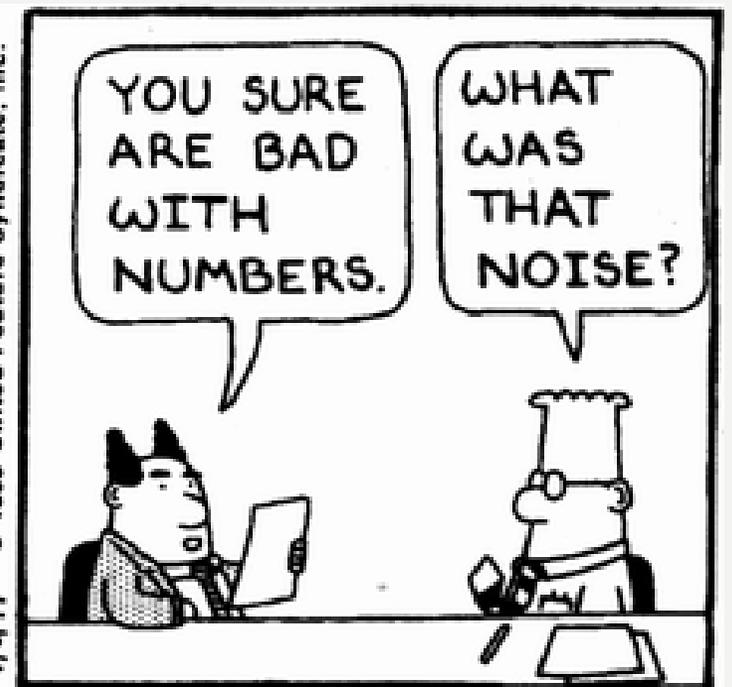


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