Sensation

Is the detection of physical energy emitted or reflected by physical objects (light, sound). Is received through the process of external environment stimulating receptors in sense organs. Entry level data. "Bottom up processing"

Transduction

Is a type of sensory processing. Converts physical stimuli into neural impulses

Coding

Is a type of sensory processing. Converts particular sensory stimuli into specific sensations

Sensory Reduction

Is a type of sensory processing. Filters & analyzes incoming sensations before sending a neural impulse to the brain

Synesthesia

Neurological phenomena where sense are blended. Ex: Smelling weekdays, hearing colours

Perception

Process of brain selecting, organizing & interpreting sensory data; "top down" It is one's own personal subjective interpretation of objective sense data.

Bottom up processing

Going from the small pieces and gathering information to recognize the whole thing. Detecting specific stimulus, combine specific features into more complex forms, then recognize stimulus.

Top down processing

Looking at the whole picture then breaking it down to understand. Formulate perceptual hypothesis about the nature of the stimulus as a while, select and examine features to check hypothesis, recognize stimulus.

Psychophysics

Study of how physical stimuli are translated into psychological experience

Absolute Threshold

Smallest quantity of physical energy that can be reliably detected by observer; not "all or nothing" - sensitivity varies, physical stimulus detected ½ of the time

Absolute Threshold of Vision

candle flame from 50km on a dark, clear night

Absolute Threshold of Hearing

tick of a watch from 20ft in absolute silence

Absolute Threshold of Smell

1 drop of perfume in a 6-room apartment

Absolute Threshold of Touch

wing of a bee dropped on your cheek from 1cm

Absolute Threshold of Taste

1tsp of sugar in 2 gallons of water

Difference Threshold

Smallest difference in stimulation reliably detected when two stimuli are compared

Just Noticeable Difference (JND)

smallest difference in amount of stimulation that can be detected

Weber's Law

This theory states: JND is a constant proportion of the size of the initial stimulus. As stimulus increases, JND becomes greater

Fechner's Law

This theory states: psychophysical scaling; increase the stimulus for it to make more of a difference Ex. three light bulb analogy; giving $10 to someone with 0$ or $1 million?

Signal Detection Theory

Theory that divides detection of sensory signal into a sensory process & decision process: 4 possible outcomes to detect weak signals

Sensory Adaptation

reduction/disappearance of sensory responsiveness when stimulation is unchanging/repetitive; prevents response to unimportant

information. Ex. beeping of broken smoke detector - stop noticing because its not a threat

Vision

Senses the stimulus of light

Amplitude of light waves

perception of brightness/intensity

Wavelength of light waves

perception of colour/hue (longer = red, shorter = violent)

Purity or Range of light waves

mixed wavelengths (perception of saturation; richness of colour)

Eye

This converts light into neural impulses

Cornea

Component of the eye: where the light enters the eye

Lens

Component of the eye: focuses the light rays on the retina

Iris

Component of the eye: coloured ring of muscle; constricts or dilates via amount of light

Pupil

Component of the eye: regulates amount of light

Saccades

jerking movements of the eye when changing focus

Vision Process

The eye captures light & focuses it on receptors on retina, where it is converted to neural signals. Small abnormalities in the eyeball's shape can cause problems with vision (nearsightedness & farsightedness)

Retina

Neural tissue lining inside back surface of the eye

Rods

Located in the retina: used for night vision; greatly outnumber cones

Cones

Located in the retina: used for colour vision; greater acuity

Fovea

Located in the retina: pit filled with cones, responsible for our sharpest vision

Optic Disc

Located in the retina: Also known as the blind spot, it is near fovea; no visual receptors, rods or cones

Trichromatic Theory

Theory made by Young and Helmholts. States that receptors in retina for red, green, blue - colour mixing, various combinations of these colours (doesn't account for colour yellow).

Opponent Process Theory

Theory made by Hering.

3 pairs of antagonistic colours: Red/green, blue/yellow, black/white colour pairs. Explains the afterimage - closing your eye after staring at a colour and seeing the opposite colour on the spectrum

Feature detection theory

Uses bottom-up processing. Detecting features - see objects = detecting features pick up & put together senses & finally see object; picks up individual features & brain puts it together

Form Perception

Uses top-down processing. Perceive whole object but unsure of its make up; breaks down into its individual elements. Testing hypotheses: a person walking is my sister or stranger?

Subjective Contours

perception of an edge; we "finish the picture"

Gestalt Psychology

Principle of this: (a) large picture perceived before component parts; (b) nervous system automatically selects simplest interpretation. Figure-ground, proximity, similarity, continuity, closure & simplicity

Phi Phenomenon

illusion of movement created by presenting visual stimuli in rapid succession (red dots blinking at different times)

Distal Stimuli

stimuli outside the body

Proximal Stimuli

stimulus energies impinging on sensory receptors

Binocular cues

Component of depth and distance perception: from both eyes together (retinal disparity & convergence)

Monocular cues

Component of depth and distance perception: from single eye (motional parallax, accommodation, pictoral depth cues)

Illusions

discrepancy between visual appearance & physical reality. Muller-Lyer Illusion: cultural differences - perceptual hypotheses at work

Hearing

Senses the stimulus of sound waves (vibrations of molecules travelling in air)

Amplitude of sound waves

Is the loudness of sound. Measured in decibles. (db)

Wavelength of sound waves

Is the pitch: low or high notes

Purity or complexity of sound waves

Is the timbre.

Frequency

Wavelength described in terms of _____: measured in cycles per second (Hz)

o _____ Increase = pitch increase

Pinna

Is a component of the ear also known as the external ear. Is responsible for collecting sound.

Ossicles

Composed of the hammer, anvil and stirrup. Tiny bones that vibrate in response to sound waves. Also known as the middle ear.

Cochlea

Component of the ear that is a fluid-filled, coiled tunnel, contains the hair cells, the auditory receptors, lined up on the basilar membrane. Also known as the inner ear

Place Theory

Theory of hearing created by Hermon von Helmholtz - if you hear a pitch, the hair cells might be activated; certain cells only respond to a certain pitch

Frequency Theory

Theory of hearing created by Rutherford - perception of pitch depends on basilar membrane's rate of vibration

Auditory Localization

The process of locating the source of sounds in space. Two cues critical: Intensity (loudness) &timing of sounds arriving at each ear. Sound from left speaker hits left ear then travels to right ear

Taste

Senses soluble chemical substances (receptor cells found in taste buds)

Sweet, Sour, Bitter, and Salty

Four primary tastes

Pathway of taste sensing

Taste buds then neural impulse then thalamus then cortex.

Smell

Senses substances carried in the air, dissolved in the fluid in mucus. (Olfaction)

Pathway of smell sensing

Olfactory cilia, then neural impulse, then olfactory nerve, then olfactory bulb in the brain. (Does not go through thalamus)

Touch

Senses mechanical, thermal, and chemical energy impinging on the skin

Pathway of touch sensing

Sensory receptors, then the spinal column, then brainstem, then cross to opposite side of brain, then thalamus, then somatosensory (parietal lobe)

Pain Pathways

Fast (cut/burn; immediate response) vs Slow (less localized pain sensations)

Gate control theory of pain

Theory that states: Incoming pain signals can be blocked by the spinal cord

Kinesthesis

Sense that knows the position of various parts of the body. Receptors in joints/muscles.

Vestibular

Sense responsible for equilibrium/balance. Semicircular canals

Consciousness

awareness of self & surroundings; participant as the inquirer; flowing stream with various depths

Top

Level of awareness: controlled processes require attention (and interfere with other functions)

Middle

Level of awareness: automatic processes require minimal attention (ex. riding a bike)

Lowest

Level of awareness: minimal/no awareness of the environment

Sleep

a behavior AND an altered state of consciousness. (we spend 1/3 of our life doing this)

Circadian Rhythms

One of these lasts about 24h (ex. Sleep-waking cycles). Light is an external cue that can set the _____. Some _____ are endogenous suggesting the existence of an internal (biological) clock.

Disruptions of Circadian Rhythms

This is caused by jet lag & shift work; adapt = stay up late

Sleep Deprivation

This limits to exploring impact, impacts as for disrupts of circadian rhythms, physiological functions not necessarily significantly impacted

3 or 4 days

How long does it take for one to experience Complete Sleep Deprivation?

EEG

Electrophysiological instruments can be used in the sleep laboratory to asses the physiological changes that occur during an episode of sleep, such as what?

Beta

The EEG Pattern that is experienced in normal waking thought, alert problem solving. 13-24 cps

Alpha

The EEG Pattern that is experienced in deep relaxation, blank mind, mediation. 8-12 cps

Theta

The EEG Pattern that is experienced in light sleep. 4-7 cps

Delta

The EEG Pattern that is experienced in deep sleep. Less than 4 cps

Stage 1

Stage of Non-REM sleep where slowing down occurs.

Stage 2

Stage of Non-REM sleep where one has sleep spindles, and is less responsive.

Stage 3

Stage of Non-REM sleep where it is hard to wake up.

Stage 4

Stage of Non-REM sleep where it is hard to wake up and bed-wetting and sleep walking could occur.

REM

Rapid eye movements, high frequency brain waves, paralysis of large muscles & dreams.

Function of REM Sleep

Consolidation of new memories, role in learning, absent in lower mammals

Non-REM sleep

people deprived of all sleep show greater time spent in _____ the next night

Biological Clock

Physiological Pathway of the _____: Light levels go to the retina then to suprachiasmatic nucleus of hypothalamus (regulates Circadian Rhythms) then to pineal gland causing secretion of melatonin.

Gaba and Serotonin

What are the two main neurotransmitters?

Hypotheses on why we sleep

Sleep evolved to conserve an organisms' energy. Or immobilization during sleep is adaptive because it reduces danger (predators). Or Sleep helps animals to restore energy and other bodily resources.

Insomnia

Sleep disorder: difficult falling asleep, staying asleep, early wakening

Narcolepsy

Sleep disorder: falling asleep uncontrollably

Sleep Apnea

Sleep disorder: reflexive gasping for air that awakens the sleeper

Nightmares

Sleep disorder: anxiety-arousing dreams - occurs during REM

Night Terrors

Sleep disorder: intense arousal and panic - occurs during NREM

Somnambulism

Sleep disorder: sleepwalking

Dreams

Mental experiences during sleep, occurs during REM sleep. Content usually familiar, common themes, waking life spillover - day residue.

Wish Fulfillment

Freud's theory of dreams. The day shapes dreams that satisfy unconscious needs. People have dreams about the unconscious desires they possess.

Hysteria

have physical symptoms of disease but without underlying physical root cause (definition in Freud's time)

Manifest content

Content of the dream what people report, what you see on the surface (freud)

Latent content

The deeper meaning of the content in one's dream

Problem Solving View

Cartwright's view on dreams from a cognitive perspective. Think through major problems in our lives; dreaming is a continuation of problems you couldn't solve during the day. Criticism: because you're dreaming about something doesn't mean you are actually making progress and working through it.

Activation Synthesis Model

Hobson and McCartney's theory on dreams from a biological approach. • A story is created to make sense of internal signals. REM sleep, certain parts of brain becomes active - that activity is translated into dreams and the brain tries to make sense of activation.
Re-activating parts of brain that were active when perceiving event - this is why memories are sometimes included.

Hypnosis

A systematic procedure that increases suggestibility; creates heightened sense of susceptibility

Effects of hypnosis

anesthesia, sensory distortions and hallucinations, disinhibition, posthypnotic suggestions and amnesia.

Meditation

Practices that train attention to heighten awareness and bring mental processes under greater voluntary control; yoga, zen, TM, etc. Potential physiological benefits. Similar to other effective relaxation procedures.

Narcotics

Type of drug: (opiates) pain relieving - "who cares"

Sedative

Type of drug: sleep inducing

Stimulants

Type of drug: increase CNS activity "I can conquer the world"

Hallucinogens

Type of drug: distort sensory and perceptual experience

Cannabis

Type of drug: produce mild relaxed euphoria

Alcohol

Type of drug: produces relaxed euphoria, decreases inhibhitions

MDMA

Type of drug: produces warm friendly euphoria

Subtractive

Colour mixing that works by removing some wavelengths of light, leaving less light than was originally there. Can be done by stacking colour filters.

Additive

Colour mixing that works by superimposing lights, putting more light in the mixture than exists in any one light itself. Can be done by shining light filters on a white surface. Human processes of colour perception parallel this more.

Simple

Type of visual cell that responds best to a line of the correct width, oriented at the correct angle, and located in the correct position in its receptive field.

Complex

Type of visual cell that also care about width and orientation, but they respond to any position in their receptive fields. Some are more responsive if a line sweeps across their receptive field, but only in the right direction.

perceptual constancy

is a tendency to experience a stable perception in the face of continually changing sensory input

optical illusion

involves an apparently inexplicable discrepancy between the appearance of a visual stimulus and its physical reality

Impossible figures

are objects that can be represented in two-dimensional pictures but cannot exist in three-dimensional space

Müller-Lyer illusion

A famous visual illusion involving the misperception of the identical length of two lines, one with arrows pointed inward, one with arrows pointed outward.

Ponzo Illusion

An illusion of size in which two objects of equal size that are positioned between two converging lines appear to be different in size. Also called the railroad track illusion.

ventral stream

visual signals traveling through this stream process the details of what objects are out there

dorsal stream

visual signals traveling through this stream process the details of where the objects are out there

signal perception

the registration of sensory input without conscious awareness. Ex. flashing a popcorn ad for a millisecond makes people think about popcorn and buy it.