Stimulus Encyclopedia Article

Stimulus

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Stimulus

A stimulus is an environmental change that triggers a response or reaction. Organisms use sensory neurons to interpret these changes. Humans interpret their entire external environment through energy in the form of light, sound, pressure, chemicals, or heat. This process is called *exteroception*, in which energy external to the body triggers responses in excitatory cells in the central nervous system. Different stimuli activate different receptors which trigger cells to produce action potentials. Action potentials send electrochemical signals from one sensory neuron to another via the spinal chord to the brain where the signal is decoded. Meanwhile, the peripheral nervous system senses and controls the body's internal environment such as hormone levels, blood sugar levels, blood pressure, and temperature. Internal stimulus and response is called *proprioception* and *interoception*. In all three, some type of stimulus is necessary to bring cells from resting membrane potential to an action potential. In exteroception, light stimulates rods and cones in the back of the eye to produce chemical responses which, when decoded by the visual cortex, produce visual images and thus we have sight. Chemical (odor) molecules inhaled through the nostrils stimulate olfactory neurons (chemoreceptors) whose action potentials carry information to the olfactory cortex to be decoded, giving us our sense of smell. The stimulus for neuroepithelial cells in taste buds on the tongue are chemical molecules which, when mixed with saliva, initiate action potentials which synapse to the medulla, the thalamus, and the postcentral gyrus, allowing us to taste. Tactile stimuli activates sensory neurons which carry messages to the somatosensory cortex, giving us the sense of touch. Sound waves stimulate hair cells inside the ear which convert the stimulus into electrochemical impulses which are transmitted to the brain via the hearing or auditory nerve, and we hear. Proprioception and interoception are also controlled by stimuli; however, unlike exteroceptive senses, we are unaware of the internal stimuli which trigger responses.