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Sensitization

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Learning Through Senses

Sensitization is a learning process wherein we become sensitive to pain, sound, smell, and other senses. It is a basic type of non-associative learning (i.e. learning that some events are irrelevant or not connected to one another). While sensitization is a good adaptive learning process of an organism, it can also lead to maladaptive process when the organism is “sensitized” with harmful stimuli.

When you rub your arms continuously, you will feel a warm sensation due to the repeated stimulation of the peripheral nerves located in your arms. However, after some time this warm sensation would turn into a painful feeling, so your brain would warn you that rubbing your arms vigorously for a long time would be harmful and painful for you. This is scenario is an example of sensitization.

The concept of sensitization holds that there is a particular cellular receptor that is expected to respond to a stimulus. Once stimulation occurs, that cellular receptor is to transmit information to and from the brain via the peripheral nerves, resulting to sensitization.

In the year 2000, Eric Kandle won the Nobel Prize in Physiology because he was the first researcher to study the neuronal learning process involving sensitization from 1960 to 1970s.



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A. Types of Sensitization

1. Long Term Potentiation or LTP

This type of sensitization involves the electrical or chemical stimulation of the organism's hippocampus (memory center of the brain). Many researchers have hypothesized that there are so-called LTP receptors which are responsible for memory and learning new things.

2. Kindling

This type of sensitization also includes the hippocampus of the organism just like in LTP. One difference of kindling to LTP, however, is that there is a repeated stimulation of the hippocampal or amygdaloid neurons. Kindling seems to be very dangerous because even a small stimulation would result to seizures in animals studied inside the laboratories. The discovery of kindling has been used as a theory in explaining epilepsy on the temporal lobe of humans. In temporal lobe epilepsy, repetitive stimulation like flickering lights or on and off sounds may cause epileptic seizures. This repetitive stimulation is the reason why kindling may be the process undergone by people who experience seizures.

3. Central Sensitization

This type of sensitization comprises the pain receptors (called the nociceptive neurons) located in the spinal cord. When peripheral tissue damage or inflammation occurs, these pain receptors are sensitized, causing a person to feel sensitive to the pain he experiences. The concept of central sensitization has shown a logical explanation for health conditions where long term pain (chronic pain) is a symptom. Because of this, many researchers have developed `desensitization` therapies to relieve the feeling of long term pain.

4. Drug Sensitization

As the name implies, drug sensitization happen when a person becomes dependent on a drug due to repeated doses.

B. Clinical Relevance

Sensitization is a useful model in studying the underlying causes of pathologies such as asthma, substance dependence, allergies, pain-related illnesses, psychological disorders, etc. Now, there are different types of sensitization therapies not only utilized for medical purposes (allergies, cancer and other tumors) but also for marriage counseling and family psychotherapy.

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