## The Invisible Work Force

Imagine you're sitting at a park having a picnic on a sunny spring evening. You just finished taking a big psychology exam, and you are relaxing on the green grass without a care in the world. The birds are singing, you feel the warmth of the setting sun on your skin, the aroma of dogwood trees in bloom is in the air, the taste of your favorite sandwich still on your tongue. Sounds pretty relaxing, right?

Even though you might feel relaxed, your nervous system is hard at work, like an invisible workforce. In order to experience that relaxing day, you must first have the ability to internalize all those pleasant things that are going on around you at the park. In other words, if your brain is not aware of the environment then you can't truly experience it.

Sensation is the **first step in the process of allowing your brain to experience the features and characteristics of the environment around you.**

## Definition of Sensation

**Sensation** is the process that allows our brains to take in information **via our five senses**, which can then be experienced and interpreted by the brain. Sensation occurs thanks to our five sensory systems: vision, hearing, taste, smell and touch. Each of these systems maintains unique neural pathways with the brain, which allows them to transfer information from the environment to the brain very rapidly. Without sensation we would not be able to enjoy the sunny spring day at the park.

Each sensory system contains **unique sensory receptors**, which are designed to detect specific environmental stimuli. Once detected, sensory receptors convert **environmental stimulus energy into electrochemical neural impulses**. The brain then interprets those neural messages, which allow the brain to experience and make decisions about the environment. Let's take a little bit closer look at the process of sensation by examining each of the five sensory systems involved.

**Sensation** is the body's detection of **external or internal stimulation** (e.g., eyes detecting light waves, ears detecting sound waves). Perception utilizes the brain to make sense of the stimulation (e.g., seeing a chair, hearing a guitar).

Sensation involves three steps:

1. Sensory receptors detect **stimuli**.
2. Sensory stimuli are transduced into electrical impulses (**action potentials**) to be decoded by the brain.
3. Electrical impulses move along  to specific parts of the brain wherein the impulses are decoded into useful information (perception).

For example, when touched by a soft feather, **mechanoreceptors** – which are sensory receptors in the **skin** – register that the skin has been touched. That sensory information is then turned into neural information through a process called **transduction**. Next, the neural information travels down **neural pathways to the appropriate part of the brain**, wherein the sensations are perceived as the touch of a feather.

Children are often taught five basic senses: seeing (i.e., vision), hearing (i.e., audition), tasting (i.e., gustation), smelling (i.e., olfaction), and touching. However, there are actually many more senses including **vestibular sense, kinesthetic sense, sense of thirst, sense of hunger, and cutaneous sense**.

Measurement of sensation

Psychologists who specialize in psychophysics measure sensory sensitivity by identifying:

1. The **absolute threshold**– the minimum amount of stimulation that a person can detect **50**% of the time
2. The differential threshold (or just noticeable difference) – the minimum difference that must happen between **two stimuli** for the body to identify them as two separate sensations 50% of the time
3. The terminal threshold – the **maximum** amount of stimulation that a person can sense

Types of Sensations

**Visual**

The **wavelength**, **intensity** and **complexity**[of Light](https://en.wikipedia.org/wiki/Light) are detected by visual receptors in the [retina](https://en.wikipedia.org/wiki/Retina) of the eye. There are two types of visual receptors: [rods](https://en.wikipedia.org/wiki/Photoreceptor_cell) and [cones](https://en.wikipedia.org/wiki/Photoreceptor_cell).[[1]](https://en.wikipedia.org/wiki/Sensation_(psychology)#cite_note-1) Rods are sensitive to **dim light**, which makes them useful for **seeing at night**. Cones are more sensitive to color and bright light, which makes them more useful in **daylight**. Signals from rods and cones are **transduced** into useful neural information via the [optic nerve](https://en.wikipedia.org/wiki/Optic_nerve). [Blindness](https://en.wikipedia.org/wiki/Visual_impairment) is the complete or nearly complete inability to see.[[2]](https://en.wikipedia.org/wiki/Sensation_(psychology)#cite_note-2)

**Auditory**

The **frequency**, **intensity**, and complexity of sounds waves in the external world are detected by auditory receptors **(**[**cilia**](https://en.wikipedia.org/wiki/Hair_cell)**or** [**hair cell receptors**](https://en.wikipedia.org/wiki/Hair_cell)) in the ear. **Different patterns of cilia movement** lead to different neural codes, which ultimately lead to hearing different loudness, pitch, and timbre of sounds. [Deafness](https://en.wikipedia.org/wiki/Hearing_loss) or [hearing loss](https://en.wikipedia.org/wiki/Hearing_loss) may occur in one or both ears.

**Gustatory**

Taste receptors (i.e., [taste buds](https://en.wikipedia.org/wiki/Taste_bud) or [papillae)](https://en.wikipedia.org/wiki/Lingual_papilla) are activated by the presence of food or another object on the tongue.[[4]](https://en.wikipedia.org/wiki/Sensation_(psychology)#cite_note-4)[[5]](https://en.wikipedia.org/wiki/Sensation_(psychology)#cite_note-5)Four basic tastes include sweet, salty, sour, and bitter.[[6]](https://en.wikipedia.org/wiki/Sensation_(psychology)#cite_note-6)[[7]](https://en.wikipedia.org/wiki/Sensation_(psychology)#cite_note-7) There is some debate on whether [umami](https://en.wikipedia.org/wiki/Umami), or meatiness, is a fifth basic flavor.[[8]](https://en.wikipedia.org/wiki/Sensation_(psychology)#cite_note-8) Aging is associated with loss of intensity in taste.[[9]](https://en.wikipedia.org/wiki/Sensation_(psychology)#cite_note-9) Complete inability to taste is called [ageusia](https://en.wikipedia.org/wiki/Ageusia).

**Olfactory**

Smells in the external world activate hair receptors in nostrils. These receptors then send signals to the [olfactory bulb](https://en.wikipedia.org/wiki/Olfactory_bulb), which is located at the base of the brain. **Anosmia** is the inability to smell.

**Somatosensory**

Somatosensory sensations occur when receptors **detect changes on one's skin or within one's body**.

**Cutaneous sensations**

Sensations on the skin are detected by [cutaneous receptors](https://en.wikipedia.org/wiki/Cutaneous_receptor). These receptors may feel sensations such as pain, tickle, cold, hot, soft, and rough. [**Mechanoreceptors**](https://en.wikipedia.org/wiki/Mechanoreceptor) detect **light** pressure (e.g., caress), vibration, and texture, **nocicreceptors** detect **strong** pressure (e.g., pain), and [**thermoreceptors**](https://en.wikipedia.org/wiki/Thermoreceptor) detect **temperature**.

For example, if your dog lightly presses its nose on your leg, mechanoreceptors in your skin will sense the smooth texture of your dog’s nose whereas thermoreceptors will detect its coldness. When a dog bites someone, nociceptors detect the sharp pressure. [Astereognosis](https://en.wikipedia.org/wiki/Astereognosis) is the inability to identify an object by touch.

**Proprioception**

Proprioception is the “**sense of bodily position**.” It includes the [**vestibular sense**](https://en.wikipedia.org/wiki/Vestibular_system) (i.e., one’s sense of balance) and [kinesthetic sense](https://en.wikipedia.org/wiki/Kinesthetic_sense) (i.e., one’s awareness of one’s movements).

**Osmoreception**

[Osmoreception](https://en.wikipedia.org/wiki/Osmoreceptor) is the body’s sensation of **thirst**. When the amount of water in one’s body falls below a certain threshold, the concentration of [osmolytes](https://en.wikipedia.org/wiki/Osmolyte) (e.g. salt) increase in one’s blood. [Osmoreceptors](https://en.wikipedia.org/wiki/Osmoreceptor), or sensory receptors in the [hypothalamus](https://en.wikipedia.org/wiki/Hypothalamus), detect these changes in [osmotic concentration](https://en.wikipedia.org/wiki/Osmotic_concentration). These signals are then transferred to neural signals of thirst.

**Vestibular Sense**

There is a strong connection between the **ear and our sense of balance**. Our **vestibular sense**, also known as the labyrinthine sense, is an elaborate sense that is involved in body position and movement of the head. It comes from the vestibular system in our inner ear and is activated when there is a change in gravity or when our head moves. We would feel very dizzy without our vestibular sense. It helps us focus and feel centered.

We have our vestibular sense to thank when we can keep our bodies upright when jumping, or when we stand from a seated position, or sit from a standing position. It's responsible for our ability to focus on an object, like a person's eyes, even when our head nods up and down in agreement or shakes back and forth in disagreement.

More specifically, the **vestibular sense in psychology** has special significance to child development and children's ability to maintain balance when learning how to walk, keep their trunk sturdy when learning how to sit up, and develop various visual, fine and gross motor skills. It also has importance with regard to ability to focus and the attention span.

**Examples of Vestibular Sense in Psychology**

Child development is a fascinating thing. It is wondrous to see babies who did not have particular motor skills the day before all of a sudden be able to hold their head up, turn at the sound of a noise, sit up on their own and walk in a straight line, even if it's wobbly at first.

The vestibular sense in psychology and child development helps kids with:

1. **Gross motor skills**: crawling, walking, running, jumping, hitting a ball with a bat, etc.
2. **Fine motor skills**: holding objects, turning pages of a book, drawing, etc.
3. **Visual spatial motor skills**: following moving objects, etc.

The vestibular sense helps adults with all of the above as well, of course. It's what helps gymnasts do somersaults and remain balanced and straight while doing them. Have you ever tried to roll down a hill while in a barrel? The vestibular sense would help you remain oriented through that joy ride. Interested in carnival rides? The vestibular sense makes riding a merry-go-round or roller coaster possible. It keeps you centered when your body is spinning. The spinning tea cup rides at a carnival or Disney is really testing your vestibular sense's limits. You will likely be dizzy after the ride, but it's your vestibular sense that will reorient you back to normal soon afterwards.

**Problems**

Sometimes an adult can feel unusually dizzy or experience **vertigo**, a sense of spinning even when you haven't moved. That person can visit a doctor's office to ascertain the cause, but when a child feels these things, they might not be able to verbalize what they are experiencing.

Loss of sensation

Many types of sensory loss occur due to a dysfunctional sensation process, whether it be ineffective [receptors](https://en.wikipedia.org/wiki/Receptor_(biochemistry)), [nerve damage](https://en.wikipedia.org/wiki/Nerve_damage), or cerebral impairment. Unlike [agnosia](https://en.wikipedia.org/wiki/Agnosia), these impairments are due to damages prior to the [perception](https://en.wikipedia.org/wiki/Perception) process. Conditions do exist where the patient experiences sensory loss, but experimental evidence shows that the effect is perception based.