



Review Article

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CONCEPT OF INDRIYA PANCHA PANCHAK WITH REFERENCE TO SENSATION AND PERCEPTION: A REVIEW

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ABSTRACT

Acharya Charaka introduced the concept of Indriya pancha panchak to explore the physiology of sense organs. Indriya pancha panchaka assembles twenty-five structural and functional components related to the Indriya (sense faculty). It consists of five sense faculties (pancha janendriyas), five sense materials (pancha indriya dravya), five seats of sense organs (pancha indriya adhisthana), five objects of sense faculties (pancha indriya artha) and five sense perceptions (pancha indriya buddhi). Five sense perceptions result from conjugating the soul, mind, sense organs and their respective objects. In light of modern science, sense organs are the specialised units of the human body that can transform information about the external environment and inside environment into a form suitable for processing by the central nervous system. Sensory organs are equipped with specialised receptors that get stimulated by light, sound waves, mechanical deformation, temperature change or certain chemicals. The information is transformed through a series of propagated nerve impulses. These neural impulses get transmitted as action potentials via specialised sensory nerves towards the central nervous system that finally arrive at the sensory cortices in the brain. At this site, sensory signals are processed and interpreted. The processes through which we experience and interpret the stimuli are known as sensation and perception. The present paper aims to explore the concept of Indriya pancha panchak critically and highlight its significance in sensation and perception.

Keywords: Indriya, Indriya pancha panchak, sense organs, sensation, perception.

INTRODUCTION

Ayurved, the ancient Indian medical system, has contributed significantly to physiology, psychology, cognition, memory, etc. Ayurved classics thoroughly explained the physiology of sense organs, sensation, perception and the role of the mind in the process of perception in a unique way. Indriya (sense faculty) is the specialised instrument that assists the soul in acquiring knowledge regarding any minute change in external or inside environments. Indriya (sense faculty) plays a significant role in connecting the soul with the environment. Indriya (sense faculty) is the basic component that aids in distinguishing between living and non-living. A calm and happy state of the soul, mind and sense organs is the key component of a healthy person.¹ Indriya pancha panchak is the concept that Acharya Charaka introduced, exploring sense organs' anatomical and physiological aspects.²

Contemporary science has a well-developed branch that deals with neuro-anatomy and neurophysiology. The sensory nervous system is a part of the nervous system responsible for processing sensory information. It consists of the sensory organs, receptors, neurons, neural pathways, and brain parts involved in sensory perception and interceptions. Commonly recognised sensory systems are vision, hearing, touch, taste, smell, balance and visceral sensation. Sense organs are transducers that convert data from the outer physical world to the realm of the mind, where

people interpret the information, creating their perception of the world around them.³ The present paper aims to analyse the concept of Indriya panchak and highlight its significance in sensation and perception.

Literature Review

Ayurved Literature: The word Indriya is derived from the word 'Indra'.⁴ Indra is one of the synonyms of the soul, and signs of the Indra are also called Indriya. The organs which Indra creates, seen by Indra and the means of knowledge and actions are called Indriyas.⁵ Thus; the soul is considered as Indra or Ishwar or creator while indriya is the instrument (sadhana or karana) of the soul for acquiring knowledge of various external objects.

Concept of Indriya Panch Panchak: Indriya pancha panchaka assembles twenty-five structural and functional components related to the senses. They include five sense faculties (pancha janendriyas), five sense materials (pancha indriya dravya), five seats of sense organs (pancha indriya adhisthana), five objects of sense faculties (pancha indriya artha) and five sense perceptions (pancha indriya buddhi).^{6,7}

Five Sense Faculties (Pancha Jyanendriyas): The five sense faculties are visual (chakshurendriya), auditory (shrotrendriya), olfactory (ghranendriya), gustatory (rasanendriya) and tactile (sparshendriya). The visual sense faculty (chakshurendriya)

perceives colour (rupa), the auditory sense faculty (shrotrendriya) perceives sound (shabda), the olfactory sense faculty (ghranendriya) perceives smell (gandh), gustatory sense faculty (rasanendriya) perceives taste (rasa); tactile sense faculty (sparshendriya) perceives touch (sparsh). Acharya Chakrapani further explained that although eyes, ears, and nasal cavities are two, the visual sense faculty, auditory sense faculty, and olfactory sense faculty are only one.⁸

Five Sense Materials (Panchendriya Dravyas): There are five material constituents of senses viz; akash, vayu, agni, apa and prithvi.⁹ The material constituent, which is predominantly responsible for creating the respective sense faculty, is called Indriya dravyas. Such indriya dravyas (sense materials) are five according to sense faculties. The predominance of one material constituent is thought to be responsible for the development of each faculty. Samkhya doctrine describes the development of sense faculties from ahankara (ego) and not from five material constituents, but having seen the practical utility in treatment; Ayurveda accepts the development of sense faculties from five material constituents^{10,11} and so these factors have been included in Indriya pancha panchakas.

Table 1: Five Sense Materials (Panchendriya Dravyas)

Sense Faculty (Indriya)	Predominant Constituent Material
Auditory (Shrotrendriya)	Akash
Tactile (Sparshendriya)	Vayu
Visual (Chakshurendriya)	Agni
Gustatory (Rasanendriya)	Apa
Olfactory (Ghranendriya),	Prithvi

Five Seats of Sense Organs (Pancha Indriya Adhithana): Sense faculties cannot be perceived directly but are inferred through their actions. Each sense faculty resides at a special place in the body. Visual sense faculty (chakshurendriya) resides in two eyes. The seat for the auditory sense faculty (shrotrendriya) is two ears; for the olfactory sense faculty (ghranendriya), the seat is the two nostrils of the nose; for the gustatory sense faculty (rasanendriya), the seat is tongue, and for tactile sense faculty (sparshendriya) the seat is skin over the whole body.¹² It is to be remembered that these places are only seats and not the sense faculties. The eyes, ears, and nostrils are two in number in the body, but the faculties are a single number. So, the five sense organs correspond to the five sense faculties. It is essential that even if the seat of faculty is destroyed, the knowledge collected by visual faculty is not wasted. So it is necessary to recognise the sense faculties and sense seats are different from each other.¹³

Fives Objects of Sense Faculties (Pancha Indriya Artha): Each sense faculty has one object. Sound (shabda) is the object of the auditory sense, touching (sparsha) is tactile, colour (rupa) is visual, taste (rasa) is gustatory, and smell (gandha) is the object of the olfactory sense organ.¹⁴ Each sense faculty possesses the excess part of one material constituent. Being developed from the particular material constituent, the particular sense faculty acknowledges the quality of that particular element. For example, auditory sense faculty (shrotrendriya) is developed with the excess part of the akasha material constituent. Sound (shabda) is its special attribute. That is why sound (shabda) is the object of the auditory sense faculty (shrotrendriya). The same principle applies to other sense faculties. Acharya Sushruta describes that because of the same group (tulya yonitvat) and same nature (tulya swabhavat), each sense faculty grasps one object only, and objects of remaining faculties are not acknowledged.^{15,16} According to Charak Samhita, the very nature of sense faculties is determined by the particular material constituent. Moreover,

the sense faculties can perceive only the same quality objects. They are omnipresent.¹⁷

Five Sense Perceptions (Pancha Indriya Buddhi): Five sense perceptions (Indriya buddhi) are the last component of Indriya pancha panchak. There are five types of perceptions, viz. visual, tactile, auditory, olfactory and gustatory.¹⁸ These perceptions result from conjugating sense faculties, their objects, the mind and the soul. They are momentary or determinative.

Process of Perception

Role of the Empirical Soul In The Process of Perception: The empirical soul (atma) is endowed with the power of perception. It perceives things when associated with the mind, the intellect and sense faculties. If these instruments of perception are either absent or impeded, then there will be no perception.¹⁹ Mind, intellect, sense faculties and conative organs are the instruments of knowledge. Their association with the empirical soul results in action, sensation and understanding.

Role of Mind In The Process of Perception: The mind mediates the empirical soul and sense faculties. Mind is always conjugated with the soul. The sense faculties can perceive their respective objects only when they are motivated by the mind.²⁰ The mind, when it loses contact with the sense organs, an individual cannot perceive knowledge, whereas the mind, when it establishes contact with sense organs, conveys knowledge to the soul.²¹ Mind, being a substance, possesses two attributes within it. They are atomicity (anutvam) and oneness (ekatvam).²² Due to its quality of atomicity, the mind moves everywhere speedily and is agile. Due to atomicity, it conjugates with different sense organs to perceive knowledge rapidly. Mind conjugates with sense organs so rapidly that visualisation, hearing, and perceiving smell all seem to co-occur.

The objects of mind, i.e. chintya, vicharya, uhya, dheya, sankalpa²³, as well as the actions of the mind, i.e. indriyaabhigraha, swasyanigraha, uhya, vichar²⁴ also plays a crucial role in the process of perception. Thought (chintya) is the ability of the mind to think practically about the knowledge perceived. Consideration (vicharya) helps to establish the logical sequence of knowledge perceived by the sense organ. It also includes complete examination and discussion at the mental level and consideration of the subject's pros and cons that help to direct the mind to accept or reject a thing based on qualities and disqualifications of the matter. Hypothesis (uhya) is the analysing capacity of the mind and helps for judgment about certain things that may happen in future. Attention (dheya) means concentrating or paying attention to a particular object. Determination (sankalpa) helps to decide what to do and what not to do before acting. Indriyaabhigraha (sense organ control) is the mind's action that helps control the sense organs. Swasnigrah (self-restraint) is the action of the mind that helps to detach manas from the subject, which is not helpful to the self.

Role of Triguna In Process of Perception: Sattva, rajas and tama are the three qualities of the mind. A balanced state of mind depends on these three attributes of mind. Sattva stimulates the mind towards the objects to acquire knowledge. Rajas motivate the mind towards the objects. Tamas produces inertia in the mind and gives necessary rest to the mind. Due to excess of rajas quality, the mind can become unstable and cannot concentrate on the objects.²⁵

Role of Dosha In The Process of Perception: Vata dosha prompts all types of actions. It retrains and impels the mental activities. It stimulates sense faculties. Prana vayu is located in

the head. It coordinates all the senses' faculties and helps them enjoy their objects.²⁶ Prana vayu establishes the chain between sense organs, the mind and the soul. Udan vayu is responsible for memory. Sadhak pitta removes the kapha and tama in hridaya, increases the sattva guna and enables the manas to perceive things. Sadhak pitta is responsible for buddhi (intelligence), medha (discriminatory ability), abhimana (self-esteem) and helps to achieve the intended objects.²⁷ Tarpak kapha is located in the head, nourishing the sense organs.²⁸

Role of Indriya Panch Panchaka in Process of Perception:

Indriya (sense faculty) is the apparatus that conveys knowledge to the soul. The connection or proximity of the sense faculties with its object is an essential qualification for perception. The process in which the sense organ and the object come in connection or proximity is called sannikarsh. There are six different types of proximity: samyoga (conjugation), samavaya (inseparable concomitance), samyukta samavaya (conjunct concomitance), samyukta samaveta samavaya (conjunct-concomitant-inseparable concomitance), samaveta samavaya (concomitant inseparable concomitance) and visheshan-visheshabhava(noun-adjective combination).²⁹ The mental faculty instantaneously manifested as a result of one of these proximities is known as pratyaksha (perception). Thus, Indriya (sense faculty) is responsible for the direct perception of knowledge from the external environment. Any impairment or abnormality in Indriya (sense faculty) leads to a lack of perception of knowledge.³⁰ The object may not get directly perceived due to factors like over proximity, over distance, obstruction, weakness of senses, diversion of mind, confusion with other similar objects, overshadowing or over minuteness.³¹

Process of Perception: An object is perceived with the help of sense organs and the mind. The perception is purely mental initially; the practical advantages or disadvantages are ascertained afterwards. The intellect, which determines the object's specific properties, compels an individual to speak or act intelligently.³²

Modern Literature: Sense organs are specialised organs that help us perceive the world around us. A sense is an individual's physiological ability to produce data for perception.³³ Humans have senses such as sight, smell, hearing, taste and touch. We have five sense organs: eyes, ears, nose, tongue and skin. These organs are equipped with sensory receptors and subsidiary physical structures.³⁴ The processes through which we experience and interpret the stimuli present in the environment are known as sensation and perception.

Sensation: Sensation is the conscious or subconscious awareness of changes in the external or internal environment.³⁵ Sensations are nothing but the feelings aroused by environmental changes.³⁶ The character of the sensation and the kind of response generated differ as per the final destination of nerve impulses. Sensory impulses at the spinal cord may be responsible for spinal reflex activity. Sensory impulses at the brain stem are responsible for more complex reflexes, such as regulating heart or respiratory rates. When sensory impulses end up at the cerebral cortex, we can discover the site of sensation as well as recognise the nature of sensation.³⁵

Types of Sensations: Sensation is broadly classified into three categories: special sensation, visceral sensation and somatic sensation. The special sensations originate in the special sense organs, including vision, audition, olfaction, gustation and vestibular senses. Special sensory receptors in the eye, ear, nose and tongue sense these. Visceral sensations originate from the stimulation of receptors in the viscera. Usually, receptors are located in the viscera's wall or the viscera's connective tissue. Visceral sensations provide information about conditions within internal organs. e.g. pressure, stretch, chemicals, nausea, hunger and temperature. Somatic sensations arise from receptors on the body surface, in the body wall, muscles, tendons, bones, joints and connective tissues. Somatic sensations include touch, pain, pressure, vibration, itch, tickle, thermal sensations like warm and cold, and proprioceptive sensations.^{37,35}

Sensory Receptors: Information about the external world and the body's internal environment exists in different energy forms, such as light, sound waves, pressure, temperature, etc. Receptors detect changes (stimuli) and generate impulses. Sensory receptors are dendrites of sensory neurons or specialised cells that can monitor changes in the external or internal environment. They receive information from the environment and act as transducers that convert various forms of energy into action potentials in the sensory nerve. The sensory nerve carries these electrical impulses to the CNS. Each unique type of sensation, such as touch, pain, vision, or hearing, is called a sensory modality. A given sensory neuron carries information for only one sensory modality.^{38,39} Neurons relaying impulses for touch to the somatosensory area of the cerebral cortex do not transmit impulses for pain. Likewise, nerve impulses from the eyes are perceived as sight, and those from the ears are perceived as sounds. Table 2 enlists the type of sensory modality, energy stimulus and concerned receptors.^{40,41}

Table 2: Sensory Modalities, Stimulus Energy and the Concerned Receptors

Sensory Modality	Stimulus Energy	Receptors and Sense Organs
Vision	Light	Rods and cones of the eye (Photoreceptor)
Auditory (hearing)	Sound	Hair cells of the organ of Corti (Mechanoreceptor)
Olfaction (smell)	Chemical	Olfactory sensory neurons (Chemoreceptor)
Gustation (taste)	Chemical	Taste receptor cells of taste buds(Chemoreceptor)
Vestibular (Balance)	Linear acceleration, Gravity	Hair cells of the utricle and saccule in the inner ear (Mechanoreceptor)
Vestibular (Balance)	Rotational /Angular acceleration	Hair cells of the semi-circular canal in the inner ear (Mechanoreceptor)
Touch and pressure	Touch, pressure, sustained pressure	Nerve endings in Merkel's disc, Meissner's corpuscle, Pacinian corpuscle (Cutaneous Mechanoreceptor)
Warmth	Thermal	The nerve endings in Ruffin's end organ (Thermoreceptor)
Cold	Thermal	The nerve ending in Krause's end bulb (Thermoreceptor)
Pain	Chemical, Thermal and mechanical	Free nerve endings (Chemoreceptor), (Thermoreceptor), (Mechanoreceptor)
Proprioception (Joint position and movement)	Stretch, tension	Receptors in and around joints, muscle spindles, Golgi tendon organ (Mechanoreceptor)

The Process of Sensation: The following stages occur sequentially in the process of sensation.³⁵ The appropriate stimulus present in the field of sensory receptors activates the receptor. A sensory receptor transduces energy in a stimulus into a graded potential. The amplitude of this graded potential varies according to the strength of the stimulus. Each type of receptor can transduce only one type of stimulus. e.g. Odorant molecules in the air stimulate olfactory receptors in the nose. Olfactory receptors transduce the molecules' chemical energy into electrical energy as a graded potential. When reached at a threshold level, a graded potential in a sensory neuron triggers further nerve impulses in the form of action potential. This action potential then propagates toward the CNS. These sensory impulses reach a specific cerebral cortex region where further interpretation is carried out.

Perception: Perception is the conscious interpretation of sensations. Perception involves first recognition and then comparison, discrimination and integration of the sensation. It is primarily a function of the cerebral cortex. Specific sensory, motor, and integrative signals are processed in certain regions of the cerebral cortex. Generally, primary sensory areas of the cerebral cortex receive sensory information and are involved in the perception of specific sensations. The association area of the cerebral cortex deals with more complex integrative functions such as recognition, evaluation, differentiation, memory, comparison with past experiences, emotions, reasoning, will, judgment, personality, traits, and intelligence. Table 3 explores the role of the cerebral cortex in perception.⁴²

Table 3: Role of Cerebral Cortex in Perception

Area of Cerebral cortex	Location	Function
The primary somatosensory area (areas 1, 2, and 3)	Directly posterior to the central sulcus of each cerebral hemisphere in the post-central gyrus of each parietal lobe	Receives nerve impulses of touch, pressure, vibration, itch, tickle, temperature (coldness and warmth), pain, and proprioception (joint and muscle position). Perception of these somatic sensations
The somatosensory association area (areas 5 and 7)	Just posterior to the primary somatosensory area. It receives input from the primary somatosensory area, as well as from the thalamus and other parts of the brain.	To determine the exact shape and texture of an object by feeling it. To determine the orientation of one object concerning another as they are felt. To sense the relationship of one body part to another. The storage of memories of past somatic sensory experiences enables comparison of current sensations with previous experiences
The primary visual area (area 17)	The posterior tip of the occipital lobe, mainly on the medial surface (next to the longitudinal fissure)	Receives visual information and is involved in visual perception.
The visual association area (areas 18 and 19)	In the occipital lobe. It receives sensory impulses from the primary visual area and the thalamus	It relates present and past visual experiences and is essential for recognising and evaluating what is seen.
The facial recognition area	Corresponding roughly to areas 20, 21, and 37 in the inferior temporal lobe. Receives nerve impulses from the visual association area	It stores information about faces and allows us to recognise people by their faces
The primary auditory area (areas 41 and 42)	The superior part of the temporal lobe near the lateral cerebral sulcus	Receives information for sound and is involved in auditory perception.
The auditory association area (area 22)	inferior and posterior to the primary auditory area in the temporal cortex	To recognise a particular sound as speech, music or noise.
Wernicke's area (posterior language area; area 22, and possibly areas 39 and 40)	a broad region in the left temporal and parietal lobes	Interprets the meaning of speech by recognising spoken words. It is active as we translate words into thoughts.
The primary gustatory area (area 43)	The base of the post-central gyrus superior to the lateral cerebral sulcus in the parietal cortex	Receives impulses for taste and is involved in gustatory perception and taste discrimination
The primary olfactory area (area 28)	The temporal lobe on the medial aspect	Receives impulses for smell and is involved in olfactory perception
The orbitofrontal cortex	Corresponding roughly to area 11 along the lateral part of the frontal lobe. Receives sensory impulses from the primary olfactory area	To identify odours and to discriminate among different odours
The common integrative area (areas 5, 7, 39 and 40)	Bordered by somatosensory, visual, and auditory association areas. Receives nerve impulses from these areas and the primary gustatory area, the primary olfactory area, the thalamus, and parts of the brain stem	Integrates sensory interpretations from the association areas and impulses from other areas. Allow the formation of thoughts based on a variety of sensory inputs. Then, it transmits signals to other parts of the brain for the appropriate response to the sensory signals it has interpreted.
The prefrontal cortex (frontal association area) (areas 9, 10, 11, and 12)	an extensive area in the anterior portion of the frontal lobe. It is well-developed in humans.	Concerned with the makeup of a person's personality, intellect, complex learning abilities, recall of information, initiative, judgment, foresight, reasoning, conscience, intuition, mood, planning for the future, and development of abstract ideas.

Process of perception: Perception consists of three stages: selection, organisation, and interpretation.^{43,44} Selection is the first stage in the process of perception, during which we attend to some stimuli in our environment and not others. The environment around us is filled with infinite stimuli that we might attend to, but our brains do not have the resources to pay attention to

everything. Therefore, we pay attention to only those stimuli we are familiar with or interested in through the selective process of perception. Organisation is the second stage in the process of perception. As the brain has decided which stimuli it will attend, it is necessary to organise the information that the brain has received. Organisation is the process by which the brain arranges

the information to make sense of it. Thus, we mentally arrange the stimuli through the organisation process into meaningful and understandable patterns. Interpretation is the final stage of perception. Interpretation refers to how we understand and attach meaning to stimuli. Our interpretations are subjective and based on personal factors. Different people may give different interpretations of the same stimulus. Cultural values, needs, beliefs, experiences, expectations, involvement, self-concept and other personal influences tremendously impact how we interpret stimuli in our environment.

DISCUSSION

Sense organs are specialised organs that help us perceive the world around us. Ayurveda classics termed sense organs as jyanendriya, which are the tools to attain knowledge for an individual. Indriya panch panchak explains the anatomy and physiology of sense organs. Indriya is nothing but the sense faculties assigned for perceiving particular senses, i.e., the auditory facility can perceive sound only and not the other senses such as touch, smell, etc. The five sense material (indriya dravya) viz; akash, vayu, agni, apa and prithvi is responsible for creating the sense faculty with the dominance of one particular material in the specific sense faculty. The five seats of sense faculties (indriya adhisthana) are the special biological apparatus located at the sense organs through which objects are perceived, and that can be correlated with sensory receptors. The five objects (indriya artha) of sense faculties are the different energy forms in the environment, such as light, sound, thermal, chemicals, etc., that act as stimuli. The five indriya buddhi is the last component of Indriya panchak, indicating the complex cognitive process of perception in which the sense organ, mind, and object come in connection or proximity.

In the process of perception, the desire to acquire knowledge is generated in the soul, which is then transformed into the mind. Vayu acts as a connecting medium between the mind and sense organs and their objects of perception. Thus, Vata is the functional aspect of the sense organ. The object is perceived with the help of the biological apparatus at the seat of the sense organ. Once perception takes place, it results in the formation of thoughts in the mind. Thus, perception is purely mental in the beginning. The sadhak Pitta, objects (chintya, vicharya, uhya, dheya, sankalpa) and actions of mind (indriyaabhidraha, swasyanigraha, uhya, vichar) help to interpret, to analyse, to interrogate the pros and cons of received information. Ultimately, the buddhi (the intellect) is responsible for drawing the conclusion and ascertaining the final decision. There are five types of indriya buddhi: visual, tactile, auditory, gustatory and olfactory. The indriya buddhi can be correlated with the final perception of an object at the brain's cortical region.

As per contemporary science, sensation enables people to experience the world around them. Sensation is the initial process of communication between the sense organ and the physical environment to generate raw data. The sensory receptors play a crucial role in gathering information about the world through the detection of stimuli. The receptors translate the physical energy emerging from the object into electrical impulses, and the process is known as transduction. These neural impulses get transmitted as action potentials via specialised sensory nerves towards the central nervous system that finally arrive at the sensory cortices in the brain. The cerebral cortex's primary areas and association areas organise and interpret the received information, and the process is termed perception. Thus, perception is a process to add meaning to the data received.

Generally, we interchange the words 'sensation and perception', but there is a fine line of difference between these two. Sensation is an initial process where sense organs are active to receive information from the environment and provide raw data to the brain. Perception is a complex process where the brain's cerebral cortex selects, organises, integrates and interprets sensory information and gives final meaning to the stimuli.

CONCLUSION

The five sense faculties (pancha jyanendriyas) are the tools for perceiving changes in the external environment. Ayurveda accepts the development of sense faculties from five material constituents (panchendriya dravyas) with a predominance of one in each sense faculty. Being developed from the particular material constituent, the particular sense faculty acknowledges the quality of that particular element. The five sense organs are the seat for the five sense faculties (pancha indriya adhisthana), and it is to be remembered that these places are only seats, not the sense faculties. Five objects of sense faculties (pancha indriya artha) are the different energy forms in the environment that act as stimuli. Five sense perceptions (indriya buddhi) result from conjugation of sense faculties, their objects, the mind and the soul. The perception is purely mental initially; the practical advantages or disadvantages are ascertained afterwards, and the buddhi (the intellect) is responsible for drawing the conclusion and verifying the final decision. The indriya buddhi can be correlated with the final perception of the object at the brain's cortical region.

As per contemporary science, sensation is an initial process where receptors of sense organs are active to detect changes (stimuli) in the environment and transduce them to action potentials that finally arrive at the sensory cortices in the brain via specialised sensory nerves. Perception is a complex process where the brain's cerebral cortex selects, organises, integrates and interprets sensory information and provides final meaning to the stimuli.

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