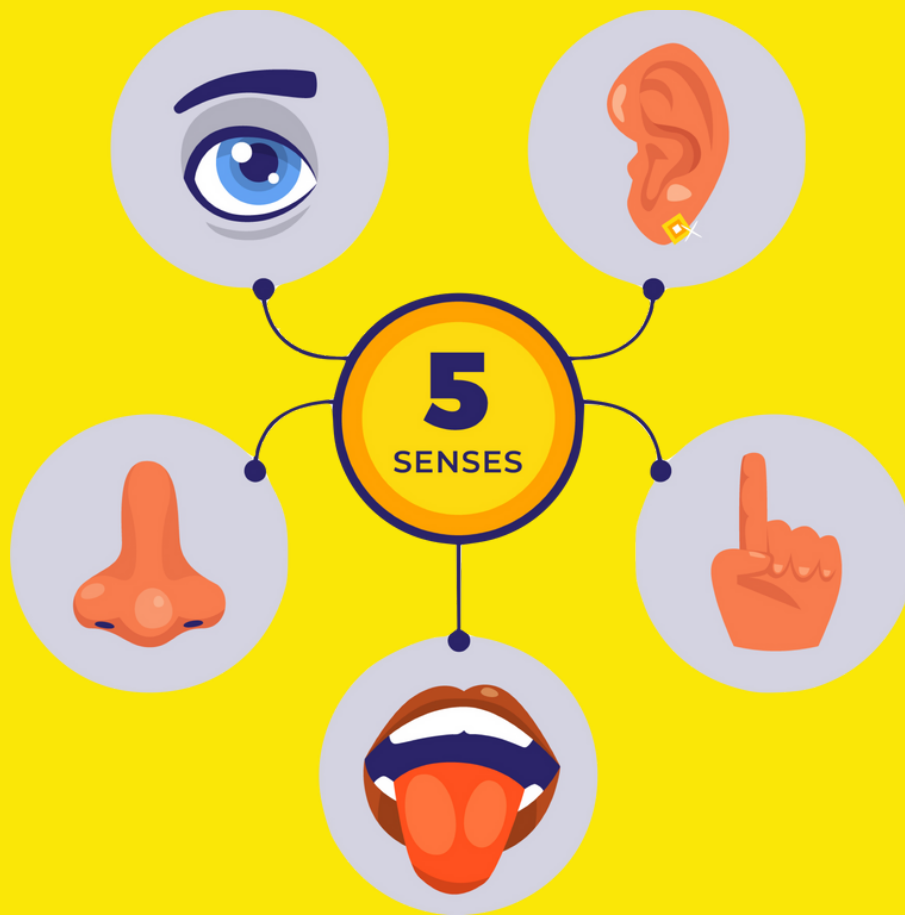


EMERACE OUR SENSES



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Khairunnisa Najwa Mohd Khairul Anuar
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PREFACE

The IIUM MBBS SEMINAR SERIES are e-books based on Phase 1 Kulliyyah of Medicine, IIUM, MBBS student seminar presentations. As part of the curriculum, all students are required to present one seminar including an Islamic Input in Medical Program (IIMP) seminar. Topics covered are varied and not necessarily related to medicine. IIMP seminars also highlight Islamic input based on these topics.

This e-book is based on the topic: Embrace our Senses. Each of the five senses will be discussed as well as the 6th sense. It is hoped that this book will encourage a newfound appreciation for our senses.

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OBJECTIVES

TO EXPLORE & EXPERIENCE ALL 5 SENSES

TO BRIEFLY EXPLAIN THE FACTS BASED ON
5 SENSES

TO CORRELATE ALL 5 SENSES WITH
ISLAMIC INPUT

TO BRIEFLY EXPLAIN FACTS ON 6TH SENSE

SENSE 1 : ViSiON

EYE-MAZING FACTS

1. THE EYE HAS FASTEST AND STRONGEST MUSCLES IN THE BODY
2. THE COLOUR VOCABULARY IN MEN AND WOMEN ARE DIFFERENT
3. OUR EYES CAN TRICK OUR MINDS

MUSCLES OF THE EYE

The muscles of the eye are responsible for controlling its movements and maintaining proper alignment.

Extraocular Muscles: These are six muscles that attach to the outer surface of the eyeball and enable it to move in various directions. They include:

- Medial rectus: Responsible for moving the eye inward (adduction).
- Lateral rectus: Responsible for moving the eye outward (abduction).
- Superior rectus: Elevates the eye and helps in inward rotation (intorsion).

- Inferior rectus: Depresses the eye and helps in outward rotation (extorsion).
- Superior oblique: Primarily responsible for downward and outward movement.
- Inferior oblique: Primarily responsible for upward and outward movement.

Ciliary Muscle: Located within the eye, this muscle controls the shape of the lens, aiding in accommodation (focusing on objects at different distances).

Pupil Constrictor Muscle (Sphincter Pupillae): A circular muscle within the iris that contracts to constrict the pupil in response to bright light or near vision.

Pupil Dilator Muscle (Dilator Pupillae): A radial muscle within the iris that dilates the pupil in response to dim light or distant vision.

These muscles work together to coordinate eye movements and maintain clear vision across different distances and lighting conditions.

ARE THE EYE MUSCLES THE FASTEST AND STRONGEST IN THE BODY?

The muscles that move your eyes are the fastest and strongest muscles in your body, **relative** to their function.

FUNCTION OF EYE MUSCLES

1. **Rapid Movement:** The extraocular muscles of the eye can move the eyeball extremely quickly and with remarkable precision. This rapid movement allows us to track moving objects, shift our gaze from one point to another, and maintain stable vision despite head movements.
2. **Fine Motor Control:** The muscles controlling eye movements are finely tuned for precise control. They must work in perfect coordination to ensure both eyes move together and focus accurately on objects of interest.
3. **Constant Activity:** The eye muscles are constantly active, even during sleep (during REM sleep, rapid eye movements occur).
4. **Adaptability:** The eye muscles are incredibly adaptable and can quickly adjust to changes in visual stimuli. This adaptability allows for rapid changes in focus, pupil size, and eye movements to accommodate varying lighting conditions and visual tasks.



COLOUR VOCABULARY (MEN VS WOMEN)

Colour vocabulary refers to the words and terms used to describe different colours and shades. It encompasses a wide range of descriptive terms that help convey the specific characteristics, nuances, and qualities of colors. It allows individuals to communicate effectively about colours, whether in describing artworks, discussing design choices, or expressing preferences for certain color schemes.

Although there is no definitive evidence to suggest that women perceive or recognise more colours than men some research suggests that women may have a slight advantage in discriminating between different shades of colours, particularly in the red-orange spectrum. This advantage may be attributed to variances in the density of cone cells in the retina, which are responsible for colour vision. Cultural and environmental factors play a significant role in shaping color perception and recognition. For example, individuals with expertise in certain fields, such as art or design, may develop a more nuanced understanding and vocabulary for colours regardless of gender.



OPTICAL ILLUSIONS

Optical illusions are perceptual phenomena that occur when the visual system misinterprets or misperceives images, patterns, or stimuli. These illusions can create discrepancies between what is actually present in the visual field and what is perceived by the observer. Optical illusions often exploit the brain's tendency to make assumptions, fill in missing information, or prioritize certain visual cues over others.

Physiological

Physiological optical illusions are illusions that occur due to the specific characteristics and limitations of the human visual system. Unlike other types of optical illusions that rely on cognitive or environmental factors, physiological illusions are directly related to how our eyes and brain process visual information.

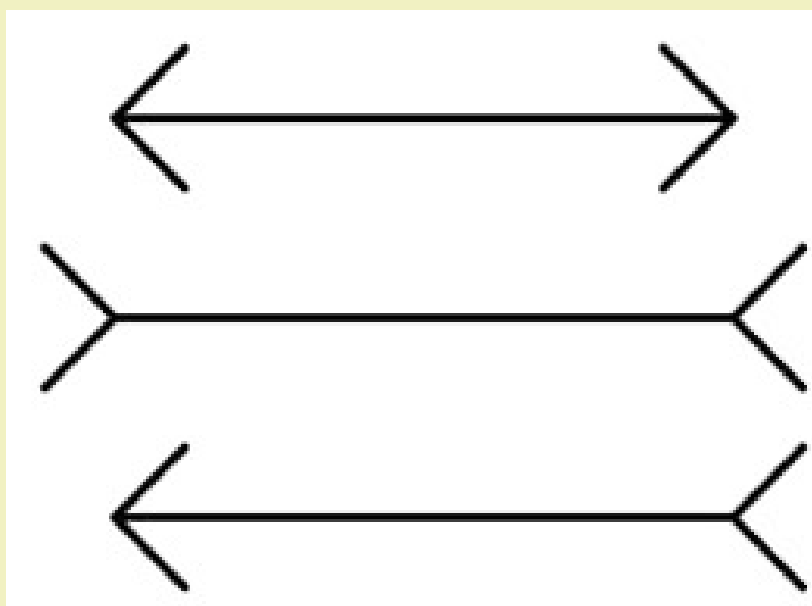
One example of a physiological optical illusion is the "afterimage" illusion. Afterimages occur when the photoreceptor cells in the retina become fatigued or overstimulated by a particular colour or pattern. When the stimulus is removed, the photoreceptor cells continue to send signals to the brain, creating the perception of an image that is not actually present. For example, staring at a brightly coloured object for a prolonged period and then looking at a neutral background can produce a ghostly afterimage of the object in complementary colours.

Cognitive

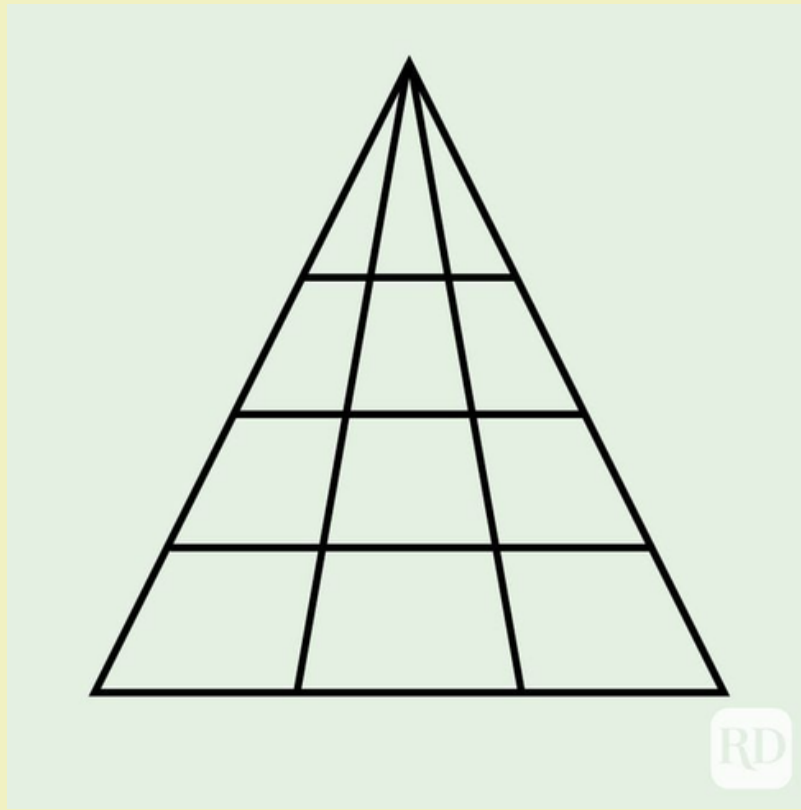
Cognitive optical illusions are perceptual phenomena that arise due to the way our brains interpret and process visual information. Unlike physiological optical illusions, which are caused by the characteristics of the visual system itself, cognitive illusions are influenced by factors such as past experiences, assumptions, and expectations. These illusions highlight the role of cognitive processes in shaping our perception of the world.



AMBIGUOUS



DISTORTING



PARADOX

Cognitive optical illusions demonstrate how our brains rely on heuristics, or mental shortcuts, to quickly process and interpret visual stimuli. These heuristics can lead to systematic errors in perception, causing us to misjudge sizes, distances, or other properties of objects in our environment.

ISLAMIC INPUT - EYES/VISION

Eyes as witness

يَوْمَ تَشْهَدُ عَلَيْهِمُ أَلْسِنُهُمْ وَأَيْدِيهِمْ وَأَرْجُلُهُمْ بِمَا كَانُوا يَعْمَلُونَ ﴿٢٤﴾

on the Day their tongues, hands, and feet will testify against them for what they used to do.

— Dr. Mustafa Khattab, the Clear Quran

On a Day when their tongues, their hands and their feet will bear witness against them as to what they used to do.

— Saheeh International

The evil eye

In a hadith from Amrah from 'Aisyah, she said: "One time the Prophet PBUH enters a house. Suddenly he heard the cries of a child, then he said:

مَا لِيَصْبِيئُكُمْ هَذَا يَبْنِي، هَلَّا اسْتَرْقَيْتُمْ لَهُ مِنَ الْعَيْنِ

"Why are your child crying? Did you not find a person who could treat him from the influence of the evil eye?"

Musnad Ahmad (24442)

According to Ibn al-Qayyim, "The evil feeling of a person is the cause of 'ain disease not just the look he gives. Sometimes, even a blind person could cause this, when it is narrated to the blind person and he has evil feeling about it, then this could result in 'ain disease without him even look at the other person. There are numerous causes of 'ain disease just through narrations without looking." (See Zad al-Ma'ad, 4/149). This means, 'ain can happen just through one's feelings without looking such as through the television or pictures.

SENSE 2 : TASTE

TASTE-TACULAR TRIVIA

1. DISCERN CHARACTERISTICS OF SUBSTANCES
2. 2000-8000 TASTE BUDS WITH EACH 50-80 RECEPTOR CELLS
3. TASTE RECEPTOR CELLS REPORTS SENSE TO BRAIN

TASTE

The total flavour of food comes from the combination of taste, smell, touch, texture or consistency, and temperature sensations.

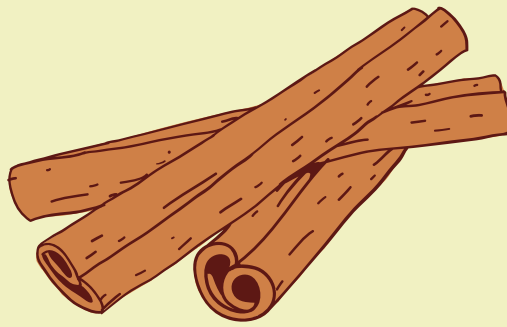
Taste buds are specialised sensory organs located on the tongue, as well as on the roof of the mouth and the back of the throat. Each taste bud contains clusters of taste receptor cells that are sensitive to different types of tastes.

taste receptor cells are responsible for detecting various taste stimuli. There are five primary taste sensations recognised by science:

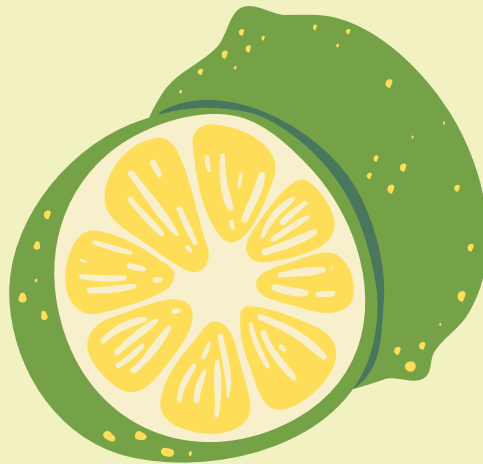
- **Sweet:** Often associated with sugars and carbohydrates, sweet taste signals the presence of energy-rich foods.
- **Sour:** Sour taste is typically associated with acidic substances, like citrus fruits or vinegar.
- **Salty:** Salty taste is triggered by the presence of sodium ions, which are important for maintaining electrolyte balance in the body.
- **Bitter:** Bitter taste can signal the presence of potentially harmful substances, such as alkaloids found in certain plants.
- **Umami:** Umami is a savory taste associated with the presence of glutamate, commonly found in foods like meat, cheese, and mushrooms.



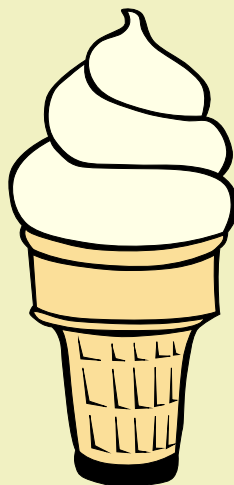
FLAVOURS WITH MOOD BOOSTING POWER



HELPING TO IMPROVE
CONCENTRATION AND
MEMORY



INCREASE ALERTNESS, ENERGY,
AND A SENSE OF WELL-BEING



EVOKES HAPPINESS AND RELAXATION

FLAVOURS ROLE IN HUMAN LIFE

Sweetness	to provide energy (source: carbohydrates such as starch)
Bitterness	to mitigate risk of ingesting toxic compounds from diverse fruits, plants, etc.
Sourness	to alert against microbiological contamination (food safety)
Saltiness	to provide essential minerals required for physiological functions
Umami	to ensure nutritional balance

Each flavour serves distinct roles in human life, influencing various aspects of nutrition, culture, and well-being.

Sweetness is associated with nutrition as sweet flavours are often associated with sugars and carbohydrates, which provide energy for the body's functions. They are also associated with enjoyment because sweet flavours are universally enjoyed and often associated with indulgence and pleasure, contributing to the enjoyment of desserts, fruits, and sweet treats.

Bitter flavours can alert us to the presence of potentially harmful substances in food, helping to prevent accidental ingestion of toxins. Additionally, many bitter foods, such as dark leafy greens, contain valuable nutrients and phytochemicals that contribute to overall health and wellness.

Sour flavours can stimulate saliva production and act as natural palate cleansers, refreshing the taste buds and preparing them for the next bite. They are also used to balance the richness of other flavours in dishes, adding brightness and acidity to savoury dishes and sauces.

Historically, salt has been used as a preservative to inhibit microbial growth and extend the shelf life of foods like cured meats, pickles, and fermented vegetables. Saltiness is also associated with sodium, an essential electrolyte that plays a critical role in fluid balance, nerve function, and muscle contraction. It enhances the flavour of foods and helps balance other flavours, making savoury dishes more palatable and satisfying.

Umami flavours are often described as savoury and satisfying, enhancing the depth and richness of dishes. Umami flavours are found in protein-rich foods such as meat, cheese, and mushrooms, signalling the presence of amino acids and contributing to the enjoyment of these foods.



ISLAMIC INPUT - TASTE

Alcohol Prohibition in Islam

يَا أَيُّهَا الَّذِينَ ءَامَنُوا إِنَّمَا الْخَمْرُ وَالْمَيْسِرُ وَالْأَنْصَابُ وَالْأَزْلَامُ رِجْسٌ مِّنْ عَمَلِ الشَّيْطَانِ فَاجْتَنِبُوهُ لَعَلَّكُمْ تُفْلِحُونَ ﴿٩٠﴾

O believers! Intoxicants, gambling, idols, and drawing lots for decisions¹ are all evil of Satan's handiwork. So shun them so you may be successful.

— Dr. Mustafa Khattab, the Clear Quran

Anas b. Malik reported: I was serving drink to Abu 'Ubaida b. jarrah, Abu Talha and Ubayy b. Ka'b prepared from unripe dates and fresh dates when a visitor came and he said: Verily liquor has been prohibited. Thereupon, Abu Talha said: Anas, stand up and break this pitcher. I stool up and (took hold) of a pointed stone and struck the pitcher with its lower part until it broke into pieces. (Sahih Muslim)

Non- alcoholic Beverages but Resembling Alcohol

- It is narrated from Ibn Umar R.Anhuma that the Prophet PBUH said:

مَنْ تَشَبَّهَ بِقَوْمٍ فَهُوَ مِنْهُمْ

“He who imitates any people (in their actions) is considered to be one of them.”

[Sunan Abu Dawud (4031), Ahmad (5114)(5115)(5667), Ibn Abi Syaibah in his Musannaf (19401), al-Tabarani in al-Mu'jam al-Awsath (8327), al-Baihaqi in Syu'ab al-Iman (1154) and al-Bazzar in his Musnad (2966)]

From the Special Discussion of the Fatwa Committee of the National Council for Islamic Religious Affairs Malaysia, which discussed the Issue of Alcohol in Food, Beverages, Fragrances, and Medicines on July 14th to 16th, 2011:

- Every alcoholic beverage contains alcohol. However, not all alcohol is liquor. Alcohol obtained from the process of making liquor is deemed forbidden (haram) and impure (najis).
- Light beverages processed/made not with the intention of producing liquor and containing alcohol below the level of 1%v/v are permissible (can be consumed).
- However, light beverages made with the same intention and method as the process of making liquor, whether containing a lot or a little alcohol or its alcohol being distilled, are forbidden (haram) to be consumed.
- Food or beverages containing flavourings or colourings containing alcohol for stabilisation purposes are permissible (can be used) if the alcohol is not produced from the process of making liquor and the quantity of alcohol in the final product is not intoxicating, with the alcohol content not exceeding 0.5%.



Among the interests of the Muslim community that need to be preserved in this matter can be seen as follows:

- Halal drinks placed in containers resembling liquor containers will cause confusion, thereby raising concerns that Muslims may inadvertently consume alcohol, thinking it is not alcohol.
- Halal drinks placed in liquor containers are likely intended as a marketing strategy to promote actual liquor, indirectly encouraging Muslims to engage in promoting the liquor industry by consuming such drinks.
- Parties intentionally producing drinks resembling liquor containers must have malicious intentions. Therefore, as a Muslim, one must refrain from consuming such products.



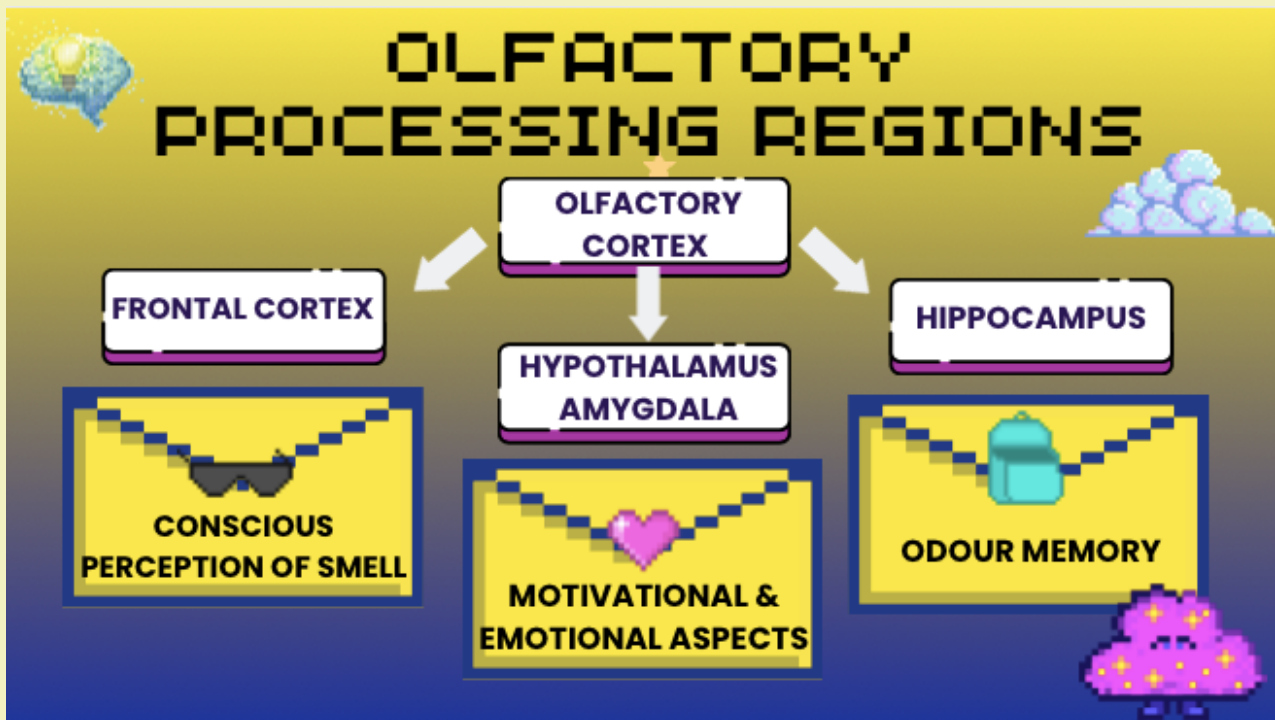
SENSE 3 : SMELL

SCENT-SATIONAL SNIPPETS

1. PHYSIOLOGY OF SMELL
2. MEMORIES AND MOOD BOOSTER
3. SAFETY MECHANISM

SMELL

The sense of smell, also known as olfaction, is one of the five primary senses and is responsible for detecting and interpreting odours in the environment. It plays a crucial role in our perception of flavor, our ability to detect potential dangers such as spoiled food or harmful chemicals, and our emotional responses to various scents.



Physiology

The orbitofrontal cortex receives inputs from the olfactory bulb and other sensory regions of the brain. It integrates this olfactory information with inputs from other sensory modalities, such as taste, vision, and touch, to create a coherent and multimodal representation of the sensory environment. It is also involved in making perceptual judgments and evaluations about odours. It helps us identify and categorise different smells, assess their pleasantness or unpleasantness, and make decisions based on our olfactory experiences.

The hypothalamus and amygdala play complementary roles in processing the motivational and emotional aspects of smell. While the hypothalamus regulates physiological responses and determines the motivational significance of odours, the amygdala evaluates the emotional significance of smells and coordinates emotional responses, influencing behavior and memory formation.

The hippocampus plays a central role in the encoding, consolidation, and retrieval of odour memories by integrating olfactory information with spatial, contextual, and emotional cues. Its contributions help us form rich and multi-dimensional odour memories that contribute to our sense of identity, emotional well-being, and connection to the world around us.

Memories

Engen and Ross (1973) found that people can remember scent with 65 % accuracy after one year compared to visual recognition (Shepard 1967) with 58% after 4-months.

وَلَمَّا فَصَلَتِ الْعَيْرُ قَالَ أَبُوهُمْ إِنِّي لَأَجِدُ رِيحَ يُوسُفَ لَوْلَا أَنْ تُفَنِّ دُونَ

Meaning: "When the caravan had left (from Egypt and entered Palestine), their father said, "Indeed I smell Yusuf if you do not accuse me of being weak of mind."

(SURAH YUSUF VERSE 94)

Mood Booster

Smell has a powerful influence on mood and emotional well-being through its effects on brain chemistry, memory recall, stress reduction, and sensory enjoyment. By incorporating pleasant scents into our environment and daily routines, we can harness the mood-boosting benefits of smell to enhance our overall quality of life.



Safety Mechanism

Smell serves as a vital safety mechanism, helping us detect and respond to potential dangers in our environment. Our sense of smell can alert us to the presence of hazardous substances such as smoke, gas leaks, or spoiled food. Certain odours, such as the smell of rotten eggs (indicative of a gas leak) or the acrid odour of smoke, can signal immediate danger and prompt us to take swift action to protect ourselves and others.





ISLAMIC INPUT - SMELL

According to Imam Ibn Al-qayyim rahimatullah:

Fragrances are food for the soul. While the soul is a source of strength. And strength can be enhanced with the help of fragrances, because they are useful in stimulating the brain and heart, as well as all the internal organs of the body. Fragrance can make the heart happy, soothe the soul and refresh the inner spirit....

SENSE 4 : HEARING

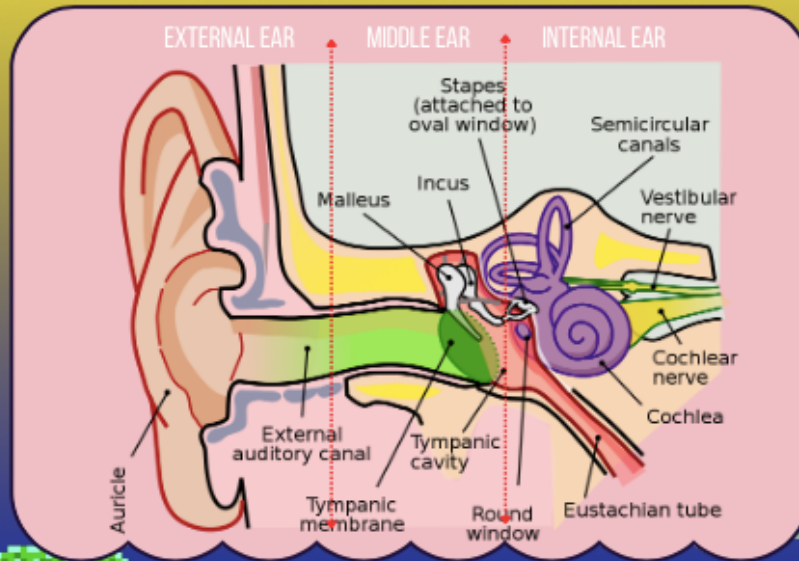
EAR-RESISTIBLE FACTS

1. ANATOMY OF THE EAR
2. HOW DO WE HEAR?
3. DIFFERENTIATING SOUNDS

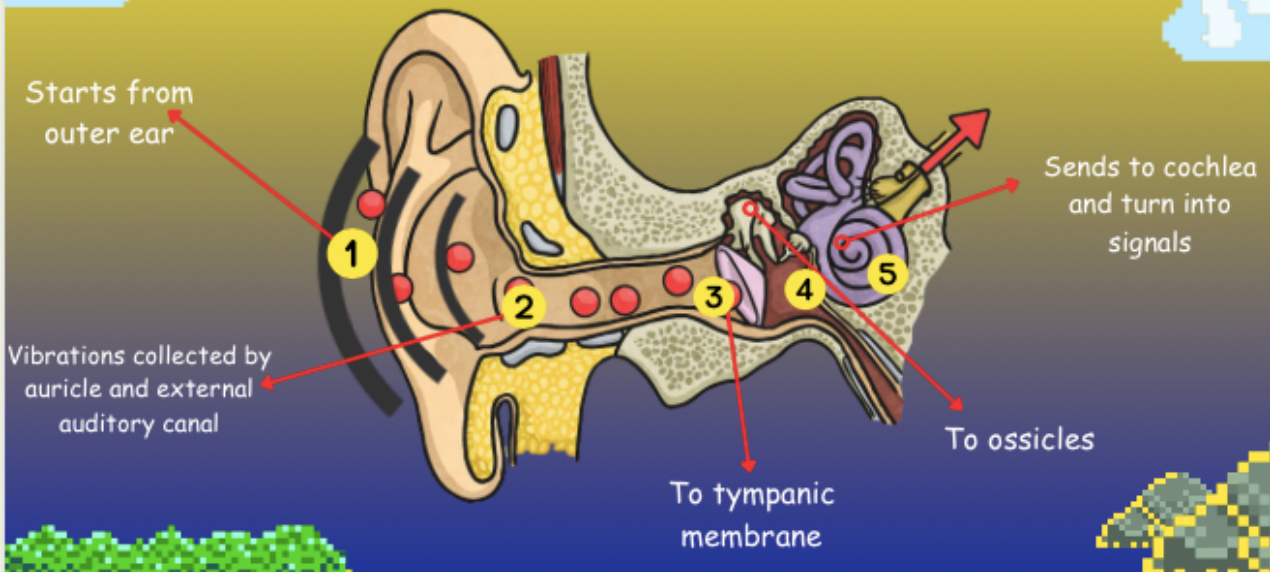
HEARING

The sense of hearing, also known as auditory perception, is one of the primary senses that allows us to perceive sound. It enables us to perceive sound waves in our environment. Sound waves are produced by vibrating objects and travel through the air or other mediums as compressional waves. When these waves reach our ears, they cause the eardrum and other structures in the inner ear to vibrate, triggering nerve impulses that are sent to the brain for processing.

ANATOMY OF THE EAR



HOW DO WE HEAR?



Once sound signals reach the brain, they are processed in the auditory cortex, located in the temporal lobe. The brain analyzes various aspects of sound, including pitch, volume, timbre, and spatial location, to create our perception of auditory stimuli. This processing allows us to distinguish between different sounds, understand speech, and interpret the meaning of music and other auditory cues.

DIFFERENTIATING SOUNDS

Sound is expressed with different measures of pitch, loudness, and other qualities to compose the timbre, which is the overall quality of the sound. The brain integrates information from multiple sensory cues to differentiate and interpret the complex auditory environment around us.

The pitch of a sound is measured in Hertz (Hz). Higher frequencies generally correspond to higher pitches, and lower frequencies correspond to lower pitches. Our ears are sensitive to a range of frequencies, allowing us to perceive a wide variety of sounds.

The loudness or intensity of a sound is measured in decibels (dB). Greater amplitude corresponds to louder sounds.

Timbre refers to the quality or character of a sound that distinguishes it from other sounds with the same pitch and loudness. It is influenced by factors such as the harmonics and overtones present in a sound, as well as its duration and envelope (how the sound changes over time).



ISLAMIC INPUT - HEARING

The earliest Revelation to the Holy Prophet (pbuh) consisted of the first five verses of Surah Al-Alaq, in which it had been Said: "Read (O Prophet), in the name of your Lord, Who created: created man from a clot of congealed blood. Read: and your Lord is Most Generous, Who taught knowledge by the pen, taught man what he did not know." (Surah Al-Alaq, 1-5)

قُلْ مَنْ يَرْزُقُكُمْ مِنَ السَّمَاءِ وَالْأَرْضِ أَمَّنْ يَمْلِكُ السَّمْعَ وَالْأَبْصَارَ

"Say: Who is that sustains you (in life) from the sky and from the earth? Or who is it that has power over hearing and sight?" [The Holy Qur'an, Yunus 10:31]

إِنَّ السَّمْعَ وَالْبَصَرَ وَالْفُؤَادَ كُلُّ أُولَئِكَ كَانَ عَنْهُ مَسْئُولًا

"Surely the hearing and the sight and the heart, all of these, shall be questioned about that." [The Holy Qur'an, al-Israa 17:36]

Allah hears and knows everything we do, hence we will be questioned on everything that we hear. Hearing is mentioned 135 times in the Quran. About 38 times mentioned before the sense of seeing.

Tafheem ul Quran

Surah 5 Al-Ma'idah, Ayat 7-7

وَاذْكُرُوا أَنْعَمَ اللَّهُ عَلَيْكُمْ وَمِيثَاقَهُ الَّذِي وَاثَقَكُمْ بِهِ إِذْ قُلْتُمْ سَمِعْنَا وَأَطَعْنَا وَأَتَّقُوا
اللَّهَ إِنَّ اللَّهَ عَلِيمٌ بِذَاتِ الصُّدُورِ (5:7)

(5:7) Remember Allah's favour upon you²⁸ and His covenant which He made with you when you said: 'We have heard and we obey.' So do fear Allah. Allah has full knowledge even of that which is hidden in the breasts of people.

The use of hearing is also to hear and obey Allah Ta'ala and the rightful leaders.

SENSE 5 : TOUCH

SENSORY SURPRISES

1. TOUCH CANNOT BE TURNED OFF
2. FINGERPRINT FUNCTION
3. CONNECTION WITH AFFECTION

TOUCH

Touch sensation, also known as tactile perception, is the ability to sense and interpret stimuli that come into contact with the skin. Specialised nerve endings in the skin called mechanoreceptors detect mechanical stimuli such as pressure, vibration, stretching, and indentation. When a mechanical stimulus activates a mechanoreceptor, it generates an electrical signal that travels along sensory nerve fibers to the spinal cord and then to the brain. In the brain, the signals from mechanoreceptors are processed and integrated in various regions of the somatosensory cortex. Different aspects of touch sensation, such as pressure, texture, temperature, and pain, are processed in different regions of the cortex.

Touch cannot be turned off

Touch is a constant aspect of our sensory experience, and while we can't completely turn it off, our brains do have mechanisms to modulate our perception of touch. Our brains have the ability to focus attention on specific sensory inputs while filtering out others. By directing our attention away from touch stimuli, we can effectively reduce their perceived intensity or importance.

Mechanoreceptors in the skin can also adapt to sustained stimulation, leading to a decrease in their response over time. This adaptation process helps prevent sensory overload from continuous touch stimuli.

Fingerprint function

The unique patterns of ridges, whorls, and loops on each person's fingertips make fingerprints an effective biometric identifier. Law enforcement agencies, border control, and various other organisations use fingerprints for security and identification purposes. Fingerprints also play a role in touch sensation. Fingertips are densely packed with sensory receptors, including mechanoreceptors, which detect mechanical stimuli such as pressure, texture, and vibration. The unique patterns of ridges and valleys on fingerprints help amplify these sensory signals, allowing us to perceive and discriminate between different textures and shapes with precision.



Connection with affection

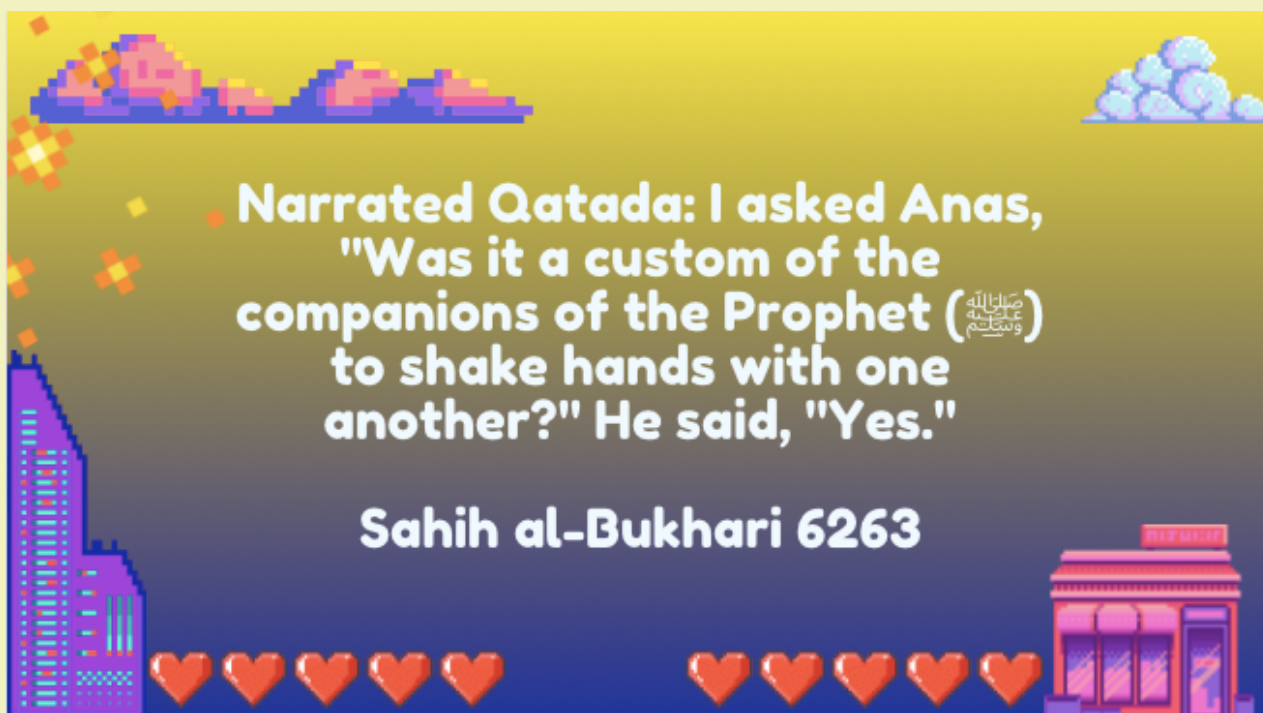
Touch is one of the primary ways through which humans express and receive affection, and it plays a crucial role in social bonding, emotional regulation, and overall well-being.

Oxytocin, often referred to as the "love hormone" or "bonding hormone," is released in the brain in response to various forms of physical affection, including touch. Oxytocin promotes feelings of trust, empathy, and attachment, and it helps strengthen social bonds between individuals. Touch can also convey a wide range of emotions, from love and comfort to support and reassurance. A hug, a gentle caress, or holding hands can communicate feelings of affection, warmth, and connection without the need for words.

In infancy, touch is essential for the development of secure attachment between infants and caregivers. Babies who receive ample affectionate touch tend to develop a stronger sense of security and trust in their relationships with others.



ISLAMIC INPUT - TOUCH



Abu Huraira reported: The Messenger of Allah, peace and blessings be upon him, said, **"Verily, when the Muslim shakes hands with his brother, both of their sins fall away like the falling of leaves from a tree."**

Source: Musnad al-Bazzār 8335



SENSE 6 : PROPRIOCEPTION

PROPRIOCEPTION

Proprioception, often considered the "sixth sense," refers to the body's ability to sense its own position, movement, and orientation in space without relying on external stimuli. While it's not traditionally recognized as one of the five classical senses (sight, hearing, taste, smell, and touch), proprioception plays a crucial role in our daily activities and spatial awareness.

INSIGHT

The author of the book "Tuhfat-Al-Ahwadi" said: "The insight is of two kinds: - The first kind is of the meaning of the Hadith, which is what Allah puts in the hearts of the people whom He loves. Thereafter, they know the conditions of people by the miracles which Allah blessed them with, the insight and vision. The second kind is what is concluded from experience, conduct and good manners; by which we know the conditions of people as well."

CONCLUSION



MINDFULNESS

Mindfulness allows us to fully engage with each sensory encounter. By cultivating present-moment awareness, we deepen our connection to the richness of life's sensations, finding solace and joy in the simple yet profound experiences that surround us.

BE DILIGENT

Through keen observation, attentive listening, and empathetic touch, we decipher cues of the human body, guiding our diagnoses and treatments with precision and compassion.

BE GRATEFUL TO ALLAH

Each sense is a divine gift, bestowed upon us to experience the wonders of His creation, therefore we should find cause for gratitude to Allah in every sensory encounter.



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