

FOOD SCIENCE AND TECHNOLOGY

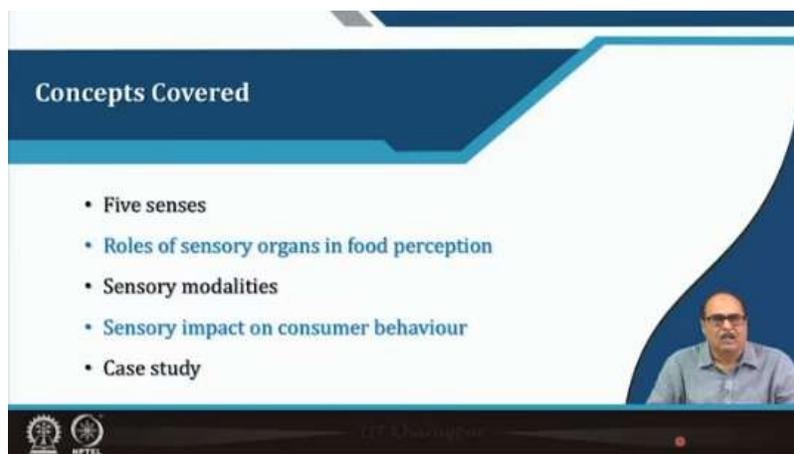
Lecture16

Lecture 16: Significance of Sensory Organs

Hello everyone. Namaskar. Now we are starting the fourth module and the 5th lecture of this module will be devoted to various sensory attributes of foods, where we will discuss what are the various sensory attributes, how this sensory perception of the food, how we analyze the food sensory or organoleptic evaluation and so on.



So, in this first lecture of the fourth module, lecture 16. We will talk about the significance of sensory organs.



We will discuss the five senses, the roles of sensory organs in food perception, sensory modalities, and sensory impact on consumer behaviour and finally, we will also take one or two case studies.

Five senses

- Eating is not just about nourishment; it's an experience shaped by our senses.
- The five primary senses play a vital role in shaping our overall sensory perception of food.
- Each sense has its unique role in gathering sensory information about food.

Diagram illustrating the five senses: Sight, Smell, Taste, Touch, and Hearing, all contributing to the overall food experience.

- **Five senses - Sight, Smell, Taste, Touch, and Hearing - work together to shape our overall food experience.**
- Each sense has its own function in getting information of the sensory attribute.

So, let us talk about five senses you know that is appearance, color, taste, feel, sound etcetera. These are the five senses that are sight, smell, taste, touch and hearing, and they work together to shape our overall food experience. Each sense has its own function in getting information attributes, which we call sensory attributes of the food or organoleptic attributes of the food.

Complexity in food preferences

- ❖ Consider the two potato chips have been served. How do a person would prefer one?
- **Seeing the chip:** May be you notice if it has any dark/burnt spots/masala sprinkled on it?
- **Touching it:** May be you feel if it is greasy or thick or thin/hard/soft?
- **Smelling it:** May be you smell the seasoning or the oil it was fried or baked in?
- Tasting the flavour or saltiness and hearing crunchiness during eating.
- ❖ **Why sensory evaluation matters?**
- Sensory evaluation helps identify what consumers like and dislike, guiding product formulation.
- It plays a crucial role in developing new products and maintaining consistent quality.

So, you will agree with me that eating is not just about nourishment; it is an experience saved by our senses, and the five primary senses play a vital role in shaping our overall sensory perception of food. Consider two potato chips that have been served. So, how would a person prefer one that is there are like in the pictures also there are three. So, in two forms in the two shapes, etcetera maybe you have seen the chip. By seeing it, maybe you notice that if it has any dark or burnt spots, whether masala is sprinkled in it, it is proper

sprinkling or not, how it looks like. All these things, there are various questions which come to your mind. Then, you will also like to touch it. That is by touching, you feel if it is greasy or thick or thin, hard or soft, sometimes you break it. Then even you like to smell, be it is smelling the seasoning which has been put on it or whether you are getting any oil smell or that is whether it was baked there was any smell of roasting etcetera. Then, finally, you also like to taste the flavour or saltiness and hear crunchiness while eating. When you cut, the cracking sound, it comes, and many times, you enjoy these things. So, these are either by seeing or by touching, smelling, eating, hearing sounds, etcetera; we have our own perception of food and its quality. So, why sensory evaluation matters because sensory evaluation helps identify what consumers like and what they do not like and it guides the product formulation. In fact, in most of the food industry, to put the product into the market, these sensory characteristics are the prime concern. It plays a crucial role in developing a new product and maintaining its consistent quality.

Role of sensory organs in food perception

- **Taste (Gustation)**
Tongue and taste buds.
- **Smell (Olfaction)**
Nose and olfactory receptors.
- **Sight (Vision)**
Eyes and their role in food appearance.
- **Touch (Tactile)**
Skin and mouthfeel.
- **Hearing (Audition)**
Ears and the perception of food sounds.

<https://youtu.com/watch?v=...>

So, the role of the five sensory organs in the food perceptions like taste that is your tongue and taste buds on the tongue they decide that is the gestation of the food. Then, smell like olfaction where the nose and olfactory receptors are present. There, they do their role in sight or vision where eyes. and their role in the food appearance, then finally, touch, tactile, skin and mouth feel and finally, hearing or addition, ears and the perception of the sound. So, these are the five senses and their role in food perceptions.

□ Eyes : Sense of sight

- The primary "filter" for consumer acceptance, as visual appeal often dictates first impressions.
- Eyes perceive visual attributes such as color, shape, size, and texture, playing a key role in food evaluation.
- They process approximately 256 unique characteristics, contributing to 80% of human learning.
- Capable of capturing over 50 images per millisecond, enabling rapid assessment of food attributes.
- Crucial for distinguishing food quality through visual cues like color, shape, and surface texture (roughness).




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So, again, let us elaborate a little bit one by one, then yes, that is the sense of sight. The primary filter for consumer acceptance is visual appeal, which often dictates the first impression; when you go to the market shop shelf, you see any product. So, the first impression about the product we see by eyes is the sense of sight. Eyes perceive visual attributes such as colour, shape, size and texture and play a key role in the food evaluation process. Many times, we decide on our impression; we take it and do not take it at first, and they eyes process approximately 256 unique characteristics contributing to 80 per cent of human learning. They are capable of capturing over 50 images per millisecond, enabling rapid assessment of food attributes. They are crucial for distinguishing food quality through visual cues like colour, shape, surface texture, roughness, etcetera.

□ Nose : Sense of smell

- Smell acts as second "filter" in food acceptance, following visual cues.
- Evaluated through three key characteristics: **Intensity, Persistence, and Saturation capacity.**
- The nose contains protein receptors that detect odors.
- Humans can distinguish over 1 trillion different odors.
- Humans possess over 400 distinct olfactory receptors for detecting various smells.
- Aging can reduce the ability to smell, a condition known as hyposmia.




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Then the nose, which is the sense of smell, is a second filter in food acceptance following visual cues. These are evaluated through three key characteristics like intensity, persistence and saturation capacity. The nose contains protein receptors that detect the odours and humans can distinguish over 1 trillion different odours. humans possess over 400 distinct

olfactory receptors for detecting visual smell. Ageing, however, can reduce the ability to smell, and that is a condition which is known as hyposmia.

Tongue : Sense of taste

- Taste is the third critical filter in food acceptance, allowing us to perceive a wide range of flavors.
- The human tongue detects five primary tastes: sweet, salty, sour, bitter, and umami.
- Food texture, perceived through both touch and sight, significantly contributes to the overall taste experience.
- Spicy sensations, often felt as heat, are actually pain signals triggered by receptors.
- Taste and smell work closely together, making it difficult to fully perceive flavors when the sense of smell is impaired, such as during a stuffy nose.

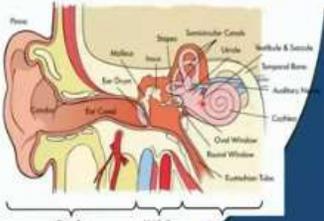




Then, the tongue, which is the sense of taste, and is the now third critical factor after that is the eye and nose that is taste. We taste only after that once we are sure that is by looking at it by smelling at it. If you find it is good, then only we go for a tasting. It filters the food excrement, allowing us to perceive a wide range of flavours. The human tongue detects five primary tastes that are sweet, salty, sour, bitter or even umami taste. Food texture perceived through both touch and sight significantly contributes to the overall taste experience. Spicy sensations, often felt as heat, are actually pain signals triggered by these receptors when it is very hot. Taste and smell work closely together making it difficult to fully perceive flavor. Means flavor is that joint appreciation by our nose as well as taste buds. Nose receptors and taste buds are taken as perceived as a flavour when the sense of smell is impaired, such as during a stuffy nose, then, you will get different types of flavour. But when both sense a smell and taste tongue, they are working perfectly, you can perceive the food flavour.

Ear : Sense of hearing

- The ear, a spiral-shaped organ, not only enables us to hear but also plays a crucial role in maintaining balance.
- In the context of food, hearing enhances the sensory experience by detecting auditory cues, such as the crispness of a chip or the sizzle of a steak, which contribute to our perception of texture.
- Hearing loss, often due to aging or medical conditions, affects millions in India, especially the elderly.
- By interpreting vibrations in the air, the ear helps us perceive sounds that are integral to the overall enjoyment and assessment of food.



<https://nptelproject.com/modules/sensation-and-perception>



The ear that is the sense of hearing because see here that ear it is a spiral-shaped organ not only enables us to hear but also plays a crucial role in maintaining a balance. In the context of food, hearing enhances the sensory experience by detecting auditory cues, such as the crispiness of a cheek or the sizzle of a stick, which contribute to our perception of texture. Hearing loss, often due to ageing or medical complications medical conditions affects millions in India, especially elderly persons, by interpreting vibrations in the ear. The ear helps us receive or perceive sounds that are integral to the overall enjoyment and assessment of food.

Overview of sensory modalities

- Sensory modalities refer to the different channels through which sensory information is received or perceived from the environment.
- In food science, these modalities include visual, auditory, tactile, olfactory, and gustatory senses.

Visual Auditory Tactile Olfactory Gustatory

- Each modality responds to specific stimuli generated by food products and has distinct neural pathways that carry these stimuli to the central nervous system, forming part of a broader sensory input.
- This sensory input is then integrated with other incoming data and stored memories to assess food qualities.

The slide features a diagram of a human head with icons for the eye, tongue, nose, hand, and ear connected to the brain. A small inset video shows a man speaking.

So, let us talk about sensory modalities that let us take an overview of the five senses. The sensory modalities refer to the different channels through which this sensory information is received or perceived from the environment. So, in food science, these modalities include visual, then auditory, tactile, olfactory and gustatory. Each modality responds to specific stimuli which are generated by food products and has distinct natural pathways that carry stimuli to the central nervous system forming a part of the product sensory attributes sensory inputs are all these organs that take their input and that input is sent to our central nervous system or brain system where this computer human computer natural computer that we have it works and that is the read as the things and decides its own impression and then further sends the signal. It processes the data which has been sent by these sensory receptors. So, this sensory input is integrated with the other incoming data and stored memories to assess the food quality finally.

❖ **Visual modality**

- Involves perceiving and interpreting information by visually observe the food , such as color, movement, and shape.
- Different components of the eye, including the retina, optic nerve, and visual cortex in the brain are involved in receiving and interpreting visual data.

Types of visual modalities during sensory of food

Form perception	Color perception	Texture perception
Recognizing and distinguishing different figures and shapes through contrast, edges, and orientation of foods.	Identifying and differentiating colors of food through variations in the frequency of electromagnetic waves reaching our eyes.	Ability to detect roughness, smoothness, hardness, and solidity of food products.



So, let us talk about visual modality. It involves perceiving and interpreting information by visually observing the food, such as its colour, movement, shape, etcetera and different components of the eye, including the retina and optic nerve. and the visual cortex in the brain is involved in receiving and interpreting visual data. The types of visual modalities during the sensory evaluation of food include the form of perception like recognizing and distinguishing different figures and shapes that contrast edges and orientation of food. They form colour perception, like identifying and differentiating colours of food through variations in the frequency of electromagnetic waves reaching our eyes, and they also decide the texture perception, like the ability to detect roughness, smoothness, hardness, and solidity of the food products.

❖ **Auditory modality**

- This modality pertains to sound perception, which involves recognizing the pitch, volume, and timbre during eating a food.
- Auditory canal, cochlea in the ear, and auditory cortex are used to processes auditory signals received by specialized hair cells within our ears.

Types of auditory modalities during sensory of food

Pitch perception	Timber perception	Loudness perception
Involves identifying varying frequencies or tones generated during biting food product, differentiating soft, hard or crispy food products	Helps in designing food according to tones, characters and harmonic overtones of surroundings	Determine whether the biting sound is loud or quiet by noticing changes in its amplitude or volume



The auditory modality. It pertains to sound perception, which involves recognizing the pitch, volume and timbre while eating food. The auditory canal or cochlea in the ear and auditory cortex are used to process auditory signals received by specialized hair cells within our ears at the types of modalities that are which are this auditory use or the pitch perceptions that involve identifying varying frequencies. For tongues generated during

biting food products differentiating soft, hard or crispy food products. Then, timber perceptions help in designing the food according to tones, characters and harmonic overtones of surroundings. Loudness perceptions determine whether the biting sound is loud or quiet for noticing changes in amplitude or volume.

❖ **Olfactory modality**

- Associated with detecting various scents and smells through receptors in our nose's olfactory membrane, known as olfactory epithelium cells.
- Can detect long-chain hydrocarbon molecules indicative of fragrances or different odors.

Types of olfactory modalities during sensory of food

Odour identification	Odour contrast	Odour memory	Odour perception
Matches smells to a database of known odors.	Differentiates similar or differently fragrant molecules based on molecular structure.	Recalls familiar smells by forming long-term associations in the brain.	Assesses scent strength, pleasantness, or intensity based on scent molecule concentration.



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Olfactory modalities are associated with detecting various scents and smells through perception or through receptors in our nose. The olfactory membranes are known as olfactory epithelium cells. They can detect long-chain hydrocarbon molecules indicative of fragrances of different odours. So, the various types of olfactory modalities include odor identification which matches a smell to a database of known odors. Odour contrast differentiates similar or different fragrance molecules based on molecular structures. Then, odour memory, that is, it recalls familiar smells by forming long-term associations in the brain and odour perception, that is, assesses scent strength, pleasantness or intensity based on scent molecule concentration.

❖ **Gustatory modality**

- Taste buds on tongue's surface detect chemical compounds by binding to specific receptor cells.
- These receptors allow us to identify flavors such as sourness and sweetness during eating or drinking.

Types of gustatory modalities during sensory of food

Sweet	Sour	Salty	Bitter
Discriminates sugary substances like glucose or fructose, creating a pleasant mouthfeel and alluring aroma.	Recognizes acidic substances like vinegar or citrus, and providing a refreshing sensation.	Detects sodium chloride and other ions, resulting in either pleasurable or unpleasant tastes.	Identifies bitterness, as in quinine found in tonic water, which can overpower added sweeteners.



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Gustatory modalities involve the taste buds or tongue surface and this detects chemical compounds by binding to specific receptor cells. These receptors allow us to identify flavours, such as sourness and sweetness, during eating or drinking. So, the types of gustatory modalities include sweet, which discriminates sugary substances like glucose or fructose, creating a pleasant mouth feel and an alluring aroma; sour, which recognizes acidic substances like vinegar or that is citrus and provides refreshing sensations. Salty detects sodium chloride and other ions resulting in either pleasurable or unpleasant taste. Then bitter identified bitterness as in quinine found in tonic water which can overpower salted sweetness etcetera.

❖ **Tactile modality**

- Involves in detecting sensations such as warmth, coldness, tenderness, hardness, and softness.
- Sensations can produce from any part of food that comes into contact with your skin.

Types of tactile modalities during sensory of food

Pressure perception	Vibration perception	Texture perception
Involves sensing whether the food product is hot or cold when touched.	Detects oscillations generated during eating or drinking through sensors under the skin.	Identifies objects with varying levels of smoothness, roughness, or hardness using sensors in the fingertips.

The slide also features a small inset video of a man speaking in the bottom right corner and logos for IITM and NPTEL at the bottom left.

Then tactile modality involves detecting sensations such as warmth, coldness, tenderness, hardness, softness, etc. Sensation can provide they can produce from any part of the food that comes in contact with your skin. So, the type of tactile modalities includes pressure perception, which involves sensing whether the food product is hot or cold when touched. Vibration perception detects oscillations generated during eating or drinking through sensation under the skin, like when you take a sip, whether it is hot or very cold, you get the perceptions vibrations, etcetera. Then texture perceptions identify objects with varying levels of smoothness, roughness, or hardness using sensors in the fingerprints, that is, whether it is hard or tough or very smooth food and all those things.

How do sensory modalities work?

- The generation of sensation typically involves four key events
 - (a) *Stimulation of sensory receptor:* A specific stimulus activates a sensory receptor.
 - (b) *Transduction of stimulus:* The stimulus is converted into an electrical signal.
 - (c) *Generation of nerve impulses:* The electrical signal triggers nerve impulses.
 - (d) *Integration of sensory input:* The brain processes and integrates the sensory information.
- A particular stimulus can activate a specific sensory receptor, while others remain dormant, a process known as selectivity.
- Adaptation is another critical feature of sensory receptors, where the response to a constant or sustained stimulus decreases over time. For instance, consuming food with extra salt may initially taste very salty, but over time, same level of saltiness may no longer be perceived as intensely.



Then, let us talk about how these sensory modalities work. So, what do they do that the generation of sensation typically involves 4 key events? Number one, stimulation of sensory receptors and a specific stimulus activates a sensory reception. When you come in contact with any food, whether you see, whether you touch, whether you eat, etc., then the first thing is the stimulation of the sensory receptors. The second is the transduction of stimulus, which means the stimulus is converted into electrical signals, and these electrical signals trigger nerve impulses that generate nerve impulses, and then this is followed by the integration of sensory input means, the brain processors process and integrate the sensory information, which is sent by these nerves, etcetera. So, a particular stimulus can activate specific sensory receptors while others remain dormant, and this is a process known as selectivity because most of these stimulator stimuli are selective. Adaptation is another critical feature of sensory receptors where the response to a constant or sustained stimulus decreases over time. For instance, consuming food with extra salt may initially taste very salty, but if you are continuing to take such a type of food regular basis on a regular basis, then the same level of saltiness may no longer be perceived as intensely. So, because your taste buds get used to it. It is very important to understand how these senses impact the sensory organs or sensory perceptions and how they impact consumer behaviour. This is very important in food marketing etcetera and food selection in eating and all those things even daily consumer this is very important.

Sensory impact on consumer behaviour

- The sensory attributes of food - such as appearance, aroma, taste, texture, and sound - play a crucial role in shaping consumer behavior.
- Connecting all five senses is essential to influencing consumers' perceptions and judgments.
- These sensory attributes affect not only the immediate eating experience but also long-term consumer preferences, purchasing decisions, and brand loyalty.
- A memorable sensory experience can deepen a consumer's connection to a product, enhance satisfaction, and shape overall attitudes and behaviors.
- Additionally, consumer behavior toward a food product is influenced by social, cultural, personal, psychological, and economic factors.





So, these sensory attributes of food, such as appearance, aroma, texture, taste and sound, play a crucial role in shaping consumer behaviour. Connecting all five senses is essential to influencing consumer perceptions and judgments. These sensory attributes affect not only the immediate eating practices, but also long-term consumer preferences even the decision to purchase a food whether many times we become used to specific brands etcetera, that is brand loyalty etcetera all those things it is all based on the sensory attributes that is we create your own idea about the food. So, a memorable sensory experience can deepen a consumer's connection to a product, enhance satisfaction and shape overall attitude and behaviours. Additionally, consumer behaviour towards a food product is influenced by social, cultural, personal, physiological and economic factors.

Consumer behaviours on appearance of food

❖ **Visual appeal**
Color, shape, and presentation influence perceptions of quality and freshness.



❖ **Shape and presentation**
Well-presented food is perceived as tastier and more desirable.



❖ **Brand recognition**
Consistent packaging reinforces brand identity and aids consumer choice.



❖ **Size and portion**
Larger portions seem more valuable; smaller portions may be viewed as healthier or premium.






So, if you discuss, we want to learn that consumer behaviour and the appearance of food, like visual appeals like colour, shape and presentation, influence the perception of quality and freshness. Then shape and presentation of how the food is presented on the table, how the food is presented in the shop, that is again that is it well presented food is perceived as a tastier and more desirable people go for it. Then brand recognition, like consistent

packaging, reinforces brand identity and aids in the consumer choice and also the size and portion. Larger portions are seen as more valuable, whether a smaller portion may be viewed as healthier or premium brands, etcetera. So, that is the appearance of the food and how we perceive how our behaviour changes.

❖ Consumer behaviours on aroma of food

- Appetite stimulation**
The smell of food triggers hunger and cravings, often leading to impulse purchases.
- Memory and emotion**
Scents evoke memories and emotions, influencing consumer choices, especially in nostalgic marketing.
- Taste perception**
Aroma enhances flavor perception; pleasant smells improve the experience, while unpleasant ones deter it.

The slide features three circular icons: a plate of food, a head with a brain, and a person smelling a flower. A small video inset shows a man speaking.

Then the consumer behaviour and aroma of the food, like, there may be appetite stimulation if you are going many times, there are some good restaurants, and you are getting good flavour and good aroma nearby, you get tempted to eat. So, appetite stimulation the smell of food triggers hunger and cravings, often leading to impulse purchases. Then, memory and emotion-like sense. evoke memories and emotions influencing consumer choices, especially in nostalgic marketing then finally the taste perception aroma enhances flavour perceptions pleasant smell improves the experience while an unpleasant smell once does not that is if you take and, the flavour is not good smell is not good you will not like to take that food you will not like even go to those areas where that some unpleasant smell is coming off the food.

❖ Consumer behaviours on taste of food

- Flavour preference**
Preferences for sweetness, saltiness, sourness, bitterness, and umami vary widely, making products aligned with these preferences more successful.
- Repeat purchases**
A positive taste experience drives brand loyalty, leading to repeat purchases.
- Health Perception**
Taste influences perceived healthiness; foods that taste fresh or less processed are often seen as healthier, regardless of actual nutritional value.

The slide includes an illustration of a hand holding a smartphone displaying food images. A small video inset shows a man speaking.

Then, consumer behaviour on the taste of the food is like there are three things: flavour preferences, repeat purchases and even health perception. These are the three things like the flavour preferences preferences for sweetness, saltiness, sourness, bitterness, and umami flavour varies widely, making products aligned with these preferences more successful. Then, repeat purchases if the flavour is good; a positive taste experience tries brand loyalty, leading to repeat purchases. If you have liked one food in like it is obvious, we go to one restaurant and you find the paid food tasty we like to go there again and again. So, that is the go-for even if we buy the food again and again if we like the taste of that particular food. So, then also the health perceptions the taste influences perceived healthiness the food that tastes fresh and less processed is often seen as healthier regardless of actual nutritional value because, many of the times we say yes if it is a tasty food, we see that yes, it is good. However, we do not know its nutritional value because to know the nutritional value, you need to go to the lab and analyze it, or you read at the level, but if it is tasty, people see that yes, it is tasty food, it should be healthier.

Consumer behaviours on taste of food (Contd..)

Mouthfeel	Texture - whether creamy, crunchy, chewy, or smooth - directly affects consumer satisfaction, enhancing or diminishing the eating experience.	
Product differentiation	Unique textures can differentiate products in crowded markets, influencing consumer choices.	
Perceived freshness	Texture signals freshness; for example, the crispness of vegetables or the softness of bread indicates quality.	





Then similarly, mouthfeel the mouthfeel, that is, the texture, whether creamy, crunchy, chewy or smooth, directly affects consumer satisfaction, enhancing or diminishing the eating experience. Then, product differentiation, that is, unique texture, can differentiate products in crowded markets, influencing consumer choices that is it like there are many such brands, and many brands have made their unique texture of the food unique taste of the food. So, in any crowded market, the person goes to the person who likes to take that food. So, then perceived freshness also texture signals freshness. For example, the crispiness of vegetables or the softness of a brand indicates its quality and so on.

❖ **Consumer behaviours on sound of food**

Auditory cues	<ul style="list-style-type: none"> The sounds associated with food, such as the crunch of chips or the sizzle of a steak, enhance the sensory experience and make food more enjoyable. These sounds are often linked to specific qualities like freshness or crispiness.
Marketing appeal	<ul style="list-style-type: none"> Sound is a powerful tool in marketing, particularly in commercials, where the auditory elements of food preparation or consumption are used to attract and engage consumers.



Potato chips



Sizzler




Then, the consumer behaviours and the sound of the food, like auditory cues, the sounds associated with food, such as the crunch of the chips or the sizzle of his teeth, enhance the sensory experience and make food more enjoyable if you like to enjoy that eating. These sounds are often linked to specific qualities like freshness or crispiness etcetera. For if you have crackers, etcetera, if it is crisp means, it is good in quality, and if it does not give that sound, that is if it is moist, it has gained moisture, etcetera, it has become soft. So, that does not mean you will not like to eat that. Similarly, marketing appeal sound is a powerful tool in marketing that is particularly in commercials, where the auditory elements of food perception or consumers are used to attract and engage consumers like potato chips, sizzlers etcetera all those.

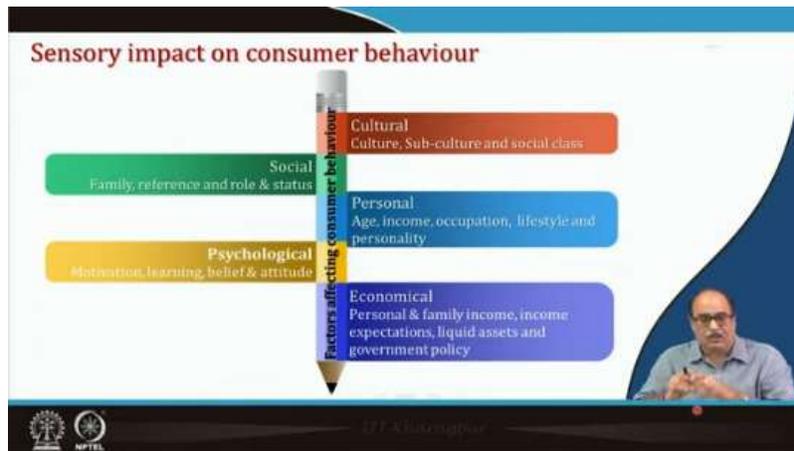
❖ **Consumer behaviours on implications of food**

Impulse buying	Sensory attributes like aroma and appearance can trigger impulse purchases, such as the smell of fresh coffee or the sight of a decorated cake.
Brand loyalty	Consistent delivery of pleasing sensory experiences builds brand loyalty, with consumers sticking to brands that meet their sensory expectations.
Willingness to pay	Consumers are often willing to pay more for products that offer superior sensory experiences, especially in premium segments where taste, texture, and presentation are crucial.
Product innovation	Understanding consumer preferences for sensory attributes drives innovation, leading to the development of new flavors, textures, or packaging that meet evolving desires.




Then, the consumer behaviours and implications, that is, how these taste buds influence the consumer behaviours and what are the effect or implications of food on consumer behaviour. Number one, you can say very importantly, impulse buying like sensory attributes like aroma and appearance can trigger impulse purchases such as the smell of fresh coffee or the sight of decorated cake, etcetera you can you are tempted to buy it. Then

brand loyalty, like consistent delivery of pleasing sensory experiences, builds brand loyalty, with consumers sticking to brands that meet their sensory expectations. Then willingness to pay like consumers are often willing to pay more willingness to pay, they are often willing to pay more for products that offer superior sensory experiences, especially in premium segments where taste, texture and presentation are crucial. Then, the product innovation that is understanding consumers' preferences for sensory attributes drives innovation, leading to the development of new flavours, textures or packaging that meet evolving desires.



So, the sensory effect is the consumer behaviours. Obviously, these factors that affect consumer behaviour are, wide-ranging they may be social factors like family, reference and role, status, cultural factors like culture, subculture and social class etcetera, then there might be even personal factors like the age of the person in the that is in the childhood we take other types of food when we become little elderly our lifestyle changes our personality all those things sometimes people are some people are vegetarian some people are non-vegetarian some people like take more hot foods and some like sweet food, sour food, I like that similarly, there may be physiological or psychological, here like motivation, learning, belief and attitude and finally, and more importantly personal and family income that is also many a time that is, if we want to go to a good restaurant, but our that is we do economic status economic condition does not support that. So, the income expectations for liquid assets and government policies are also the ones. So, these are some of the important factors which influence consumer behaviour.

Sensation and perception

- Sensation is the awareness triggered by sensory stimulation, while perception involves the organization and interpretation of these sensory inputs.
- Together, they enable the experience of food through sensory organs, integrating new information with existing knowledge to support decision-making and appropriate actions.

The diagram illustrates the flow of sensory information. Sensory stimuli (Sights, Sound, Smell, Taste, Texture) are processed by their respective sensory receptors (Eye, Ear, Nose, Tongue, Hand). The information from these receptors is sent to the 'Attention' stage, which then leads to 'Interpretation'.

So, sensation and perception are the awareness triggered by sensory stimulation, while perception involves the organization and interpretation of these sensory inputs. Together, they enable the experience of food through sensory organs, integrating new information with existing knowledge to support decision-making and appropriate actions. Sensory stimuli like sight, sound, smell, taste etc. give signals to sensory receptors like the eye, ear, nose, and tongue, and then in that attention and finally, interpretation and it we the data is interpreted and, we decide our that is a role that we take a stand about the food we make our own perception about that food.

Multi-sensory experience

It involves

- ✓ Imagining the food itself,
- ✓ Perceiving the setting where it is purchased or consumed,
- ✓ Noticing its sight or aroma from a distance,
- ✓ Handling its packaging or container,
- ✓ Using tools to prepare and cook it,
- ✓ Choosing the cutlery for eating, and
- ✓ Considering how leftovers are disposed of, and so on.

The illustration shows a central brain surrounded by icons for different senses: an eye, an ear, a nose, and a mouth. Surrounding these are various food items like an apple, a banana, and a pizza, symbolizing the integration of multiple senses in food experience.

So, there is a multi-sensory experience which involves imagining the food itself, perceiving the setting where it is purchased or where it is consumed, then noticing its site or aroma from a distance, handling its packaging or container, using tools to prepare and cook it, choosing the cutlery for eating and considering how leftovers are disposed of and so on these are the various experiences.

Sensory branding

- Sensory branding leverages all five senses to create a memorable experience, influencing consumer perceptions from pre-purchase to post-purchase.

360° Sensory Communication

Pre-purchase experience
Developing awareness and expectations reinforcing relevance

Post-purchase experience
Maximize the consumer experience

Experience during purchase
Maximize the perception of food

So, in sensory branding that is, it leverages all five senses to create a memorable experience influencing consumers' perceptions from pre-purchase to post-purchase, like in the pre-purchase developing awareness and expectation reinforcing relevance, then experience during purchase, like maximize the perception of the food and finally, in the post-purchase maximize the consumer experience at these are all interrelated.

Case study I

- Multi-sensory experience at café shop
 - A soothing environment fosters comfort for reading or conversations.
 - Multi-colored interiors and pleasant lighting create a restful atmosphere.
 - Background music or televised events enhance the ambience.
 - The aroma and taste of freshly ground coffee heighten the sensory experience.
 - Comfortable, cushioned seating adds to the overall comfort.
 - The taste and presentation of hot and cold beverages complete the experience.

So, we will take one or two case studies, like, let us say, one case history of a multi-sensory experience at a cafe shop. That is where you are going to a cafe; there is a soothing environment that fosters comfort for reading or conversation, like there are many such brands, there is where coffee houses, etcetera you go there. There are multi-coloured interiors, and pleasant lighting creates a restful atmosphere you feel that as you feel comfortable sitting there and having coffee, taking a snack, etcetera. Even though there is some background music or televised events, which also enhance the ambience, the aroma and taste of the freshly ground coffee heighten the sensory experience, and you feel comfortable. also, there is comfortable cushioned seating adds that is to overall comfort. So, the taste and presentation of hot and cold beverages complete the experience. So, that

is how that is what is the environment inside, how you sit there, how there are people, and you feel like sitting there taking the coffee, sipping and then either discussing with your things or taking leisure. So, you feel comfortable in this. So, that is the one thing that is how the food is presented, what is the environment, what is your mood and all this it influences.

❖ **Case study II**

- A globally recognized fast-food chain is famous for its beef and pork hamburgers.
- However, in India, where a large portion of the population is vegetarian, the chain adapted by introducing options like veggie burgers and potato-based patties to meet local preferences.
- To enhance the dining experience, the chain offers amenities such as free Wi-Fi, children's play areas, and modern music.
- It also employs memorable taglines to reinforce brand identity and connect with customers on an emotional level.





You can take another case study like a globally recognized fast food chain and let us say it is famous for its beef and pork hamburgers. , however, when that food chain comes to a country like India, where large population large portion of the population is vegetarian, then the chain obviously, if it wants to survive in this they have to adopt by introducing options like veggies, burgers, potato-based patties to meet local preferences also and that many such international brands restaurants etcetera, they have done that is there are the same chain if you go to US or any other countries they do not serve at all the veggies options, but the same when they are come to India because they have to do business. So, they have to target the larger section of the population and you have to serve what people want. To enhance the dining experience, the chain offers many amenities, such as free Wi-Fi, a children's play area and even modern music and all those things. So, it also employs memorable taglines to reinforce brand identity and connect with the consumers on an emotional level and all those things. So, that is how they try to create such a lively atmosphere, which is liked by the consumer, and the consumer prefers to go there and eat and enjoy the food, relish the food. So, that is basically, there may be any good food, but if you are not enjoying it, you are not relishing the food. So, that is of no use. So, that is the food that you have eaten is not that important, but that is how much you have enjoyed it. Eating that food is what actually goes, and it serves its purpose of nutrition and health.

Summary

- The five senses viz. sight, hearing, taste, smell, and touch are essential in how food is perceived and enjoyed.
- Each sense operates through specific modalities that send stimuli to the central nervous system, influencing food preferences and decisions.
- Sensory attributes like appearance, aroma, taste, texture, and sound play a significant role in shaping consumer behavior, including preferences and purchasing choices.
- The integration of sensory inputs creates a holistic experience that can enhance brand loyalty and contribute to market success.
- Consumer behavior is also influenced by social, cultural, psychological, and economic factors in addition to sensory experiences.



So, I like to summarize this lecture like the five senses sight, hearing, taste, smell and touch. They are very essential in how food is perceived and enjoyed. Each sense operates through a specific modality and sends stimuli to the central nervous system, which influences our food preferences and decisions. Sensory attributes like appearance, aroma, taste, texture and sound play a significant role in shaping consumer behaviour, including preferences and purchasing choices. The integration of sensory inputs creates a holistic experience that can enhance brand loyalty and contribute to market success. Consumer behavior is also influenced by social, cultural, physiological and economic factors in addition to sensory experiences.

These are the references. Thank you very much for your patience hearing. Thank you.