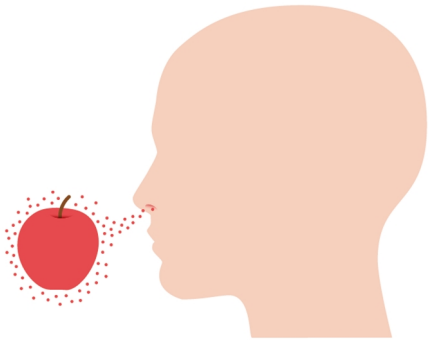
1.2.1

Odours and aromas – What's the difference?

CHEMICAL STIMULI

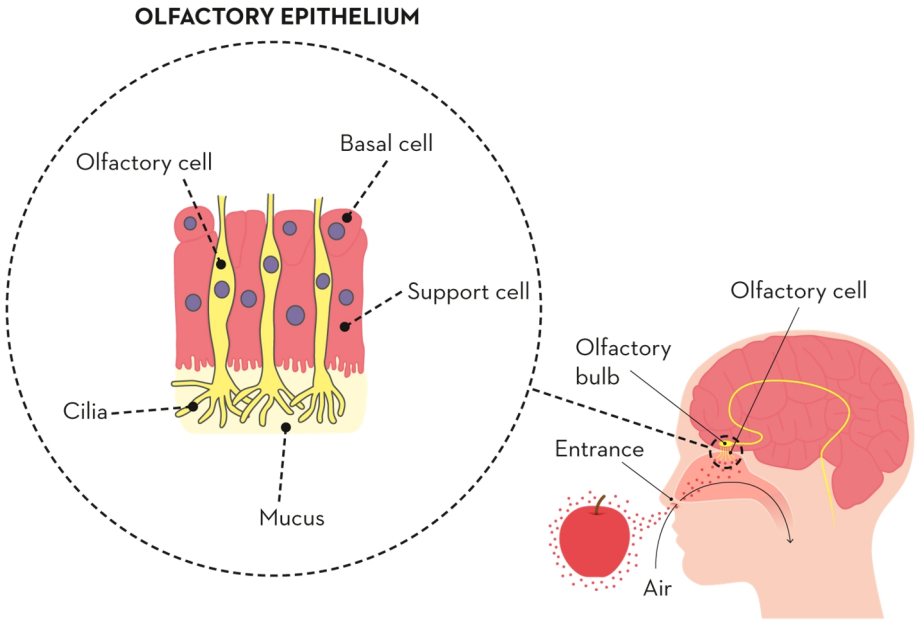
In everyday life, sight and hearing are more important than smell. For example, your sense of sight lets you know when to stop at a red light and your sense of hearing tells you to pay attention if you hear a car horn. These two senses allow us to avoid danger. But smell has a much deeper impact in life than we realise, especially when it comes to food.



The nose reacts to chemical stimuli, so how does that work in practice? First of all, odorous substances release volatile molecules into the air. These molecules are so small that your eyes cannot see them, but your nose is able to smell them.

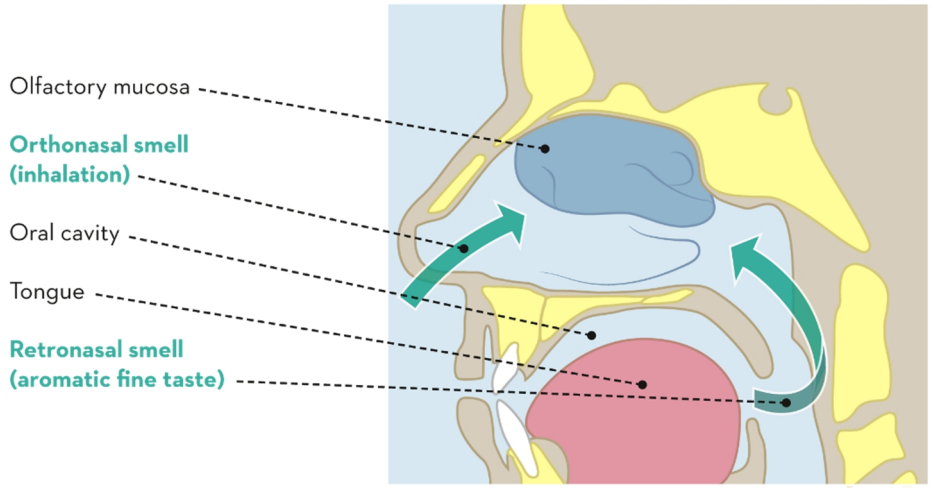
ORTHONASAL OLFACTION

When odour molecules reach the nose through the air we breathe, we talk about 'orthonasal' olfaction. Nasal mucus comprises olfactory cells which end in fine sensory filaments. We call these filaments the olfactory cilia.



These brush-like cilia contain olfactory receptors which fix the inhaled molecules. These molecules convey stimuli to the brain via the olfactory nerve, which is how we perceive different odours.

RETRONASAL OLFACTION



In addition to this 'orthonasal' olfaction, we perceive olfactory molecules retronasally, i.e. via the mouth. As we chew food and warm it up in our mouths, it releases odorous molecules. These molecules go up to the olfactory receptors via the pharynx.

ODOUR AND AROMA

You sometimes hear about the 'smell' or ‘odour' of food and sometimes you hear people talk about its 'aroma'. What's the difference? It is very simple, when odour molecules come from the air you breathe, we talk about ‘odour’. When they come from your mouth, we talk about the 'aroma' of food.

Keywords > Through the nose: smell
Keywords > Through the mouth: aroma

We can therefore conclude that we perceive odour molecules from food twice – once, directly, through the nose and a second time, indirectly, via the mouth.

1.2.1

Odours and aromas – What's the difference?

Your nose reacts to physical stimuli.

- O False
- O True

We talk about orthonasal olfaction when odorous molecules reach olfactory receptors via...

- O the tongue
- O the buccal cavity
- O the nose

What do we call the fine sensory filaments located at the end of olfactory cells?

- O Olfactory hairs
- O Olfactory cilia
- O Olfactory brows

What is the average number of olfactory cilia found at the end of olfactory cells?

- O Twenty
- O One hundred
- O Fifty

When retronasal olfaction takes place, which combination leads to olfactory molecules being released into the buccal cavity?

- O Coldness and hiccups
- O Enzymes and breathing
- O Heat and chewing

When we perceive olfactory substances via the retronasal pathway we call these...

- O odours
- O tastes
- O aromas

Which organ do aromas go through before reaching the olfactory receptors at the back of the nasal cavities?

- O The pharynx
- O The larynx
- O The nose

How are olfactory stimuli transmitted to the brain?

- O Via the olfactory nerve
- O Via the auditory nerve
- O Via the signage nerve

The molecules released via orthonasal and retronasal pathways adhere to...

- O receptors
- O the brain
- O the tongue

When we talk about the strawberry aroma of a yoghurt, we are referring to what we perceive...

- O when we sniff it
- O when we chew it
- O when we look at it

Answers

Your nose reacts to physical stimuli.

- ● **False**
  Well done! Your nose reacts to volatile molecules released into the air, from food for example.
- ○ **True**
  Wrong! Your nose reacts to chemical molecules released into the air, from food for example. These are therefore chemical stimuli.

We talk about orthonasal olfaction when odorous molecules reach olfactory receptors via...

- ○ **the tongue**
  Wrong! Your tongue does not have any olfactory receptors.
- ○ **the buccal cavity**
  Wrong! When odorous molecules reach the olfactory cells in your nose via your buccal cavity, this is called retronasal olfaction.
- ● **the nose**
  Well done! Orthonasal olfaction is in fact when odorous molecules reach your olfactory cells via your nose.

What do we call the fine sensory filaments located at the end of olfactory cells?

- ○ **Olfactory hairs**
  Wrong! Nice try, but that's not right.
- ● **Olfactory cilia**
  Well done! Olfactory cilia, located at the end of olfactory cells, use olfactory receptors to capture odorous molecules.
- ○ **Olfactory brows**
  Wrong! Try again!

What is the average number of olfactory cilia found at the end of olfactory cells?

- ● **Twenty**
  Well done! There are around twenty olfactory cilia at the end of each of your olfactory cells.
- ○ **One hundred**
  Wrong! It's much less.
- ○ **Fifty**
  Wrong! It's less than that.

When retronasal olfaction takes place, which combination leads to olfactory molecules being released into the buccal cavity?

- ○ **Coldness and hiccups**
  Wrong! A cold environment does not encourage odorous molecules to become volatile.
- ○ **Enzymes and breathing**
  Wrong! Enzymes play another role in your buccal cavity.
- ● **Heat and chewing**
  Well done! Heat and chewing release olfactory molecules from food in your buccal cavity.

When we perceive olfactory substances via the retronasal pathway we call these...

- ○ **odours**
  Wrong! Odours are perceived via your orthonasal pathway. This means that they reach your olfactory cells via your nose.
- ○ **tastes**
  Wrong! Your tongue perceives tastes.
- ● **aromas**
  Well done! Aromas are released into your buccal cavity and then reach the olfactory cells in your nose.

Which organ do aromas go through before reaching the olfactory receptors at the back of the nasal cavities?

- ● **The pharynx**
  Well done! Aromas released via your retronasal pathway move up through your pharynx to reach your olfactory receptors.
- ○ **The larynx**
  Wrong! Your larynx produces sounds and passively prevents food from reaching your lungs.
- ○ **The nose**
  Wrong! Odours travel through your nose to reach your olfactory receptors.

How are olfactory stimuli transmitted to the brain?

- ● **Via the olfactory nerve**
  Well done! Your olfactory nerves transmit olfactory stimuli from olfactory receptors to your brain.
- ○ **Via the auditory nerve**
  Wrong! Your auditory nerves transmit auditory stimuli.
- ○ **Via the signage nerve**
  Wrong! There is no such thing as a signage nerve.

The molecules released via orthonasal and retronasal pathways adhere to...

- ● **receptors**
  Well done! Chemical molecules adhere to receptors in the olfactory mucous membrane, at the very top of the nasal cavities of your nose.
- ○ **the brain**
  Wrong! Molecules do not adhere to your brain. It receives an electrical message transmitted by your olfactory nerves.
- ○ **the tongue**
  Wrong! Once released, the chemical molecules adhere to receptors in the olfactory mucous membrane in your nose.

When we talk about the strawberry aroma of a yoghurt, we are referring to what we perceive...

- ○ **when we sniff it**
  Wrong! Your nose perceives odours.
- ● **when we chew it**
  Well done! Aromas are released in your mouth and then stimulate receptors in your nasal mucous membrane.
- ○ **when we look at it**
  Wrong! Our eyes respond to physical stimuli.

ACTT01C02L01_A

Odours

[8-10 years old]

When odorous substances come from the air we breathe, we talk about **odours**. When they come from your oral cavity we talk about the **aroma of food**.

Close your eyes and try to identify the following odours using your nose.

- cheese
- chocolate
- vinegar
- vanilla
- mint
- lemon
- strawberry
- onion

[11-13 years old AND 14-16 years old do the same activity but with more complex odours.]

- cinnamon
- ginger
- basil
- cumin
- cloves
- aniseed
- coriander
- cardamom
- nutmeg
- saffron

ACTT01C02L01_B

Aromas

[8-10 years old]

When odorous substances come from the air we breathe, we talk about **odours**. When they come from the oral cavity we talk about the **aroma of food**.

Close your eyes and pinch your nose, and then try to recognise the following aromas using your mouth.

- cheese
- chocolate
- vinegar
- vanilla
- mint
- lemon
- strawberry
- raspberry
- apple
- pear

[11-13 years old and 14-16 years old do the same activity but use the following list.]

- cinnamon
- ginger
- basil
- cumin
- cloves
- aniseed
- coriander
- cardamom
- nutmeg
- saffron

ACTT01C02L01_G

The interaction between aroma and taste

[11-13 years old and 14-16 years old]

Instructions:
Prepare the following three solutions and take a sip of each in turn. Then put them in order from the least sweet to the sweetest.

- solution A: sugary solution (Vittel water with 50 g sugar/L)
- solution B: strawberry-flavoured sugary solution (Vittel water with 50 g sugar/L and 5 mg ethyl butyrate/L)
- solution C: lemon-flavoured sugary solution (Vittel water with 50 g sugar and lemon extract/L)

Usually the result is C > A > B

Start again, but this time pinch your nose and concentrate on the sweet taste. You will no longer be able to tell the three drinks apart.

Explanation:
The three solutions have the same sugar content, equivalent to 10 cubes of sugar in a litre of water. Surprisingly, the strawberry-flavoured drink generally seems sweeter. This is caused by the ethyl butyrate molecule. The opposite is also true, as the lemon-flavoured drink seems slightly less sweet, even though it contains exactly the same amount of sugar.

This is due to the interaction between our different senses. Our experience of the food we eat means the brain has become used to perceiving a sweet taste in the mouth when it detects one of these aromas. It has therefore created an association between an aroma and a taste, which makes it easier to detect and evaluate the taste.