

# IELTSFEVER ACADEMIC READING TEST 67

## Smell and Memory

### Smells like yesterday

**Why does the scent of a fragrance or the mustiness of an old trunk trigger such powerful memories of childhood? New research has the answer, writes Alexandra Witze.**

A . You probably pay more attention to a newspaper with your eyes than with your nose. But lift the paper to your nostrils and inhale. The smell of newsprint might carry you back to your childhood when your parents perused the paper on Sunday mornings. Or maybe some other smell takes you the back—the scent of your mother's perfume, the pungency of a driftwood campfire. Specific odors can spark a flood of reminiscences. Psychologists call it the "Proustian phenomenon", after French novelist Marcel Proust. Near the beginning of the masterpiece *In Search of Lost Time*, Proust's narrator dunks a madeleine cookie into a cup of tea and the scent and taste unleash a torrent of childhood memories for 3000 pages.

B. Now, this phenomenon is getting scientific treatment. Neuroscientists Rachel Herz, a cognitive neuroscientist at Brown University in Providence, Rhode Island, have discovered, for instance, how sensory memories are shared across the brain, with different brain regions remembering the sights, smells, taste, and sounds of a particular experience. Meanwhile, psychologists have demonstrated that memories triggered by smells can be more emotional, as well as more detailed, than memories not related to smells. when you inhale, odour molecules set brain cells dancing within a region known as the amygdala, a part of the brain that helps control emotion. In contrast, the other senses, such as taste or touch, get routed through other parts of the brain before reaching the amygdala. The direct link between odours and the amygdala may help explain the emotional potency of smells. "there is this unique connection between the sense of smell and part of the brain that processes emotion," says Rachel Herz.

C . But the links don't stop there, Like an octopus reaching its tentacles outward, the memory of smells affects other brain regions as well. In recent experiments, neuroscientists at University College London (UCL) asked 15 volunteers to look at pictures while smelling unrelated odours. for instance, the subjects might see a photo of a duck paired with the scent of a rose, and then be asked to create a story linking the two. Brain scans taken at the time revealed that the volunteers' brains were particularly active in a region known as the olfactory cortex, which is known to be involved in processing smells. Five minutes later, the volunteers were shown the duck photo again, but without the rose smell. And in their brains, the olfactory cortex lit up again, the scientists reported recently. The fact that the olfactory cortex became active in the absence of the odour suggests that people's sensory memory of events is spread across different brain regions. Imagine going on a seaside holiday, says UCL team leader, Jay Gottfried. The sight of the waves becomes stored in one area, whereas the crash of the surf goes elsewhere, and the smell of seaweed in yet another place. There could be advantages to having memories spread around the brain. "You can reawaken that memory from any one of the sensory triggers," says Gottfried. "Maybe the smell of the sun lotion, or a particular sound from that day, or the sight of a rock formation." Or- in the case of an early hunter and gatherer (out on a plain- the sight of a lion might be enough to trigger the urge to flee, rather than having to wait for the sound of its roar and the stench of its hide to kick in as well.

D . Remembered smells may also carry extra emotional baggage, says Herz. Her research suggests that memories triggered by odours are more emotional than memories triggered by other cues. In one recent study, Herz recruited five volunteers who had vivid memories associated with a particular perfume, such as opium for Women and Juniper Breeze from Bath and Body Works. She took images of the volunteers' brains as they sniffed that perfume and an unrelated perfume without knowing which was which. (They were also shown photos of each perfume bottle.) Smelling the specified perfume activated the volunteers brains the most, particularly in the amygdala and in a region called the hippocampus, which helps in memory formation. Herz published the work earlier this year in the journal *Neuropsychologia*.

E . But she couldn't be sure that the other senses wouldn't also elicit a strong response. So in another study, Herz compared smells with sounds and pictures. She had 70 people describe an emotional memory involving three items-popcorn, fresh-cut grass and a campfire. Then they compared the items through sights, sounds, and smells. For instance, the person might see a picture of a lawnmower, then sniff the scent of grass and finally listen to the lawnmower's sound. Memories triggered by smell were more evocative than memories triggered by either sights or sounds.

F . Odour-evoked memories may be not only more emotional but more detailed as well. Working with colleague John Downes, psychologist Simon Chu of the University of Liverpool started researching odour and memory partly because of his grandmother's stories about Chinese culture. As generations gathered to share oral histories, they would pass a small pot of spice or incense around; later, when they wanted to remember the story in as much detail as possible, they would pass the same smell around again. "It's kind of fits with a lot of anecdotal evidence on how smells can be really good reminders of past experiences," Chu says. And scientific research seems to bear out the anecdotes. In one experiment, Chu and Downes asked 42 volunteers to tell a life story, then tested to see whether odours such as coffee and cinnamon could help them remember more detail in the story. They could.

G . Despite such studies, not everyone is convinced that Proust can be scientifically analysed. In the June issue of *chemical senses*, Chu and Downes exchanged critiques with renowned perfumer and chemist J. Stephan Jellinek. Jellinek chided the Liverpool researchers for, among other things, presenting the smells and asking the volunteers to think of memories, rather than seeing what memories were spontaneously evoked by the odours. But there's only so much science can do to test a phenomenon that's inherently different for each person, Chu says. Meanwhile, Jellinek has also been collecting anecdotal accounts of Proustian experiences, hoping to find some common links between the experiences. "I think there is a case to be made that surprise may be a major aspect of the Proust phenomenon," he says. " That's why people are so struck by these memories." No one knows whether Proust ever experienced such a transcendental moment. But his notions of memory, written as fiction nearly a century ago, continue to inspire scientists of today.\

**Questions 1-5**

Use the information in the passage to match the people (listed A-C) with opinions or deeds below. Write the appropriate letters A-C in boxes 1-5 on your answer sheet.

NB you may use any letter more than once.

**A. Rachel Herz**

**B. Simon Chu**

**C. Jay Gottfried**

- 1 . Found pattern of different sensory memories stored in various zones of a brain.
- 2 . Smell brings detailed event under a smell of certain substance.
- 3 . Connection of smell and certain zones of the brain is different from that of other senses.
- 4 . Diverse locations of stored information help us away from the hazard.
- 5 . There is no necessary correlation between smell and processing zone of the brain.

**Questions 6-9**

Choose the correct letter, A, B, C, or D.

Write your answers in boxes 6-9 on your answer sheet.

- 6 . What does the experiment conducted by Herz show?
  - A . Women are more easily addicted to opium medicine
  - B . Smell is superior to other senses in connection to the brain
  - C . Smell is more important than other senses
  - D . Amygdala is part of the brain that stores processes memory

7 . What does the second experiment conducted by Herz suggest?

- A . Result directly conflicts with the first one
- B . Result of her first experiment is correct
- C . Sights and sounds trigger memories at an equal level
- D . Lawnmower is a perfect example in the experiment

8 . what is the outcome of an experiment conducted by Chu and Downes?

- A . Smell is the only functional under Chinese tradition
- B . half of the volunteers told detailed stories
- C . smells of certain odours assist story tellers
- D . odours of cinnamon is stronger than that of coffee

9 . What is the comment of Jellinek to Chu and Downers in the issue of Chemical Senses

- A . Jellinek accused their experiment of being unscientific
- B . Jellinek thought Liverpool is not a suitable place for experiment
- C . Jellinek suggested that there was no further clue of what specific memories aroused
- D . Jellinek stated that an experiment could be remedied

### Questions 10-13

### Summary

Complete the following summary of the paragraphs of reading Passage, using no more than three words from the reading Passage for each answer. write your answers in boxes 10-13 on your answer sheet.

In the experiments conducted by UCL, participants were asked to look at a picture with the scent of a flower, then in the next stage, everyone would have to .....10..... for a connection. A method called.....11.....suggested that specific area of brain named.....12..... were quite active. Then in another paralleled experiment about Chinese elders, storytellers could recall detailed anecdotes when smelling a bowl of .....13..... or incense around.

## Water Treatment 2: Reed Bed

A . Nowadays subsurface flow wetlands are a common alternative in Europe for the treatment of wastewater in rural areas. mainly in the last 10 to 12 years, there has been significant growth in the number and size of the systems in use. Compared to common treatment facilities, wetlands lower in cost investment, lesser to maintain, and are ideal for densely populated rural or suburban areas rather than urban areas.

B . the Common Reed has the ability to transfer oxygen from its leaves, down through its stem and rhizomes and out via its root system. As a result of this action, a very high population of micro-organisms occurs in the root system, with zones of aerobic, anoxic, and anaerobic conditions. Therefore with the waste water moving very slowly and carefully through the mass of Reed roots, this liquid can be successfully treated.

C . A straightforward definition of a reed bed is if you have dirty water in your pool or water, which is heavily polluted, Reed Beds will be planted to make the water clean again. This is good for ecology and living organisms and fish in the water. Reed Beds have a wide range of qualities and are acceptable for cleaning everything from secondary to tertiary treatment of mild domestic effluent, to rural waste and even heavy industrial contaminants. The reason why they're so effective is often that within the bed's root sector, natural biological, physical and chemical processes interact with one another to degrade or remove a good range of pollutants. Reed beds can be built in a number of variants, but mainly they are of the horizontal flow or vertical (down) flow configuration where water flows through the beds horizontally or vertically.

D . Horizontal-flow wetlands may be of two types: free-water surface-flow (FWF) or subsurface water-flow (SSF). In the former, the effluent flows freely above the sand/gravel bed in which the reeds etc. are planted; in the latter effluent passes through the sand/ gravel bed. In FWF-type wetlands, the effluent is treated by plant stems, leaves and rhizomes. Such FWF wetlands are densely planted and typically have water-depths of less than 0.4m. However, dense planting can limit oxygen diffusion into the water. These systems work particularly well for low strength effluents or effluents that have undergone some form of pretreatment and play an invaluable role in tertiary treatment and the polishing of effluents. The horizontal reed flow system uses a long reed bed, Where the liquid slowly flows horizontally through. The length of the reed bed is about 100 meters. The downside of the horizontal reed beds is that they use up lots of land space and they do take quite a long time to produce clean water.

### VERTICAL FLOW REED BED SYSTEMS

E . A vertical flow reed bed is a sealed, gravel-filled trench with reeds growing in it (see the picture below). The common reed oxygenates the water, which helps to create the right environment for colonies of bacteria to break down unwanted organic matter and pollutants. The reeds also make the bed attractive to wildlife.

### **How does a vertical flow reed bed work?**

F . In vertical flow (Downflow) reed beds, the wastewater is applied on top of the reed bed, flows down through a rhizome zone with sludge as substrate, then the root zone with sand as substrate and followed by a layer of gravel for drainage, and is collected in an under drainage system of large stones. The effluent flows on to the surface of the bed and percolates slowly through the different layers into an outlet pipe, which leads to a horizontal flow bed and is cleaned by millions of bacteria, algae, fungi, and microorganisms that digest the waste, including sewage. There is no standing water so there should be no unpleasant smells.

G . Vertical flow reed bed systems are much more effective than horizontal flow reed-beds not only in reducing biochemical oxygen demanded (BOD) and suspended solids (SS) levels but also in reducing ammonia levels and eliminating smells.

Usually considerably smaller than horizontal flow beds, but they are capable of handling much stronger effluents which contain heavily polluted matters and have longer lifetime value. A vertical reed bed system works more efficiently than a horizontal reed bed system, but it requires more management, and its reed beds are often operated for a few days then rested, so several beds and a distribution.

H . There are several advantages of Reed Bed systems over traditional forms of water treatment: first, they have low construction and running costs; second, they are easy management; third they have an excellent reduction of biochemical oxygen demand and suspended solids; last they have a potential for efficient removal of a wide range of pollutants.

I . Reed beds are natural habitats found in floodplains waterlogged depressions and estuaries. The natural bed systems are a biologically proved, and an environmentally friendly and visually unobtrusive way of treating wastewater and have the extra virtue of frequently been better than mechanical wastewater treatment systems. In the medium to long term reed bed systems are, in most cases, more cost-effective in installment than any other wastewater treatment. They are robust and require little maintenance. They are naturally environmentally sound protecting groundwater, dams, creeks, rivers, and estuaries.

### Questions 14-16

Do the following statements agree with the information given in Reading Passage 2?

In boxes 14-16 on your answer sheet, write

**True** If the statement is true.

**False** If the statement is false

**Not Given** If the information is not given in the passage.

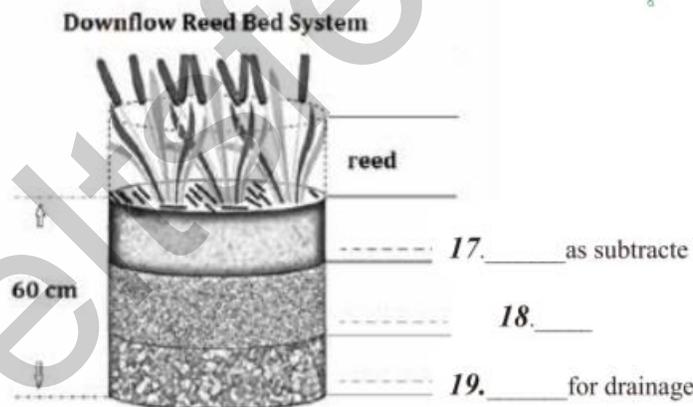
14 . The Reed bed system is a conventional method for water treatment in the urban area.

15 . IN the reed roots, there's a series of process that helps breakdown the pollutants.

16 . Escherichia coli is the most difficult bacteria to be dismissed.

### Questions 17-19

Complete the diagram below. Choose **NO MORE THAN THREE WORDS OR A NUMBER** from the passage for each answer.



### Questions 20-24

Use the information in the passage to match the advantages and disadvantages of the two systems: horizontal flow system and downflow system (listed A-H) below. Write the appropriate letters A-H in boxes 20-24 on your answer sheet.

.....20....., which is the advantage of the down-flow system. However,

.....21..... and .....22..... are the disadvantages of down-flow system.

.....23.....and .....24..... are the two benefits of the horizontal flow system.

However it's less effective and efficient.

A . It can deal with a more seriously polluted effluent.

B . It requires more beds than one compared to the other.

C . It needs less control and doesn't need to be taken care of all the time.

D . It requires a lot of guidance.

E . It can't work all the time because the pool needs time to rest and recover after a certain period.

F . It's a lot more complicated to build the system.

G . The system is easy to be built which does not need an auxiliary system.

H . It consumes less water.

### Questions 25-26

Choose two correct letters from the following A, B, C, D, or E.

Write your answers in boxes 25-26 on your answer sheet.

What are the two benefits of natural bed systems when compared to conventional systems?

A . Operation does not require electricity or fuel supply.

B . They're visually good and environmentally friendly.

C . No mechanical systems are involved.

D . They're to be set up and used in less cost.

E . They do not break down.

## Going nowhere fast

New transport mode PRT RUF

A . This is ludicrous! We can talk to people anywhere in the world or fly to meet them in a few hours. We can even send probes to other planets. But when it comes to getting around our cities, we depend on systems that have scarcely changed since the days of Gottlieb Daimler

B . In recent years, the pollution belched out by millions of vehicles has dominated the debate about transport. The problem has even persuaded California that home of car culture to curb traffic growth. But no matter how green they become, cars are unlikely to get us around crowded cities any faster. And persuading people to use trains and buses will always be an uphill struggle. Cars, after all, are popular for very good reasons, as anyone with small children or heavy shopping knows.

C . A profewssor of mechanical engineering sits typing at a computer keyboard, conjuring up a scene on his monitor that looks something like the classic computer game PacMan. White dots stream in from the right of the screen, switch to red and merge with green boxes, which swiftly change color to yellow and then red while moving through a bewildering maze. But this is not a video game. J. Edward Anderson of Boston University is testing an urban transit system that he believes could revolutionize public transport worldwide.

D . For the past quarter of a century, Anderson has been promotion his version of a personal rapid transit(PRT). other versions came and went in the 1970s, From Europe, Japan and elsewhere in the Us, but he was so convinced of the idea's potential that he stuck with it and, in 1983, founded the Taxi 2000 Corporation to 'exommercialise' the initiative. Although the University of Minnesota, Anderson's employer until 1986, holds the patents to the technology, he is licensed to develop it and to sub-license other developers. So politicians should be trying to lure people out of their cars, not forcing them out. There's certainly no shortage of alternatives. Perhaps the most attractive is the concept known as personal rapid transit(PRT), independently invented in the US and Europe in the 1950s.

E . The idea is to go to one of many stations and hop into a computer-controlled car which can whisk you to your destination along a network of guideways. You wouldn't have to share your space with strangers, and with no traffic lights, pedestrians or parked cars to slow things down, PRT guideways can carry far more traffic, nonstop, than any inner city road. It's a wonderful vision, but the odds are stacked against PRT for a number of reasons. The first cars ran on existing roads, and it was only after they became popular-and after governments started earning revenue from them- that a road network designed specifically for motor vehicles was built. With PRT, the fracture would have to come first-and that would cost megabucks.

F . What's more, any transport system that threatened the car's dominance would be up against all those with a stake in maintaining the status quo, from private car owners to manufactures and oil multinationals. Even if PRTs were spectacularly successful in trials, it might not make much difference. Superior technology doesn't always triumph, as the VHS versus Betamax and windows versus Apple Mac battles showed.

G . But "dual-mode" systems might just succeed where PRT seems doomed to fail. The Danish RUF system envisaged by Palle Jensen, for example, resembles PRT but with one key difference: vehicles have wheels as well as a slot allowing them to travel on a monorail, so they can drive off the rail onto a normal road. Once on a road, the occupant would take over from the computer, and the Ruf vehicle-the term comes from a Danish saying meaning to "go fast"-would become an electric car.

H . Build a fast network of guideways in a busy city center and people would have a strong incentive not just to use public Ruf vehicles, but also to buy their own dual-mode vehicle. Commuters could drive onto the guideway, sit back and read as they are chauffeured into the city. At work they would jump out, leaving their vehicles to park themselves. Unlike PRT, such a system could grow organically, as each network would serve a large area around it and people nearby could buy into it. And a dual-mode system might even win the support of car manufacturers, who could easily switch to producing dual-mode vehicles.

I . The RUF system can reduce energy consumption from individual traffic. The main factor is the reduction of air resistance due to the close coupling of vehicles. The energy consumption per Ruf can is reduced to less than 1/3 at 100 km/h. Since RUF is an electric system, renewable sources can be used without problems. A combination of windmills and a RUF rail could be used over water. Solar cells can also be integrated into the system and ensure completely sustainable transportation.

J . Of Course, creating a new transport system will not be cheap or easy. But unlike adding a dedicated bus lane here or extending the underground railway there, an innovative system such as Jensen's could transform cities. The vehicles in a RUF system rides" very safety on top of a triangular monorail. This means that derailments are impossible and that the users will feel safe because it is easy to understand that when the rail is actually inside the vehicle it is absolutely stable. The special rail brake ensures that braking power is always available even during bad weather. The brake can squeeze as hard against the rail as required in order to bring the vehicle to a safe stop. If a vehicle has to be evacuated, a walkway between the two rails can be used.

K . And it's not just a matter of saving a few minutes a day. According to the Red Cross, more than 30 million people have died in road accidents in the past century-three times the number killed in the First World War-and the annual death toll is rising. and what's more the Red Cross believes road accidents will become the third biggest cause of death and disability by 2020, ahead of diseases such as AIDS and tuberculosis. Surely we can find a better way to get around.

**Questions 27-30**

Do the following statements agree with the information given in Reading Passage 3 In boxes 27-30 on your answer sheet, write

- True**                      If the statement is true.
- False**                     If the statement is false
- Not Given**                If the information is not given in the passage.

- 27 . City transport developed slower than other means of communication.
- 28 . Many states in the US consider reducing cars growth.
- 29 . Car pollution has been concerned these days.
- 30 . Trains and buses are not suitable to drive on an uphill road.

**Questions 31-37.**

Use the information in the passage to match the category (listed A-C) with the description below. Write the appropriate letters A-C in boxes 18-24 on your answer sheet.

- A . ONLY PRT
- B . ONLY RUF
- C . BOTH OF THEM
- 31 . Totally apply computer system
- 32 . Opposition to a system from companies
- 33 . Reach destination fast
- 34 . Not necessary to share with the public
- 35 . Work on the existing road
- 36 . Individuals can buy cars after all
- 37 . Controlled both by computer and manual

**Questions 38-40**

Choose **Three correct letters** from followings that are advantages of developing a NEW TRANSPORT SYSTEM:

Write your answers in boxes 38-40 on your answer sheet.

- A . Stimulating economy
- B . Successful application in Europe
- C . Safety consideration
- D . Less pollution to the environment
- E . Economical budget
- F . Public popularity
- G . Fast speed