

1 Memory

1 Synopsis

This video focuses on the connection between memory and our sense of smell. Three people talk about different smells and childhood memories the smells remind them of. Then, a scientist named Professor David Glanzman gives some basic facts about the human brain. He describes his research on the brains of *siphons*, or marine snails, and what it can teach us about human learning and memory. Today, the use of new technology called MRI is used in brain research, and scientists have discovered that the parts of the brain that deal with smell and memory are located very close to each other. Professor Glanzman talks about the connection between a poor sense of smell and memory diseases such as Alzheimer's. He concludes by pointing out that the research scientists are conducting today could help find a cure for these diseases.

Length of video: 5:40 min

2 Target Language

Grammar: gerunds and infinitives

Vocabulary: parts of the brain, memories, the senses, and what triggers them

Language Points: *all kinds of stuff, reminds me of, brings me back*

3 Procedural Notes

A Before you watch

1 As a class. Begin by sharing with the class one of your childhood memories that is linked to a smell (e.g., *I remember when I was about four years old, I fell down the stairs. My father was painting the inside of our house at the time. Now, whenever I smell paint, I remember falling. Luckily, I didn't break any bones.*) Write *smell* on the board. Elicit the four other senses. Then, pre-teach the verb *trigger* (to cause someone to have particular feelings or memories) and elicit the rest of the chart below. Finally, take a class vote on which sense they think is the most important.

Sense	Organ	Triggered by
smell	nose	a scent / a smell / an odor
taste	mouth	a flavor / a taste
touch	skin / entire body	a texture / a feeling / a touch
sight (v. to see)	eyes	a sight
hearing (v. to hear)	ears	a sound

In groups. Ask the students to form small groups. Give them ten minutes to discuss the questions. Then, ask a few students to share some of their group's answers with the class.

2 As a class. Before students complete this exercise individually, elicit or pre-teach the following words:

10^{12} = *ten to the twelfth* = $10 \times 10 \times 10 \dots$ (12 times)
= a trillion

hit (v.) – to touch someone with force so that you hurt them.

Individuals. Give students three minutes to read the statements and choose their answers. Then, have them compare answers in pairs. Go over the correct answers as a class.

Answer key: 1 a 2 b 3 a 4 c

B While you watch

1 Individuals. Before watching the video, give students two minutes to read the six sentences. Pre-teach the meaning of *snail* (a small animal that has a soft body, a hard shell, and no legs; snails move very slowly.) If necessary, draw a picture of one on the board. Explain that they should watch and listen for the answers. Play the video without pausing. If students didn't manage to answer all of the questions on the first listen, play the video again, pausing after the part containing each answer. Have students compare answers in pairs, then check the answers as a class. Elicit the correct answers for the false statements.

Answer key: 1 F (They're talking about memories triggered by smells.) 2 T 3 T 4 T 5 F (Scientists are using MRI technology now. It is new technology.) 6 T

2 As a class. Write the following on the board:

to be being

1 *It seems _____ raining.*

2 *Thank you for _____ so helpful.*

Elicit the correct answers (1 *to be*, 2 *being*). Ensure students know that *being* is an example of a *gerund* and *to be* is an example of an *infinitive*. Elicit the difference between the two forms (a *gerund* ends in *-ing* and an *infinitive* begins with *to*). Explain that in English, some verbs are followed by gerunds, others take infinitives, and others can take either form. On the board, brainstorm a list of common verbs followed by gerunds



1 Memory

(*enjoy, avoid, quit, keep, etc.*), a list of common verbs followed by infinitives (*want, need, seem, appear, etc.*), and finally, a list of common verbs that can be followed by either form (*begin, like, love, hate, etc.*).

Individuals. Before watching the video, pre-teach the meaning of the verbs *keep* (continue) and *attempt* (try). Then, give students a few minutes to complete the sentences. Play the entire video. Tell students you will give them a signal at the point where each segment begins (where we see a nose sniffing a perfume bottle [01:04] and then, later on in the video, when we see the professor about to tap the snail [02:36]).

In pairs. Have students compare their answers. Then, check the correct answers as a class. Encourage students to explain their answers.

Answer key: 1 to be (*seem* + infinitive) 2 to be (*seem* + infinitive) 3 triggering (*for* + gerund) 4 to find out (*attempt* + infinitive) 5 tapping (*keep* + gerund) 6 giving (*stop* + gerund)

C After you watch

1 As a class. If your students are not familiar with mind maps, introduce them first. A mind map is a diagram that has a central word or idea with related ideas branching off it. It helps to generate, visualize, and organize a lot of ideas that can then be used for writing, problem solving, and decision-making. Copy the mind map from the worksheet onto the board. Add an idea of your own (e.g., you could draw a line coming out of the “Memory problems” circle and write *loss of smell* at the end). Then, elicit one or two other ideas from the class.

Individuals. Tell students to think back to what they saw in the video and add as many words and phrases to their mind map as they can. Set a time limit of five minutes. Circulate and help with any vocabulary queries.

Possible answers:

Memory and smell: strong/complex connection; smells trigger memories; poor sense of smell = memory problem

Scientists: conduct experiments; MRI technology; tapping a marine snail/siphon; study the brain

Memory problems: Alzheimer's; disease; loss of smell; devastating; abnormal proteins in the brain

2 In groups. Ask students to work in groups of three or four. Encourage them to expand their individual mind maps by adding ideas from their classmates. Wrap up this exercise as a class by asking a few students to explain their mind maps and how they remembered the video. Finally, elicit some reasons why mind maps are useful.

Possible answers: 1 Students' own answers.

2 Students' own answers. 3 They are very visual; it's easy to see how ideas are connected; they can be used in many different situations.

D Language Points

As a class. Ask students if they can remember the first part of the video (three people talking about childhood memories associated with certain smells). Tell them to read sentence 1. Starting from the beginning, play the video, pausing after the first woman. If students don't manage to write down all of the words, play the segment (or simply the target phrase) again one or more times. Ask students to call out the answer. Write *all kinds of stuff* on the board. Explain that it means *a lot of different things*. Then, say these sentences: *When I go on vacation, I take all kinds of stuff. I have all kinds of stuff in my bag. At the café, my friends and I talk about all kinds of stuff.* Elicit more example sentences from the class.

Repeat the above procedure with sentence 2 and play the relevant section of the video [00:34-00:41]. Once you have elicited the answer, explain that *reminds me of* means *causes me to remember*. Say these sentences: *The smell of roses reminds me of my mother. The taste of soda reminds me of vacations when I was a kid. Seeing Marco reminds me of when I lived in Barcelona.* Elicit more example sentences from the class.

Repeat the above procedure with sentence 3 and play the relevant section of the video [00:41-00:55]. Explain that *brings me back to* also means *causes me to remember*. Say the sentences: *Seeing my friends on Facebook® brings me back to my schooldays. The smell of hotdogs brings me back to my childhood.* Highlight that *bring back* can also be used without the object pronoun *me*. Ask students to find an example of this in sentence 1 (*When I smell the ocean, it brings back all kinds of stuff.*) Say the sentences: *These photographs bring back a lot of memories. The smell of gas brings back all kinds of memories.* Elicit more example sentences from the class.



1 Memory

Answer key: 1 all kinds of stuff 2 reminds me of
3 brings me back to

In groups. Have students work in groups of three. Each student in the group chooses one of the expressions and writes it in their notebook (they should each write a different one). Underneath, they write one sentence about themselves, using that expression. When everyone has finished, students exchange notebooks, read their partner's sentence, and write another sentence about themselves. Students exchange notebooks again and repeat. Finally, they choose the best sentence in each notebook and read it to the class.

E Your Viewpoint

In groups Nominate three students to read the questions aloud, and check to be sure that everybody understands them. Give students time to discuss the questions in

small groups. While the groups are working, circulate and help with vocabulary as necessary.

As a class. Discuss the answers to the questions. For question 1, write *Always OK*, *Sometimes OK*, and *Never OK* on the board. Hold a class vote about using animals for scientific research. How many students think it is always, sometimes, or never OK? Ask some of the students who voted *Sometimes OK* to give examples of acceptable situations. Ask some of the students who voted *Never OK* or *Always OK* to explain why. For question 2, ask students to raise their hands if they would like a job like Professor Glanzman's. Ask a few of the students who didn't raise their hands to explain why not. Then, ask a few who did raise their hands to say why. For question 3, ask a few students to explain why they think they have a good or bad memory. Ask them to do the same for a person they know.

4 Video Script

Presenter:	Have you ever noticed that a particular smell, like the scent of a rose, or a cup of coffee, or the ocean, or a forest, has the power to trigger an intense memory? What memories do smells trigger for you?	Glanzman of UCLA, conduct experiments attempting to find out what happens in the brain on a cellular and biological level.
Woman 1:	When I smell the ocean, it brings back all kinds of stuff. Like collecting seashells with my grandma and going fishing with my dad. I love the beach.	David Glanzman: Your brain consists of ten to the twelfth neurons, which is approximately a trillion neurons. And each of those neurons is ... makes a connection which is referred to as a synapse with approximately 1,000 to 10,000, and in some cases 100,000 neurons.
Man 1:	The smell of dirt reminds me of a garden. When I was ... I think I was about five years old, when my sister and I planted a garden.	Presenter: Glanzman believes that on a molecular level, the brain of a marine snail is like the brain of a human. Learning about the snail's brain can tell us about the kinds of changes that take place in our brains when we learn and form memories.
Woman 2:	Cotton candy. Really brings me back to my childhood. A couple of times every summer, we would go up to this amusement park, and I always ordered cotton candy.	David Glanzman: The reason why snails are great for this research is they're very simple, they've very simple nervous systems, and yet they still learn. And we expect that what we discover about learning and memory in their primitive nervous systems will apply to our brains as
David Glanzman:	Smell seems to be a very powerful trigger of memory. So odors and tastes seem to be some of the most powerful stimulants for triggering memories in our brain.	
Presenter:	To understand this complex connection of memory and smell, scientists like Professor David	



1 Memory

well. What we study are changes in the reflex. When I tap the siphon, what the animal does is contract. And that's a defensive contraction. If I keep tapping it gently, it'll eventually stop giving me that withdrawal reflex, that defensive reflex. And what it's learning there is that this is not dangerous. So it's gonna ... it's basically ignoring it. But if I give it a very painful stimulus, then it is learning that the environment is dangerous, and it needs to be aware of that. What we found in our research is that when the snail learns, synapses get stronger, and we've been able to understand the biochemical and molecular process by which that strengthening happens, and we think the same thing takes place in our brains when we learn.

Presenter:

Today, other scientists and neurologists are using new technology called MRIs to help them study this fascinating memory-smell connection. In experiments, they have found that the area of the brain that processes smell is located here, immediately next to the hippocampus and the amygdala, the parts of the brain that are known to control memory and emotion. The sense of smell has a powerful connection to memory and the brain. The loss of the ability to smell is often one of the earliest

indications that there is something wrong in the brain.

David Glanzman: People that have poor senses of smell, very poor senses of smell, often that's associated with clinical diseases of memory, such as Alzheimer's. Alzheimer's disease is a very devastating disease of memory and it's caused by the malfunction of certain types of proteins in your brain. Recent research indicates that these abnormal proteins are particularly prominent in the olfactory bulb, which is one of the main centers for smelling, and olfactory cortex. It may be that first, the disruption begins there, and then it spreads to the parts of the brain that are important for memory.

Presenter:

The knowledge we are gaining today can lead us to ways to cure and prevent diseases of the mind that destroy our most precious gift as human beings, our memories.

Man 2:

The smell of the ocean reminds me of when I was young. I was stung by a jellyfish on my chest, and it hurt.

Man 3:

The smell of potato pancakes reminds me of my childhood, my mother, actually, my whole family, when I was very young.

Man 4:

The smell of gas reminds me of when I was young and my dad and I would fix cars together.