# Neuroscience

with Professor Jack Mellor

## Talking points

#### Knowledge

1. What is synaptic plasticity?

#### Comprehension

2. Why is it important that our memories are flexible?

#### Application

- 3. What questions would you ask Jack and the team to find out more about their research methods for studying synaptic plasticity?
- 4. When using optogenetics to study inception, how do you think researchers verify that they have successfully implanted a false memory in a mouse?
- 5. What role do you think philosophers play in the field of neuroscience?

#### Analysis

- 6. Why do you think that issues with synaptic plasticity might cause psychiatric disorders?
- 7. How might an understanding of the biological mechanisms behind schizophrenia help scientists find treatments for the condition?

#### **Evaluation**

8. If neuroscientists discover a method for removing, altering or adding false memories to humans, it may help treat patients with psychiatric conditions such as post-traumatic stress disorder (PTSD). What ethical implications would this raise? To what extent do you agree that such treatments should be investigated?

#### Creativity

9. What memories do you have of yesterday? For example, what did you do, learn or experience? Choose three memories from yesterday and consider how each might help you in the future. Be imaginative, and you will soon discover that even mundane everyday events, such as eating lunch, can influence your actions!

### Activity

Design an experiment to test your classmates' memory and synaptic in which they apply their memories to a new scenario. You could use the following instructions or create your own experiment.

- 2. Show the coloured numbers to your participants. Give them 15 seconds to memorise the colour associated with each number, then hide the coloured numbers.
- 3. Task 1: Give each participant a sheet of paper with the numbers 1 to 10 written on it, in order. Ask them to colour each number according to
- 4. Collect their responses and record how accurate each participant was.
  5. Show the coloured numbers to your participants for a further 15
- 6. Task 2: Give each participant a sheet of paper with the numbers 1 to 10 written on it, in a random order. Ask them to colour each number according to its colour in the example they were shown. 7. Collect their responses and record how accurate each participant was.

any correlation between a participant's score in the first task and their score in the second task? What conclusions can you draw about synaptic plasticity and our ability to apply memories in new scenarios? How do you think your results would change if participants completed task 2 before task 1? (You could test this by asking half your participants to

### More resources

- Find out more about Jack, his team and their research: mellor-lab.github.io/contents/welcome.html
- · Learn how neuroscientists are investigating whether optogenetics could treat epilepsy and schizophrenia in this Futurum article: www. futurumcareers.com/can-we-control-the-electrical-activity-in-our-brains
- This article from Time Magazine explains how and why your brain changes during your teenage years: www.time.com/4929170/inside-teen-teenage-brain
- Learn more about the Amaani Foundation Trust, the organisation Shyline founded to improve the welfare of Zimbabwean prisoners through psychological therapy: www.amaanifoundation.org