






## Your task

For each of the scenarios described below:

- Circle **sympathetic** or **parasympathetic** to show which nervous system is responsible.
- Describe what this branch of the nervous system is doing (e.g. dilates pupils).

		What nervous system is doing
	Sue is so nervous before her driving test that she can't eat a thing for breakfast.	<i>sympathetic / parasympathetic</i>
	Les is not a happy man. He's just arrived at the pub to find his girlfriend entwined with another man. Breathing heavily, Les decides to confront the pair.	<i>sympathetic / parasympathetic</i>
	Lenny absolutely loves the roller coaster ride. When he gets off, his mum notices how big his pupils look.	<i>sympathetic / parasympathetic</i>
	Amadeep is about to get the results of an important blood test. She feels really dry-mouthed in the doctor's surgery.	<i>sympathetic / parasympathetic</i>
	After the shock of thinking there was an intruder in the house, the police sit Mary down and reassure her.  She can hear her pounding heart getting slower.	<i>sympathetic / parasympathetic</i>
	After starring in a play for the local amateur dramatics group, Jerry finds he's very hungry after the performance.	<i>sympathetic / parasympathetic</i>

Something extra: If you look online, you'll see a useful mnemonic to summarise the functions of the parasympathetic nervous system: it's SLUDD. See if you can find out what those letters stand for.

<b>Genotype</b>	<b>Phenotype</b>	<b>Natural Selection</b>	<b>Monozygotic</b>
<b>Dizygotic</b>	<b>Evolution</b>	<b>Determinism</b>	<b>Phenylketonuria</b>
<b>Central nervous system</b>	<b>Peripheral nervous system</b>	<b>Somatic nervous system</b>	<b>Autonomic nervous system</b>
<b>Gland</b>	<b>Sensory neurons</b>	<b>Adrenaline</b>	<b>Endocrine system</b>
<b>Hormones</b>	<b>Axon</b>	<b>Synapse</b>	<b>Dendrites</b>
<b>Terminal buttons</b>	<b>Myelin sheath</b>	<b>Motor neurons</b>	<b>Relay neurons</b>
<b>Neurotransmitter</b>	<b>Excitation</b>	<b>Inhibition</b>	<b>Synaptic transmission</b>

Changes in inherited characteristics in a biological population over successive generations.	Branch-like structures that protrude from the cell body and carry nerve impulses from neighbouring neurons towards the cell body.	These are at the end of the axon and they communicate with the next neuron in the chain across the synapse.	The characteristics of an individual determined by both genes and the environment.
Governs vital functions in body, e.g. breathing, heart rate, digestion, sexual arousal and stress responses.	Controls muscle movement and receives information from sensory receptors.	The particular set of genes that a person possesses.	A fatty layer that protects the axon and speeds up electrical transmission of the impulse.
When a neurotransmitter, increases the positive charge of the postsynaptic neuron, increasing the likelihood that the neuron will fire.	Carry messages from sensory neurons to motor neurons.	The theory that a genetic behaviour that enhances survival (and reproduction) will continue in future generations.	Carry messages from CNS to effectors, e.g. glands and muscles.
The brain and spinal cord and the origin of all complex commands and decisions.	Identical twins.	When a neurotransmitter increases the negative charge of the postsynaptic neuron, decreasing the likelihood that the neuron will fire.	A rare genetic disorder that can cause severe learning difficulties in those who carry the genotype.
An organ in the body that synthesises biochemical substances such as hormones.	The view that behaviour is not under the influence of free will.	Carry messages from the PNS to the CNS.	Non-identical twins.
Process by which neighbouring neurons communicate with each other by sending chemical messages across the synapse.	One of the body's major information systems that instructs glands to release hormones directly into the bloodstream.	Sends information to the CNS from outside and transmits messages from the CNS to muscles and glands in the body.	Hormone produced by adrenal glands which stimulates heart rate, contracting blood vessels, etc.
Biochemical substances that circulate in the bloodstream and only affect target organs.	Part of the neuron that carries the impulses away from the cell body.	Brain chemicals released from synaptic vesicles that relay signals across the synapse from one neuron to another.	The gap between neurons.

## Task:

Watch the following video clip and then read the BBC news article. These both refer to the case of Phineas Gage's accident.

<https://www.youtube.com/watch?v=mnAehjF7p3E>

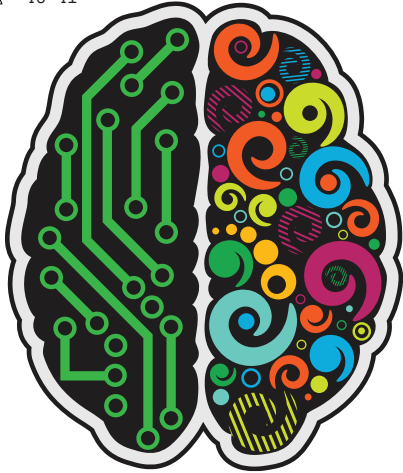
<http://www.bbc.co.uk/news/health-12649555>

Answer the questions that follow in preparation for a class discussion.

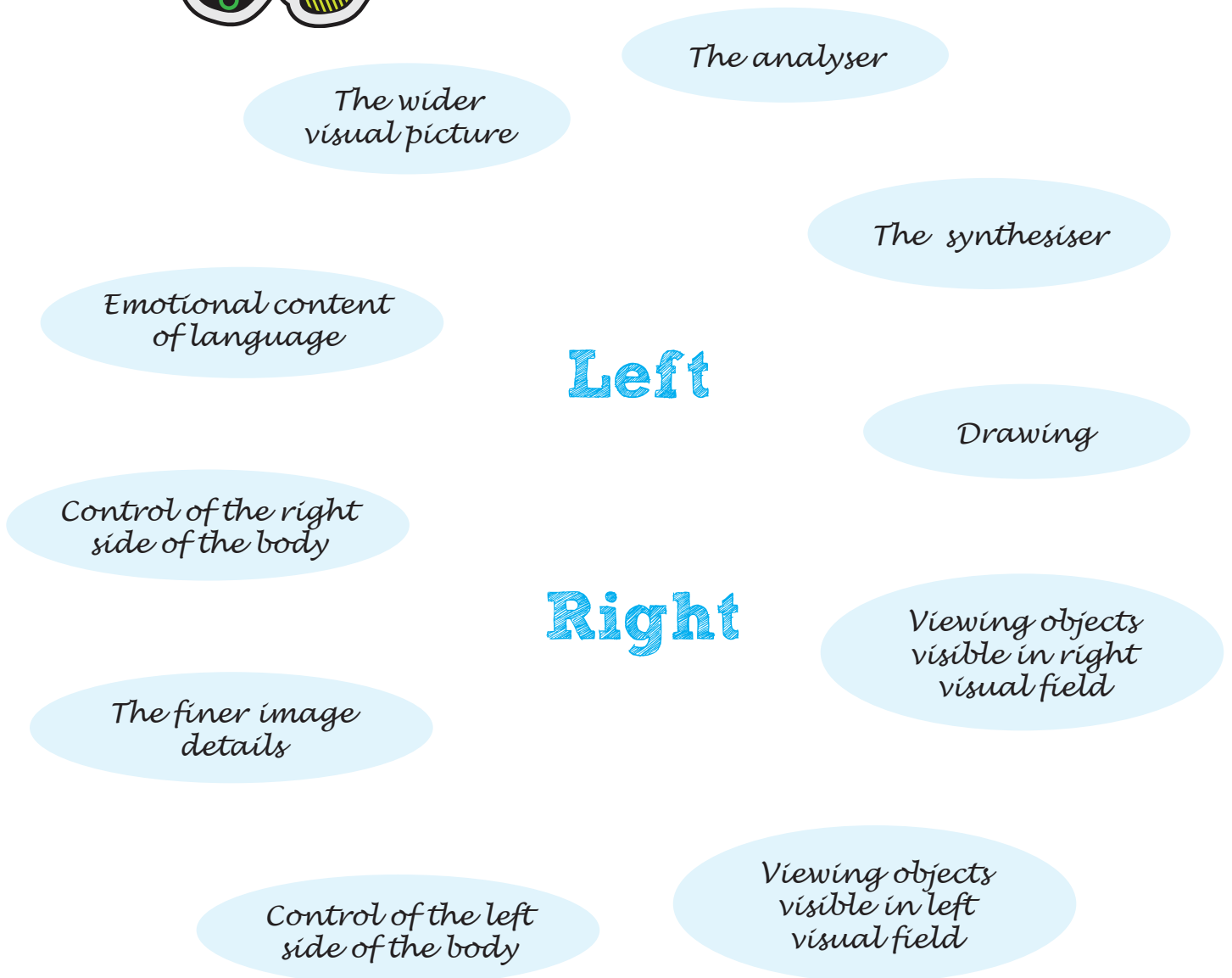


1. The details of Phineas Gage's accident and subsequent behaviour could be considered to be a case study. Find a suitable definition of a **case study**.
2. The 'reconstruction' reminds us of one of the weaknesses of case studies – that we can only *assume* that the behavioural changes were a direct result of the brain damage.
  - a) The possibility of a soul transfer with a 'notorious gun fighter and card cheat' was a suggestion made in the video. Explain why this suggestion would generally be rejected by psychologists. Refer to elements of the **scientific method** in your answer.
  - b) Can you suggest any other cause of the changes that are reported?
  - c) What are some of the other limitations of case studies highlighted by this case?
3. Given the limitations of case studies, argue for their value in psychology with reference to Phineas Gage's case specifically.
4. The case of Phineas Gage occurred well before the creation of the ethical guidelines on patient confidentiality. Make notes on the ways in which the rights of patients today would need to be dealt with when writing them up as a case study.

 40-41



Split-brain research has been able to tell us much about what behaviours are controlled by what hemisphere of the brain – test what you have understood and remembered by simply drawing a line between the side of the brain (right or left) and the function or activity.



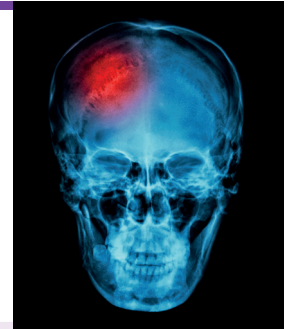
**Extension activity**

Outline the procedure used by Sperry and Gazzaniga to investigate hemispheric lateralisation.



Fill in the gaps in this summary about plasticity and functional recovery of the brain after trauma.

To help you, there are some words at the bottom of the page that fit in the gaps – **however, there are three words that you will have to work out for yourself!**



We now know that the brain has the ability to change throughout a person's lifespan and this is known as ....., whereas previously this ability was thought to be restricted to infancy. The time of greatest growth of synaptic ..... is during infancy. However, when it becomes established that some are not used then a process of synaptic ..... occurs, which involves their removal. In addition new neural connections can be formed and existing ones changed as a result of learning and .....

Scientists have looked closely at this process and concluded that the brain undergoes a process of rewiring by forming new ..... connections. Secondary neural pathways near the trauma are activated or ..... to allow functioning to continue despite the damage. New pathways are formed through the growth of new nerve endings ( ..... sprouting) and the re-formation of blood vessels serving the brain.




The application of this knowledge has led to advances in the field of ....., which is the process of supporting people after brain trauma to regain as much function as possible. Functional recovery involves unaffected areas of the brain taking over from damaged areas. Usually this will occur quickly after the trauma and is known as ..... recovery but slows down later. At this point, therapies need to take over to continue the rehabilitation, for example electrical stimulation of the brain or ..... therapy.

There are some individual differences that have already been discovered in relation to plasticity. Age is certainly one factor and functional plasticity has been shown to ..... with age. Schneider *et al.* (2014) found that the ability of people to adapt after brain injury was associated with the time that they had spent in .....

All of this sounds very positive – it seems to give hope that many people who have suffered a brain injury will experience at least partial and occasionally complete recovery. However, plasticity has been shown to have a downside too. .... limb disorder is thought to result from a reorganisation in the somatosensory ..... Also, prolonged drug use impacts negatively on cognitive functioning and is associated with ..... in later life.

### Missing terms:

unmasked	connections	cortex	pruning
axonal	movement	experience	education
spontaneous	synaptic	phantom	neurorehabilitation

Technique	Description	Strengths	Limitations
<p>Functional magnetic resonance imaging (fMRI)</p> 			
<p>Electroencephalogram (EEG)</p> 			
<p>Event-related potentials (ERPs)</p> <p>             A: Baseline              B: N200              C: P300         </p>			
<p>Post-mortem examinations</p> 			

Task: Using your textbook and notes, complete the above table to summarise in your own words what you need to know about these techniques for investigating the brain. Focus on identifying key details. Hopefully the pictures will help to remind you about which is which.

## Task:

A hospital wants to provide leaflets for patients who are undergoing either functional magnetic resonance imaging (fMRI) or electroencephalograms (EEG). What would you put in such a leaflet?

The aim would be to both inform and reassure the patient.

1. Choose the treatment that you want to produce a leaflet for.
2. Research the testing procedure including what the patient might experience. Use the notes spaces below to guide you as to the areas you might cover.
3. Finally you should design an A5 booklet or A4 trifold that can be given to potential patients.

*This brain testing sounds so scary*



**What might patients worry about?**

**Why is this test used by doctors and researchers?**

**How useful will the results of the test be to the doctors? How could they be used?**

**What should a patient expect if they undergo the test?**

**Extension:** It is a sensitive issue but if we are to know more about the brain, people do need to allow their brain to be researched after their death (post-mortem). Why might people be particularly sensitive about allowing this and do you think they are justified? How might you try to persuade someone it was a good idea by referring to what you have been learning in this section?





Read the following summary of Geoffrey Munro and Cynthia Munro's (2014) study into 'soft' versus 'hard' psychological evidence and then answer the questions that follow ready for discussion in the next lesson.

<http://digest.bps.org.uk/2015/02/were-quicker-to-dismiss-evidence-from.html>

1. What was the experimental design used in this study?
2. Why was it important to match other details in the story?
3. How might the sample be considered to be biased?
4. 'In reality, a diagnosis of probable Alzheimer's will always be made with cognitive tests.' Consider the implications of this for clinicians and patients.
5. Explain in your own words what the researchers found about the impact of personal political beliefs on their judgement of the validity of the respective data.
6. The fact that medical students have been shown to consider their psychology lessons as 'soft and fluffy' and less important than their other lectures is a concern. They are the doctors of the future!

Either:

- a) Prepare a short presentation or speech to persuade them of the importance of taking note of what can be learned from psychology for the treatment of at least one physical or psychological problem.

Or

- b) Address the whole issue by considering what their arguments against psychology as a science may be and prepare a suitable defence of your subject.

## Reference

Munro, G. and Munro, C. (2014) 'Soft' versus 'hard' psychological science: Biased evaluations of scientific evidence that threatens or supports a strongly-held political identity. *Basic and Applied Social Psychology*, 36(6), 533–543.



The case of Michel Siffre is quite fascinating. Imagine being in a cave alone for six months. What can we learn about circadian rhythms from the case, though? There is often nothing like hearing it straight from the man himself. The following is an interview with him conducted in 2008. Read through it and have a good look at the pictures too – it really gives an insight into what he was trying to achieve.

<http://www.cabinetmagazine.org/issues/30/foer.php>

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NOW ANSWER THE FOLLOWING QUESTIONS.

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1. How might extraneous variables have been controlled if the study had been conducted in a laboratory, rather than a cave as suggested?
2. Siffre acknowledges he experienced perfect sleep. The psychological testing in these early studies was rather rudimentary and focused on passage of time, etc. What other testing would have been valuable to do? In each case, justify your suggestion.
3. The French army pursued the idea of a 48-hour schedule, including drug trials, but it was never fully implemented. Why might this have been?
4. Whilst case studies are often criticised as being weak evidence because they do not account for individual differences, Siffre's study and its findings have been replicated on a number of individuals. Does this make it likely that the results are generalisable?
5. The free running 24.5-hour cycle was observed but 48-hour cycles were also reported. Obviously, there was interest from the French army, but who else might be interested in this finding and what are the potential economic implications of this research?
6. 'I have no theory. I don't make theories.' From what you know of the scientific method (you may need to look this up) why would this imply that Siffre did not consider himself a scientist?
7. Siffre also notes that such studies could not be carried out now. Using your ideas from question 2, how would you argue the costs and benefits of similar studies to persuade an ethics committee to allow you to carry out such research?



Temporal isolation studies have told us much about the 'free running' of the sleep/wake cycle. Two of the key studies are Aschoff and Wever (1976) and Folkard *et al.* (1985).

Summarise the key details of these studies below then consider some of the ethical issues that would have been raised.

### Aschoff and Wever (1976)

Duration

Location

Procedure

Findings

### Folkard *et al.* (1985)

Duration

Location

Procedure

Findings

Other tasks:

1. Prepare a consent form for the participants in **Aschoff and Wever's** study. This must include both **procedural** and **ethical** details to allow participants to give informed consent.
2. In **Folkard's** study there was an element of deception in that the participants were not aware that the clock was being speeded up. Suggest ways in which the ethical issues involved here might have been dealt with.
3. Protection from harm would be an important concern in such studies. Suggest what a psychologist might need to look out for to ensure that participants were well protected.



A quick recap on the facts of this topic. You have a question and three possible answers – just pick the right one!

1. The menstrual cycle is an example of a/an 

ultradian
infradian
circadian

 rhythm.
2. An ultradian rhythm lasts 

around
less than
more than

 24 hours. An example is the 

menstrual
sleep/wake
stages of sleep

 cycle.
3. The winter blues is an example of a/an 

ultradian
infradian
circadian

 rhythm. It is otherwise known as 

SDA
SED
SAD

.
4. The menstrual cycle is controlled by endogenous factors, namely the hormones oestrogen and 

testosterone
progesterone
cortisol

.
5. Melatonin is implicated in a rhythmically occurring depressive disorder and this has been found to be secreted from the 

adrenal
pituitary
pineal

 gland during the night.
6. Synchronisation of the menstrual cycles of women who spend time in close proximity is thought to have a/an 

evolutionary
behavioural
cognitive

 basis whereby it would result in babies being born around the same time and they could then be looked after collectively.
7. One of the applications of research into infradian rhythms has been therapy for seasonal affective disorder. The positive impact 

light
dark
exercise

 seems to be 

temporary
significant
long-term

 (Rohan *et al.* 2009).
8. One of the applications of sleep research has been 

CBT
phototherapy
drug therapy

 to treat people whose maladaptive melatonin levels need resetting.
9. Sleep stages are an example of a/an 

ultradian
infradian
circadian

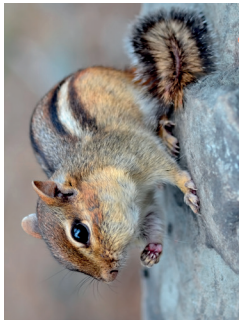

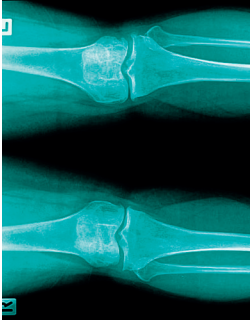
 rhythm with cycles of around 

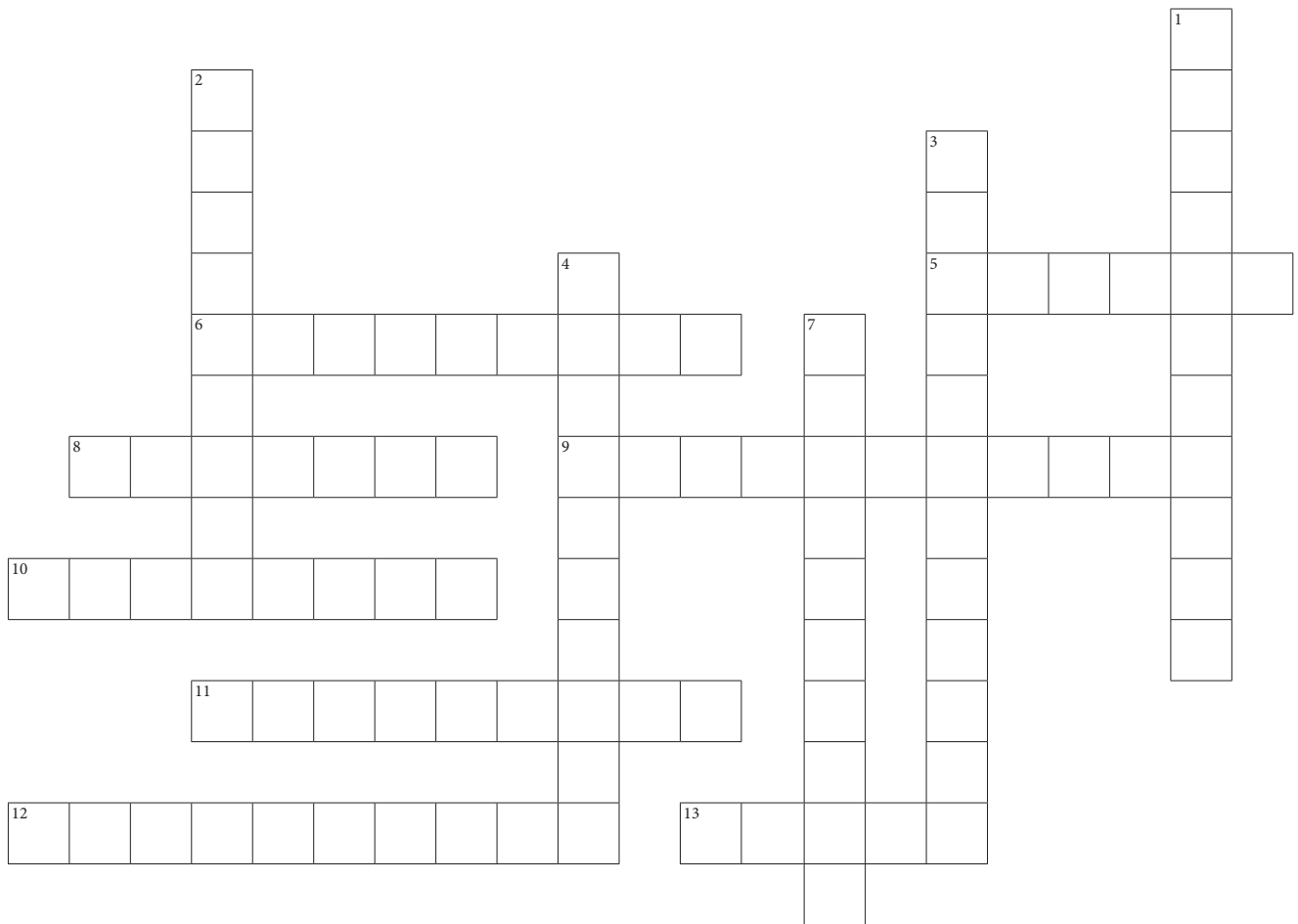
120
20
90

 minutes.
10. In stage 5 of the sleep cycle the body is effectively paralysed and most dreaming takes place during this stage, known as 

NREM
RAM
REM

 sleep.

Study	Findings and conclusions	Methodological and/or ethical issues	Potential applications
<p>Decoursey <i>et al.</i> (2000)</p> 			
<p>Ralph <i>et al.</i> (1990)</p> 			
<p>Campbell and Murphy (1988)</p> 			



**Across**

5. This gland increases its production of melatonin at night. (6 letters)
6. A hormone that induces sleep. (9)
8. When biological rhythms are supposedly unaffected by external factors they are said to be free \_\_\_\_\_. (7)
9. A structure where the optic nerves cross and on top of which the SCN sits. (5,6)
10. The animals used in Ralph *et al.*'s (1990) study. (8)
11. & 12. External or environmental cues that may influence a biological rhythm are called \_\_\_\_\_ \_\_\_\_\_. (9,10)
12. See 11 across.
13. Campbell and Murphy (1995) demonstrated that the eyes are not the only source of light information to the brain. On what body parts did they shine the light? (5)

**Down**

1. The process by which biological rhythms are reset by environmental cues. (11)
2. The animals used in De Coursey *et al.*'s (2000) study. (9)
3. The part of the brain that houses the SCN. (12)
4. The SCN is an \_\_\_\_\_ factor in the sleep/wake cycle. (10)
7. Meal times are an example of these. (6,4)

How quickly can you work out the clues? The answers are all words that appear in this chapter and you have been given the initial letter to help you!

Area located in the temporal lobe, analyses speech.	A
Frontal lobe area, typically responsible for speech production.	B
A bodily rhythm that occurs across a 24-hour period.	C
What happens to the sleep/wake cycle during shift work?	D
A record of the electrical impulses produced by the brain's activity.	E
This measures brain activity by detecting changes in blood flow.	F
The Phineas _____ case study suggests that the frontal lobe may be responsible for regulating mood.	G
The idea that the two hemispheres of the brain are functionally different is called _____ lateralisation.	H
Biorhythm with a frequency of less than one cycle in 24 hours.	I
The knee-_____ reflex is an example of a reflex arc.	J
Campbell and Murphy (1998) found light shone on the back of the _____ led to deviation of the sleep/wake cycle.	K
Different brain areas do different things.	L
_____ cycle, example of infradian rhythm, lasting around 28 days.	M
The study of brains!	N
A key hormone related to endogenous rhythms.	O
Brain's tendency to change and adapt as a result of new learning.	P
Used in many biopsychology studies to collect data.	Q
A stage of sleep.	R
The man in the cave.	S
They may benefit from having a later start to the school day.	T
A rhythm lasting less than 24 hours.	U
_____ cortex, part of the occipital lobe.	V
Damage to left temporal lobe might result in language comprehension problems known as _____ aphasia.	W
External/environmental factors that reset our biological clocks.	Z