

Academic Reading Paper 36

Lamps, Neurons and Apologies

Time allowed: 1 hour

INSTRUCTIONS TO CANDIDATES

- Do not open this booklet until you are told to do so.
- Write your name and the date at the top of the answer sheet.
- Answer **all** the questions.
- Write your answers **on the answer sheet**, not in this booklet.
- You must transfer your answers within the hour. **No extra time is given for transferring answers in the Reading test.**
- Do not remove this booklet from the examination room.

INFORMATION FOR CANDIDATES

- There are 40 questions in this paper.
- Each question carries one mark.
- There are three passages, with 13, 13 and 14 questions.

These passages were written for this library. They are **not** reproduced from any published past paper. The format, timing and task types follow the published specification for the Academic Reading test so that sitting this on paper feels like the real thing.

You should spend about 20 minutes on Questions 1–13, which are based on Reading Passage 1 below.

The lamp that made mining more dangerous

As British coal mines went deeper in the eighteenth century they ran into a gas the miners called firedamp, which is largely methane, and which explodes when it meets a flame in the right proportion. The men worked by candlelight because there was nothing else, so the arrangement was a naked flame carried into a space that might at any moment fill with an explosive mixture. On 25 May 1812 an explosion at the Felling colliery near Gateshead killed ninety-two people, among them boys of eight and nine, and the scale of it, in a village where most of the dead were known to each other, produced a public subscription and a society formed specifically to find a lamp that would not set the gas off.

Two answers arrived within months of each other in 1815 and they were reached by opposite routes. George Stephenson was an engine-wright at Killingworth colliery who had taught himself to read in his late teens. He built lamps, carried them into workings known to contain gas, and observed what happened, which is a method with an obvious risk attached and which he ran several times. His design admitted air through narrow tubes, on the reasoning that a flame will not travel back along a passage that is small enough. He arrived at the right principle without being able to say why it worked.

Humphry Davy, at the Royal Institution in London, approached it as chemistry. He established by experiment that a flame will not pass through a fine wire mesh, and he identified why: the metal carries heat away from the burning gas faster than the flame can generate it, so combustion is quenched at the surface. A cylinder of gauze around the flame therefore lets air and gas in, burns whatever enters, and does not let the burning out. The same principle also gave the lamp a second use, since the height of the blue cap that appears above the flame in the presence of methane indicates roughly how much of it is present.

The two men and their supporters then argued about priority for years, and the argument had a shape that had little to do with lamps. Davy was a celebrated chemist and a fellow of the Royal Society. Stephenson was a working man with an accent that London found comic, and it was suggested more than once that he could not have arrived at his design without hearing of Davy's. A public subscription awarded Davy two thousand pounds. Stephenson was offered a hundred, later raised to a thousand after a local committee protested. Davy declined to patent the lamp, saying that his only object had been to serve humanity, which was true and also cost him nothing he wanted.

The lamp worked. It did what it was designed to do, it was adopted across the coalfields within a few years, and deaths from explosions in British mines went up rather than down.

The reason is not a defect in the device. A lamp that can be carried safely into gas makes it possible to work seams and depths that had previously been left alone as unworkable, and owners worked them. The number of men underground rose, the hours rose, and the places they were sent became worse. Risk per man-hour fell and exposure rose faster, and the product of the two is what appears in the mortality

figures, which is why the lamp can be both a success and a cause of more funerals. The safety device was converted into production rather than into safety, and there was nothing in the lamp itself that could have prevented that.

There were also two real limitations, and both were known. The gauze corrodes in the damp and sooty air of a mine, and a corroded or damaged gauze will pass a flame. And in a strong current of air, of the kind produced by the ventilation the deeper workings required, the flame can be driven through the mesh. The lamp was safe in still air and when properly maintained, and a mine is not a still place and maintenance was somebody's responsibility rather than everybody's.

None of this is an argument that the lamp should not have been made, which would be absurd, and the lamp remained in use as a gas detector long after electric lighting replaced it as a light. It is an argument about what a safety device does when it is introduced into a system that has an interest in output. The benefit is available either as fewer deaths or as more coal, and which of the two is taken is not decided by the person who designed the device.

Questions 1–5

Complete the table below.

Choose **NO MORE THAN TWO WORDS AND/OR A NUMBER** from the passage for each answer.

Two routes to the same device, 1815		
	Stephenson	Davy
Background	an 1 at Killingworth colliery who taught himself to read in his late teens	a chemist at the 2 in London
Method	built lamps and carried them into workings known to contain 3	established the principle by experiment before building
The design	air admitted through narrow 4 , so a flame cannot travel back	a cylinder of 5 around the flame, which carries heat away faster than the flame can generate it

Questions 6–9

Complete the sentences below.

Choose **NO MORE THAN TWO WORDS AND/OR A NUMBER** from the passage for each answer.

6 The Felling explosion of May 1812 killed people.

- 7 The height of the blue above the flame indicates roughly how much methane is present.
- 8 A public subscription awarded Davy pounds.
- 9 The gauze is unsafe if it has corroded and also in a strong current of

Questions 10–13

Do the following statements agree with the information given in Reading Passage 1?

Write **TRUE** if the statement agrees with the information, **FALSE** if the statement contradicts the information, or **NOT GIVEN** if there is no information on this.

- 10 Stephenson could not explain why his own design worked.
- 11 The rise in mining deaths was caused by a fault in the lamp.
- 12 Stephenson's design was more widely adopted than Davy's.
- 13 The lamp went out of use entirely once electric lighting arrived.

You should spend about 20 minutes on Questions 14–26, which are based on Reading Passage 2 below.

New cells in an old brain

- A** Santiago Ramón y Cajal, who had established more than anybody that the nervous system is made of separate cells, also wrote the sentence that closed a question for most of a century. In the adult brain, he said, the pathways are fixed and finished and immutable; everything may die, nothing may be regenerated. It was a reasonable conclusion from what could be seen, and it became something stronger than a conclusion. It became the assumption against which any contrary observation would have to argue, which is a considerably stronger position for a claim to occupy than being merely believed.
- B** Joseph Altman produced such an observation in the early 1960s using a method that was new at the time. A radioactive form of one of the building blocks of DNA is given to an animal, and any cell that copies its DNA afterwards takes the label up and can be identified in tissue examined later. Cells that never divide again stay unlabelled, which is what makes the method a test of when a cell was born. Altman found labelled cells with the appearance of neurons in the hippocampus and the olfactory bulb of adult rats, and published in the most visible journals available. The work was not refuted, and nobody published anything to show it was wrong. It was not taken up either, and over the following years he lost his funding and his position, and the finding sat in the literature unread for the better part of two decades.
- C** Michael Kaplan repeated it in the 1970s with the electron microscope, which allowed him to show the structures that distinguish a neuron from the other cells present, and met the same response. A senior figure in the field is reported to have told him that the cells might look like neurons in Iowa but they did not in Los Angeles. That remark is usually quoted as a joke about arrogance. It is more interesting as an illustration of what a firmly held framework does to a piece of evidence, which is that the evidence does not have to be answered at all, because it can be classified as an error before anybody looks at it.
- D** What broke it was a bird. Fernando Nottebohm was studying canaries, whose males learn a fresh song each breeding season, and found that the regions of the brain controlling song grow in the spring and shrink afterwards, and that the growth involves neurons generated in the adult animal. This was much harder to set aside than a labelled cell in a rat, because the anatomy and the behaviour moved together and on a schedule. Something was being built, used and dismantled annually, and it was visible from two directions at once. A bird that learns a new song every year is doing something a fixed and finished brain cannot do.
- E** Human evidence arrived in 1998 and by an unusual route. A compound similar to Altman's label had been given to a small number of terminally ill cancer patients so that the growth of their tumours could be tracked. Some of them agreed that their brains could be examined after death. In tissue from those patients, labelled cells with the characteristics of neurons were found in the hip-

pocampus. Within a few years the textbooks had been rewritten, adult neurogenesis was being investigated as a target for treating depression and memory loss, and the century-old assumption was being described in lectures as a standard example of how dogma delays science.

- F** That account is now itself in difficulty. In 2018 one group reported that when human brain tissue is preserved rapidly and examined with careful controls, the number of new neurons in the adult hippocampus falls essentially to nothing after childhood. A month later a second group, using different preservation and different markers, reported that healthy people in their seventies were producing them at rates comparable to much younger people. Both papers appeared in leading journals within weeks of each other, neither has been withdrawn, and neither group has conceded.
- G** The disagreement is not about whether the phenomenon exists in rodents, where it is not seriously disputed, but about whether it occurs at a meaningful rate in adult human beings, and it turns on technical questions that are genuinely hard rather than on anybody being careless: how quickly tissue must be preserved after death before the markers degrade, and whether the molecules used to identify a young neuron are found in any other kind of cell. The honest summary is that a story about dogma being overturned by evidence has become a story about two sets of evidence that do not agree, which is a less satisfying shape and a more common one.

Questions 14–18

Reading Passage 2 has seven sections, A–G.

Which section contains the following information?

Write the correct letter, A–G.

NB You may use any letter more than once.

- 14** a statement that neither side has given way
- 15** an explanation of why evidence did not have to be answered
- 16** an account of how the labelling method distinguishes new cells from old
- 17** an insistence that the current disagreement is not about carelessness
- 18** a case in which anatomy and behaviour changed together

Questions 19–22

Look at the following statements and the list of people below.

Match each statement with the correct person, A–C.

NB You may use any letter more than once.

List of People

- A** Ramón y Cajal
- B** Joseph Altman
- C** Fernando Nottebohm

- 19** He wrote that nothing in the adult brain can be regenerated.
- 20** He lost his funding and his position after publishing.
- 21** He worked with animals that learn something new each year.
- 22** He established that the nervous system is made of separate cells.

Questions 23–26

Complete the summary using the list of words, A–H, below.

List of Words

- A** assumption
- B** conclusion
- C** schedule
- D** markers
- E** tumours
- F** dogma
- G** rodents
- H** preservation

From settled to unsettled

Cajal's sentence became something stronger than a **23** The canary work was hard to dismiss because the anatomy and the behaviour moved together and on a **24** Human evidence came from patients who had been given a label so that their **25** could be tracked. The present dispute is not about **26**, where the phenomenon is not seriously disputed.

You should spend about 20 minutes on Questions 27–40, which are based on Reading Passage 3 below.

Why institutions cannot apologise

There is a particular register that public bodies use when something has gone wrong, and everybody recognises it. Mistakes were made. Lessons will be learned. The organisation regrets any distress caused. The passive voice does the work of removing anybody who might have done anything, and the noun distress replaces whatever actually happened. It is universally derided and it is produced anyway, year after year, by institutions that have watched every previous version of it be derided in public.

The usual explanation is cowardice, or lawyers, and both contribute. But the deeper reason is that an apology is a particular kind of act and an institution cannot perform it. When a person apologises properly they do something costly: they place themselves at the mercy of the person they wronged, admit they could have acted otherwise, and offer no defence. That cost is what makes it worth anything, because a signal that is expensive to send cannot be faked cheaply, and everybody involved knows it. An institution has no self to expose. The people writing the statement did not do the thing, the people who did it have often left, and the entity that is apologising is a legal fiction that cannot feel the exposure that gives the act its meaning.

This is why the corporate apology reads as it does. It is not a failed attempt at a real apology; it is a different object wearing the same clothes. The characteristic constructions follow from the structure: an agentless passive because no agent can be named without exposing an individual, a reference to distress because the actual harm may be the subject of litigation, and a promise about the future because the future is the only part the institution can commit.

Where this becomes serious rather than merely annoying is in medicine, and the evidence there is instructive. For decades the standard legal advice after an adverse outcome was to say nothing, on the reasonable-sounding grounds that an admission could be used in court. Several jurisdictions then passed laws making expressions of regret inadmissible as evidence, and hospitals began programmes of open disclosure, in which patients are told what happened, told why, and offered compensation without being required to sue for it. Claims did not rise. In the systems that have been studied, the number of claims and the total paid out both fell.

The reason is worth stating because it is not obvious. A great many people who sue an institution are not primarily seeking money. They are seeking an account of what happened, an acknowledgement that it should not have happened, and an assurance that it will not happen to somebody else, and litigation is the only mechanism they have been offered for extracting any of the three. Give them the three things directly and the mechanism becomes unnecessary in a substantial fraction of cases, which is what the falling numbers record.

Which points at what an institution can actually do, as distinct from what it cannot. It cannot feel remorse and it should stop performing something it cannot feel, because the performance is what everybody objects to. It can publish an account of what happened that is detailed enough to be checked. It can name what has changed as a result, in terms specific enough that somebody could verify a year later whether it did. It can pay, promptly, without requiring the harmed party to fight for it. These are all things a person apologising can only promise, and they are the parts that were doing the work.

The concession is that the words are not nothing, and treating them as pure theatre is its own kind of error. People who have been harmed frequently say that being addressed directly, in ordinary language, by somebody with a name, mattered to them independently of the compensation. What they object to is not the presence of an apology but its substitution for the rest, and an institution that says the words and does none of the other things has not merely failed to apologise. It has used the form of an apology to close the matter, which is a use of language the form was not built for.

So the test is straightforward and it does not require anyone to judge sincerity, which is unknowable in any case. Does the statement say what happened, in enough detail to be wrong about? Does it name a change that can be checked? Is money being offered rather than defended? An institution that does those three things has done everything within its power, whatever its statement sounds like, and one that does none of them has said nothing at all, however sorry it has managed to sound.

Questions 27–32

Do the following statements agree with the claims of the writer in Reading Passage 3?

Write **YES** if the statement agrees with the claims of the writer, **NO** if the statement contradicts the claims of the writer, or **NOT GIVEN** if it is impossible to say what the writer thinks about this.

- 27** The writer thinks the words of an apology are pure theatre.
- 28** The writer accepts that lawyers contribute to how these statements are written.
- 29** Open disclosure programmes are now used by most hospitals.
- 30** The writer believes sincerity is what should be judged.
- 31** The writer holds that many people who sue are looking for something other than money.
- 32** Individuals apologise more effectively than institutions in every kind of situation.

Questions 33–36

Complete each sentence with the correct ending, A–G, below.

Endings
A no agent can be named without exposing an individual.
B the future is the only part the institution can commit.
C litigation is the only mechanism they have been offered.
D they are the parts that were doing the work.
E the statement was not approved by senior management.
F the harmed party has refused to accept compensation.
G the institution has no lawyers of its own.

- 33 Such statements use an agentless passive because
- 34 They contain a promise about the future because
- 35 People take an institution to court because
- 36 Publishing an account, naming a change and paying matter because

Questions 37–40

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

- 37 According to the passage, what makes a personal apology worth anything?
- A The sincerity of the feeling behind it.
 - B Its cost, which is why it cannot be faked cheaply.
 - C The formality of the words chosen.
 - D The presence of witnesses.
- 38 Which position does the writer reject?
- A That an institution should publish a checkable account of what happened.
 - B That the corporate apology is a failed attempt at a real one.
 - C That being addressed in ordinary language matters to people.
 - D That claims fell where open disclosure was adopted.
- 39 What happened where laws made expressions of regret inadmissible?
- A Claims and total payments both fell.
 - B Claims rose but payments fell.
 - C Hospitals stopped disclosing adverse outcomes.
 - D The laws were repealed.

- 40** Which of the following best expresses the writer's test?
- A** Does it say what happened, name a checkable change, and offer money rather than defend it?
 - B** Does it sound sincere to the people affected?
 - C** Was it approved without legal advice?
 - D** Was it issued quickly enough?