英　　語

〈監督者の指示があるまで開いてはいけない〉

1. 試験開始後，まず解答用紙に自分の受験番号と氏名を正しく記入しなさい。
2. 試験開始後，速やかに問題冊子に落丁や乱丁がないか確認しなさい。
   落丁や乱丁があった場合は，手を挙げなさい。
3. 下書きは問題冊子の余白を利用しなさい。
4. 記入中でない解答用紙は必ず裏返しにしておきなさい。
5. 問題冊子は試験終了後，持ち帰ってもよい。
   ただし，試験途中には持ち出してはいけない。

I. Read the following passage and answer the questions that follow.

A workday filled with a (A) of mentally demanding tasks can leave you feeling drained. After long hours of mentally tracking one thought to the next, you're probably more likely to choose a relaxing evening of streaming TV shows than to tackle a tough task on your to-do list or to make time on a creative pursuit. A new study provides a biological explanation for this familiar phenomenon: thinking hard leads to a buildup of chemicals that may (B) the functioning of the brain.

For some time, scientists have struggled to find an explanation for why our mental resources get depleted. Researchers have hypothesized that long periods of strenuous mental effort lead to a depletion of glucose and other key resources that supply the energy-hungry brain. Early experiments in the 2000s supported this notion — reporting that people experienced a reduction in blood glucose after a cognitively demanding task and that consuming a sugar drink could boost performance. But subsequent work failed to (C) those findings. "If you look at all of the studies together, there has been, on average, no effect," says Antonius Wiehler, a cognitive neuroscientist at Pitie-Salpetriere Hospital in France.

In a previous study published in 2016, Wiehler's Pitie-Salpetriere colleague Mathias Pessiglione and his team demonstrated that long periods of mentally effortful tasks made people more likely to choose immediate gratification over waiting for a bigger reward much later ($40 now versus $50 in two weeks, for example). This behavioral change was accompanied by a decrease in brain activity in the lateral prefrontal cortex (LPFC), an area involved in cognitive processes such as decision-making. The result left the team with the question of what was causing this change in brain activity.

To (D) that question further in the new study, published in *Current Biology* on August 11, Pessiglione, Wiehler and their colleagues recruited 40 volunteers to follow up on the earlier work. Participants had to spend around six and a half hours at the lab — the approximate equivalent of a full workday — performing repetitive but mentally challenging tasks. Among them was the "N-back" task, which asked individuals to recall a letter that appeared on a screen "N" number of trials before. The subjects were split into two groups: one was assigned a difficult version of these tasks, while the other was given a simpler version. Although both groups reported feeling similar levels of exhaustion after the daylong experiment, only those who had been given the harder task were more likely to choose to take home an immediate reward rather than wait for a larger cash-out at a later date.

To determine what was going on, the team used magnetic resonance spectroscopy, a form of magnetic resonance imaging that enables researchers to detect levels of certain chemicals in the

brain. The investigators found that people who had undertaken the harder task had higher concentrations of the neurotransmitter glutamate in the LPFC than those who had performed the easier one. They also found an increased level of glutamate diffusion in the difficult group, indicating that the molecules were moving faster — which, according to Wiehler, suggests the chemical was building up outside cells, where its movement was less constrained.

When the researchers looked at glutamate in the primary visual cortex — another brain area activated during the experiment because of its role in vision — they found no such changes. "A lot of the existing work had gone into the assumption that fatigue occurs because you deplete a resource of some kind," says Matthew Apps, a cognitive neuroscientist at the University of Birmingham in England, who was not involved in this work. "I think it's really exciting that there might be a different model whereby the accumulation of materials in the brain may stop it from functioning properly — and that might actually be what leads to the consequences of fatigue on your behavior."

Apps (E) a number of areas where these findings could prove useful. One is in the workplace. For people in jobs that require a sustained intense focus, burnout can lead to detrimental consequences — particularly in a field like surgery. In the future, therapeutics aimed at reversing the buildup of glutamate may help boost these individuals' ability to sustain attention for long periods of time. Another area of interest would be researching clinical conditions in which fatigue is a symptom, such as chronic fatigue syndrome. The presence of glutamate as a biological marker might shed light on why patients struggle with exhaustion. [....]

[Adapted from: Kwon, Diana. "Why Thinking Hard Wears You Out." *Scientific American.* 11 August, 2022. URL: https://www.scientificamerican.com/article/why-thinking-hard-wears-you-out/]

1. Choose the best word from the list to fill in blanks (A)~(E) and write the number in the space on the answer sheet.

(A) :	1. group	2. case	3. string	4. phase
(B) :	1. prevent	2. confuse	3. soothe	4. disrupt
(C) :	1. accept	2. succeed	3. reproduce	4. discover
(D) :	1. probe	2. respond	3. inquire	4. determine
(E) :	1. treats	2. serves	3. functions	4. notes

2. What was the hypothesis in the early study about why strenuous mental effort makes us fatigued?

1. Mental effort consumes the substances our brains need to function well.
2. Brains get worn out with mental effort in the same way as muscles.
3. Extended periods of mental effort make us crave sugary drinks for more energy.
4. Mental fatigue is caused not by a reduction in chemicals but a buildup instead.

3. How do mentally challenging tasks affect people's behavior?

1. They are unlikely to accept a smaller reward if they worked hard for it.
2. They are more willing to put off getting a reward if they can get more money.
3. They are unwilling to take immediate gratification.
4. They are less likely to accept a larger but delayed monetary reward.

4. What did the researchers in the new study NOT look at?

1. The levels of a neurotransmitter in the subjects' brains.
2. The score subjects got in the N-back task.
3. How tired the subjects stated they felt at the end of the tasks.
4. Whether or not the subjects would accept a delayed compensation.

5. Why did the researchers in the new study believe their theory was correct?

1. There was no buildup of glutamate in the lateral prefrontal cortex of subjects who did the less demanding mental task.
2. Brain activity in the LPFC went down in subjects who performed a more difficult task.
3. Glutamate was diffusing from inside to outside cells in the demanding task group.
4. Subjects who did the more demanding task had increased glutamate in their brain cortex.

Ⅱ. Read the following passage and answer the questions that follow.

Crowd wisdom such as what might arise from online voting is popularly assumed to provide better answers than any one person by (A) multiple perspectives. Democratic methods, however, tend to favor the most popular information, not necessarily the most correct. The ignorance of the masses can cancel out a knowledgeable minority with specialized information of a topic, resulting in the wrong answer (B) the most accepted.

To give more weight to correct information that may not be widely known, researchers from Princeton University and the Massachusetts Institute of Technology have developed what they call the "surprisingly popular" algorithm. Reported in the journal *Nature* on Jan. 26, the technique hinges on asking people two things about a given question: ____[X]____, and how popular do they think each answer will be? The correct answer is that which is more popular than people predict, the researchers report. The technique could refine wisdom-of-crowds surveys, which are used in political and economic forecasting, as well as many other (C) activities, from pricing artwork to grading scientific research proposals.

The researchers tested their algorithm through multiple surveys conducted on various populations. In one test, they asked people a yes-or-no question, Is Philadelphia the capital of Pennsylvania? Respondents also were asked to predict the prevalence of "yes" votes. Because Philadelphia is a "large, historically significant city," most people in the group thought that, yes, it is the capital of Pennsylvania — Harrisburg is in fact the state's capital. In addition, the people who mistakenly thought Philadelphia is the state capital also predicted that a very high percentage of people would answer "yes."

Meanwhile, a certain number of respondents knew that the correct answer is "no." But these people also anticipated that many other people would incorrectly think the capital is Philadelphia, so they also expected a very high percentage of "yes" answers. Thus, almost everyone expected other people to answer "yes," but the actual percentage of people who did was significantly lower. "No" was the surprisingly popular answer because it exceeded expectations of what the answer would be.

Sebastian Seung, Princeton's Evnin Professor in Neuroscience and professor of computer science and the Princeton Neuroscience Institute, said that the surprisingly popular, or SP, method is (D) democratic because there is no expectation of who would have specialized information, only that the information exists. Seung added that the researchers' work was published 110 years after Nature published the seminal paper in crowd wisdom, Sir Francis Galton's 1907 study "The Wisdom of Crowds." "The SP method is elitist in the sense that it tries to identify those who have expert knowledge," Seung said. "However, it is democratic in the sense that potentially anyone could be identified as an expert. The method does not look at anyone's resume or academic

degrees."

The researchers developed their method mathematically then applied it through surveys on multiple groups of people, including U.S. state capitals, general knowledge, medical diagnoses and art auction estimates. (E) all topics, the researchers found that the "surprisingly popular" algorithm reduced errors by 21.3 percent compared to simple majority votes, and by 24.2 percent compared to basic confidence-weighted votes (where people express how confident they are in their answers). It also reduced errors by 22.2 percent compared to answers with the highest average confidence levels. On the 50 test questions related to state capitals — such as the Harrisburg-Philadelphia question — the SP method reduced incorrect decisions by 48 percent compared to the majority vote. "The argument in this paper, in a very rough sense, is that people who expect to be in the minority deserve some extra attention," said co-author Drazen Prelec, a professor at the MIT Sloan School of Management as well as of economics and brain and cognitive sciences. "In situations where there is enough information in the crowd to determine the correct answer to a question, that answer will be the one [that] most outperforms expectations."

Aurelien Baillon, a professor of economics at Erasmus University in Rotterdam who is familiar with the new paper but had no role in it, said that the researchers' work "opens up completely new ways to think about an old problem." The paper is persuasive because it contains both theoretical arguments "and empirical evidence that it works well," Baillon said.

[Adapted from: Princeton University. "In crowd wisdom, the 'surprisingly popular' answer can trump ignorance of the masses." ScienceDaily. ScienceDaily, 6 February 2017. <www.sciencedaily.com/releases/2017/02/170206130411.htm>.

1. Choose the best word or phrase from the list to fill in blanks (A)~(E) and write the number in the space on the answer sheet.

(A) :	1. aggregating	2. incorporating	3. collaborating	4. pardoning
(B) :	1. becomes	2. became	3. becoming	4. that became
(C) :	1. cognitive	2. constructive	3. competitive	4. collective
(D) :	1. so	2. not	3. still	4. being
(E) :	1. Not	2. Across	3. With	4. Above

2. What is the weakness of using crowd wisdom to find a correct answer?

1. A wrong answer can be acknowledged as true even though many people know it is wrong.
2. People will often choose the most popular answer over the correct one.
3. People are not good at predicting which answers will be popular.
4. Questions that require prior knowledge are not easily answered by democratic procedures.

3. What is meant by the "surprisingly popular" answer?

1. More people are predicted to vote "no" than the actual number.
2. The wrong answer is more popular than it is supposed to be.
3. More people choose an answer than is predicted.
4. The most popular answer is the correct one.

4. Why is the surprisingly popular answer usually the correct one?

1. People who know the right answer will underestimate how many other people know it.
2. People who choose the wrong answer think other people will choose the same way.
3. People who choose an unpopular answer will assume that most people will choose a popular answer.
4. The most popular answer might be wrong, but the minority answer based on real knowledge is right.

5. What can we infer from this research?

1. More people know the right answers to questions than we used to expect.
2. Those who know their answer will not be popular often have the right answer.
3. Some people have more specialized information but crowd wisdom is more often correct.
4. People can brush up their knowledge by using crowd wisdom with this algorithm.

[X]. Fill in blank ____[X]____ to best fit the context of the passage.

Ⅲ. Read the following passage and answer the questions that follow.

In her seminal book *After Harm*, Nancy Berlinger, a health research scholar, conducted an investigation into the way doctors talk about errors. It proved to be very eye-opening. 'Observing more senior physicians, students learn that their mentors and supervisors (A) reward the concealment of errors,' Berlinger writes. 'They learn how to talk about unanticipated outcomes until a "mistake" morphs into a "complication". Above all, they learn not to tell the patient anything.'

She also writes of: 'the depths of physicians' resistance to disclosure and (B) the habit of nondisclosure — it was only a technical error, things just happen, the patient won't understand, the patient doesn't need to know.'

Just let that sink in for a moment. Doctors and nurses are not, in general, dishonest people. They do not go into healthcare to deceive people, or to mislead them; they go into the profession to heal people. Informal studies have shown that many clinicians would willingly trade a loss of income in order to improve outcomes for patients.

And yet, deep in the culture, there is a profound tendency for evasion. This is not the kind of all-out deceit practised by conmen. Doctors do not *invent* reasons for an accident to pull the wool over the eyes of their patients. Rather, they deploy a series of euphemisms — 'technical error', 'complication', 'unanticipated outcome' — each of which contains an element of truth, but none of which provides the whole truth.

This is not just about avoiding litigation. Evidence suggests that medical negligence (C) doctors are open and honest with their patients. When the Veterans Affairs Medical Center in Lexington, Kentucky, introduced a 'disclose and compensate' policy, its legal fees fell sharply. Around 40 per cent of victims say that a full explanation and apology would have persuaded them not to take legal action. Other studies have revealed similar results.

No, the problem is not just about the *consequences* of failure, it is also about the *attitude towards* failure. In healthcare, competence is often equated with clinical perfection. Making mistakes is considered to demonstrate ineptness. The very idea of failing is threatening.

As the physician David Hilfiker put it in a seminal article in the *New England Journal of Medicine*: 'The degree of perfection expected by patients is no doubt also a result of what we doctors have come to believe about ourselves, or better, have tried to convince ourselves about ourselves. This perfection is a grand illusion, of course, (D).'

Think of the language: surgeons work in a 'theatre'. This is the 'stage' where they 'perform'. How dare they fluff their lines? As James Reason, one of the world's leading thinkers on system safety, put it: 'After a very long, arduous and expensive education, you are expected to get it right.

The consequence is that medical errors are marginalised and stigmatised. They are, by and large, equated to incompetence.'

In these circumstances the euphemisms used by doctors to distract attention from mistakes ('technical error', 'complication', 'unanticipated outcome') begin to make sense. For the individual doctor the threat to one's ego, let alone reputation, is considerable. Think how often you have heard these euphemisms outside healthcare: by politicians when a policy has gone wrong; by a business leader when a strategy has failed; by friends and colleagues at work, for all sorts of reasons. You may have heard them coming from your own lips, from time to time. I know I have heard them coming from mine.

[Adapted from Syed, Matthew. *Black Box Thinking: Marginal Gains and the Secrets of High Performance*. John Murray Press. London. 2020.]

Choose the most appropriate option from the ones given below and write the number in the space on the answer sheet.

A. Choose the best phrase to fit blank (A).

1. give encouragement not to
2. not only punish but also
3. teach how to admonish
4. believe in, practice and

B. Choose the best phrase to fit blank (B).

1. the lengths to which some will go to justify
2. then physicians have been able to eliminate
3. also they are increasingly getting
4. discovery which is often considered as

C. Choose the best phrase to fit blank (C).

1. is a common problem while
2. should be treated as such due to
3. causes troubles rather than that
4. claims actually go down when

D. Choose the best phrase to fit blank (D).

1. every doctor will know this to reality
2. a game of mirrors that everyone plays
3. but physicians strive not to be imperfect
4. yet not everyone could have accepted it

WRITING QUESTION: The reading passage in Section III describes two attitudes about medical errors. Which attitude do you think is better? Give reasons and examples (hypothetical examples are acceptable) to support your opinion. There is no wrong answer as long as you can explain your opinion logically in English.