2018年度

U 英語問題

注 意

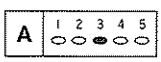
1．試験開始の指示があるまでこの問題冊子を開いてはいけません。
2．解答用紙はすべて**ＨＢの黒鉛筆またはＨＢの黒のシャープペンシル**で記入することになっています。ＨＢの黒鉛筆・消しゴムを忘れた人は監督に申し出てください。（万年筆・ボールペン・サインペンなどを使用してはいけません。）
3．この問題冊子は**16ページ**までとなっています。試験開始後，ただちにページ数を確認してください。なお，問題番号はⅠ～Ⅴとなっています。
4．解答用紙にはすでに受験番号が記入されていますので，出席票の受験番号が，あなたの受験票の番号であるかどうかを確認し，出席票の氏名欄に**氏名**のみを記入してください。なお，出席票は切り離さないでください。
5．解答は解答用紙の指定された解答欄に記入し，その他の部分には何も書いてはいけません。
6．解答用紙を折り曲げたり，破ったり，傷つけたりしないように注意してください。
7．この問題冊子は持ち帰ってください。

マーク・センス法についての注意

マーク・センス法とは，鉛筆でマークした部分を機械が直接よみとって採点する方法です。

1．マークは，下記の記入例のようにＨＢの黒鉛筆で枠の中をぬり残さず濃くぬりつぶしてください。
2．１つのマーク欄には１つしかマークしてはいけません。
3．訂正する場合は消しゴムでよく消し，消しくずはきれいに取り除いてください。

マーク記入例：



（３と解答する場合）

I 。次の文を読み，下記の１～10それぞれに続くものとして，本文の内容ともっともよく合致するものを，各イ～ニから１つずつ選び，その記号を解答用紙の所定欄にマークせよ。

I held my breath and swam deeper, 10, 20, 30 feet. I heard a thunderous crack, then another, so loud they vibrated my chest. Below my kicking feet, two sperm whales emerged from the shadows, each as long as a school bus.

The cracking was coming from the whales; it's a form of sonar called echolocation that species of dolphins and whales use to "see" underwater. With these vocalizations, called clicks, the whales were snapping three-dimensional images of my body and those of my diving companions from the inside out—scanning us to see if we were a threat, or if we were food. As we kicked down deeper, within just a few feet of the mother whale's gigantic mouth, the click patterns changed, becoming slower, softer. They sounded to me like "coda clicks," the sounds sperm whales use to identify themselves to others in their family pod. The whales were probably introducing themselves. They were saying hello.

Fabrice Schnöller, a French engineer with a degree in biology, was leading the dive. For the past six years, he has traveled the world's oceans seeking out these face-to-face encounters. His goal is to record close-up audio and video data of sperm whales passing one another coda clicks, which he believes contain coded information, possibly a language.

Sperm whales use coda clicks most often during socializing. They sound unremarkable, like a popgun firing in quick succession. But when the clicks are viewed on a spectrogram, a visual representation of an audio signal, each reveals a remarkably complex pattern. Inside these clicks are a series of shorter clicks, each lasting a few thousandths of a second, and so on. The more we focus in on a click, the more detailed it becomes. And sperm whales can repeat these millisecond-long clicks, which suggests, Schnöller says, that this is "some form of communication."

We know little about sperm whale clicks and behavior because sperm whales are too large to put in a laboratory, and until recently, few researchers have been willing to study the animals up close in the wild. Who could blame them? Sperm whales are the world's largest predators. They have eight-inch-long teeth and can grow as long as 60 feet and weigh up to 110,000 pounds. Their vocalizations, along

with blue whales', are the loudest animal sounds on the planet; the pressure waves can damage human eardrums and even conceivably a person's lungs. Diving with them was considered suicide.

As a result, most research on sperm whales' communication has been conducted from a boat. This has nonetheless revealed some fascinating facts: Sperm whales live in close-knit societies, females raise and guide pods that can include three generations, and they appear to share regional dialects and family nicknames. But studying the animals from the deck of a boat can also be limiting. Researchers can analyze their clicks but can't see how the whales' interactions change in response to those clicks, which is crucial for understanding how they communicate.

Those willing to get in the water with the whales face another problem. The noise made by scuba gear scares the animals away, and they avoid submarines and robots. Rebreathers, which recycle the divers' exhaled breath into breathable air, are relatively quiet but also expensive and too difficult to deploy on a moment's notice when pods approach. Thus, the best option for studying the behavior and communication of whales is free diving. This is what it sounds like: diving dozens, sometimes hundreds of feet, on a single breath of air.

After a chance, frightening encounter with a pod of sperm whales off the coast of Mauritius in 2007, Schnöller became fascinated by clicks. Two years later he started working with Fred Buyle, a Belgian former world-champion free diver and underwater photographer, and the pair formed a volunteer-run whale communication research project called Darewin. They wanted to record up-close sperm whale social behavior and clicks, so they began approaching the animals while free diving. When they entered the water wearing only a wet suit, mask, and fins, the incredibly shy whales didn't scatter or attack. They were curious, and welcomed the divers into the pods for hours, circling them and peppering them with communication clicks.

Free diving has another big advantage. It is totally silent, allowing Schnöller and Buyle to record a clear audio signal of whale vocalizations. The team began shooting video, including from 360 degrees, of their encounters. Darewin has collected and made publicly available more of this footage than any scientific institution or university. The group has built audio and video systems that will allow researchers to record their encounters and see all the whales in a pod at all

times, which should help them determine who is clicking to whom, and how each whale responds.

Along with Schnöller and Buyle, the group includes the speech-pattern expert Hervé Glotin, from the University of Toulon in France. It also collaborates with Olivier Adam, a professor at the University of Paris. All of the data the researchers find will be given away to whoever wants it.

Not everyone is a fan of this approach. Every few months Schnöller gets an angry note from institutional researchers claiming his data is "unscientific," or that he's harassing the animals, or that he's just an amateur. He and Buyle insist they are not trying to subvert the scientific system; they want to work within it. But the current pace of research is far too slow and its approach is too timid.

"We finally have the technology and methods to significantly increase our understanding of one of the planet's most intelligent animals," said Schnöller. "We can't just sit here and do nothing. We've got to get in the water!"

Outsiders, he pointed out, were often behind the biggest advancements in science. "You think of Einstein or Newton," he said. "They were math guys working regular jobs who set out to prove a crazy idea."

Here's the "crazy" part of his idea: Darewin is working with a team of engineers on a small underwater machine capable of recording more information about the coda clicks. Schnöller and Buyle believe that sonar images might be contained in these vocalizations—that because these animals are already viewing their world through echoes, they may also be able to send these echoed images to one another. They'll test the theory by capturing these clicks, sending them back to the animals, and seeing if they repeat them. Next, the researchers will create artificial clicks containing three-dimensional sonographic images of things in our world—a tree, a human—and send these as well, prompting, perhaps, a kind of dialogue.

While almost all experts agree that the whales' clicks are a form of communication, most are doubtful that we will be able to understand, and even join, these conversations. Yes, I realize that the idea of talking to sperm whales sounds silly. It certainly sounded ridiculous to me when I first met Schnöller and Buyle in 2012 on an unrelated magazine assignment. And the team's free-diving approach seemed like a death wish. But after a few months of witnessing Schnöller and

Buyle's close encounters from the deck of a boat, I changed my mind. The free diving they employed seemed safe and natural, a kind of underwater meditation that connected them with the ocean and its inhabitants more closely than any researchers before them. The whales could have easily eaten us or smashed us with their 15-foot-wide tales. But they didn't. As I stared into the tennis ball-sized eyes of a sperm whale mother and her calf, I immediately recognized that these were extraordinarily intelligent, fully conscious beings. I believe the whales saw the same in us.

1. All of the following are true about coda clicks EXCEPT that they are
   イ. easy for humans to hear underwater.
   ロ. well understood by the scientific community.
   ハ. used by whales when socializing with each other.
   ニ. made up of a series of shorter clicks.

2. The passage suggests that most research on sperm whales has been conducted from boats because scientists have
   イ. wanted to preserve the whales' natural habitat.
   ロ. assumed that diving with the whales would not be worthwhile.
   ハ. had to rely on large pieces of equipment.
   ニ. been afraid to dive with the whales.

3. Research on sperm whales conducted from boats has revealed that
   イ. the young may stay with the group even when they mature.
   ロ. the father serves as the leader of the social group.
   ハ. individual whales respond to clicks with predictable behaviors.
   ニ. clicks are the same no matter where the whales are from.

4. The underlined word "deploy" (paragraph 7) is closest in meaning to

イ. control.

ロ. observe.

ハ. repair.

ニ. use.

5. The main goal of the Darewin research project is to

イ. promote free diving as an ideal research method.

ロ. study how sperm whales relate to other sea creatures.

ハ. understand the meaning of sperm whales' clicks.

ニ. help prevent sperm whales from going extinct.

6. The passage suggests that the Darewin research group

イ. may not be scientific in their approach to studying whales.

ロ. welcomes the assistance of outsiders to analyze their data.

ハ. avoids the use of advanced technology in the study of whales.

ニ. hopes to study a wide variety of whales in the future.

7. The underlined word "subvert" (paragraph 11) is closest in meaning to

イ. analyze.

ロ. blame.

ハ. change.

ニ. support.

8. Fabrice Schnöller refers to Einstein and Newton (paragraph 13) in order to make the point that

イ. one need not be a genius to do research on animals.

ロ. scholars rarely attempt to solve big scientific questions.

ハ. one need not be a scholar to make a scientific discovery.

ニ. the mystery of whale language will be solved by a genius.

9. The author would most likely agree that

イ. diving with whales is a dangerous way to collect data.

ロ. it may be possible for humans to communicate with whales.

ハ. Darewin researchers should do scuba as well as free diving.

ニ. whales will probably not be able to understand artificial clicks.

10. The most appropriate title for this passage is

イ. Studying Whales Up Close.

ロ. The Lost Language of Whales.

ハ. Recent Research on Whale Behavior.

ニ. The Wonders of Free Diving.

Ⅱ．次の文を読み，下記の１～８それぞれに続くものとして，本文の内容ともっともよく合致するものを，各イ～ニから１つずつ選び，その記号を解答用紙の所定欄にマークせよ。

Running may be the single most effective exercise to increase life expectancy, according to a new review and analysis of past research about exercise and premature death. The new study found that, compared to nonrunners, runners tended to live about three additional years, even if they run slowly or irregularly and smoke, drink or are overweight. No other form of exercise that researchers looked at showed comparable impacts on life span.

The findings come as a follow-up to a study done three years ago, in which a group of distinguished exercise scientists studied data from a large store of medical and fitness tests conducted at the Cooper Institute in Dallas. That analysis found that as little as five minutes of daily running was associated with prolonged life spans.

After that study was released, the researchers were flooded with queries from fellow scientists and the general public, says Duck-chul Lee, a professor at Iowa State University. Some people asked if other activities, such as walking, were likely to be as beneficial as running for reducing mortality risks. High-mileage runners wondered if they could be doing too much, and if at some undefined number of miles or hours running might become counterproductive and even contribute to premature mortality. And a few people questioned whether running really added materially to people's life spans. Could it be, they asked rather suspiciously, that in order to reduce your risk of dying by a year, you had to spend the equivalent of a year's worth of time on the trails or track, producing no recognizable net gain?

So for the new study, which was published in *Progress in Cardiovascular Disease*, Lee and his colleagues set out to address those and related issues by reanalyzing data from the Cooper Institute and also examining results from a number of other large-scale recent studies looking into the associations between exercise and mortality.

Overall, this new review supported the findings of the earlier research, the scientists determined. Taken together, the data indicated that running, whatever someone's pace or mileage, dropped a person's risk of premature death by almost

40%, a benefit that held true even when the researchers controlled for smoking, drinking, and a history of health problems such as hypertension or being overweight.

Using those numbers, the scientists then determined that if every nonrunner who had been part of the reviewed studies took up the sport, there would have been 16% fewer deaths overall, and 25% fewer fatal heart attacks. One caveat, however, is that the participants in those studies were mostly white and middle class.

Perhaps most interesting, the researchers calculated that, hour for hour, running statistically returns more time to people's lives than it consumes. Figuring two hours per week of training, since that was the average reported by runners in the Cooper Institute study, the researchers estimated that a typical runner would spend less than six months actually running over the course of almost 40 years, but could expect an increase in life expectancy of 3.2 years, for a net gain of about 2.8 years. In concrete terms, an hour of running statistically lengthens life expectancy by seven hours, the researchers report.

Of course, these additions "are not infinite," Lee says. Running does not make people immortal. The gains in life expectancy are capped at around three extra years, he says, however much people run. The good news is that prolonged running does not seem to become counterproductive for longevity, he continues, according to the data he and his colleagues reviewed. Improvements in life expectancy generally leveled out at about four hours of running per week, Lee says. But they did not decline.

Meanwhile, other kinds of exercise also reliably benefited life expectancy, the researchers found, but not to the same degree as running. Walking, cycling, and other activities, even if they required the same effort as running, typically dropped the risk of premature death by about 12%. Why running should be so uniquely effective against early mortality remains uncertain, Lee says. But it is likely, he says, that it combats many of the common risk factors for early death, including high blood pressure and extra body fat, especially around the middle. It also raises aerobic fitness, he says, and high aerobic fitness is one of the best-known indicators of an individual's long-term health.

Of course, the findings in this new review are associational, meaning that they prove that people who run tend also to be people who live longer, but not that

running directly causes the increases in longevity. Runners typically also lead healthy lives, Lee says, and their lifestyles may be playing an outsized role in total life expectancy. But even taking that possibility into consideration, he says, the data suggest that running could add years to our lives.

1. In the initial Cooper Institute study,
   イ. subjects did not include people with health problems.
   ロ. data were based on subjects' medical and fitness records.
   ハ. subjects were required to run at least five minutes every day.
   ニ. data were based on the observation of subjects in their daily lives.

2. Duck-chul Lee was motivated in his research
   イ. to answer questions from the public about the Cooper Institute study.
   ロ. to gather a fresh set of data from runners and nonrunners.
   ハ. to criticize the research methods of the Cooper Institute study.
   ニ. to prove that running is the best form of exercise.

3. In the new study, Lee and his colleagues
   イ. asked nonrunners to take up the sport of running.
   ロ. recruited subjects from a variety of backgrounds.
   ハ. examined additional data from other studies.
   ニ. focused on the relation of exercise and lifestyle.

4. The underlined word "caveat" (paragraph 6) is closest in meaning to
   イ. question.
   ロ. rule.
   ハ. suggestion.
   ニ. caution.

5. The underlined word "concrete" (paragraph 7) is closest in meaning to

イ. abstract.

ロ. fixed.

ハ. positive.

ニ. specific.

6. Lee and his colleagues found all of the following EXCEPT that

イ. even people who smoke and drink get benefits from running.

ロ. too much running causes life expectancy to decline.

ハ. runners may live up to about three years longer than nonrunners.

ニ. walking and cycling also contribute to improved life expectancy.

7. One theme of the passage is that, in contrast to other forms of exercise, running

イ. has a special effect on life expectancy.

ロ. will bring about positive changes in lifestyle.

ハ. is not well understood in its physical effects.

ニ. may not be associated with a healthy lifestyle.

8. The most appropriate title for this passage is

イ. How Running Affects the Human Body.

ロ. Recent Research on Exercise and Health.

ハ. Running for a Longer Life.

ニ. The Science of Long-Distance Running.

Ⅲ．次の空所(1)～(8)を補うのにもっとも適当なものを，それぞれ対応する各イ～ニから1つずつ選び，その記号を解答用紙の所定欄にマークせよ。

At birth, human infants are prepared to make the sounds of any language in the world. In the quiet moments as they awaken or (1) they go to sleep, it is (2) to hear infants "practicing" many sounds. However, within a few weeks, the infant's range of language sounds will begin to (3). The highly efficient computer that is her brain is (4) to conserve energy and effort. Slowly but surely, the infant will dispose of the "extra" sounds and rhythms, focusing in on only those she (5) to hear from the people around her. This is the reason experts in child development recommend that babies (6) spoken to in adult language rather than in "baby talk." Children will learn to speak using the accent and intonation (7) hear. Learning baby talk first means that, inevitably, all children must devote themselves to unlearning the sounds of baby talk, (8) them with sounds actually used by adult members of their language community or that of their immediate caretakers.

(1)	イ. before	ロ. since	ハ. unless	ニ. while
(2)	イ. frequent	ロ. important	ハ. noticeable	ニ. possible
(3)	イ. advance	ロ. narrow	ハ. shape	ニ. turn
(4)	イ. corrected	ロ. increased	ハ. programmed	ニ. reminded
(5)	イ. assumes	ロ. becomes	ハ. continues	ニ. prepares
(6)	イ. be	ロ. being	ハ. have	ニ. were
(7)	イ. it	ロ. they	ハ. we	ニ. you
(8)	イ. actualizing	ロ. echoing	ハ. imitating	ニ. replacing

Ⅳ. 次の空所(1)～(6)を補うのにもっとも適当なものを，それぞれ対応する各イ～ニから1つずつ選び，その記号を解答用紙の所定欄にマークせよ。

A.

Jim: So, (1)?

Tom: Well, I've taken three classes so far.

Jim: You were taking a class last fall, right?

Tom: Yeah, I was. It turns out that as a family member, I can take classes for free.

Jim: Oh, (2)! Your mom works there.

(1) イ. how long have you been dancing now
ロ. how often do they offer dance classes
ハ. what have you been doing lately
ニ. who is in your dance class

(2) イ. that's right
ロ. how about that
ハ. what a coincidence
ニ. I can't believe it

B.

Mary: Hi, Pete. You are right on time for our little dinner party.

Pete: (3)

Mary: Would you like to make the salad? I'll prepare the steaks.

Pete: Sure! How about lettuce, tomatoes, cucumbers, and for some color, yellow peppers?

Mary: That sounds fantastic. How would you like your steak?

Pete: Medium rare. (4) garlic bread?

Mary: Wonderful idea!

(3) イ. What's for dinner?

ロ. I just love cooking.

ハ. What can I do to help?

ニ. You seem to have everything under control.

(4) イ. Who wants some

ロ. Why don't we have any

ハ. Where can I get some

ニ. How about some

C.

Lisa: (5) that boy who lived next door when we were kids?

Kelly: You mean the one who was always swinging his baseball bat?

Lisa: Yeah, him. Two weeks ago I'm watching TV, and guess what?

Kelly: He's a pro? (6)?

Lisa: Yes! He's playing baseball now for the Giants.

(5) イ. Do we know

ロ. Do you remember

ハ. Where is

ニ. How is

(6) イ. Can you introduce me

ロ. You met him

ハ. Are you serious

ニ. Did you know that

V．次の空所(1)～(6)それぞれにもっとも適当な1語を補い，英文を完成せよ。解答は解答用紙の所定欄にしるせ。

When my parents informed me that my blood type was A+, I felt a strange sense of pride. If A+ was the top grade in school, then surely A+ was also the most excellent of blood types—a biological mark of distinction.

It didn't take (1) for me to recognize just how silly that feeling was. But I didn't learn much more about what it really (2) to have type A+ blood. By the time I was an adult, all I really knew was that if I should end up in a hospital in need of blood, the doctors there would need to make sure they gave me the (3) type. And yet there remained some questions. Why do 40% of Caucasians have type A blood, while only 27% of Asians do? Where do different blood types come from, and what do they do?

In 1900 the Austrian physician Karl Landsteiner first discovered blood types, winning the Nobel Prize for his research in 1930. Since then scientists have found some interesting (4) about them—tracing their deep ancestry, for example, and detecting influences of blood types on our health. And yet scientists have yet to come up with a good (5) for their very existence.

"Isn't it amazing?" says Ajit Varki, a biologist at the University of California, San Diego. "Almost a hundred years after the Nobel Prize was awarded for this discovery, we still don't know exactly what they're (6)."

【以下余白】