

I 次の英文を読んで、以下の設問に答えよ。(90点)

When a chimpanzee gazes at a piece of fruit or a silverback gorilla beats his chest to warn off an approaching male, it's hard not to see a bit of ourselves in those behaviors and even to imagine what the animals might be thinking. We are, after all, great apes like them, and their intelligence often feels like a diminished — or at least a familiar — version of our own. But dolphins are something truly different. They “see” with sonar and do so with such phenomenal precision that they can tell from a hundred feet away whether an object is made of metal, plastic, or wood. They can even eavesdrop on the echolocating*¹ clicks of other dolphins to figure out what they're looking at. Unlike primates*², they don't breathe automatically, and they seem to sleep with only half their brains resting at a time. Their eyes operate independently of each other. They're a kind of alien intelligence sharing our planet — watching them⁽¹⁾ may be the closest we'll come to encountering creatures from outer space.

Dolphins are extraordinarily garrulous. Not only do they whistle and click, but they also emit loud broadband packets of sound called burst pulses to discipline their young and chase away sharks. Scientists listening to all these⁽²⁾ sounds have long wondered what, if anything, they might mean. Surely such a large-brained, highly social creature wouldn't waste all that energy babbling beneath the waves unless the vocalizations contained some sort of meaningful content. And yet despite a half century of study, nobody can say what the fundamental units of dolphin vocalization are or how those units get assembled.

“If we can find a pattern connecting vocalization to behavior, it'll be a huge deal,” says Stan Kuczaj,^(3a) who has published more scientific articles on dolphin cognition than almost anyone else in the field. He believes that his work with the synchronized dolphins at Roatán Institute for Marine Sciences may prove to be a Rosetta stone that unlocks dolphin communication, though he adds, “The

sophistication of dolphins that makes them so interesting also makes them really difficult to study.”

Yet virtually no evidence supports the existence of anything resembling a dolphin language, and some scientists express exasperation*³ at the continued quixotic search. “There is also no evidence that dolphins cannot time travel, cannot bend spoons with their minds, and cannot shoot lasers out of their blowholes,” writes Justin Gregg, author of *Are Dolphins Really Smart? The Mammal Behind the Myth*.^(3b) “The ever-present scientific caveat that ‘there is much we do not know’ has allowed dolphinese supporters to slip the idea of dolphin language in the back door.”

But where Gregg sees a half century of failure, Kuczaj sees plenty of circumstantial evidence that leads him to believe that the problem simply hasn’t yet been looked at in the right way, with the right set of tools. It’s only within the past decade or so that high-frequency underwater audio recorders, like the one Kuczaj uses, have been able to capture the full spectrum of dolphin sounds, and only during the past couple of years that new data-mining algorithms have made possible a meaningful analysis of those recordings. Ultimately dolphin vocalization is either one of the greatest unsolved mysteries of science or one of its greatest dead ends.

Until our upstart genus surpassed them, dolphins were probably the largest brained, and presumably the most intelligent, creatures on the planet. Pound for pound, relative to body size, their brains are still among the largest in the animal kingdom — and larger than those of chimpanzees. The last common ancestor of humans and chimps lived some six million years ago. By comparison cetaceans*⁴ such as dolphins split off from the rest of the mammal lineage about 55 million years ago, and they and primates haven’t shared an ancestor for 95 million years.

This means that primates and cetaceans have been on two different evolutionary trajectories for a very long time, and the result is not only two different body types but also two different kinds of brains. Primates, for

example, have large frontal lobes*⁵, which are responsible for executive decision-making and planning. Dolphins don't have much in the way of frontal lobes, but they still have an impressive ability to solve problems and, apparently, a capacity to plan for the future. We primates process visual information in the back of our brains and language and auditory information in the temporal lobes, located on the brain's flanks. Dolphins process visual and auditory information in different parts of the neocortex*⁶, and the paths that information takes to get into and out of the cortex are markedly different. Dolphins also have an extremely well developed and defined paralimbic system*⁷ for processing emotions. One hypothesis is that it may be essential to the intimate social and emotional bonds that exist within dolphin communities.

“A dolphin alone is not really a dolphin,” says Lori Marino, a biopsychologist and executive director of the Kimmela Center for Animal Advocacy. “Being a dolphin means being part of a complex social network. Even more so than with humans.”

When dolphins are in trouble, they display a degree of connectedness rarely seen in other animal groups. If one becomes sick and heads toward shallow water, the entire group will sometimes follow, which can lead to mass strandings*⁸. It's as if they have a singular focus on the stranded dolphin, Marino says, “and the only way to break that concentration may be to give them⁽⁴⁾ something equally strong to pull them away.” A mass stranding in Australia in 2013 was averted only when humans intervened, capturing a juvenile of the group and taking her out to the open ocean; her distress calls drew the group back to sea.

Why did dolphins, of all the creatures roaming land and sea, acquire such large brains? To answer that question, we must look at the fossil record. About 34 million years ago the ancestors of modern dolphins were large creatures with wolflike teeth. Around that time, it's theorized, a period of significant oceanic cooling shifted food supplies and created a new ecological niche, which offered

dolphins opportunities and changed how they hunted. Their brains became larger, and their terrifying teeth gave way to the smaller, peglike teeth that dolphins have today. Changes to inner-ear bones suggest that this period also marked the beginnings of echolocation, as some dolphins likely changed from solitary hunters of large fish to collective hunters of schools of smaller fish. Dolphins became more communicative, more social—and probably more intelligent.

Richard Connor, who studies the social lives of dolphins in Shark Bay, Australia, has identified three levels of alliances within their large, open social network. Males tend to form pairs and trios that aggressively court females and then keep those females under close guard. Some of these pairs and trios are remarkably stable relationships that can last for decades. Males are also members of larger teams of 4 to 14, which Connor dubs second-order alliances. These teams come together to steal females from other groups and defend their own females against attacks, and they can remain intact for 16 years. Connor has observed even larger, third-order alliances that coalesce when there are big battles between second-order alliances.

Two dolphins can be friends one day and foes the next, depending on which other dolphins are nearby. Primates tend to have a “you’re either with us or against us” mentality when it comes to making distinctions within and between groups. But for dolphins, alliances seem to be situational and extremely complicated. The need to keep track of all those relationships may help explain why dolphins possess such large brains.⁽⁵⁾

Dolphins are also among the most cosmopolitan animals on the planet. Like humans on land, dolphin species are seemingly everywhere in the sea, and like humans, イルカは食べ物を得るために、住んでいる環境にふさわしい方法を発見するのがうまいことがわかった。⁽⁶⁾ In Shark Bay some bottlenose dolphins detach sponges from the seafloor and place them on their beaks for protection while searching the sand for small hidden fish—a kind of primitive tool use. In the

shallow waters of Florida Bay dolphins use their speed, which can exceed 20 miles an hour, to swim quick circles around schools of mullet fish, stirring up curtains of mud that force the fish to leap out of the water into the dolphins' waiting mouths. Dusky dolphins off the coast of Patagonia herd schools of anchovies into neat spheres and then take turns gulping them down.

All these behaviors have the mark of intelligence. But what is intelligence really? When pressed, we often have to admit that we're measuring how similar a species is to us. Kuczaj thinks that's a mistake. "The question is not how smart are dolphins, but how *are* dolphins smart?"

- *1 echolocate : to determine the location of objects by reflected sound
- *2 primate : any member of the group of mammals that includes humans, apes, and monkeys
- *3 exasperation : the feeling of being extremely annoyed
- *4 cetacean : a mammal that lives in the ocean, such as a whale or a dolphin
- *5 frontal lobe : the part of the brain behind the forehead
- *6 neocortex : the outer layer of the brain associated with higher brain functions
- *7 paralimbic system : brain regions that are involved in emotion, instinct, and memory
- *8 stranding : the condition of a sea animal being unable to swim free from a beach or shallow water

I-1. 下線部(1)を日本語に訳せ。them の指す内容は明らかにしなくてよい。

I-2. 下線部(2)を日本語に訳せ。

I-3. イルカの言語に関して、下線部(3a) Stan Kuczaj と下線部(3b) Justin Gregg の考え方の違いを日本語で説明せよ。人名はアルファベット表記のままでもいい。

I-4. 下線部(4)を日本語に訳せ。them の指す内容は明らかにしなくてよい。

I-5. 下線部(5)を日本語に訳せ。

I-6. 下線部(6)を英語に訳せ。

I-7. 以下の(1)から(3)の答としてもっとも適切なものをAからEの中から選び、記号で答えよ。

(1) Choose one statement about dolphin characteristics that is discussed in the text.

A. Dolphins and humans share nearly identical genetic codes.

B. Dolphins appear to be capable of thinking ahead and finding solutions.

C. Dolphins exhibit self-recognition when they see their reflection in a mirror.

D. Dolphin females attract dolphin males and guard them from other potential mates.

E. Dolphins sometimes stir up the mud in water to defend against shark attacks.

- (2) Which is one reason why researchers mentioned in this text are interested in dolphins?
- A. They want to design technology that can detect objects in water the way dolphins do.
 - B. They want to explain the mechanisms that allow dolphins to network with one another.
 - C. They want to save dolphins by demonstrating that they are clever and should be preserved.
 - D. They want to show that dolphins are intelligent enough to be trained as lifeguards and rescuers.
 - E. They want to understand dolphins better so that animal doctors can treat them more effectively.
- (3) Choose the sentence that best restates the question at the end of the text, “The question is not how smart are dolphins, but how *are* dolphins smart?”
- A. We should compare dolphin intelligence to that of other sea animals rather than to that of land animals.
 - B. We should devise intelligence tests that dolphins can operate easily with their noses or tails.
 - C. We should discover the nature of dolphin intelligence instead of using human notions of intelligence.
 - D. We should judge human intelligence using categories of intelligence evident among dolphins.
 - E. We should teach dolphins to perform intelligent tasks and behaviors that will be useful to humans.

I-8. 次の1から10の文から、本文の内容に一致するもの2つを選び、番号で答えよ。

1. Dolphins can determine through sound that solid items in the ocean are made of distinct materials.
2. Dolphins are difficult to study because they journey over such vast distances in the sea.
3. Dolphins emit a wider variety of noises when they are being recorded in the presence of humans.
4. Dolphins have the largest brains among creatures on Earth, and they are more intelligent than chimpanzees.
5. Dolphins differ physically from primates when it comes to processing sights and emotions.
6. Dolphins lead other sick dolphins to calmer shallow water to rest and recover.
7. Dolphins in the wild avoid contact with humans due to the danger of their young being captured.
8. Dolphin teeth have become larger over the centuries as a result of global warming.
9. Dolphins search for food by themselves and are careful not to let others steal their catch.
10. Dolphins are more likely than primates to be friendly with the same group of creatures over time regardless of circumstances.

II 次の英文を読んで、以下の設問に答えよ。(60点)

(1) It has become the norm to cut library services whenever a community or state runs low on funds. The fact that it's been there for so long, taken for granted, and is free — that leads some people to see it as worthless, a faceless victim. It even happens with school libraries.

As the Great Recession*¹ tightened its squeeze in 2010, Los Angeles's seventy-three public libraries shut their doors on Mondays, as did hundreds of others across the nation. A city of immigrants, brimming with poverty, containing some of the lowest school scores in the nation, and L.A.'s county fathers close the library.

As the travel writer Pico Iyer observed at the time of the Los Angeles closings, "To save money by reducing library services and resources is like trying to save a bleeding man by cutting out his heart."

An extraordinary public library rescue effort occurred in 2012 in Troy, Michigan, a city of 80,000 (eleventh largest in the state) and one of Detroit's attractive suburbs — just the place to be lulled into believing the library will always be there.

With a median household income of \$85,000 (nearly double the state average), Troy met the Great Recession with a resolve that it wasn't going to go the way of Detroit. When state support declined by 20 percent, the city told the Troy Public Library (243,000 books) that it didn't have the funds to keep it alive any longer. The library sought support through a tax increase of 0.7 percent, but voters turned it down twice, led by strong support from local Tea Party*² forces. Finally a last-gasp third vote was planned for August 2 — just when many families would be away on vacation. If they lost on this vote, the library would be closed and its contents sold.

What to do? In mid-June library supporters, with \$3,500 in hand, sought help from the famous Leo Burnett advertising agency, which had a regional

headquarters right there in Troy. The agency reasoned that if the same 19 percent of voters turned out for the next election, the results would be the same.

How to convince the rest of Troy to turn out, the ones who took the library for granted? Previous votes had focused on the tax increase, but the real issue was the life of the library. A vote to close the library would really be a vote to betray — *burn*, if you will — the books. Now *that* would start a different kind of conversation, wouldn't it?

The agency and library supporters formed a fake community action group called Safeguarding American Families (SAFe) and, posing as opponents of the tax increase, flooded Troy with announcements in social media, along with lawn signs, each with the message: "Vote to close Troy library Aug. 2nd, book burning party Aug. 5th." They even placed an ad for clowns and ice-cream vendors for the burning party.

Suddenly the debate was no longer just about money but the very life of the library. Library users of all ages were awakened, even secretly taking down SAFe's signs at night. (SAFe replaced them with more signs.) The debate and resulting furor made state, national, and international news and, finally, two weeks before the election, SAFe revealed itself as a faux opponent. By then, however, the patrons and voters were awake enough to double previous voter turnout (38 percent) and give the library a landslide victory. The advertising agency, in turn, won both national and international awards for the campaign.

かりに公共図書館を厳密に税金の問題として考えたとしても、やはりコミュニティーに役立つものだということになる。

⁽³⁾ Let's consider the library in my little town of forty-five thousand people (eleven thousand families). Strictly from a money-saving point of view, the town library works better than any bank in town: four to one! Yup, that's the return on the tax dollar. Here's how it works: If you ⁽⁴⁾ take all the items the library circulates each year (books, movies, audios, magazines, newspapers), questions answered, programs attended, and licensed databases used, and compare them with what it would cost taxpayers to

commercially pay for those items, it's a four-dollar savings for every tax dollar spent. Even Bernie Madoff*³ wasn't promising that kind of return. Yet cities and states cut the library first.

*¹ the Great Recession : the dramatic downturn in the US economy and global markets, beginning in late 2007

*² Tea Party : a 21st century American political movement characterized by its conservative positions on economic, governmental and social issues

*³ Bernie Madoff : a former investment advisor who committed the biggest financial fraud in US history and was sentenced to 150 years of imprisonment in 2009

II-1. 下線部(1)を日本語に訳せ。

II-2. 下線部(2)を日本語に訳せ。

II-3. 下線部(3)を英語に訳せ。

II-4. 下線部(4)は何を意味しているか。80字以内の日本語で説明せよ。

II-5. 以下の(1)から(3)の答としてもっとも適切なものをAからEの中から選び、記号で答えよ。

- (1) According to the text, which of the following was not against reducing library services?
- A. L.A.'s county fathers and Troy's Tea Party forces
 - B. Pico Iyer and L.A.'s county fathers
 - C. SAFe and Pico Iyer
 - D. the Leo Burnett advertising agency and SAFe
 - E. Troy's Tea Party forces and the Leo Burnett advertising agency
- (2) In paragraph 6, the text says, "Now *that* would start a different kind of conversation, wouldn't it?" Which of the following best explains the meaning of "*that*"?
- A. boycotting the third and final vote to approve the closure of the library
 - B. emphasizing the fact that Detroit fell into a serious financial crisis
 - C. increasing local taxes to keep the city's finances sound
 - D. proposing to destroy surplus books rather than close the library
 - E. shifting attention from the money issue to the library's survival
- (3) According to the text, which of the following is true?
- A. Pico Iyer believes that saving money may eventually raise the living standards of the citizens.
 - B. The book burning party with clowns and ice-cream vendors was held three days after the third vote.
 - C. The SAFe candidates won the third vote for their simple and persistent campaign.
 - D. The Troy Public Library case became widely known as an example of a successful advertising strategy.
 - E. Twenty percent of the Troy Public Library budget had been provided by state support.