受験番号

平成28年度

入学試験問題

英　語

注意：答えはすべて解答用紙に記入しなさい。

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空白ページ

第１問　次の英文を読んで、後の問いに答えなさい。

The Prisoner's Dilemma is one of the most fiercely debated thought experiments in philosophy and the social sciences. Unlike many other intellectual puzzles discussed by academics, the Prisoner's Dilemma is also a type of situation that many of us actually encounter in real life from time to time. Events as diverse as traffic jams, political power struggles, and global warming can be analyzed as Prisoner's Dilemmas.

Albert W. Tucker coined the term "Prisoner's Dilemma" during a lecture in 1950 in which he discussed the work of his graduate student John F. Nash. If this is the first time you have come across the Prisoner's Dilemma, I ask you to keep in mind that the following somewhat artificial example is just meant to illustrate a much more general phenomenon:

> Two gangsters, Row and Col, have been arrested for a serious crime. The district attorney gives them one hour to either confess or deny the charges. The district attorney explains that if both prisoners confess, each will be sentenced to ten years in prison. However, if one confesses and the other denies the charges, then the prisoner who confesses will be rewarded and get away with serving just one year. The other prisoner will get twenty years. Finally, if both prisoners deny the charges, each will be sentenced to two years. The prisoners are kept in separate rooms and are not allowed to communicate with each other. Naturally, both prisoners prefer to spend as little time in prison as possible.

The Prisoner's Dilemma has attracted so much attention in the academic literature because it seems to capture something important about a broad range of phenomena. Tucker's story is just a colorful illustration of a general point. In order to understand this general point, note that both Row and Col are rationally required to confess their crimes, no matter what the other player decides to do. Here is why: If Col confesses, then (　あ　) in prison for Row is better than (　い　); and if Col denies the charges, then (　う　) in prison is better for Row than (　え　). By reasoning in analogous ways we see that Col is also better off confessing, [　ア　] what Row decides to do. This is somewhat counterintuitive, because both prisoners know it would be better for both of them to deny the charges. If Row and Col were to deny the charges, they would each get just two years, which is better than ten. The problem is that as long as both prisoners are fully rational, there seems to be no way for them to reach this intuitively plausible conclusion.

The general lesson is that whenever two or more players interact and their preferences have a very common and reasonable structure, the actions that most benefit each individual do not benefit the group. This makes the Prisoner's Dilemma relevant to a broad range of social phenomena. When I do what is best for me, and you do what is best for you, we end up in a situation that is worse for both of us. The story of the two prisoners is just a tool for illustrating this point in a precise manner.

We cannot avoid the Dilemma, at least not in a straightforward way, by allowing the prisoners to communicate and coordinate their actions. If Col and Row each promises the other that he will deny the charges, it would still be rational for both men to confess, [イ]. When the district attorney asks the players to confess, they no longer have a rational reason to keep their promises. If Row confesses and Col does not, then Row will get just one year, which is better than two. It is also better for Row to confess if Col confesses. Therefore, it is better for Row to confess irrespective of what Col does. And because the game is [ウ], Col should reason exactly like Row and confess too.

For an alternative and perhaps more realistic illustration of the Prisoner's Dilemma, consider two competing car manufacturers: Row Cars and Col Motors. Each company has to decide whether to sell their cars for a high price and make a large profit from each car sold, or lower the price and sell many more vehicles with a lower profit margin. Each company's total profit will depend on whether the other company decides to set its prices high or low. If both manufacturers sell their cars at high prices, each will make a profit of $100 million. However, if one company opts for a low price and the other for a high price, then the latter company will sell just enough cars to cover its production costs, meaning that the profit will be $0. In this case, the other company will then sell many more cars and make a profit of $150 million. Finally, if both manufacturers sell their cars at low prices, they will sell an equal number of cars but make a profit of only $20 million.

Imagine that you serve on the board of Row Cars. In a board meeting you point out that irrespective of what Col Motors decides to do, it will be better for your company to opt for (お) prices. This is because if Col Motors sets its price (か), then a profit of $20M is better than $0; and if Col Motors sets its price (き), then a profit of $150M is better than $100M. Moreover, because the game is [ウ], Col Motors will reason in the same way and also set a (く) price. Therefore, both companies will end up making a profit of $20M each, instead of $100M.

The conclusion that the two companies will, if rational, opt for low prices is not something we have reason to regret. Not all Prisoner's Dilemmas are bad for ordinary consumers. However, for Row Cars and Col Motors it is no doubt unfortunate that they are facing a Prisoner's Dilemma. If both companies could have reached a binding agreement to go for high prices, both companies would have made much larger profits ($100M). This might explain why government authorities, in protecting consumers' interests, do their best to prevent cartels and other types of binding agreements about pricing.

The Prisoner's Dilemma, Martin Peterson (一部改変)

問 1. 下線部の 'a general point' とはどのようなことか。本文中の記述に即して、その内容を 40 字以内の日本語で書きなさい（句読点も 1 文字に数える）。

問 2. 空所 (あ) から (え) に入る年数としてそれぞれ最も適切なものを選び、番号で答えなさい。

(1) one year (2) two years (3) ten years (4) twenty years

問 3. 空所 [ア] に入れるのに最も適切な表現を選び、番号で答えなさい。

(1) along with (2) as a result of

(3) in accordance with (4) regardless of

問 4. 空所 [イ] には「彼らにとっては収容年数が最も重要であることを考慮すると」を意味する表現が入る。次の語句を並べ替え、2 番目と 5 番目に入るものの番号を答えなさい。

(1) everything (2) given that (3) important to them

(4) represent (5) that is (6) the years in prison

問 5. 2 つの空所 [ウ] に共通して入れるのに最も適切な語を選び、番号で答えなさい。

(1) alternative (2) elaborate (3) flexible (4) symmetric

問 6. 空所 (お) から (く) には、それぞれ 'high' か 'low' のいずれかが入る。'high' が入る場合には H を、'low' が入る場合には L を書きなさい。

問 7. 本文の内容に合致するものを 2 つ選び、その番号を答えなさい。

(1) The Prisoner's Dilemma has been discussed at length by academics, although it is a type of situation which we don't actually face in our daily life.

(2) In Tucker's story of the Prisoner's Dilemma, the prisoners cannot rationally decide to deny the charges, even if they know it is better for both of them to do so.

(3) In Tucker's story of the Prisoner's Dilemma, the prisoners can easily avoid the Dilemma by arranging in advance what to say to the district attorney.

(4) If Row Cars sells its cars at a high price, it will make a profit of at least $20 million irrespective of which price Col Motors decides to set, and vice versa.

(5) Because binding agreements between companies about pricing can put consumers at a disadvantage, government authorities try to prevent them.

空白ページ

第２問　次の英文を読んで、後の問いに答えなさい。

Invasive species are both a fact of life and 《A》a scientific puzzle. Humans transport animals and plants thousands of miles from where they first evolved—sometimes accidentally, sometimes intentionally. Many of those species die off in their new homes. Some barely eke out an existence. But some become 《B》ecological nightmares. In the Northeast, emerald ash borers are destroying ash trees, while Japanese barberry is blanketing forest floors, outcompeting native plants. Scientists aren't certain why species like these are proving superior so far from home. "If natives are adapted to their environment and exotics are from somewhere else, why are they able to invade?" asked Dov F. Sax, an ecologist at Brown University.

A big part of the answer may be found in the habitats in which invasive species evolve. Many alien species in the northeastern United States, including the emerald ash borer and Japanese barberry, invaded from East Asia. But the opposite is not true. Few species from the northeastern United States have become problems in East Asia. In a new study published in the journal *Global Ecology and Biogeography*, Dr. Sax and Jason D. Fridley, a biologist at Syracuse University, argue that 《C》this is not a coincidence. They offer evidence that some parts of the world have been 《D》evolutionary incubators, producing superior competitors primed to thrive in other environments. "I don't believe that all species are created equally," said Dr. Sax.

Until recently, ecologists trying to solve 《E》the mystery of invasive species paid relatively little attention to their origins, focusing instead on factors that might be helping them in their new homes. The invaders, for example, may benefit from leaving behind their enemies: Without the parasites and predators adapted to killing them, they're free to multiply with abandon. Or a newly arrived species may thrive because humans have made the new ecosystems vulnerable to invasion. Cutting a forest into fragments or loading a lake with fertilizer tears apart the ecological web, making it easier for new species to slip into the gaps.

But as far back as the 19th century, some scientists saw a role for evolution. In "The Origin of Species," Charles Darwin wrote that we shouldn't be surprised by native species "being beaten and supplanted by the naturalised productions from another land." Darwin reasoned that these victories were inevitable. Different species might adapt to a particular ecological niche in different parts of the world. Put them in the same place, in the same niche, and one might well outcompete the other because it has evolved superior attributes.

Before Dr. Fridley and Dr. Sax met in 2007, each had become convinced that Darwin might be right. When they discovered they shared the same belief, they joined forces to test Darwin's idea. Their approach was two-pronged. First, they looked at the places where invasive plant species tend to originate, examining the number of plant families in various regions. Invasive plants, they found, were more likely to have evolved in habitats with a great diversity of competing species. Darwin was right: Some plants have evolved to be fighters. "We were both kind of gobsmacked," said Dr. Fridley.

In the second test, Dr. Fridley and Dr. Sax looked at the role that canals have played in helping some species become invasive. Sometimes, humans have dug canals that linked ecosystems with an equal diversity of species. But in other instances, canals have connected regions with low diversity to those with great variety of species. The scientists predicted that invasive fish and mollusks would tend to come from places with high diversity and would have used canals to establish themselves in habitats with low diversity. "It's not a perfect experiment," said Dr. Sax. "But it's still a pretty good unplanned experiment."

In 1825, the Erie Canal joined the Great Lakes to the Hudson River. The two ecosystems originally had about the same diversity of fish and mollusk species, the ecologists found, and species from each side became invasive on the opposite side in roughly the same proportions. The story of the Suez Canal was very different. On one side was the Red Sea and the Indian Ocean, a huge, stable ecosystem with a deep diversity of fish and mollusks. On the other side was the Mediterranean, a relatively young habitat without nearly as much species diversity. Dr. Fridley and Dr. Sax found the Mediterranean was overwhelmed with invasive species from the other side of the canal, while hardly any from the Mediterranean took up residence in the Red Sea. Dr. Fridley speculated that a similar imbalance could explain why the Northeast gets so many invasive species from East Asia. Today both regions have a similar climate. But the United States was buried by glaciers during the Ice Ages, while East Asia was spared. Its species continued to grow more diverse, to evolve and eventually to become superior competitors—ready to invade, once humans started acting as their chauffeurs.

Jay Stachowicz, an ecologist at the University of California, Davis, who was not involved in the study, praised the researchers for finding a way to investigate Darwin's idea. （ あ ） he said. David Tilman, an ecologist at the University of Minnesota, called the study "a wonderful extension of Darwin's hypothesis." But he cautioned that the work raises 《F》a paradox. While predators and pathogens can wipe out native species, it's rare for an invasive competitor to do so. （ い ） said Dr. Tilman. The new hypothesis doesn't explain why. The evolutionary imbalance hypothesis, as Dr. Sax and Dr. Fridley call their hypothesis, could have a grim implication for conservation biologists trying to preserve native species: They may be fighting millions of years of evolution. （ う ） said Dr. Stachowicz.

http://www.nytimes.com/2014/10/09/science/turning-to-darwin-to-solve-the-mystery-of-invasive-species.html

(一部改変)

注 eke out an existence：生き延びる
ash tree：トネリコの木
predator：捕食生物
prime：準備させる
niche：生態的地位
mollusk：軟体動物
emerald ash borer：アオナガタマムシ(もともと中国に分布していた)
Japanese barberry：メギ
outcompete：駆逐する
with abandon：思うままに
two-pronged：両面作戦の
chauffeur：運転手
blanket：おおう
incubator：孵卵器
supplant：とって代わる
gobsmacked：驚かされた
pathogen：病原体

問 1. 下線部《A》'a scientific puzzle'、《E》'the mystery of invasive species'、《F》'a paradox' の 3 つが指す内容に関して、次の中からもっとも適切なものを 1 つ選び、その番号を答えなさい。

(1) 《A》、《E》、《F》の指す内容はすべて同じである。

(2) 《A》と《E》の指す内容は同じだが、《F》の指す内容は異なる。

(3) 《A》と《F》の指す内容は同じだが、《E》の指す内容は異なる。

(4) 《E》と《F》の指す内容は同じだが、《A》の指す内容は異なる。

(5) 《A》、《E》、《F》の指す内容はすべて異なる。

問 2. 下線部《B》の ecological nightmares の説明としてもっとも適切なものを 1 つ選び、その番号を答えなさい。

(1) 外来種が生存していくには厳しすぎる気候などの自然環境

(2) 外来種を排除して在来種を守ろうとする環境保護運動家たち

(3) 侵入してきた新しい地では生きていけず、絶滅してしまう外来種

(4) 侵入してきた新しい地で繁栄して、在来種の生存を脅かす外来種

(5) 侵入してきた外来種を攻撃し、撃退してしまう強力な在来種

問 3. 下線部《C》の 'this' が指している内容を、30 字から 50 字の日本語で答えなさい（句読点も 1 文字に数える）。

問 4. 下線部《D》の evolutionary incubators の説明としてもっとも適切なものを 1 つ選び、その番号を答えなさい。

(1) 現に進行しつつある生物の進化を目の当たりに観察できる地域

(2) 実験によって生物進化の仕組みを調べることができる地域

(3) 進化の過程を通じて優れた特性をもつ種を生み出してきた地域

(4) 進化論を創造した生物学者たちが生まれ育ってきた地域

(5) 進化論を着想させ、育て上げるための根拠となった観察がなされた地域

問 5. 外来種が在来種をおしのけて新しい地で繁栄することができるのはなぜかという問題を考える際に次の (a) 、(b) のうち (b) の方を重要視したものを、(1)～(3) の中から選び、その番号をすべて答えなさい。ひとつもない場合には「なし」と答えなさい。

(a) 外来種が侵入してくる新しい地域の環境条件がその生存に適していること

(b) 侵入してくる外来種自身が優れた形質・特性をもっていること

(1) Darwin

(2) 従来の生態学者

(3) Fridley と Sax

問 6. 運河の影響に関する本文の叙述内容を下記の 2 つの表にまとめた。

「①と②はほぼ同じ」を「① ＝ ②」
「①は②より大きい」を「① ＞ ②」
「①は②より小さい」を「① ＜ ②」

と表記するとき、表の空所【 甲 】～【 丁 】にはそれぞれ「＝」、「＞」、「＜」のどれが入るか。各空所に入る記号（等号または不等号）を書きなさい。

	五大湖側		ハドソン川側
エリー運河ができる前の生物種の多様性	A	【 甲 】	B
エリー運河ができた後の新規外来種の割合	C	【 乙 】	D

	紅海側		地中海側
スエズ運河ができる前の生物種の多様性	E	【 丙 】	F
スエズ運河ができた後の新規外来種の割合	G	【 丁 】	H

問 7. 空所（ あ ）、（ い ）、（ う ）にはそれぞれ次の (1)～(3) のどれかが入る。各空所に入るものの番号を答えなさい。（注：futile：むだな）

(1) “If that’s true, the phrase, ‘Resistance is futile’ comes to mind,”

(2) “The most common outcome is coexistence,”

(3) “They’re probably the first to test it in a meaningful way,”

第３問　次の英文の空所 ア～シ に、それぞれ与えられた文字で始まる単語を入れなさい。

Your brain lies to you a lot. We're sorry to have to break the news to you, but it's true. Even when your brain is doing essential and difficult stuff, you're not aware of most of what's going on. Your brain doesn't intend to lie to you, of course. For the most part, it's doing a great (ア: j___), working hard to help you survive and accomplish your goals in a complicated world. Because you often have to react quickly to emergencies and opportunities alike, your brain usually aims to get a half-assed answer in a (イ: h___) rather than a perfect answer that takes a (ウ: w___) to figure out. Combined with the world's complexity, this means that your brain has to take shortcuts and make a lot of assumptions. Your brain's lies are in your (エ: b___) interest—most of the time—but they also lead to predictable mistakes.

One of our goals is to help you (オ: u___) the types of shortcuts and hidden assumptions that your brain uses to get you through life. We hope this knowledge will make (カ: i___) easier for you to predict when your brain is a source of reliable information and when it is (キ: l___) to mislead you. The problems start right up front, when the brain (ク: t___) in information from the world through the senses. Even if you are sitting quietly in a room, your brain receives far more information than it can hold on to, or than you (ケ: n___) to decide how to act. You may be aware of the detailed (コ: p___) of colors in the rug, the photographs on the wall, and the sounds of birds outside. Your brain perceives many other aspects of the scene initially (サ: b___) quickly forgets them. Usually these things really aren't important, so we don't often (シ: n___) how much information we lose. The brain commits many lies of omission, as it discards most of the information in the world as soon as it is deemed to be unremarkable.

Welcome to your brain, Sam Wang

注 half-assed: 不十分な　rug: 敷物　deem: みなす

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