

〔 I 〕 下の英文を読み、問に答えなさい。なお、本文中の * のついた語（句）は注として本文の後にまとめてあります。

When we look in the mirror, we see some of the “instruments” necessary for choice. Our eyes, nose, ears, and mouth gather information from our environment, while our arms and legs enable us to act on it. We depend on these capabilities to effectively negotiate between hunger and satiation, safety and vulnerability, even between life and death. (ア) Yet our ability to *choose* involves more than simply reacting to sensory information. Your knee may twitch* if hit in the right place by a doctor’s rubber mallet,* but no one would consider this reflex to be a choice. To be able to truly choose, we must evaluate all available options and select the best one, making the mind as vital to choice as the body.

The development of the prefrontal cortex* is a perfect example of natural selection in action. While humans and animals both possess a prefrontal cortex, the percentage of the brain it occupies in humans is larger than in any other species, granting us an unparalleled ability to choose “rationally,” superseding all other competing instincts. This facility improves with age, as our prefrontal cortex continues to develop well past adolescence. While [(1) (2), and (3) (4), (5) (6)] into our mid-20s. This is why young children have more difficulty understanding abstract concepts than adults, and both children and teenagers are especially prone to acting on impulse.

The ability to choose well is arguably the most powerful tool for controlling our environment. After all, it is humans who have dominated the planet, despite a conspicuous absence of sharp claws, thick hides, wings, or other obvious defenses. We are born with the tools to exercise choice, but just as significantly, we’re born with the desire to do so. Neurons in the striatum,* for example, respond more to rewards that people or animals actively choose than to identical rewards that are passively received. As the song goes, “Fish gotta* swim, birds gotta fly,” and we all gotta choose.

This desire to choose is so innate that we act on it even before we can express it. In a study of infants as young as four months, researchers attached strings to the infants’ hands and let them learn that by tugging the string, they could cause pleasant music to play. When the researchers later broke the association with the string, making the music play at random intervals instead, the children became (7), even though the experiment was designed so that they heard the same amount of music as when they had activated the music themselves. These children didn’t *only* want to hear music; they craved* the power to choose it.

(8), while the power of choice lies in its ability to unearth* the best option possible out of all those presented, sometimes the desire to choose is so strong that it can interfere with the pursuit of these very benefits. Even in situations where there is no advantage (9) having more choice, meaning that it actually raises the cost in time and effort, choice is still instinctively preferred. In one experiment, rats in a maze were given the option of taking a direct path or one that branched

into several other paths. The direct and the branched paths eventually led to the same amount of food, so one held no advantage (10) the other. Nevertheless, over multiple trials, nearly every rat preferred to take the branching path. Similarly, pigeons and monkeys that learned to press buttons to dispense food preferred to have a choice of multiple buttons to press, even though the choice of two buttons (11) opposed to one didn't result in a greater food reward. And though humans can consciously override this preference, [(12) (13) (14) (15) (16) (17)]. In another experiment, people given a casino chip preferred to spend it at a table with two identical roulette-style wheels rather than at a table with a single wheel, even though they could bet on only one of the wheels, and *all three* wheels were identical.

The desire to choose is thus a natural drive, and though it most likely developed because it is a crucial aid to our survival, it often operates independently of any concrete benefits. In such cases, the power of choice is so great that it becomes not merely a means (18) but something intrinsically valuable and necessary. So what happens when we enjoy the benefits that choice is meant to confer but our need for choice itself is not met?

(注) twitch : ぴくっと動く mallet : こづち prefrontal cortex : 前頭前皮質
striatum : 線条体 (脳の部位) gotta : (have) got to crave : 欲しがる
unearth : 明るみに出す

問1 下線部 (ア) Yet our ability to choose involves more than simply reacting to sensory information. を 30 ～ 40 字の日本語に訳しなさい。答は解答用紙に記しなさい。

問2 [(1) (2), and (3) (4), (5) (6)] の (1) ～ (6) に入る最も適切なものを下の選択肢から選びなさい。答はマークシートの (1) ～ (6) にマークしなさい。

1. by adolescence 2. factual reasoning abilities
3. largely developed by childhood 4. motor abilities are 5. that continues
6. the prefrontal cortex undergoes a process of growth and consolidation

問3 (7) に入る最も適切なものを下の選択肢から選びなさい。答はマークシートの (7) にマークしなさい。

1. happy and satisfied 2. indifferent and persistent
3. interested and enjoyed 4. sad and angry

問4 (8) に入る最も適切なものを下の選択肢から選びなさい。答はマークシートの (8) にマークしなさい。

1. Abruptly 2. Accordingly 3. Incidentally 4. Ironically

問5 (9)～(11)に入る最も適切なものを、それぞれ下の選択肢から選びなさい。答はマークシートの(9)～(11)にマークしなさい。

1. as 2. for 3. from 4. over 5. to 6. with

問6 [(12) (13) (14) (15) (16) (17)] の(12)～(17)に入る最も適切なものを下の選択肢から選びなさい。答はマークシートの(12)～(17)にマークしなさい。

1. doesn't 2. mean 3. necessarily 4. this 5. we 6. will

問7 (18)に入る最も適切なものを下の選択肢から選びなさい。答はマークシートの(18)にマークしなさい。

1. to an end 2. to be consumed 3. to be made 4. to the contrary

〔Ⅱ〕下の英文 A), B) を読み、問に答えなさい。なお、本文中の*のついた語は注として本文の後にまとめてあります。

A) When does a human life begin? [(19) (20) (21) (22)]. The nation has divided itself into warring camps labeled 'pro-choice'* and 'pro-life,'* each side claiming to protect the fundamental moral law and the rights of the individual.

Similar questions attend the legal definition of death. At what point should a human being, living only in a coma,* be removed from a (ア) life-support system, and allowed to expire? Should a 'brain-dead' body donate liver, heart, kidneys, and eyes to save others? Who is to make these decisions? Relatives? Doctors? Lawyers? Many Americans now write instructions called 'living wills' that call for ending their lives rather than prolonging them mechanically. (イ) Others carry cards authorizing the removal of usable organs and tissues as they are pronounced dead.

B) Nature has been emphasized as a social value. The idea that man was free to exploit nature through technology for his own protection and comfort has been replaced by the idea that man and society must live in harmony with nature. There is growing pressure to (23) not only public forest but the coastal wetlands. Insecticides and fertilizers which upset a balance in nature have been banned. (ウ) Endangered species among plants, fish, and animals have been protected. A giant health food industry has arisen to (24) a growing population that refuses to eat or drink anything tainted by human chemistry. Rural communes make a strong point for natural farming. Hikers and campers invade the national parks in unprecedented numbers. Joggers line the highways and health clubs (25) in every urban area with their pools and saunas, weightlifting and exercise programs, indoor

and outdoor court games. With a seemingly permanent energy shortage as a (エ) stimulus, enough commuters have turned to bicycles so that American city streets begin to resemble those of Japan and Europe some thirty years ago.

(注) 'pro-choice': 中絶合法化賛成(派) 'pro-life': 中絶合法化反対(派) coma: 昏睡^{こん}

問1 [(19) (20) (21) (22)] の (19) ~ (22) に入る最も適切なものを下の選択肢から選びなさい。答はマークシートの (19) ~ (22) にマークしなさい。なお, fetus は妊娠8週後期以降の胎児を指します。

1. Others have said the answer depends on the age at which a fetus could sustain life outside the womb.
2. Some religions have answered that it begins with conception.
3. These answers shape the sometimes violent controversy concerning abortion.
4. Under what circumstances may a pregnant woman abort the life of an unborn infant?

問2 下線部 (ア) life-support system を5~10字の日本語に訳しなさい。答は解答用紙に記しなさい。

問3 下線部 (イ) Others carry cards authorizing the removal of usable organs and tissues as they are pronounced dead. を35~45字の日本語に訳しなさい。答は解答用紙に記しなさい。

問4 (23) ~ (25) に入る最も適切なものを, それぞれ下の選択肢から選びなさい。答はマークシートの (23) ~ (25) にマークしなさい。

1. decrease 2. demand 3. evade 4. flourish 5. preserve 6. supply

問5 下線部 (ウ) Endangered species を5~10字の日本語に訳しなさい。答は解答用紙に記しなさい。

問6 下線部 (エ) stimulus の複数形は何か。答は解答用紙に記しなさい。

〔Ⅲ〕 下の英文を読み、問に答えなさい。なお、本文中の*のついた語（句）は注として本文の後にまとめてあります。

Any smoker can tell you that giving up cigarettes is extremely difficult. Nicotine creates a genuine physical addiction. Especially for those who begin smoking early, this addiction creates a deep-seated hunger for tobacco, which is very hard to resist. But just as (26) alcohol, studies of families and identical twins have demonstrated that (ア)the tendency toward tobacco addiction varies between individuals and appears to have significant genetic contributions.

Not only is tobacco addiction under some kind of genetic influence, but it appears that the health consequences of long-term smoking may also vary between individuals, on the basis of genetic inheritance. A particularly interesting recent finding brings these two susceptibilities together in unexpected ways. Three independent groups, attempting to identify why some smokers develop lung cancer whereas others with equivalent exposure to smoking do not, scanned the genome looking for variants that might play a role in susceptibility. All three groups (イ)zeroed in on the same part of chromosome 15,* where three genes that code for nicotine receptors* reside. So the question immediately arose: have these investigators discovered genes for nicotine addiction, or genes that heighten the risk of cancer in people who are addicted for other reasons?

(ウ)Follow-up studies are conflicting, but there is some chance that both answers may be true. Having two copies of the risk version of these receptor genes apparently increases the risk of addiction, but may also raise the chance of smoking-associated lung cancer in heavy smokers.

(注) chromosome 15 : 15 番染色体 receptor : 受容体

問 1 (26)に入る最も適切なものを下の選択肢から選びなさい。答はマークシートの(26)にマークしなさい。

1. but 2. for 3. so 4. with

問 2 下線部 (ア)the tendency toward tobacco addiction varies between individuals and appears to have significant genetic contributions を 35 ～ 45 字の日本語に訳しなさい。
答は解答用紙に記しなさい。

問 3 下線部 (イ)zeroed in on の意味を下の選択肢から選びなさい。答はマークシートの(27)にマークしなさい。

1. 並べた 2. 無視した 3. 的をしぼった 4. 解明できなかった

問 4 下線部 (ウ)Follow-up studies の意味を下の選択肢から選びなさい。答はマークシートの(28)にマークしなさい。

1. 事後検討 2. 追跡調査 3. 補習授業 4. 連続調査

〔Ⅳ〕 下の BBC (英国放送協会) *News* 電子版の記事を読み、問に答えなさい。なお、本文中の * のついた語は注として本文の後にまとめてあります。

The US researchers from Northwestern University say bilingualism is a form of brain training — a mental “work out” that fine-tunes the mind. Speaking two languages profoundly affects the brain and changes how the nervous system responds to sound, lab tests (29). Experts say the work in *Proceedings of the National Academy of Sciences* provides “biological” evidence of this. For the study, the team monitored the brain responses of 48 healthy student volunteers — which included 23 who were bilingual — to different sounds. They used scalp electrodes to trace the pattern of brainwaves. Under quiet, laboratory conditions, both groups — the bilingual and the English-only-speaking students — responded (30). But (ア) against a backdrop of noisy chatter, the bilingual group were far superior at processing sounds. They were better able to tune in to the important information — the speaker’s voice — and block out other distracting noises — the background chatter.

And these differences were visible in the brain. The bilingualists’ brainstem* responses were heightened. Prof. Nina Kraus, who led the research, said: “The bilingual’s (31) experience with sound results in an auditory system that is highly efficient, flexible and focused in its automatic sound processing, especially in challenging or novel listening conditions.” Co-author Viorica Marian said: “People do crossword puzzles and other activities to keep their minds sharp. But the advantages we’ve discovered in dual language speakers come automatically simply from knowing and using two languages.... It seems that the benefits of bilingualism are particularly powerful and broad, and include attention, inhibition and encoding of sound.” Musicians appear to gain a similar benefit when rehearsing, say the researchers. Past research has also suggested that being bilingual might help (イ) ward off dementia.*

(注) brainstem : 脳幹 dementia : 認知症

問 1 (29) と (31) に入る最も適切なものを、それぞれ下の選択肢から選びなさい。答はマークシートの (29) と (31) にマークしなさい。

1. concerned 2. enhanced 3. lessened 4. revealed 5. reversed

問 2 (30) に入る最も適切なものを下の選択肢から選びなさい。答はマークシートの (30) にマークしなさい。

1. differently 2. respectively 3. similarly 4. simultaneously

問 3 下線部 (ア) against a backdrop of noisy chatter, the bilingual group were far superior at processing sounds を 35 ～ 45 字の日本語に訳しなさい。答は解答用紙に記しなさい。

問 4 下線部 (イ) ward off とほぼ同じ意味を持つものを下の選択肢から選びなさい。答はマークシートの (32) にマークしなさい。

1. cure 2. offend 3. prevent 4. worsen