平成25年度入学試験問題

医　学　科　(前　期)

英　　語

(注　意)

1. 問題冊子及び解答用紙は試験開始の合図があるまで開かないでください。
2. 問題は全部で3問題あります。
3. 問題冊子は表紙を除いて10ページ，解答用紙は1枚です。
4. 監督者の指示に従い，解答用紙の所定欄に受験番号・氏名をはっきり記入してください。
5. 解答は，必ず解答用紙の指定されたところに横書きで記入してください。
6. 問題冊子は，持ち帰ってかまいません。
7. 下書きは，問題冊子の余白部分を使用してください。

I 次の文章を読み，下の設問に答えなさい。

Pollatsek and his colleagues have been studying a particular class of accidents in which the elderly, especially those older than 70, are disproportionately involved: right-of-way crashes. These crashes occur when one driver fails to yield properly to another driver at an intersection of some kind. Experts have long assumed that these crashes occur when an elderly driver either cannot see the other car, is distracted and loses concentration or is physically compromised in some way. Pollatsek's group decided to test these assumptions.(1)

The scientists used driving simulators to analyze the visual scanning of both older and middle-aged drivers in realistic driving conditions. Drivers experienced long uneventful stretches of road, punctuated by scenarios involving intersections. For example, a driver might come to a stop sign at a T intersection, which would require yielding (the left, approaching, a driver, from, to).(2) Or the driver might need to make a left turn across traffic at a four-way intersection with a traffic light. Each scenario contained a visual area that required monitoring for other, perhaps obscured, vehicles approaching with right-of-way. The drivers typically had three seconds to detect and respond to an oncoming vehicle.

The scientists measured precisely how long the drivers spent glancing at the potential threat areas as they approached and entered these intersections. Their findings(3) were somewhat unexpected. As reported online February 3 in the journal *Current Directions in Psychological Science*, the older drivers spent significantly less time monitoring these critical visual regions than did the younger drivers. More important, there were no distractions in the simulations — pedestrians, for example — that might cause this poor scanning. Nor were the older drivers less capable of looking around; indeed, they looked around just as much as the younger drivers in general — just not when they should have been attentive to potential threats. In short, a failure to scan for potential hazards was by itself a cause of the crashes — rather than visual, cognitive or physical deficits.

So why are older drivers not watchful in risky situations? Here is where the findings get really interesting. The scientists' measurements suggest that this group of drivers were not mindful because they were spending significantly more time looking straight ahead. In other words, they were not scanning to their left and right, as they should have been, because they were looking elsewhere — in front of their car. The researchers believe that, over time, older drivers become intensely focused on not hitting anything directly in front of the car — to the exclusion of other goals. It is a habit and not a bad one for most routine driving; in

intersections, however, the habit is perilous. (4)

Habits can be broken, of course, and the scientists attempted to do just that. They designed an experiment in which older drivers were filmed as they drove near their homes. One camera was mounted on the drivers' head to record approximate line of sight as they looked around, and three other cameras were mounted in the car to monitor driving behavior. After being recorded, the drivers underwent a training session. Some watched the recorded videos of themselves driving through intersections. They also spent time driving in a simulator, where the researchers evaluated them and offered feedback, after which they were allowed to practice proper scanning. Other drivers did not watch the video of themselves and instead got half an hour of instruction, including coaching about the hazards of intersections and how to deal with them. All of them (and a control group that got no instruction) were evaluated in the simulator and on the road afterward.

The results were dramatic. Those who had merely received instruction did no better than the control group in subsequent driving tests. That is, merely being told to be careful had no effect. The older drivers who had received the video feedback, however, were indistinguishable from younger, experienced drivers in negotiating intersections. What is more, these improvements lasted a full year after the training.

The training did not attempt to improve motor skills or attention in the older drivers. The fact that this remediation worked — and so dramatically — means the scanning deficiencies are unlikely to be rooted in basic deficits of aging. The more probable conclusion, according to the scientists, is that the older drivers simply unlearned a bad driving habit.

This conclusion is welcome news. By 2030 one in four American drivers will be 65 or older, and these aging drivers are predicted to be logging more miles on our roads and highways than ever before. Older motorists are holding on to their licenses longer and relying less on others to drive them. Training such as the program used in the study (5) may not help those who are visually, mentally or physically impaired, but it could be a simple and inexpensive method for heading off a looming public health problem.

〔注〕

cognitive：認知の，認識の

deficiency：欠陥，不足

deficit：不足，弱点

disproportionately：不均衡に

impaired：障害のある

indistinguishable：区別(見分け)がつかない

intersection：交差点

loom：不気味に迫りくる

mindful：注意して

oncoming：近づいてくる

punctuate：区切る

remediation：改善，治療教育

right-of-way：優先権(のある道)

scan：ざっと見る

scenario：筋書き，シナリオ

simulation：シミュレーション，模擬実験

simulator：シミュレーター，模擬実験装置

uneventful：平穏な

設　問

1. 下線部(1)の内容を具体的に日本語で説明しなさい。
2. (2)の〔　〕内の下線部の語(句)を正しく並べ替えなさい。
3. 下線部(3)の内容を具体的に日本語で説明しなさい。
4. 下線部(4)を日本語に直しなさい。("the habit" の内容が分かるように訳すこと。)
5. 下線部(5)の内容を具体的に日本語で説明しなさい。

II 次の文章を読み，下の設問に答えなさい。

(1) Three times in my life I have had crushing chest pain, the kind of chest pain that felt like an NFL lineman was sitting on my rib cage. The first time, I was twenty-six years old and in medical school in Oklahoma. My grandfather had his second heart attack at the age of seventy-five. He was a warmhearted, kind, happy man who loved to do things for others. He had many, many friends and he had been a candy maker who owned his own shop on Wilshire Boulevard in Los Angeles for many years. The candy, and the inflammation caused by excessive sugar, likely contributed to his heart disease. I was named after him and he was my best friend growing up.

After his heart attack, Grandpa became very depressed for the first time in his life. Those who loved him were very surprised by the change. He had trouble sleeping at night, cried easily, and lost a lot of weight. The antidepressants then, in 1980, were not much help to him, and he died within a short time. At his funeral I had crushing chest pain. His loss was overwhelming and I truly sobbed for the first time in my life. What I found out later, to my sad dismay, was that (2) people who suffer a depressive episode after a heart attack are three times more likely to die in the next two and a half years than those who do not have depression. If only I knew, I would have pushed for them to treat his depression more aggressively. As I was writing this book, my first grandchild, Elias, was born. The day of his birth I had constant thoughts of my grandfather and how important he was in my life, which, I am sure, will help drive me to be a good grandpa too, but without all the candy.

The second time I had chest pain was at age forty-five at three o'clock in the morning. I woke up holding my chest, panicked, and couldn't breathe. Before bed that night, I was reading Dean Ornish's book *Love and Survival.* In it, he wrote about a study where researchers asked ten thousand men one question, "Does your wife show you her love?" The men who answered no had significantly more illnesses and, in fact, died early. At the time, I had been in a twenty-year marriage that was filled with stress and chronic unhappiness. I had to answer the question as a definite no. The chest pain was a reflection of my unconscious mind telling me that the lack of love was killing me.

The third time I had chest pain, at age fifty-one, was during another period of grief when I had lost a very close friend. When I could no longer talk to my friend, my heart ached. I couldn't sleep, my mind raced, and the crushing pain in my chest returned. I also remember that when my other grandfather died, my father's mother used to hold her chest and cry with

pain and sorrow. Grief is manifested physically, often through chest pain. After my own experiences, I researched the physical effects of grief.

Scientific studies report that grief triggers a storm of hormonal activity. Stress chemicals, such as adrenaline and cortisol, are pumped into the bloodstream. They cause the heart to beat irregularly, causing the feeling of fluttering in your chest, and they cause spasms of the blood vessels that supply the heart, also causing pain. If the heart is already compromised by atherosclerosis (fortunately for me, mine was not), it can set the stage for a heart attack by constricting blood vessels, rupturing atherosclerotic plaques, and forming blood clots or triggering dangerous abnormal heart rhythms.

In my last experience, I felt so terrible that I decided to do a SPECT scan on myself during grief. I had already done ten other scans over the years, so I had a pretty good idea of my own brain pattern. In this study, I found that my emotional brain was significantly overactive, especially in the anterior cingulate gyrus — as I was stuck on thoughts of missing my friend — and my insular cortex, an area of the brain that often sends stress signals to other parts of the body, especially the heart. I needed to calm my brain in order to soothe my heart. The brain's stress is clearly played out in every organ of the body, but most especially in the heart. Your heart and brain are completely intertwined with each other.

(3) The brain-heart connection is beautifully and consistently displayed throughout our language.

〔注〕

adrenaline：アドレナリン

anterior cingulate gyrus：前帯状回

antidepressant：抗うつ薬

atherosclerosis：アテローム性動脈硬化症

atherosclerotic：アテローム性動脈硬化の

clot：(凝)血塊

constrict：収縮する

cortisol：コルチゾール

depressive episode：うつ症状

flutter：どきどきする

hormonal：ホルモンの

inflammation：炎症

insular cortex：島皮質

intertwine：絡み合う

lineman：アメリカンフットボールのラインマン(クォーターバックを除く攻守の第一線に位置する選手で，通常，体格の良さとスピードが要求される)

NFL：National Football League の略

plaque：プラーク，斑(病変部)

rib cage：胸郭

rupture：破裂させる

sob：すすり泣く

spasm：痙攣(けいれん)

SPECT：single photon emission computed tomography (単光子放射型コンピュータ断層撮影法)の略

設　問

1. 下線部(1)のそれぞれの胸痛のきっかけとなった出来事を具体的に日本語で説明しなさい。
2. 下線部(2)を日本語に直しなさい。
3. 下線部(3)の例として不適切なものを，次の①～⑤の中から一つ選び，番号で答えなさい。

① My heart is broken.

② You make my heart beat fast.

③ I miss you with all my heart.

④ He's got a lot of hearts.

⑤ I don't get heart attacks, I give them.

Ⅲ 次の文章の空欄(1)～(8)に入る最も適切な語を下の語群から選び，必要に応じて適切な形にして，解答用紙に書き入れなさい。(同じ語を2度以上使わないこと。ただし，(8)には同じ語が入る。)

Six years ago, on an early morning in September, Molly Birnbaum was out for her regular jog when she was hit by a car. Her pelvis was shattered, her skull fractured, her knee torn. Yet for her, the most serious damage was far less visible: she lost her sense of smell. Birnbaum, now 29, was an aspiring chef, and the loss meant the end of her career. It also meant something else, something that was potentially even more life-changing. "I felt like I lost a dimension of my memory," she says. "It made me worried about the future. If I couldn't smell ever again, was I losing this important layer?"

Memory (1)s in many forms. Every day we constantly receive and process sights, sounds, touches and smells from our surroundings, some of which will become our memories. The nature of those recollections, however, is inconstant. One memory can seem immediate and colorful, as if the event had just occurred, whereas another must be coaxed out of our brain little by little. Although a moment that excites our emotions is more likely to be recorded than a routine experience, the sensory qualities of the event we have buried in our brain also plays a part in how vividly and accurately we remember something.

Although sight dominates our daily life, it has long been thought that smell might have a privileged relation with memory. Until relatively recently, however, the precise nature of that connection remained largely unexplored. Now scientists are revealing that recollections tied to smell can be stronger than memory of other types. Olfaction can transport our thoughts back to some of our earliest experiences and tint these remembrances with feeling. On the flip side, its absence could be a sign — and potentially a cause — of cognitive decline. Scientists are at a very early stage of developing therapies to train people to smell better, which could one day stave off the deterioration of mental faculties.

To understand why odors seem to strongly evoke very early life experiences, scientists began to search for other differences in how the senses (2) with memory. In 2009 neuroscientist Noam Sobel of the Weizmann Institute of Science in Rehovot, Israel, and his colleagues taught subjects to pair pictures of objects with a smell or a sound, or both. Subjects then viewed pictures of the objects while in an MRI scanner and were asked to recall either the smell or sound associated with each image. In a second round, the researchers paired every object with an (3)ing odor or sound or odor-sound pair: if the first stimulus

had been pleasant; this time, it was unpleasant — and vice versa. Another brain scan and test of these memories followed.

One week later the researchers presented the pictures a third time and asked participants to name the odor or sound that popped into their mind. Overall, people recalled the memories from the first round slightly more than those in the second set. The brain scans, however, produced a more nuanced picture. When a person thought of the first odor, the hippocampus became much more active than when he or she remembered the second smell, suggesting that the brain issues a special tag for first odor associations. In contrast, the hippocampus activity was the same for first and second sounds.

In addition, on the first memory test, the more the hippocampus responded during odor retrieval, the more likely a person was to later remember that first odor as opposed to the second. No such relation existed for sounds. Given the brain's unique response to first odor memories, the smells of childhood may make early remembrances particularly durable.

Although its effect on our earliest recollections may be most (4), smell might also facilitate learning more broadly. In a study published in 2007 neuroendocrinologist Jan Born and his colleagues at the University of Lübeck in Germany asked people to inhale the smell of a rose while studying the locations of 15 pairs of cards on a computer screen. When the participants went to sleep that night in the lab, some of them were exposed to the rose odor, whereas others' sleep was unscented. In the morning, all the participants were tested on their memory for the card locations. Those who had been exposed to the flower fragrance remembered 97 percent of them, compared with just 86 percent for those who had received an odorless stimulus, suggesting that odors can boost learning as memories are consolidated during sleep.

The memories that smell evokes also have a distinct emotional tint. In studies in which Herz and her colleagues asked people to rate the poignancy of various memories, those provoked by odors were steeped in more feeling than those (5) to mind by visual, verbal, tactile and auditory cues. In these studies, the subjective responses of emotion jibed with physical changes, such as heart rate.

Consistent with the anatomical portrait of smell, odors also uniquely recruit brain regions that process both emotion and memory. In a 2004 study Herz's team asked participants to identify a perfume that elicited a pleasant personal memory. One month later the people were shown a picture of the perfume as well as a photograph of a different perfume — and exposed to the odor of each — while inside a brain scanner. The researchers found that the odor

related to the emotional memory generated more activity in the amygdala than did the pictures or the other odor. These chosen odors were also the only cues that boosted the neural response in memory-related regions. The brain's response thus mirrors people's subjective impressions that odors (6) a unique power to summon emotional memories.

Accordingly, the loss of smell seems to have ripple effects on the integrity of memory and emotion centers. In studies published in 2010 and 2011 researchers at Friedrich Schiller University of Jena in Germany saw shrinkage of neural tissue in both the hippocampus and emotional brain structures in individuals with anosmia (the inability to perceive smells) and parosmia (the distortion of smells), as compared with people with no smell impairments, hinting that a loss of smell may impair memory or emotional processing, or a combination of both.

Such effects might explain Birnbaum's impression that her anosmia, though not (7)ing out her memory, stripped her recollections of their poignancy. "I'd always had memories that came from smell that were really important to me," Birnbaum recalls. After the accident, "I didn't forget them, but the emotional potency wasn't there." Smell's ties to emotion also become apparent in cases in which the loss of smell (8)s to depression — or depression (8)s to the loss of smell.

〔注〕

amygdala：(小脳)扁桃
anosmia：無嗅覚(症)
auditory：聴覚の
coax：導き出す
consolidate：強固にする
deterioration：低下
evoke：呼び起こす
fracture：骨折する
hippocampus：海馬
impairment：欠陥，障害
inhale：吸い込む
neural：神経の
neuroscientist：神経科学者
olfaction：嗅覚(作用)
pelvis：骨盤
potency：影響力，効果
retrieval：想起
shatter：粉砕する
stave off：前もって防ぐ
strip：取り去る
tactile：触覚の
tint：色合い(をつける)，性質
anatomical：構造的
aspiring：向上心にあふれる
boost：高める
cognitive：認知の，認識の
cue：刺激，きっかけ
elicit：引き出す
flip side：裏側
fragrance：よい香り，香水
impair：損なう，悪くする
inconstant：変わりやすい
jibe：一致する
neuroendocrinologist：神経内分泌学者
nuanced：微妙な差異をつける
parosmia：嗅覚錯誤
poignancy：心を打つ出来事(瞬間)，痛切さ
remembrance：思い出
ripple effect：波及効果
skull：頭蓋骨
steep：浸す，没頭する
summon：呼び起こす
tag：タグ，付け札

〔語群〕

bring	come	interact	lead
oppose	possess	pronounce	wipe