令和４年度一般選抜前期日程

英　語　問　題　紙

注意事項

1. 試験開始の合図があるまで，この問題紙を開いてはいけません。
2. 英語の問題紙は，９ページあります。
3. 解答用紙は５枚あります。
4. 受験番号は，監督者の指示に従って，すべての解答用紙の指定された箇所に必ず記入しなさい。
5. 受験番号および解答以外のことを解答用紙に書いてはいけません。
6. 解答はすべて解答用紙の指定された欄に書くこと。裏面に書かないこと。
7. 解答用紙のみを提出しなさい。問題紙は持ち帰りなさい。

問題 1 次の英文を読み，問いに<u>日本語で</u>答えなさい。

There's an age-old philosophical question that goes: 'Why is there something rather than nothing?' We can pose a similar query about the scientific process: 'Why do studies always find something rather than nothing?' Reading the science pages in the newspaper, one could be forgiven for thinking that scientists are constantly having their predictions verified and their hypotheses supported by their research, while studies that don't find anything of interest are as rare as hens' teeth. (1)<u>That's understandable</u>: the newspapers are supposed to be 'news', after all, not 'the record of absolutely everything that's happened'. The scientific literature, on the other hand, *is* supposed to be the record of absolutely everything that's happened in science — but it shows just the same bias towards new and exciting stories. If one looks through the journals, one finds endless positive results (where the scientists' predictions pan out or something new is found) but very few null results (where researchers come up empty-handed). In just a moment we'll dive into the technical, statistical definition of 'positive' versus 'null' results. For now, it's enough to know that scientists are usually looking for the former and are disappointed to end up with the latter.

Research has quantified just how positive the scientific literature is: the meta-scientist Daniele Fanelli, in a 2010 study, searched through almost 2,500 papers from across all scientific disciplines, totting up how many reported a positive result for the first hypothesis they tested. Different fields of science had different positivity levels. The lowest rate, though still high, at 70.2 per cent, was space science; you may not be surprised to discover that the highest was psychology/psychiatry, with positive studies making up 91.5 per cent of publications. Reconciling this astounding success rate with psychology's replicability rate is tricky, to say the least.

You might wonder why we shouldn't expect a fairly high success rate for scientific studies. After all, scientists have background knowledge of their field and hypotheses are usually educated guesses, rather than random stabs in the dark. (2)<u>But unless scientists are genuinely psychic, we'd hardly expect to see the levels of positivity reported by Fanelli.</u> Where are all the blind alleys, the great ideas that didn't quite work out when put to the test? Where is all the trial and error? Where, for that matter, are all the false negatives, the studies that failed to find the expected result by mere bad luck, even though the scientists' hypothesis was correct? In other words, the proportion of positive results in the literature isn't just high, it's unrealistically high.

There's a straightforward, but devastating, reason for this persistent positivity: scientists choose whether to publish studies *based on their results*. In a perfect world, the methodology of a study would be all that matters: if everyone agrees it's a good test of its hypothesis, from a well-designed piece of research, it gets published. This would be a true expression of the Mertonian norm of disinterestedness, where scientists are supposed to care not about their specific results (the very idea of having a 'pet theory' is an affront to this norm) but just the rigour with which they're investigated.

That's far from the reality, however. Results that support a theory are written up and submitted to journals with a flourish; disappointing 'failures' (which is how null results are often seen) are quietly dropped, the scientists moving on to the next study. And it isn't just the researchers themselves: journal editors and reviewers also make the decision to accept and publish papers according to how interesting the findings appear, not necessarily how *meticulous the researchers have been in discovering them. This feeds back to the scientists themselves and (3)<u>the whole thing becomes a vicious circle:</u>

---

*meticulous　非常に慎重な

why bother submitting your null paper for publication if it has a negligible chance of being accepted?

This is *publication bias*. It's also known, now anachronistically, as the 'file-drawer problem' — since that's where scientists are said to be keeping all their null results, hidden from the eyes of the world. Think of it as 'history is written by the victors', but for scientific results; or think of it as 'if you don't have anything positive to publish, don't publish anything at all'.

To understand how publication bias plays out in practice, we need to take a closer look at how scientists decide what's a 'positive' or a 'null' result. That is, how data are analysed and interpreted. Every measurement and every sample comes with a degree of random statistical variation, of measurement and sampling error. This is not just hard for a human to fake — it's also hard to distinguish from the signal for which scientists are looking. The noisiness of numbers constantly throws up random outliers and exceptions, resulting in patterns that might in fact be meaningless and misleading. You might, for example, see an apparent difference in reported pain between the group taking your new drug and the control group taking a placebo, even though the difference is due entirely to chance. Or you might see what appears to be a correlation between two measurements that's merely a fluke in your dataset, which wouldn't appear again if you ran a replication study. Or you might think you see an energy signal in your particle accelerator that turns out to be due to random fluctuations. How do you tell the difference between the effect you're interested in and the vagaries of chance and error? The answer, for the vast majority of scientists, is: (4)calculate a *p*-value.

Where does this *p*-value (short for 'probability value') come from? For example, imagine we want to test the hypothesis that Scottish men are taller than Scottish women. Of course, in reality we know it's true: on average, men are taller than women across the world. But we also know that not every man is taller than every woman; all of us can think of individual cases that just the opposite. Let's pretend, though, that we genuinely didn't know if there was a height difference between men and women in Scotland as a whole. Scotland only has a population of 5.5 million, but we still can't realistically measure every single one of those people, so for our study we'll draw a random sample of a more manageable size. Let's say we don't have much funding for this study, so we can only afford to sample ten men and ten women. (5)Here's where the noise comes in. Because height varies quite a bit across individuals, we might, by chance — or more specifically by *sampling error* — end up with a group of unusually tall women and a group of unusually short men. Not only that, but because we can never fully eliminate *measurement error*, we won't get the height of every single person exactly correct.

(Adapted from *Science Fictions: How Fraud, Bias, Negligence, and Hype Undermine the Search for Truth*, by Stuart Ritchie)

問 1　下線部(1)の理由を本文に即して述べなさい。

問 2　下線部(2)の意味するところを本文に即して述べなさい。

問 3　下線部(3)の内容を本文に即して述べなさい。

問 4　下線部(4)の必要性を本文に即して述べなさい。

問 5　下線部(5)の内容を本文に即して述べなさい。

問題 2 Read the following text and answer the questions **in English** according to the text.

Dairy products — the counter-trends

Nearly all newborns produce enough lactase, the enzyme needed to digest lactose — the sugar (a disaccharide composed of glucose and galactose) in their mothers' milk. Only a tiny share of babies have congenital lactase deficiency (that is, lactose intolerance). But after infancy, the ability to digest milk diverges. In societies that were originally pastoral or kept domesticated dairy animals, the capacity to digest lactose persists; while in those societies that never kept milking animals, it weakens and even disappears. Typically, this loss translates only into abdominal discomfort after drinking a small amount of milk, but it can cause nausea and even vomiting.

Evolution has produced complex patterns of these traits, with lactase-deficient populations surrounded by milk drinkers (such as the horse milk-drinking Mongolians and yak milk-drinking Tibetans north and west of the non-milk-drinking Chinese), or even with the two societies intermingled (cattle pastoralists and slash-and-burn farmers or hunters of sub-Saharan Africa).

Given these realities, it is remarkable that economic modernization has produced two counterintuitive outcomes: dairy strongholds have seen prolonged declines of average per capita milk consumption; while in several traditionally non-milk-drinking societies, demand for liquid milk and dairy products has risen from nothing to appreciable quantities. At the beginning of the 20th century, annual US consumption of fresh milk (including cream) was almost 140 liters per capita (80 per cent of it as whole milk); it peaked at about 150 liters in 1945, but the subsequent decline cut it by more than 55 per cent, to about 66 liters by 2018. The concurrent decrease of demand for all dairy products has been slower, in large part because of the still slowly rising consumption of mozzarella via American pizza.

The key factors behind the decline have included higher consumption of meat and fish (supplying protein and fat formerly derived from milk) and decades of warnings about the deleterious effect of consuming saturated dairy fat. That conclusion has been disproved, and the latest findings claim that dairy fat may actually lower the frequency of coronary heart disease and stroke mortality — but these findings come too late for the declining industry. A similar retreat took place among Europe's leading dairy consumers, where traditionally high levels of milk drinking were accompanied by daily eating of cheeses. Most notably, the French annual per capita milk consumption was about 100 liters in the mid-1950s, but by 2018 the rate was down to 45 liters.

Japan offers the best example of dairy's rise in a non-milk-drinking society. Annual per capita supply averaged less than 1 liter in 1906, and 5.4 liters by 1941. The latter total prorated to 15 milliliters (or a tablespoon) a day: in reality, this meant that by the time American forces occupied the country in 1945, none but a few large-city dwellers ever drank milk or ate yogurt and cheese. Milk was introduced through the National School Lunch Program in order to eliminate urban/rural discrepancy in childhood growth, and the per capita rates rose to 25 liters per year in 1980 and 33 liters per year by the year 2000, when the total dairy consumption (including cheeses and yogurt) was equivalent to more than 80 liters per year!

Given the country's size, Chinese dairy adoption was necessarily slower, but the average rates rose from negligible minima during the 1950s to 3 liters annually per capita during the 1970s (before the start of China's rapid modernization), and are now more than 30 liters — higher than in South

Korea, another traditionally non-milk-drinking culture that now consumes milk, cheeses, and yogurt. Diversification of diets, convenience of dairy foods in modern urban societies, smaller family size, and higher shares of working women in cities have been the main driving factors of this Chinese transition, which was supported by the government's elevation of milk to the status of healthy, prestige food, though it has been marred by poor quality and even out right adulteration: in 2008, some 300,000 babies and children were affected by drinking milk dosed with melamine, an industrial chemical added in order to increase milk's nitrogen and hence its apparent protein content.

But how have lactase-deficient societies been able to undergo this shift? Because lactose intolerance is not universal, and because it is relative rather than absolute. Four-fifths of Japanese have no problems drinking up to a cup of milk a day, and that would translate to annual consumption of more than 70 liters — more than the recent America mean!

And fermentation removes progressively more lactose, with fresh cheeses (such as ricotta) retaining less than a third of the lactose present in milk, and hard varieties (such as Cheddar or Parmigiano) having just a trace. And while yogurt retains nearly all of the original lactose, its bacterial enzymes facilitate the digestion. Milk, an ideal food for babies, is thus also, in moderation, an excellent food for anybody... except for those with overt lactose intolerance.

(Adapted from *Numbers Don't Lie: 71 Things You Need to Know About the World*, by Vaclav Smil)

Question 1. What symptoms does congenital lactase deficiency cause?

Question 2. Why has the decline of dairy products not been faster in America?

Question 3. What is an incorrect claim about dairy fat?

Question 4. Give a reason why milk consumption has increased in Japan.

Question 5. Why can people in lactase-deficient societies consume dairy products?

問題 3 Some people say animals exist for human pleasure and our needs, as we are at the top of the food chain. Therefore, animals are just commodities for humans to exploit whenever required. To what extent do you agree or disagree with this opinion? Write an essay <u>**in English**</u>. Support your argument with reasons and examples.