E

令和6年度 総合問題A

問題冊子

注意事項

1. 監督者の指示があるまで，問題冊子を開かないこと。
2. 問題冊子は，15ページに組んである。
   なお，落丁，乱丁及び印刷不鮮明なものがあれば，すぐに申し出ること。
3. **全ての解答用紙に必ず本学の受験番号，氏名を記入すること。各解答用紙に受験番号欄と氏名欄がそれぞれ1箇所ある。**
4. 解答は，解答用紙の指定された解答欄に記入すること。異なる解答用紙・解答欄に記入されたものは採点されない。
5. 記入した解答用紙は，裏返して机上に置くこと。
6. 解答用紙の※欄は記入しないこと。
7. 試験終了後，問題冊子は持ち帰ること。

総合問題 A　問題訂正

2　7ページ　上から 1 行目

誤：　・・・注は本文あるいは問いの後に・・・・

正：　・・・注は本文の後に・・・・

2　8ページ　上から 7 行目

誤：・・・and reality　(column [D]) are close・・・・

正：・・・and reality　(Column [D]) are close・・・・

2　13 ページ　問 5　上から 4 行目

誤：　・・・about events related to・・・・

正：　・・・about events in Table 1 related to・・・・

1 次の英文を読んで，あとの問いに答えなさい。＊印のある語句の注は本文の後に示されています。

At the beginning of the 20th century, London's underground train service (the Tube) became so intricate* that more and more complicated maps had to be issued from time to time, in order to orient* the travelers. In 1931, after many attempts, Henry Beck, an employee of the company, changed the criteria for drawing the chart. Instead of embedding* the lines on top of an actual map of London, Beck placed them in an abstract space (Figure 1, see page 2). Stations were represented by well-spaced dots. Tube connections became straight lines with neat angles of 45 or 90 degrees. This map has little to do with the real positions and distances of stations, but it is much clearer and more useful for the passengers. (1) Those travelling on the Tube network are not interested in its geographic features: the information about the sequence of stations and the intersection of Tube lines is enough.

Henry Beck's London's Tube map is basically a graph. His solution to the mapping problem exploited a basic feature of the network approach: in networks, *topology* is more important than *metrics*. That is, what is connected to what is more important than how far apart two things are: in other words, the physical geography is less important than the 'netography' of the graph. The difference between these two concepts is shown in Figure 2 (see page 3). The three images represented in the picture are different from a metric point of view. That is, the positions of nodes in space and the lengths of links are different. However, from the topological point of view, they are identical: (2) they are just three different representations of the same graph. In the network representation, the connections between the elements of a system are much more important than their specific positions in space and their relative distances.

The focus on topology is one of the biggest strengths of the network

approach, useful whenever topology is more relevant than metrics.[3] For example, an email sent from New York reaches an office in London in the same time as one sent from the office next door. Even on the Internet, a material infrastructure embedded in geographical space, the pattern of the connections is more important than the physical distance.

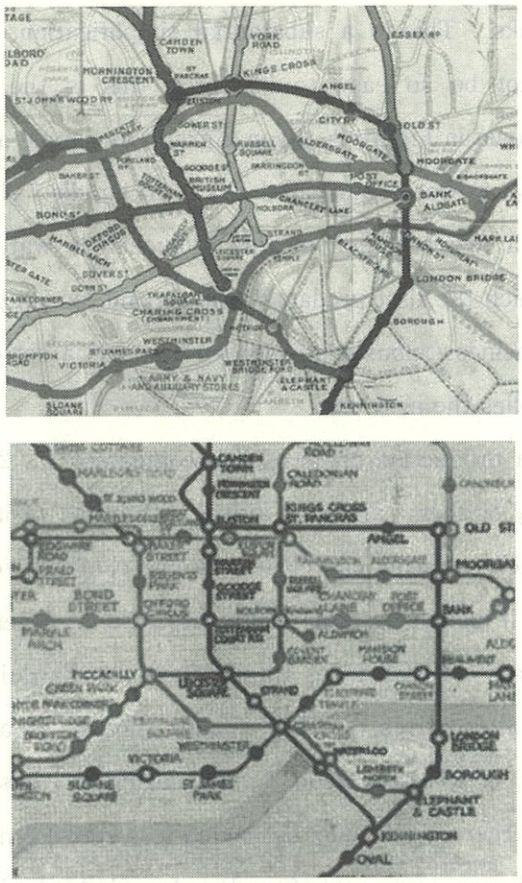

Figure 1. A 'metric' representation of part of the London Tube (top) versus a 'topological' one (bottom)

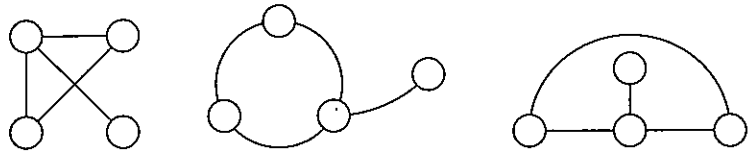

Figure 2. Three different representations of the same graph

The network approach reduces complex systems to a bare architecture of nodes and links. This is a substantial simplification, but still the resulting graph may not be so easy to interpret: this is the case with the tricky illustration shown in Figure 2. Even a graph as simple as an innocent chain of nodes can be a rather complicated object to handle. A chain may represent, for example, a fire brigade* moving a bucket of water; or a food chain of species, in which the first predates* the second, which predates the third, and so on; or a business-to-business supply structure: a set of companies in which each one supplies the next one.

Imagine a production chain of five companies (1, 2, 3, 4, and 5). Along this chain, any of them can make a deal with either of its two neighbors. The rule is that each company can close only one contract: for example, if 3 closes a deal with 2, it cannot have arrangements with 4. Given this simple structure and rule, it turns out that nodes 1 and 5 have less bargaining power, since they have fewer alternatives. This makes nodes 2 and 4 stronger, and (unexpectedly) it weakens node 3. Indeed, node 3 has only strong nodes to deal with, and therefore it ends up having less convenient deals. Something as simple as a linear sequence of nodes does indeed yield a rather complex landscape. This example shows what sociologists call an *exclusion mechanism*. Far from being a theoretical situation, this is commonly experienced in economics, when the establishment of a commercial relation between two parts excludes a third node.

(注) intricate 入り組んだ　　orient 案内する
embedding 埋め込む　　fire brigade 消防隊
predates 捕食する

出典：Guido Caldarelli and Michele Catanzaro, *Networks: A Very Short Introduction*. Oxford University Press. 2012. (一部改変)

問 1　新しい地図が下線部(1)のように受け取られた理由は何か。20 字以内の日本語で簡潔に説明しなさい。

問 2　下線部(2)は Figure 2 の図のどのような特徴を意味するか。20 字以内の日本語で説明しなさい。

問 3　次の問いに答えなさい。答えは以下の選択肢(A)～(D)から選んで，記号で答えなさい。

Which of the following statements is *not true* in relation to the explanation that the three images in Figure 2 are metrically different but topologically identical?

(A) Three out of the four nodes are related to each other.
(B) The lines connecting the nodes may differ in shape and length.
(C) There is one node that plays a more important role than others.
(D) There is one isolated node that is related to only one other node.

問 4　下線部(3) metrics とは，直後の例で何に当たるか。以下の選択肢(ア)～(エ)から選んで，記号で答えなさい。

(ア) ニューヨークからロンドンに到着するのにかかる時間
(イ) ニューヨークからロンドンまでの距離
(ウ) 隣のオフィスからロンドンまでの切手代金
(エ) 隣のオフィスからロンドンに到着するのにかかる時間

問 5　次の説明文を読み，以下の 3 つの問い(Q 1)～(Q 3)に答えなさい。答えはそれぞれの問いに対する選択肢(A)～(D)から選んで，記号で答えなさい。

The analysis in the text implies that for a production chain of 5 companies, nodes 1 and 5 have less bargaining power, and nodes 2 and 4 are stronger, leaving node 3 unexpectedly weaker (see the possible directions of agreement in the upper part of the chart below). Answer the following questions (Q 1, Q 2 and Q 3) with reference to the bottom part of the same chart, when the same structure and rule are applied to an expanded production chain of 7 companies.

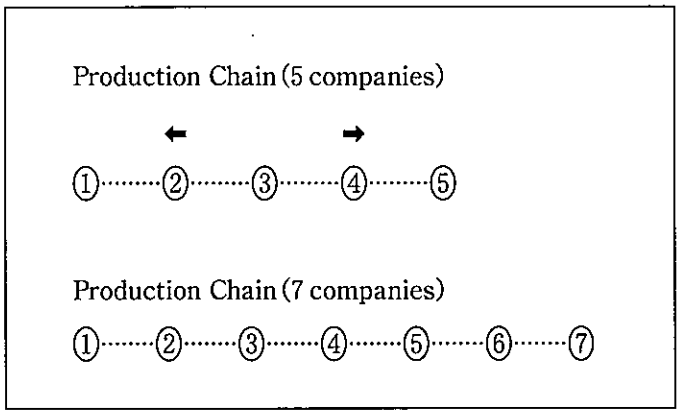

Chart: Directions of agreement in production chains

(Q 1)　Which nodes have limited bargaining power?

(A)　nodes 1 and 3

(B)　nodes 1 and 7

(C)　nodes 5 and 7

(D)　nodes 1 and 5

(Q 2) Based on (Q 1), which nodes are made stronger by the limited power of other nodes?

(A) nodes 2 and 3

(B) node 4 only

(C) nodes 5 and 6

(D) nodes 2 and 6

(Q 3) Based on (Q 1) and (Q 2), which combination of nodes are (unexpectedly) weakened?

(A) nodes 2 and 7

(B) nodes 2 and 5

(C) nodes 3, 4, and 5

(D) nodes 3 and 6

問 6 次の問いに答えなさい。答えは以下の選択肢(A)~(D)から選んで，記号で答えなさい。

What is the main conclusion of the arguments discussed in the text?

(A) Topology is always more important than metrics.

(B) Simple structures and rules of networking can result in the exclusion of some nodes.

(C) The network approach can be useful in simplifying complex systems with illustrations using sets of nodes.

(D) The relationships observed in the real world cannot be always described by chains.

2 次の英文を読んで，あとの問いに答えなさい。＊印のある語句の注は本文あるいは問いの後に示されています。

If people have trouble using numbers, why not have them express their risk perceptions with everyday words like 'very likely' or 'rare'? Indeed, when asked, people prefer using words. However, (1) they also prefer having other people use numbers. Thus, they want to know just what a doctor means when saying that a treatment is 'likely to work' or 'not likely to hurt very much'. Is 'likely' 50% or 90%? Is 'not likely' equal to 100% minus 'likely'? However, when the tables are turned*, people are more comfortable using words to express themselves. Unfortunately, that leaves their beliefs as unclear as the meaning of those 'verbal quantifiers*'. 'Likely' might mean '40%' to one person and '70%' for another, who would use 'probable' for the same expectation. Indeed, 'likely' might imply different probabilities for the same person, when applied to different events, such as rain, disappoint, score a goal, and fall ill.

Understanding how people perceive risks requires asking clear questions, then eliciting* answers with numbers that they are comfortable using. Probabilities are everyday numbers which can apply to any well-defined event, good or bad. Table 1 (see page 10) shows the results of asking teens to give probabilities for twelve significant events in their lives. Column [B] shows how well these judgements predict their futures. The high correlation (0.64) in the first row shows that teens who gave higher probabilities to being in school a year later were also more likely to have that happen. Indeed, teens who gave higher probabilities to each event were also more likely to experience it (except for dying, in the last two rows). Thus, teens who see bigger risks also face bigger risks.

Comparing Column [C] (the probability judgements) and Column [D] (how often each event happened) shows how accurately teens perceive these

risks, in an absolute sense. For example, as a group, young women underestimate their chance of becoming mothers (16.0% versus 25.7%; row 7), whereas young men overestimate their chance of becoming fathers (19.1% versus 13.4%; row 8). These results are consistent with other studies finding that young women exaggerate* their control over sexual situations and young men exaggerate their sexual prowess*. For these two events, and most others in Table 1, teens' judgements (Column [C]) and reality (column [D]) are close enough that better information about risk levels might not affect their decisions. One exception is their tendency to exaggerate how easy it is to find work (rows 3 and 4). (2) Better knowledge might help keep teens in school.

A second exception is that teens greatly overestimate their risk of dying in the next year (18.7% versus 0.1%; row 11) or by age 20 (20.3% versus 0.5%; row 12), expressing their unique sense of vulnerability. Figure 1 (see page 11) shows these judgements in greater detail. About half of these teens gave a probability close to 0%. The others gave probabilities that are much too high. Among those teens, many said 50%, a completely unrealistic judgement, for all but a very few. (3) Such '50 blips' are, however, fairly common in studies that ask about threatening events, such as dying from breast cancer or lung cancer (for smokers). When people are unable or unwilling to give a probability, saying '50', in the sense of 50/50 (or 'I don't know') satisfies the survey's need for a number without really committing themselves. Thus, for whatever reasons, many of these teens can't, or won't, give a probability of dying and say '50' instead. Presumably, they don't think that the probability is 0%. However, treating their judgements literally (as 50%) overstates how much they exaggerate their risk of dying — which is still worryingly high.

(注) when the tables are turned 立場が逆になれば
quantifiers 数量詞, 数量表現 eliciting 引き出す
exaggerate 誇張する prowess 大胆な行為

出典：Baruch Fischhoff and John Kadvany, *Risk: A Very Short Introduction.* Oxford University Press. 2011. (一部改変)

Wändi Bruine de Bruin, Andrew M. Parker, and Baruch Fischhoff, "Can Adolescents Predict Significant Life Events?" *Journal of Adolescent Health* 41. 2007. (一部改変)

Table 1. Probability judgements for 12 significant life events (National Longitudinal Study of Youth)

What is the percent chance that you will …	[A]	[B]	[C]	[D]
1. Be a student in a regular school a year from now?	3160	0.64	92.5%	79.6%
2. Have received a high school diploma by the time you turn 20?	3077	0.60	94.5%	92.0%
3. If you are in school a year from now, … be working for pay more than 20 hours a week?	2492	0.29	57.7%	27.2%
4. If you are not in school a year from now, … be working for pay more than 20 hours a week?	610	0.31	80.5%	43.9%
5. Become pregnant within 1 year from now? (female)	844	0.37	8.9%	20.1%
6. Get someone pregnant within the next year? (male)	1553	0.35	9.4%	7.9%
7. Become the parent of a baby sometime between now and when you turn 20? (female)	1368	0.38	16.0%	25.7%
8. Become the parent of a baby sometime between now and when you turn 20? (male)	1356	0.27	19.1%	13.4%
9. Be arrested, whether rightly or wrongly, at least once in the next year?	3141	0.41	10.3%	8.2%
10. Serve time in jail or prison between now and when you turn 20?	3300	0.39	5.4%	2.8%
11. Die from any cause (crime, illness, accident, and so on) in the next year?	3165	NS	18.7%	0.1%
12. Die from any cause (crime, illness, accident, and so on) between now and when you turn 20?	3169	NS	20.3%	0.5%

Notes: Column [A] represents the sample size, [B] the correlation with outcome, [C] the mean response of probability judgements, and [D] the observed outcome rate. NS represents correlation that is not significantly different from zero.

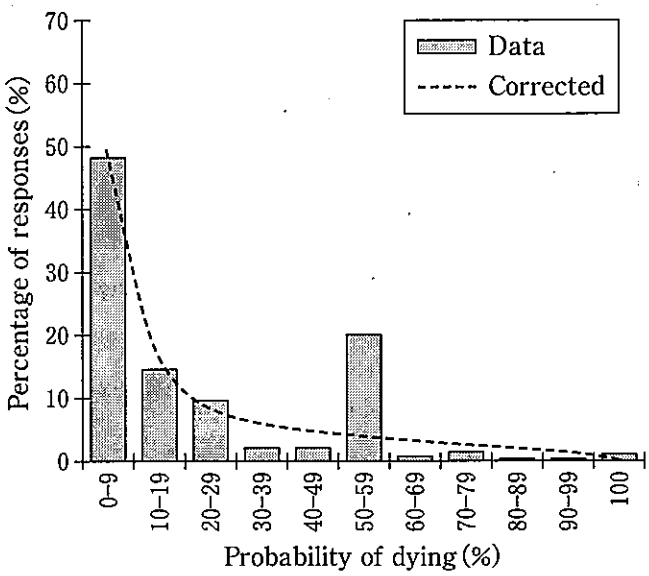

Figure 1. Judgements of the probability of dying in the next year, from a large representative sample of American teens

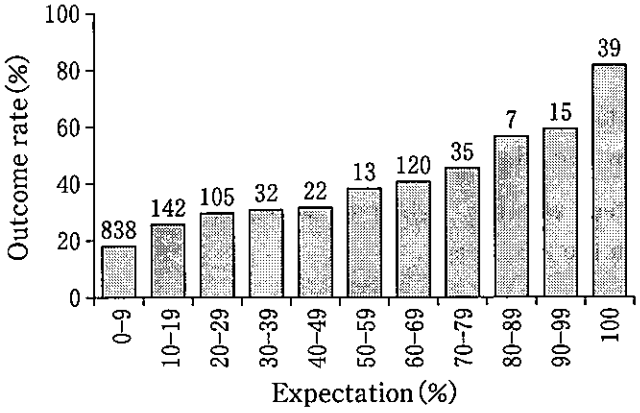

Figure 2. Percentage of female teens who reported becoming a parent by age 20 years (outcome rate), noting the number of respondents using probability values in each category.

問 1　下線部(1)の状況を具体的に示す例はどのようなものか。45 字以内の日本語で説明しなさい。

問 2　次の問いに答えなさい。答えは以下の選択肢(A)～(D)から選んで，記号で答えなさい。

How many significant life events have predictions higher than observed outcome rates?

(A)　2

(B)　8

(C)　10

(D)　12

問 3　下線部(2)のように筆者が推測できる理由は何か。45 字以内の日本語で説明しなさい。

問 4　下線部(3)が Figure 1 において出現する理由は何か。60 字以内の日本語で説明しなさい。

問 5　次の問いに対する答えとして最も適切なものを，以下の選択肢(1)～(5)から選んで，記号で答えなさい。

Which combination [(1) to (5)] best describes two main assumptions underlying the arguments about events related to criminal behavior?

(A) The fairness of the justice system does not matter in the judgement of American teens.

(B) The observed outcomes are self-reported outcomes.

(C) American teens have a poor understanding of the criminal justice system and their legal rights and obligations.

(D) The judgement about the chances of being arrested in the next year does not affect that about serving time in jail or prison until the age of 20.

選択肢：

(1) A and B

(2) B and C

(3) C and D

(4) A and C

(5) A and D

問 6　次の問いに答えなさい。答えは選択肢(A)～(D)から選んで，記号で答えなさい。

Which of the following statements is *definitely not true* with reference to Table 1 and Figure 2?

(A) The majority of female teens did not expect to become pregnant by the age of 20 years.

(B) Females tend to underestimate their probability of becoming pregnant by the age 20.

(C) Approximately 80% of female teens who predicted with 100% confidence that they would become parents failed to become pregnant by the age of 20 years.

(D) About 20% of female teens who expected with 0-9% confidence to become parents did become pregnant by the age of 20.

問 7　次の問いに対する答えとして最も適切なものを，以下の選択肢(1)～(5)から選んで，記号で答えなさい。

Which combination [(1) to (5)] of the following statements best describes the main conclusions from the arguments in the text?

(A) There is a tendency for males to underestimate their chances of becoming fathers and for females to underestimate their chances of becoming pregnant.

(B) Predictions made by teens about significant life events, other than premature death, tend to be accurate.

(C) The highest correlations are obtained for events related to education.

(D) More information about risk levels does not necessarily affect how teens perceive risk.

選択肢：

(1) A and B

(2) A and C

(3) B and C

(4) B and D

(5) C and D