© 2005 Oxford University Press

＊各段落の問いに答えながら，読み進めなさい＊

①Most of what we learn about the world is obtained from information based on samples of what we are studying -- samples of, say, rock formations, light from stars, television viewers, cancer patients, whales, or numbers. Samples are used because it may be impossible, impractical, or too costly to examine all of something, and because a sample often is sufficient for most purposes.

②In drawing conclusions about all of something from samples of it, two major concerns must be taken into account. First, we must be alert to possible bias created by how the sample was selected. Common sources of bias in drawing samples include convenience (for example, A ), self-selection (for example, B ), failure to include those who have dropped out along the way (for example, C ), and D .

A~D に相応しい名詞句を下から選べ。

・deciding to use only the data that support our preconceptions
・studying only people who volunteer or who return questionnaires
・testing only students who stay in school or only patients who stick with a course of therapy
・interviewing only one's friends or picking up only surface rocks

③A second major concern that determines the usefulness of a sample is its size.
{以下、文脈をたどって並べかえよ}

A　For example, for samples chosen at random, finding that 600 out of a sample of 1,000 have a certain feature is much stronger evidence that a majority of the population from which it was drawn have that feature than finding that 6 out of a sample of 10 (or even 9 out of the 10) have it.

B　This is because the larger a sample is, the smaller the effects of purely random variations are likely to be on its summary characteristics.

C　On the other hand, the actual size of the total population from which a sample is drawn has little effect on the accuracy of sample results.

D　The chance of drawing a wrong conclusion shrinks as the sample size increases.

E　If sampling is done without bias in the method, then the larger the sample is, the more likely it is to represent the whole accurately.

A random sample of 1,000 would have about the same margin of error whether it were drawn from a population of 10,000 or from a similar population of 100 million.

④Some aspects of reasoning have clear logical rules, others have only guidelines, and still others have almost unlimited room for creativity (and, of course, error). A convincing argument requires both true statements and valid connections among them. Yet formal logic concerns the validity of the connections among statements, not whether the statements are actually true. It is logically correct to argue that if all birds can fly and penguins are birds, then penguins can fly. But the conclusion is not true unless the premises are true: Do all birds really fly, and are penguins really birds? Examination of the truth of premises is as important to good reasoning as the logic that operates on them is. 下線部を訳せ。→ In this case, because the logic is correct but the conclusion is false (penguins cannot fly), one or both of the premises must be false (not all birds can fly, and/or penguins are not birds).

⑤Very complex logical arguments can be built from a small number of logical steps, which hang on precise use of the basic terms "if," "and," "or," and "not." For example, medical diagnosis involves branching chains of logic such as "If the patient has disease X or disease Y and also has laboratory result B, but does not have a history of C, then he or she should get treatment D." Such logical problem solving may require expert knowledge of many relationships, access to much data to feed into the relationships, and skill in deducing branching chains of logical operations. Because computers can store and retrieve large numbers of relationships and data and can rapidly perform long series of logical steps, they are being used increasingly to help experts solve complex problems that would otherwise be very difficult or impossible to solve.並べかえよ。{ be all however computers solved not problems can by logica l, , .}

⑥全訳せよ。

Logical connections can easily be distorted. For example, the proposition that all birds can fly does not imply logically that all creatures that can fly are birds. As obvious as this simple example may seem, distortion often occurs, particularly in emotionally charged situations. For example: All guilty prisoners refuse to testify against themselves; prisoner Smith refuses to testify against himself; therefore, prisoner Smith is guilty.

⑦以下、文脈をたどって並べかえよ。

・A condition, however, may be both necessary and sufficient; for example, receiving a majority of the electoral vote is both necessary for becoming president and sufficient for doing so, because it is the only way.

・A condition that is necessary for a consequence is always required but may not be enough in itself--being a U.S. citizen is necessary to be elected president, for example, but not sufficient.

・A condition that is sufficient for a consequence is enough by itself, but there may be other ways to arrive at the same consequence--winning the state lottery is sufficient for becoming rich, but there are other ways.

・Distortions in logic often result from not distinguishing between necessary conditions and sufficient conditions.

⑧Logic has limited usefulness in finding solutions to many problems.

以下、文脈をたどって並べかえよ。

・Commonly, therefore, strict logic has to be replaced by probabilities or other kinds of reasoning that lead to much less certain results--for example, to the claim that on average, rain will fall before evening on 70 percent of days that have morning weather conditions similar to today's.

・Precise logic requires that we can make declarations such as "If X is true, then Y is true also" (a barking dog does not bite), and "X is true" (Spot barks).

・Outside of abstract models, we often cannot establish with confidence either the truth of the premises or the logical connections between them.

・Typically, however, all we know is that "if X is true, then Y is often true also" (a barking dog usually does not bite) and "X seems to be approximately true a lot of the time" (Spot usually barks).

⑨If we apply logical deduction to a general rule (A), we can produce a conclusion about a particular instance or class of instances (B). But where do the general rules come from? Often they are generalizations made from observations--finding a number of similar instances and guessing that what is true of them is true of all their class (C). Or a general rule may spring from the imagination, by no traceable means, with the hope that some observable aspects of phenomena can be shown to follow logically from it (example:D).

A~D に相応しい文を下から選べ。

・penguins fly

・"What if it were true that the sun is the center of motion for all the planets, including the earth? Could such a system produce the apparent motions in the sky?"

・all feathered creatures fly

・"every feathered creature I have seen can fly, so perhaps all can"

⑩Once a general rule has been hypothesized, by whatever means, logic serves in checking its validity. If a contrary instance is found (a feathered creature that cannot fly), the hypothesis is not true. On the other hand, the only way to prove logically that a general hypothesis about a class is true is to examine all possible instances (all birds), which is difficult in practice and sometimes impossible even in principle. So it is usually much easier to prove general hypotheses to be logically false than to prove them to be true.

並べかえよ。Computers ｛now sometimes it to mathematical convincingly make questionable possible demonstrate the of generalizations truth｝, even if not to prove them, by testing enormous numbers of particular cases.

⑪Science can use deductive logic if general principles about phenomena have been hypothesized, but such logic cannot lead to those general principles. Scientific principles are usually arrived at by generalizing from a limited number of experiences--for instance,(A). This is a very important kind of reasoning even if the number of observations is small (for example, being burned once by fire may be enough to make someone wary of fire for life). However, our natural tendency to generalize can also lead us astray. (B) . On a more sophisticated level, finding that (C) .

A~C に相応しい文を下から選べ（Bの文頭文字は小文字に変えた）。

・getting sick the day after breaking a mirror may be enough to make someone afraid of broken mirrors for life

・several patients having the same symptoms recover after using a new drug may lead a doctor to generalize that all similar patients will recover by using it, even though recovery might have occurred just by chance

・if all observed feathered creatures hatch from eggs, then perhaps all feathered creatures do

⑫The human tendency to generalize has some subtle aspects. Once formed, generalities tend to influence people's perception and interpretation of events. Having made the generalization that the drug will help all patients having certain symptoms, for example, the doctor may be likely to interpret a patient's condition as having improved after taking the drug, even if that is doubtful. To prevent such biases in research, scientists commonly use ＊a "blind" procedure in which the person observing or interpreting results is not the same person who controls the conditions (for instance, the doctor who judges the patient's condition does not know what specific treatment that patient received).

＊a "blind" procedure について説明せよ。50 字程度。

⑬Much of reasoning, and perhaps most of creative thought, involves not only logic but analogies. When one situation seems to resemble another in some way, we may believe that it resembles it in other ways too. For example, light spreads away from a source much as water waves spread from a disturbance, so perhaps light acts like water waves in other ways, such as producing interference patterns where waves cross (it does). Or, the sun is like a fire in that it produces heat and light, so perhaps it too involves burning fuel (in fact, it does not). The important point is that 並べかえよ。(「, 」を挟んで 2 文) {but , it them never can can be prove suggest reasoning true analogy conclusions by to }.