

READING PASSAGE 1

You should spend about 20 minutes on Questions 1-13, which are based on Reading Passage 1 on pages 2 and 3.

Becoming an expert

What is the nature of expertise and what is the process by which one moves from being a novice, to a journeyman, and eventually to becoming an expert?

Expertise is commitment coupled with creativity. It takes a considerable amount of time and regular exposure to a large number of cases to become an expert. An individual enters a field of study as a novice. The novice needs to acquire the guiding principles and rules of a given task in order to undertake that task. Concurrently, the novice needs to be exposed to specific cases, or instances, that test the boundaries of such rules. Generally, a novice will find a mentor to direct them through the process of acquiring new knowledge.

In time, and with much practice, the novice begins to distinguish patterns of behavior within cases, and thus becomes a journeyman. With more practice and exposure to increasingly complex cases, the journeyman finds patterns not only within cases but also between cases. More importantly, the journeyman learns that these patterns often repeat themselves over time. The journeyman still maintains regular contact with a mentor to solve specific problems and learn more complex strategies.

When journeymen start to make and test hypotheses about future behavior based on past experiences, they begin the next transition. Once they creatively generate knowledge, rather than simply matching superficial patterns, they become experts. At this point, they are confident in their knowledge and no longer need a mentor – they become responsible for their own knowledge. Once they make predictions based on patterns, and test those predictions against actual behavior, they are generating new knowledge.

This process is rather like an apprenticeship model. Apprenticeship may seem like a restrictive 18th-century mode of education, but it is still a standard method of training for many complex tasks. Academic doctoral programs are based on an apprenticeship model, as are fields like law, music, engineering, and medicine. Graduate students enter such fields of study, find mentors, and begin the long process of becoming independent experts and generating new knowledge in their respective domains.

Experts have a deeper understanding of their domains than novices have, and utilize higher-order principles to solve problems. A novice, for example, would group objects together by color or size, whereas an expert would group the same objects according to their function or utility. Experts comprehend the meaning of data and weigh variables using different criteria within their domains better than novices. Experts recognize variables that have the largest influence on a particular problem and focus their attention on those variables.

Experts have better domain-specific short-term and long-term memory than novices have. Moreover, experts perform tasks faster than novices and commit fewer errors while solving problems. Interestingly, experts go about solving problems differently than novices. Experts spend more time thinking about a problem to fully understand it at the beginning of a task than do novices, who immediately seek to find a solution. Experts use their knowledge of previous cases as a context for creating mental models to solve given problems.

Better at self-monitoring than novices, experts are more aware of instances where they have committed errors or failed to understand a problem. Experts check their solutions more often than novices and recognize when they are missing information necessary for solving a problem. Experts are aware of the limits of their domain knowledge and apply their domain's principles and rules to solve problems that fall outside of their experience base.

The Contradiction of Expertise

The strengths of expertise can also be weaknesses. Although one would expect experts to be good forecasters, they are not particularly good at making predictions about the future. The performance of experts has been tested against predictions derived from pure statistical analysis of past events to determine if they are better than these models. With more than 200 experiments in different domains, it is clear that the answer is no.

Theorists and researchers differ when trying to explain why experts are less accurate forecasters than statistical models. Some have argued that experts, like all humans, are inconsistent when using mental models to make predictions. That is, the model an expert uses for predicting something in one month, is different from the model used for predicting the same thing in a following month, although identical data sets are used in both instances.

A number of other researchers point to human bias in order to explain unreliable expert predictions. During the last 30 years, researchers have categorized, experimented with, and theorized about the different aspects of forecasting. Despite such efforts, the literature shows little consensus regarding the causes or manifestations of human bias.

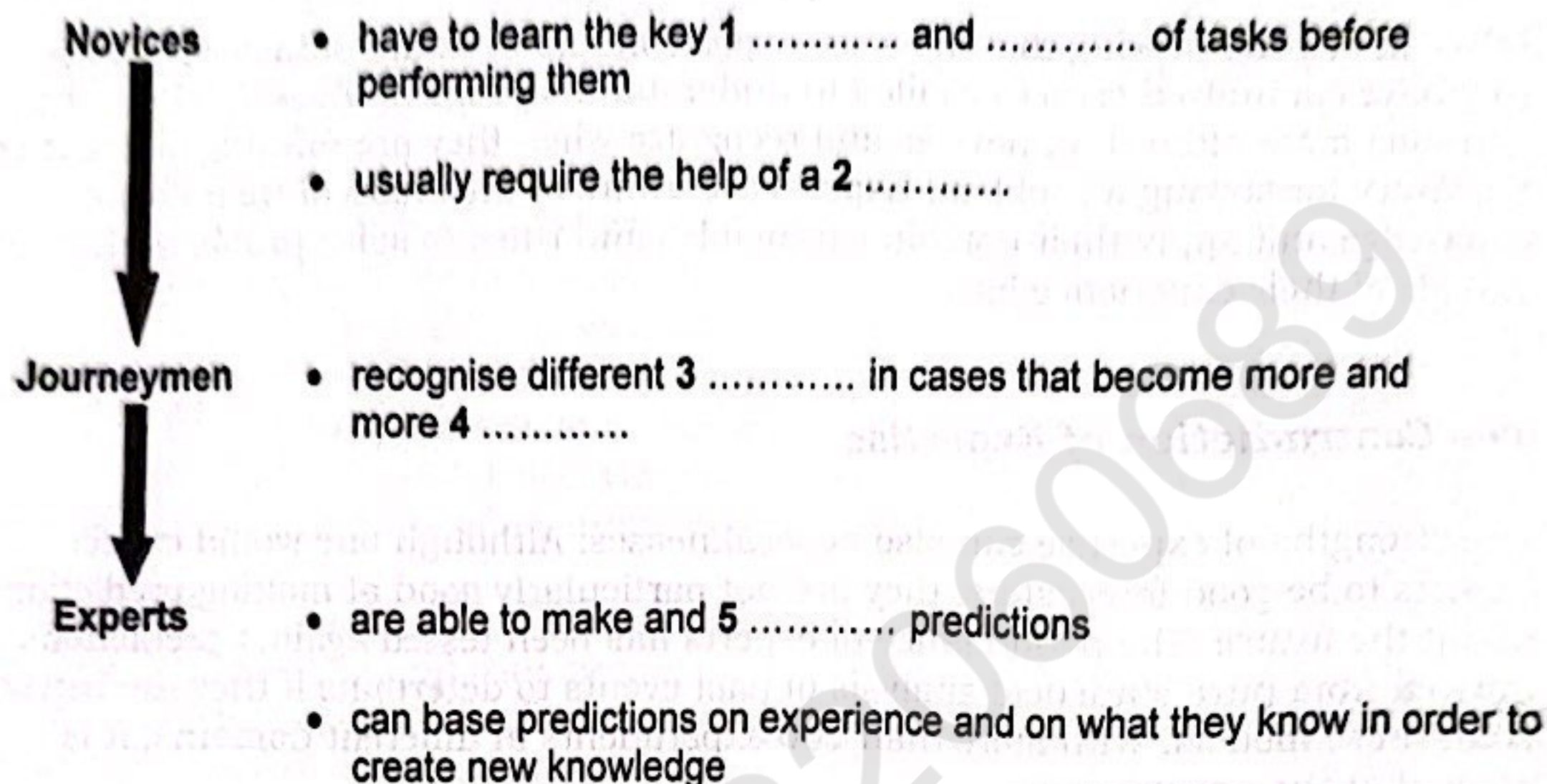
The very method by which one becomes an expert explains why experts are much better at describing, explaining, performing tasks, and problem-solving within their domains than are novices, but, with a few exceptions, are worse at forecasting than tables based on historical, statistical models.

Questions 1 – 5

Complete the flow-chart below.

Choose **NO MORE THAN THREE WORDS** from the passage for each answer.

Write your answers in boxes 1-5 on your answer sheet.



Questions 6 – 10

Do the following statements agree with the information given in Reading Passage 1?

In boxes 6-10 on your answer sheet, write

TRUE

if the statement agrees with the information

FALSE

if the statement contradicts the information

NOT GIVEN

if there is no information on this

- 6 Experts and novices use the same classification systems for objects.
- 7 Novices are often required to work on tasks that build memory skills.
- 8 Novices perform tasks more slowly than experts.
- 9 Novices begin a task by looking for an answer straight away.
- 10 Experts review their work more efficiently than novices.

Questions 11 – 13

Complete the summary below.

Choose **NO MORE THAN TWO WORDS** from the passage for each answer.

Write your answers in boxes 11-13 on your answer sheet.

The Contradiction of Expertise

Researchers have conducted a large number of 11 in different areas which show that statistical models provide more accurate predictions than experts. Some theorists think this may be because experts can apply different mental models to the same data sets on different occasions.

Others suggest that forms of 12 may also influence experts, although there is not a great deal of 13 about why or how this happens.

READING PASSAGE 2

You should spend about 20 minutes on Questions 14-26, which are based on Reading Passage on pages 6 and 7.

The fascinating world of attine ants

Nicholas Wade examines leaf-cutter ants and their amazing agriculture

- A** Leaf-cutting ants and their fungus* 'farms' are a marvel of nature and perhaps the best-known example of symbiosis – the mutual dependence of two species. The ants cultivate a mushroom-like fungus in 'farms'. Both the ants and their so-called 'agriculture' have been extensively studied over the years, but recent research has uncovered intriguing new findings.

Ants invented agriculture 50 million years before people did, and the leaf-cutters, members of the large attine ant family, practice the most sophisticated example of it. They grow their fungus in underground chambers that can reach the size of a football. A single leaf-cutter nest may contain a thousand such chambers, embedded in an underground metropolis up to 18 feet deep, and support a society of more than a million ants.

- B** These ant communities are the dominant plant-eaters of the Neotropics, the region comprising South and Central America, Mexico and the Caribbean. Biologists believe 15 per cent of the leaf production of tropical forests disappears down the nests of leaf-cutter ants. In the nest, the leaves are shredded and added to the fungus, which digests the leaves and is in turn eaten by the ants. The attine ants' achievement is remarkable because it allows them to consume, courtesy of their mushroom's digestive powers, the harvest of tropical forests whose leaves are laden with poisonous chemicals.
- C** There are more than 200 known species of attine ant, divided into 12 groups. The leaf-cutters use fresh vegetation while the other groups, known as the lower attines because their nests are smaller and their techniques more primitive, feed their gardens with similar leaves which have fallen on the ground and insects that lie on the forest floor. Lower attine ants are all a similar size. However, leaf-cutter worker ants come in made-to-fit sizes – large ants to saw off leaves, medium ones to shred them and miniature workers to seed them with fungus and clean off alien growths.
- D** In 1994, biologists from the United States Department of Agriculture analyzed the DNA of ant funguses. They found that the leaf-cutters' fungus was descended from a single pure strain, propagated for at least 23 million years. However, the funguses grown by lower attine ants fell into four different groups, as if the ants had domesticated wild funguses at least four times in evolutionary history. What could be driving these two patterns of fungus gardening, the pure clone cultivation of the leaf-cutters and multiple varieties of the lower attines?

* fungus: an organism such as a mushroom which obtains its food from decaying material.

- E** The answer has been suggested by Cameron Currie of the University of Toronto. The pure strain of fungus grown by the leaf-cutters, it seemed to him, resembled the single crops grown by humans to the exclusion of all others, such as potato growing. These 'monocultures' are very productive for a while but can succumb to disease. Monocultures, which lack the genetic diversity to respond to changing environmental threats, are particularly vulnerable to parasites – organisms which live and feed on their host, often causing harm. Currie felt there had to be a parasite in the ant-fungus system. But a century of ant research did not provide any evidence for his idea. Textbooks describe how leaf-cutter ants scrupulously weed their gardens of all foreign organisms. 'People kept telling me, the ants keep their gardens free of parasites,' said Currie. Nevertheless, after three years of sifting through attine ant gardens, Currie discovered several alien organisms, particularly a family of parasitic molds called 'Escovopsis'.
- F** Escovopsis is a deadly disease that can devastate a fungus garden in a couple of days. It blooms like a white cloud which envelops the whole garden. Other ants won't go near it and the ants associated with the garden just starve to death. Evidently, the ants usually manage to keep Escovopsis and other parasites under control. Nevertheless, with any lapse in control Escovopsis will quickly burst forth. Although new leaf-cutter gardens start off free of Escovopsis, within two years some 60 per cent become infected.
- G** The discovery of Escovopsis's role brings a new level of understanding to the evolution of the attine ants. In the last decade, evolutionary biologists have become increasingly aware of the role of parasites as driving forces in evolution. With Currie's work, there is now a possible reason for the different varieties of fungus in the lower attine mushroom gardens – to stay one step ahead of the relentless Escovopsis. Interestingly, the leaf-cutters had fewer alien molds in their gardens than the lower attines, yet more Escovopsis infections. Clearly, the price they pay for cultivating a pure variety of fungus is a higher risk from Escovopsis.
- H** So how do attine ants keep this parasite under control? People have known for a hundred years that ants have a whitish growth on their body surface. It was thought to be a wax but, after examining it under a microscope, Currie discovered a specialized patch on the ants' bodies that harbors a particular kind of bacterium, one well known to the pharmaceutical industry and the source of many antibiotics used in medicine. This bacterium is a potent poisoner of Escovopsis, inhibiting its growth and suppressing spore formation.

Astoundingly, the leaf-cutter ants are accomplishing feats beyond the power of humans: they are growing a monocultural crop year after year without disaster, and they are using an antibiotic apparently so wisely that, unlike people, they are not provoking antibiotic resistance in the target disease-producing organism.

Questions 14 – 19

Reading Passage 2 has eight sections, A-H.

Which section contains the following information?

Write the correct letter, A-H, in boxes 14-19 on your answer sheet.

- 14** two things at which leaf-cutter ants have succeeded but humans have failed
- 15** a comparison between the nests of leaf-cutter and lower attine ants
- 16** an assessment of the impact leaf-cutter ants have on their environment
- 17** the effect Escovopsis has on ant communities
- 18** the advantage for lower attine ants of growing a range of funguses
- 19** the discovery of the age of the attine ant funguses

Questions 20 – 24

Classify the following features as belonging to

- A** leaf-cutter ants
- B** lower attine ants
- C** both leaf-cutter and lower attine ants

Write the correct letter, A, B or C, in boxes 20-24 on your answer sheet.

NB You may use any letter more than once.

- 20** the use of dead vegetation to cultivate their fungus
- 21** very small ants that keep the fungus free of foreign organisms
- 22** the ability to safely eat harmful plants
- 23** the cultivation of a single fungus
- 24** a nest with a very large number of rooms for growing fungus

Questions 25 and 26

Choose the correct letter, **A**, **B**, **C** or **D**.

Write the correct letter in boxes 25 and 26 on your answer sheet.

25 What does the writer say about Cameron Currie's research?

- A** No previous work had been done in this area.
- B** Earlier studies did not support his theory.
- C** Textbooks on this subject lacked specific detail.
- D** Currie's initial theory had proven to be incorrect.

26 Using a microscope, Currie was the first to discover that the body of attine ants

- A** has a white covering.
- B** is covered in wax.
- C** is poisonous to humans.
- D** has a substance useful to humans.

READING PASSAGE 3

You should spend about 20 minutes on **Questions 27-40**, which are based on Reading Passage 3 on pages 10 and 11.

Decisions, decisions!

Research explores when we can make a vital decision quickly and when we need to proceed more deliberately

A widely recognised legend tells us that in Gordium (in what is now Turkey) in the fourth century BC an oxcart was roped to a pole with a complex knot. It was said that the first person to untie it would become the king of Asia. Unfortunately, the knot proved impossible to untie. The story continues that when confronted with this problem, rather than deliberating on how to untie the Gordian knot, Alexander, the famous ruler of the Greeks in the ancient world, simply took out his sword and cut it in two – then went on to conquer Asia. Ever since, the notion of a ‘Gordian solution’ has referred to the attractiveness of a simple answer to an otherwise intractable problem.

Among researchers in the psychology of decision making, however, such solutions have traditionally held little appeal. In particular, the ‘conflict model’ of decision making proposed by psychologists Irving Janis and Leon Mann in their 1977 book, *Decision Making*, argued that a complex decision-making process is essential for guarding individuals and groups from the peril of ‘group-think’. Decisions made without thoroughly canvassing, surveying, weighing, examining and reexamining relevant information and options would be suboptimal and often disastrous. One foreign affairs decision made by a well-known US political leader in the 1960s is typically held up as an example of the perils of inadequate thought, whereas his successful handling of a later crisis is cited as an example of the advantages of careful deliberation. However, examination of these historical events by Peter Suedfield, a psychologist at the University of British Columbia, and Roderick Kramer, a psychologist at the Stanford Graduate School of Business, found little difference in the two decision-making processes; both crises required and received complex consideration by the political administration, but later only the second one was deemed to be effective.

In general, however, organisational and political science offer little evidence that complex decisions fare better than simpler ones. In fact, a growing body of work suggests that in many situations simple ‘snap’ decisions will be routinely superior to more complex ones – an idea that gained widespread public appeal with Malcolm Gladwell’s best-selling book *Blink* (2005).

An article by Ap Dijksterhuis of the University of Amsterdam and his colleagues, ‘On Making the Right Choice: the Deliberation-without-attention Effect’, runs very much in the spirit of Gladwell’s influential text. Its core argument is that to be effective, conscious (deliberative) decision making requires cognitive resources. Because increasingly complex decisions place increasing strain on those resources, the quality of our decisions declines as their complexity increases. In short, complex decisions overrun our cognitive powers. On the other hand, unconscious decision making (what the authors refer to as ‘deliberation without attention’) requires no cognitive resources, so task complexity does not degrade effectiveness. The seemingly counterintuitive

conclusion is that although conscious thought enhances simple decisions, the opposite holds true for more complex decisions.

Dijksterhuis reports four simple but elegant studies supporting this argument. In one, participants assessed the quality of four hypothetical cars by considering either four attributes (a simple task) or 12 attributes (a complex task). Among participants who considered four attributes, those who were allowed to engage in undistracted deliberative thought did better at discriminating between the best and worst cars. Those who were distracted and thus unable to deliberate had to rely on their unconscious thinking and did less well. The opposite pattern emerged when people considered 12 criteria. In this case, conscious deliberation led to inferior discrimination and poor decisions.

In another study, Dijksterhuis surveyed people shopping for clothes ('simple' products) and furniture ('complex' products). Compared with those who said they had deliberated long and hard, shoppers who bought with little conscious deliberation felt less happy with their simple clothing purchases but happier with the complex furniture purchases. Deliberation without attention actually produced better results as the decisions became more complex.

From there, however, the researchers take a big leap. They write:

There is no reason to assume that the deliberation-without-attention effect does not generalise to other types of choices – political, managerial or otherwise. In such cases, it should benefit the individual to think consciously about simple matters and to delegate thinking about more complicated matters to the unconscious.

This radical inference contradicts standard political and managerial theory but doubtless comforts those in politics and management who always find the simple solution to the complex problem an attractive proposition. Indeed, one suspects many of our political leaders already embrace this wisdom.

Still it is here, in the realms of society and its governance, that the more problematic implications of deliberation without attention begin to surface. Variables that can be neatly circumscribed in decisions about shopping lose clarity in a world of group dynamics, social interaction, history and politics. Two pertinent questions arise. First, what counts as a complex decision? And second, what counts as a good outcome?

As social psychologist Kurt Lewin (1890 – 1947) noted, a 'good' decision that nobody respects is actually bad. His classic studies of decision making showed that participating in deliberative processes makes people more likely to abide by the results. The issue here is that when political decision makers make mistakes, it is their politics, or the relation between their politics and our own, rather than psychology which is at fault.

Gladwell's book and Dijksterhuis's paper are invaluable in pointing out the limitations of the conventional wisdom that decision quality rises with decision-making complexity. But this work still tempts us to believe that decision making is simply a matter of psychology, rather than also a question of politics, ideology and group membership. Avoiding social considerations in a search for general appeal can take us away from enlightenment rather than toward it.

Questions 27 – 31

Choose the correct letter, **A**, **B**, **C** or **D**.

Write the correct letter in boxes 27-31 on your answer sheet.

- 27** The legend of the Gordian knot is used to illustrate the idea that
- A** anyone can solve a difficult problem.
 - B** difficult problems can have easy solutions.
 - C** the solution to any problem requires a lot of thought.
 - D** people who can solve complex problems make good leaders.
- 28** The 'conflict model' of decision making proposed by Janis and Mann requires that
- A** opposing political parties be involved.
 - B** all important facts be considered.
 - C** people be encouraged to have different ideas.
 - D** previous similar situations be thoroughly examined.
- 29** According to recent thinking reinforced by Malcolm Gladwell, the best decisions
- A** involve consultation.
 - B** involve complex thought.
 - C** are made very quickly.
 - D** are the most attractive option.
- 30** Dijksterhuis and his colleagues claim in their article that
- A** our cognitive resources improve as tasks become more complex.
 - B** conscious decision making is negatively affected by task complexity.
 - C** unconscious decision making is a popular approach.
 - D** deliberation without attention defines the way we make decisions.
- 31** Dijksterhuis's car study found that, in simple tasks, participants
- A** were involved in lengthy discussions.
 - B** found it impossible to make decisions quickly.
 - C** were unable to differentiate between the options.
 - D** could make a better choice when allowed to concentrate.

Questions 32 – 35

Complete the summary using the list of words, A-I, below.

Write the correct letter, A-I, in boxes 32-35 on your answer sheet.

Dijksterhuis's shopping study and its conclusions

Using clothing and furniture as examples of different types of purchases, Dijksterhuis questioned shoppers on their satisfaction with what they had bought. People who spent 32 time buying simple clothing items were more satisfied than those who had not. However, when buying furniture, shoppers made 33 purchasing decisions if they didn't think too hard. From this, the researchers concluded that in other choices, perhaps more important than shopping, 34 decisions are best made by the unconscious. The writer comments that Dijksterhuis's finding is apparently 35 but nonetheless true.

A	more	B	counterintuitive	C	simple
D	better	E	conscious	F	obvious
G	complex	H	less	I	worse

Questions 36 – 40

Do the following statements agree with the views of the writer in Reading Passage 3?

In boxes 36-40 on your answer sheet, write

YES

if the statement agrees with the views of the writer

NO

if the statement contradicts the views of the writer

NOT GIVEN

if it is impossible to say what the writer thinks about this

- 36 Dijksterhuis's findings agree with existing political and management theories.
- 37 Some political leaders seem to use deliberation without attention when making complex decisions.
- 38 All political decisions are complex ones.
- 39 We judge political errors according to our own political beliefs.
- 40 Social considerations must be taken into account for any examination of decision making to prove useful.