Academic Reading

READING PASSAGE 1

*You should spend about 20 minutes on **Questions 1–13**, which are based on Reading Passage 1 below.*

Robots with a sense of self

At Yale University, scientists have created a humanoid robot named Nico. When Nico sits in front of a mirror and raises an arm, he recognises the arm moving in the mirror as his own. It may not sound like much of a feat, but he has just become the first of his kind to recognise his own reflection in a mirror.

The ability to recognise your reflection is considered an important milestone in infant development and as a mark of self-awareness, sociability and intelligence in a non-human animal. Nico's ability to perform the same feat could pave the way for more sophisticated robots that can recognise their own bodies even if they are damaged or reconfigured.

The achievement is one of a cluster of recent instances in which robots have begun to approach the major milestones in cognitive development. If robots can be taught to move from one developmental stage to the next, as infants do, they may eventually be capable of learning more complicated tasks and therefore become more useful to humans. 'It's less about recreating a human than making a human-compatible being,' says Matt Berlin, a robotics researcher at Massachusetts Institute of Technology.

To give Nico the ability to recognise himself, Kevin Gold and his supervisor Brian Scassellati equipped Nico with a video camera behind one of his eyes. They also gave him a jointed arm with an attached computer running some clever software. When Nico points his camera eye at the mirror, the software assigns sections of the image a probability of being 'self', 'another' or 'neither'. At the same time, motion sensors in Nico's arm tell the software when he is moving. Whenever a section of the image changes at the same time as his motion sensors detect movement in the arm, he assigns that section a high probability of being 'self'. If a section of the image shifts and Nico detects no movement in his arm, he assigns that image section a high probability of being 'another', while static sections are likely to be 'neither'. This allows him to recognise not only his own moving limbs, but those of other robots or people.

To test the self-recognition software, Gold programmed Nico to move his arm for four minutes while filming it with his camera, allowing him to learn when movement of his arm, detected by his arm sensors, corresponded to motion of the arm in the video. Nico was then positioned so that he could see both his own reflection in a mirror and Gold standing beside it. Gold carried out a range of different tasks, including juggling balls, while Nico moved his arm around. Nico's software was able to correctly classify the movements corresponding to his own reflection and those of Gold 95% of the time.

The same system should also make it possible for robots to recognise their own limbs even if they are damaged, or wearing different clothes by correlating movement detected by on-board cameras with those reported by sensors on their limbs, says Gold. This should help them carry out tasks such as manipulating objects or let them adapt the way they walk to a changing terrain, when conventional vision software can be fooled by changes in appearance or environment.

The ability to tell self from other should also allow robots to carry out more sophisticated tasks, says Olaf Sporns, a cognitive scientist and roboticist at Indiana University in Bloomington. For instance, researchers are investigating imitation as a way of helping robots learn how to carry out tasks. To successfully and safely imitate someone, though, robots will need to distinguish between their own limbs and those of another person, as Nico can.

'The distinction between self and other is a fundamental problem for humanoid robotics,' says Sporns.

Meanwhile, a furry robot called Leonardo, built at MIT recently, reached another developmental milestone, the ability to grasp that someone else might believe something you know to be untrue. You can test the capacity for 'false belief' in children by showing them a scene in which a child puts chocolate in a drawer and goes away. While he is out of sight, his mother moves the chocolate somewhere else. Young children are incapable of seeing the world through the other child's eyes, and so predict that he will look for the chocolate in the place his mother has left it. Only when they reach four or five can they predict that the other child will mistakenly look for the chocolate in the drawer.

Leonardo, developed by Cynthia Breazeal together with Berlin and colleague Jesse Gray, uses face, image and voice recognition software running on an array of attached computers to build a 'brain' for himself – basically a list of objects around him in the room and events that he has witnessed. Whenever he spots a new face, he builds and stores another 'brain' which processes information in the same way as his own but sees the world from the new person's point of view.

When faced with the false-belief test, Leonardo knows that the object has been moved and also that a person who left the room before this would not know this. It is more than just a cute trick, however. Gray found that the ability to model other people's beliefs allows Leonardo to gain a better understanding of their goals.

As well as helping to build better robots, such research could ultimately enhance our understanding of cognitive development in infants. Developmental milestones such as self-recognition and modelling other people's beliefs are believed to be associated with the development of other important capabilities, such as empathy and sociability. By performing feats associated with these milestones, such robots could help researchers understand what capabilities infants need to reach them, says Sporns. 'It shows us that complex phenomena can sometimes be explained on the basis of simple mechanisms.'

Questions 1–4

Look at the following people (Questions 1–4) and the list of statements below.

Match each person with the correct statement, ***A–E****.*

Write the correct letter, ***A–E****, in boxes 1–4 on your answer sheet.*

1 Matt Berlin

2 Kevin Gold

3 Olaf Sporns

4 Jesse Gray

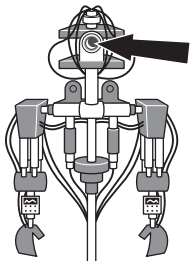
A	suggests that robots cannot yet discriminate between themselves and others
B	thinks that research using robots can help us understand the skills young children need to develop
C	wants robots to be able to respond to varying conditions
D	is working on a number of different versions of a robot
E	is not trying to make a human being but a machine to help humans

Questions 5–8

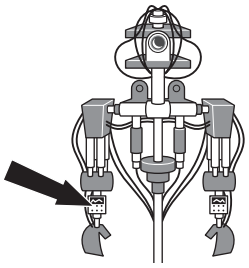
Label the diagrams below.

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

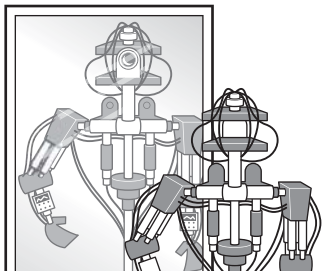
Write your answers in boxes 5–8 on your answer sheet.



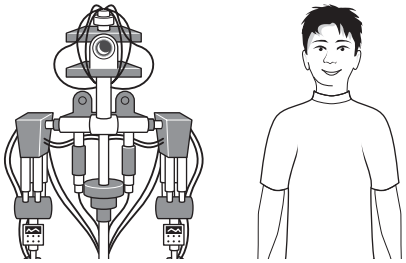
5 ..... placed inside robot's 'head'



6 robot's arm fitted with computer software and .....



7 robot films own ..... movement



8 researcher performs separate actions, e.g. .....

Questions 9–13

Complete the sentences below.

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

Write your answers in boxes 9–13 on your answer sheet.

9 Nico has reached a significant developmental stage by identifying a ..... as his own.

10 Nico classifies what he sees as being '.....' if he detects no movement on the image or his sensors.

11 Researchers are developing robots that can recognise broken ..... belonging to them.

12 Researchers investigate ..... among youngsters using chocolate.

13 Robotic research can help us learn about children's ..... .

READING PASSAGE 2

*You should spend about 20 minutes on **Questions 14–26**, which are based on Reading Passage 2 below.*

Consumer behaviour

A 'Consumer behaviour' is the behaviour that consumers display in seeking, purchasing, using, evaluating and disposing of products and services that they expect will satisfy their personal needs. The study of consumer behaviour is the study of how individuals make decisions to spend their available resources (money, time and effort) on products and services. Consumer behaviour includes both mental decisions and the physical actions that result from those decisions. Although some social scientists limit their understanding of 'behaviour' to observable actions, it is apparent that the reasons and decisions behind the actions involved in human (and consumer) behaviour are as important to investigate as the actions themselves.

B People engage in activities for many purposes other than consumption but, when acting as a customer, individuals have just one goal in mind – to obtain goods and services that meet their needs and wants. All consumers face varying problems associated with acquiring products to sustain life and provide for some comforts. Because solutions to these problems are vital to the existence of most people, and the economic well-being of all, they are usually not taken lightly. The process is complex, as choices must be made regarding what, why, how, when, where and how often to buy an item.

C Take, for instance, the product bottled water – a multimillion-dollar industry. A study of consumption behaviour in this area would investigate what kinds of consumers buy bottled water, and why, when and where they buy it. The study might find that, among some consumers, the growing use of bottled water is tied to concerns with fitness; and, among others, with the quality of tap water. It might find that domestic brands have a totally different image from imported brands, and that the reasons and occasions for usage vary among consumers. By contrast, a more durable product such as a document scanner would have a very different target market. What kinds of consumers buy, or would buy, a scanner for home use? What features do they look for? How much are they willing to pay? How many will wait for prices to come down? The answers to these questions can be found through consumer research, and would provide scanner manufacturers with important input for product design modification and marketing strategy.

D The word 'consumer' is often used to describe two different kinds of consuming entities; the personal consumer and the organisational consumer. The personal consumer buys goods and services for his or her own use (e.g. shaving cream), for the use of the whole household (television set), for another member of the household (a shirt or electronic game) or as a gift for a friend (a book). In all these contexts, the goods are bought for final use by individuals who are referred to as 'end-users' or 'ultimate consumers'.

E The second category of consumer includes profit and non-profit businesses, public sector agencies (local and national) and institutions (schools, churches, prisons), all of which buy products, equipment and services in order to run their organisations. Manufacturing companies must buy the raw materials and other components to manufacture and sell their products; service companies must buy the equipment necessary to render the services they sell; government agencies buy the office products needed to operate agencies; institutions must buy the materials they need to maintain themselves and their populations.

F The person who purchases a product is not always the sole user of the product. Nor is the purchaser necessarily the person who makes the decision or pays for the product. Thus the marketplace activities of individuals entail three functions, or roles, as part of the processes involved in consumer behaviour. The three functions are the consumer, the person who consumes or uses the product or service; the purchaser, the person who undertakes the activities to obtain the product or service; and the payer, the person who provides the money or other object of value to obtain the product or service. Marketers must decide whom to direct their marketing efforts toward. For some products or services, they

must identify the person who is most likely to influence the decision. Some marketers believe that the buyer of the products is the best prospect, others believe it is the user of the product, while still others play it safe by directing their promotional efforts to both buyers and users. For example, some toy manufacturers advertise their products on children's television shows to reach the users, others advertise in magazines to reach the buyers, and others run dual campaigns designed to reach both children and their parents.

G In addition to studying how consumers use the products they buy, consumer researchers are also interested in how individuals dispose of their once-new purchases when they are finished with them. The answer to this question is important to marketers, as they must match production to the frequency with which consumers buy replacements. It is also important to society as a whole, as solid waste disposal has become a major environmental problem that marketers must address in their development of products and packaging. Recycling is no longer a sufficient response to the problem. Many manufacturers have begun to remanufacture old components to install in new products, because remanufacturing is often cheaper, easier and more efficient than recycling.

Questions 14–18

Reading Passage 2 has seven paragraphs, **A–G**.

Which paragraph contains the following information?

*Write the correct letter, **A–G**, in boxes 14–18 on your answer sheet.*

14 a description of the organisational consumer

15 the reason why customers take purchasing decisions seriously

16 reference to a way of re-using materials

17 ways of exposing products to a range of potential customers

18 a term used to describe someone who buys for the family

Questions 19–22

Complete the summary below.

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

Write your answers in boxes 19–22 on your answer sheet.

Market research

Market research carried out on non-durable products like **….19….** aims to find out who buys these goods and why. Researchers look at what motivates buyers, such as issues of personal **….20….** or environmental factors. They may discover that **….21….** are viewed differently from a local product.

Alternatively, research on durable, manufactured goods is likely to focus more on pricing, and the results may help suggest appropriate changes to the **….22….** of the product, as well as showing how best to market it.

Questions 23–26

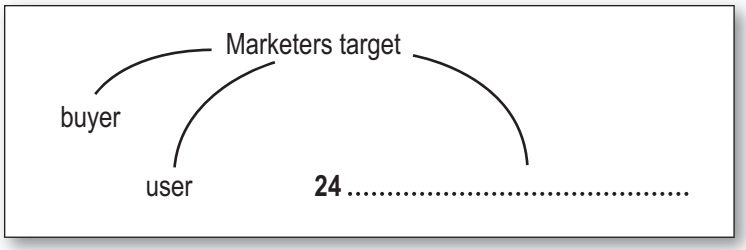
Complete the notes below.

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

Write your answers in boxes 23–26 on your answer sheet.

Marketplace activities involve:

- consumer
- **23 ……**
- payer



Researchers study:

- patterns of consumer usage
- methods of **25 ……**
- product replacement frequency

Remanufacture is replacing **26 ……** .

READING PASSAGE 3

*You should spend about 20 minutes on **Questions 27–40**, which are based on Reading Passage 3 below.*

You are what you speak

Does your mother tongue really affect the way you see the world? Alison Motluk looks at some of the findings

Does the language you speak influence the way you think? Does it help define your world view? Anyone who has tried to master a foreign tongue has at least thought about the possibility.

At first glance the idea seems perfectly plausible. Conveying even simple messages requires that you make completely different observations depending on your language. Imagine being asked to count some pens on a table. As an English speaker, you only have to count them and give the number. But a Russian may need to consider the gender and a Japanese speaker has to take into account their shape (long and cylindrical) as well, and use the number word designated for items of that shape.

On the other hand, surely pens are just pens, no matter what your language compels you to specify about them? Little linguistic peculiarities, though amusing, don't change the objective world we are describing. So how can they alter the way we think?

Scientists and philosophers have been grappling with this thorny question for centuries. There have always been those who argue that our picture of the Universe depends on our native tongue. Since the 1960s, however, with the ascent of thinkers like Noam Chomsky, and a host of cognitive scientists, the consensus has been that linguistic differences don't really matter, that language is a universal human trait, and that our ability to talk to one another owes more to our shared genetics than to our varying cultures. But now the pendulum is beginning to swing the other way as psychologists re-examine the question.

A new generation of scientists is not convinced that language is innate and hard-wired into our brain and they say that small, even apparently insignificant differences between languages do affect the way speakers perceive the world. 'The brain is shaped by experience,' says Dan Slobin of the University of California at Berkeley. 'Some people argue that language just changes what you attend to,' says Lera Boroditsky of the Massachusetts Institute of Technology. 'But what you attend to changes what you encode and remember.' In short, it changes how you think.

To start with the simplest and perhaps subtlest example, preparing to say something in a particular language demands that you pay attention to certain things and ignore others. In Korean, for instance, simply to say 'hello' you need to know if you're older or younger than the person you're addressing. Spanish speakers have to decide whether they are on intimate enough terms to call someone by the informal *tu* rather than the formal *Usted*. In Japanese, simply deciding which form of the word 'I' to use demands complex calculations involving things such as your gender, their gender and your relative status. Slobin argues that this process can have a huge impact on what we deem important and, ultimately, how we think about the world.

Whether your language places an emphasis on an object's shape, substance or function also seems to affect your relationship with the world, according to John Lucy, a researcher at the Max Planck Institute of Psycholinguistics in the Netherlands. He has compared American English with Yucatec Maya, spoken in Mexico's Yucatan Peninsula. Among the many differences between the two languages is the way objects are classified. In English, shape is implicit in many nouns. We think in terms of discrete objects, and it is only when we want to quantify amorphous things like sugar that we employ units such as 'cube' or 'cup'. But in Yucatec, objects tend to be defined by separate words that describe shape. So, for example, 'long banana' describes the fruit, while 'flat banana' means the 'banana leaf' and 'seated banana' is the 'banana tree'.

To find out if this classification system has any far-reaching effects on how people think, Lucy asked English- and Yucatec-speaking volunteers to do a likeness task. In one experiment, he gave them three combs and asked which two were most alike. One was plastic with a handle, another wooden with a handle, the third plastic without a handle. English speakers thought the combs with handles were more alike, but Yucatec speakers felt the two plastic combs were. In another test, Lucy used a plastic box, a cardboard box and a piece of cardboard. The Americans thought the two boxes belonged together, whereas the

Mayans chose the two cardboard items. In other words, Americans focused on form, while the Mayans focused on substance.

Despite some criticism of his findings, Lucy points to his studies indicating that, at about the age of eight, differences begin to emerge that reflect language. 'Everyone comes with the same possibilities,' he says, 'but there's a tendency to make the world fit into our linguistic categories.' Boroditsky agrees, arguing that even artificial classification systems, such as gender, can be important.

Nevertheless, the general consensus is that while the experiments done by Lucy, Boroditsky and others may be intriguing, they are not compelling enough to shift the orthodox view that language does not have a strong bearing on thought or perception. The classic example used by Chomskians to back this up is colour. Over the years many researchers have tried to discover whether linguistic differences in categorising colours lead to differences in perceiving them. Colours, after all, fall on a continuous spectrum, so we shouldn't be surprised if one person's 'red' is another person's 'orange'. Yet most studies suggest that people agree on where the boundaries are, regardless of the colour terms used in their own language.

Questions 27–31

Do the following statements agree with the information in Reading Passage 3?

In boxes 27–31 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*

27 Learning a foreign language makes people consider the relationship between language and thought.

28 In the last century cognitive scientists believed that linguistic differences had a critical effect on communication.

29 Dan Slobin agrees with Chomsky on how we perceive the world.

30 Boroditsky has conducted gender experiments on a range of speakers.

31 The way we perceive colour is a well established test of the effect of language on thought.

Questions 32–36

Look at the following features (Questions 32–36) and the list of languages below.

Match each feature with the correct language, ***A–E****.*

Write the correct letter, ***A–E****, in boxes 32–36 on your answer sheet.*

32 the importance of the relative age of speakers

33 the use of adjectives to distinguish the names of objects or things

34 a need to use some numbers with the correct gender

35 a relationship between form and number

36 the need to know how friendly your relationship is with the person you are addressing

List of Languages

A Russian

B Japanese

C Korean

D Spanish

E Yucatec Maya

Questions 37–40

Complete the summary using the list of words, ***A–J****, below.*

Write the correct letter, ***A–J****, in boxes 37–40 on your answer sheet.*

Lucy's Experiments

In the likeness task, Lucy gave his subjects three combs. Two of these were made of the same **….37….** and two were alike in that they had the same **….38….** . In another experiment, plastic and **….39….** items were used.

The **….40….** that English and Yucatec speakers used to group these objects helped him show that speakers of different languages think about things differently.

A method	**E** purpose	**I** similarity
B language	**F** gender	**J** wood
C cardboard	**G** box	
D design	**H** material	