

Section 1

Sustainable architecture - lessons from the ant

Termite mounds were the inspiration for an innovative design in sustainable living

Africa owes its termite mounds a lot. Trees and shrubs take root in them. Prospectors mine them, looking for specks of gold carried up by termites from hundreds of metres below. And of course, they are a special treat to aardvarks and other insectivores. WWW.THEIELTSHUB.COM

Now, Africa is paying an offbeat tribute to these towers of mud. The extraordinary Eastgate Building in Harare, Zimbabwe's capital city, is said to be the only one in the world to use the same cooling and heating principles as the termite mound.

Termites in Zimbabwe build gigantic mounds inside which they farm a fungus that is their primary food source. This must be kept at exactly 30.5°C, while the temperatures on the African yield outside can range from 1.5°C at night only just above freezing to a baking hot 40°C during the day. The termites achieve this remarkable feat by building a system of vents in the mound. Those at the base lead down into chambers cooled by wet mud carried up from water tables far below, and others lead up through a Hue to the peak of the mound. By constantly opening and closing these heating and cooling vents over the course of the day the termites succeed in keeping the temperature constant in spite of the wide fluctuations outside.

Architect Mick Pearce used precisely the same strategy when designing the Eastgate Building, which has no air conditioning and virtually no heating. The building the country's largest commercial and shopping complex uses less than 10% of the energy of a conventional building ns size. These efficiencies translated directly to the bottom line: the Eastgate's owners saved \$3.5 million on a \$36 million building because an air- conditioning plant didn't have to be imported. These savings were also passed on to tenants: rents are 20% lower than in a new building next door.

The complex is actually two buildings linked by bridges across a shady, glass-roofed atrium open to the breezes. Fans suck fresh air in from the atrium, blow it upstairs through hollow spaces under the floors and from

there into each office through baseboard vents. As it rises and warms, it is drawn out via ceiling vents and finally exits through forty- eight brick chimneys.

To keep the harsh, high yield sun from heating the interior, no more than 25% of the outside is glass, and all the windows are screened by cement arches that just out more than a metre. WWW.THEIELTSHUB.COM

During summer's cool nights, big fans flush air through the building seven times an hour to chill the hollow floors. By day, smaller fans blow two changes of air an hour through the building, to circulate the air which has been in contact with the cool floors. For winter days, there are small heaters in the vents.

This is all possible only because Harare is 1600 feet above sea level, has cloudless skies, little humidity and rapid temperature swings days as warm as 31°C commonly drop to 14°C at night. 'You couldn't do this in New York, with its fantastically hot summers and fantastically cold winters,' Pearce said. But then his eyes lit up at the challenge.' Perhaps you could store the summer's heat in water somehow.

The engineering firm of Ove Amp & Partners, which worked with him on the design, monitors daily temperatures outside, under the floors and at knee, desk and ceiling level. Ove Arup's graphs show that the temperature of the building has generally stayed between 23°C and 25°C. with the exception of the annual hot spell just before the summer rains in October, and three days in November, when a janitor accidentally switched off the fans at night. The atrium, which funnels the winds through, can be much cooler. And the air is fresh far more so than in air-conditioned buildings, where up to 30% of the air is recycled.

Pearce, disdaining smooth glass skins as 'igloos in the Sahara', calls his building, with its exposed girders and pipes, 'spiky'. The design of the entrances is based on the porcupine-quill headdresses of the local Shona tribe. Elevators are designed to look like the mineshaft cages used in Zimbabwe's diamond mines. The shape of the fan covers, and the stone used in their construction, are echoes of Great Zimbabwe, the ruins that give the country its name. WWW.THEIELTSHUB.COM

Standing on a roof catwalk, peering down inside at people as small as termites below. Pearce said he hoped plants would grow wild in the atrium and pigeons and bats would move into it. Like that termite fungus, further extending the whole 'organic machine' metaphor. The architecture, he says, is a regionalised style that responds to the biosphere, to the ancient traditional stone architecture of Zimbabwe's past, and to local human resources. WWW.THEIELTSHUB.COM

Questions 1-5

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

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

1. Why do termite mounds have a system of vents?

- A. to allow the termites to escape from predators
- B. to enable the termites to produce food
- C. to allow the termites to work efficiently
- D. to enable the termites to survive at night

2. Why was Eastgate cheaper to build than a conventional building?

- A. Very few materials were imported.
- B. Its energy consumption was so low.
- C. Its tenants contributed to the costs.
- D. No air conditioners were needed.

3. Why would a building like Eastgate not work efficiently in New York?

- A. Temperature change occurs seasonally rather than daily.
- B. Pollution affects the storage of heat in the atmosphere.
- C. Summer and winter temperatures are too extreme.
- D. Levels of humidity affect cloud coverage.

4. What does Ove Arup's data suggest about Eastgate's temperature control system?

- A. It allows a relatively wide range of temperatures.
- B. The only problems are due to human error.
- C. It functions well for most of the year. WWW.THEIELTSHUB.COM
- D. The temperature in the atrium may fall too low.

5. Pearce believes that his building would be improved by

- A. becoming more of a habitat for wildlife.
- B. even closer links with the history of Zimbabwe.

- C. giving people more space to interact with nature.
- D. better protection from harmful organisms.

Questions 6-10

Complete the sentences below with words taken from Reading Passage 1. Use **NO MORE THAN THREE WORDS** for each answer. Write your answers in boxes **6-10** on your answer sheet.

- 6. Warm air leaves the offices through
- 7. The warm air leaves the building through
- 8. Heat from the sun is prevented from reaching the windows by
- 9. When the outside temperature drops bring air in from outside. WWW.THEIELTSHUB.COM
- 10. On cold days raise the temperature in the offices.

Questions 11-13

Answer the question below, using **NO MORE THAN THREE WORDS** from the passage for each answer.

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

Which three parts of the Eastgate Building reflect important features of Zimbabwe's history and culture?

- A. entrances
- B. quill
- C. cages
- D. elevators
- E. fan covers
- F. stone

Section 2

Inside the mind of the consumer

Could brain-scanning technology provide an accurate way to assess the appeal of new products and the effectiveness of advertising?

A

Marketing people are no longer prepared to take your word for it that you favour one product over another. They want to scan your brain to see which one you really prefer. Using the tools of neuroscientists, such as electroencephalogram (EEG) mapping and functional magnetic-resonance

imaging (fMRI), they are trying to learn more about the mental processes behind purchasing decisions. The resulting fusion of neuroscience and marketing is inevitably, being called 'neuromarketing'.

B

The first person to apply brain-imaging technology in this way was Gerry Zaltman of Harvard University, in the late 1990s. The idea remained in obscurity until 2001, when BrightHouse, a marketing consultancy based in Atlanta, Georgia, set up a dedicated neuromarketing arm, BrightHouse Neurostrategies Group. (BrightHouse lists Coca-Cola, Delta Airlines and Home Depot among its clients.) But the company's name may itself simply be an example of clever marketing. BrightHouse does not scan people while showing them specific products or campaign ideas, but bases its work on the results of more general fMRI-based research into consumer preferences and decision-making carried out at Emory University in Atlanta.

C

Can brain scanning really be applied to marketing? The basic principle is not that different from focus groups and other traditional forms of market research. A volunteer lies in an fMRI machine and is shown images or video clips. In place of an interview or questionnaire, the subject's response is evaluated by monitoring brain activity. fMRI provides real-time images of brain activity, in which different areas "light up" depending on the level of blood flow. This provides clues to the subject's subconscious thought patterns. Neuroscientists know, for example, that the sense of self is associated with an area of the brain known as the medial prefrontal cortex. A flow of blood to that area while the subject is looking at a particular logo suggests that he or she identifies with that brand. WWW.THEIELTSHUB.COM

D

At first, it seemed that only companies in Europe were prepared to admit that they used neuromarketing. Two carmakers, DaimlerChrysler in Germany and Ford's European arm, ran pilot studies in 2003. But more recently, American companies have become more open about their use of neuromarketing. Lieberman Research Worldwide, a marketing firm based in Los Angeles, is collaborating with the California Institute of Technology (Caltech) to enable movie studios to market-test film trailers. More controversially, the New York Times recently reported that a political consultancy, FKF Research, has been studying the effectiveness of campaign commercials using neuromarketing techniques.

E

Whether all this is any more than a modern-day version of phrenology, the Victorian obsession with linking lumps and bumps in the skull to personality traits, is unclear. There have been no large-scale studies, so scans of a handful of subjects may not be a reliable guide to consumer behaviour in general. Of course, focus groups and surveys are flawed too: strong personalities can steer the outcomes of focus groups, and people do not always tell opinion pollsters the truth. And even honest people cannot always explain their preferences.

F

That is perhaps where neuromarketing has the most potential. When asked about cola drinks, most people claim to have a favourite brand, but cannot say why they prefer that brand's taste. An unpublished study of attitudes towards two well-known cola drinks. Brand A and Brand B. carried out last year in a college of medicine in the US found that most subjects preferred Brand B in a blind tasting fMRI scanning showed that drinking Brand B lit up a region called the ventral putamen, which is one of the brain's 'reward centres', far more brightly than Brand A. But when told which drink was which, most subjects said they preferred Brand A, which suggests that its stronger brand outweighs the more pleasant taste of the other drink.

G

"People form many unconscious attitudes that are obviously beyond traditional methods that utilise introspection," says Steven Quartz, a neuroscientist at Caltech who is collaborating with Lieberman Research. With over \$100 billion spent each year on marketing in America alone, any firm that can more accurately analyse how customers respond to products, brands and advertising could make a fortune.

H

Consumer advocates are wary. Gary Ruskin of Commercial Alert, a lobby group, thinks existing marketing techniques are powerful enough. "Already, marketing is deeply implicated in many serious pathologies," he says. "That is especially true of children, who are suffering from an epidemic of marketing-related diseases, including obesity and type-2 diabetes. Neuromarketing is a tool to amplify these trends."

I

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Dr Quartz counters that neuromarketing techniques could equally be used for benign purposes. "There are ways to utilise these technologies to create more responsible advertising," he says. Brain-scanning could, for

example, be used to determine when people are capable of making free choices, to ensure that advertising falls within those bounds.

J

Another worry is that brain-scanning is an invasion of privacy and that information on the preferences of specific individuals will be misused. But neuromarketing studies rely on small numbers of volunteer subjects, so that seems implausible. Critics also object to the use of medical equipment for frivolous rather than medical purposes. But as Tim Ambler, a neuromarketing researcher at the London Business School, says: 'A tool is a tool, and if the owner of the tool gets a decent rent for hiring it out, then that subsidises the cost of the equipment, and everybody wins.' Perhaps more brain-scanning will some day explain why some people like the idea of neuromarketing, but others do not.

Questions 14-19

Reading Passage 2 has ten paragraphs A-J

Choose the correct heading for Paragraphs B-G from the list of headings below.

Write the correct number (i-x) in boxes **14-19** on your answer sheet.

List of headings

- i** A description of the procedure
- ii** An international research project
- iii** An experiment to investigate consumer responses
- iv** Marketing an alternative name
- v** A misleading name
- vi** A potentially profitable line of research
- vii** Medical dangers of the technique
- viii** Drawbacks to marketing tools
- ix** Broadening applications
- x** What is neuromarketing?

Example: Paragraph A X

- 14. Paragraph B
- 15. Paragraph C
- 16. Paragraph D
- 17. Paragraph E
- 18. Paragraph F
- 19. Paragraph G

Questions 20-22

Look at the following people (Questions 20-22) and the list of opinions below.

Match each person with the opinion credited to him.

Write the correct letter **A-F** in boxes **20-22** on your answer sheet.

- 20.** Steven Quartz WWW.THEIELTSHUB.COM
- 21.** Gary Ruskin
- 22.** Tim Ambler

List of opinions

- A.** Neuromarketing could be used to contribute towards the cost of medical technology.
- B.** Neuromarketing could use introspection as a tool in marketing research.
- C.** Neuromarketing could be a means of treating medical problems.
- D.** Neuromarketing could make an existing problem worse.
- E.** Neuromarketing could lead to the misuse of medical equipment.
- F.** Neuromarketing could be used to prevent the exploitation of consumers.

Questions 23-26

Complete the summary below using words from the passage.

Choose **ONE WORD ONLY** from the passage for each answer.

Write your answers in boxes **23-26** on your answer sheet.

Neuromarketing can provide valuable information on attitudes to particular **23** It may be more reliable than surveys, where people can be **24** or focus groups, where they may be influenced by others. It also allows researchers to identify the subject's **25** thought patterns. However, some people are concerned that it could lead to problems such as an increase in disease among **26**

Section 3

The accidental rainforest

According to ecological theory, rainforests are supposed to develop slowly over millions of years. But now ecologists are being forced to reconsider their ideas

When Peter Osbeck, a Swedish priest, stopped off at the mid-Atlantic island of Ascension in 1752 on his way home from China, he wrote of 'a heap of ruinous rocks' with a bare, white mountain in the middle. All it boasted was a couple of dozen species of plant, most of them ferns and some of them unique to the island.

And so it might have remained. But in 1843 British plant collector Joseph Hooker made a brief call on his return from Antarctica. Surveying the bare earth, he concluded that the island had suffered some natural calamity that had denuded it of vegetation and triggered a decline in rainfall that was turning the place into a desert. The British Navy, which by then maintained a garrison on the island, was keen to improve the place and asked Hooker's advice. He suggested an ambitious scheme for planting trees and shrubs that would revive rainfall and stimulate a wider ecological recovery. And, perhaps lacking anything else to do, the sailors set to with a will.

In 1845, a naval transport ship from Argentina delivered a batch of seedlings. In the following years, more than 200 species of plant arrived from South Africa, from England came 700 packets of seeds, including those of two species that especially liked the place: bamboo and prickly pear. With sailors planting several thousand trees a year, the bare white mountain was soon cloaked in green and renamed Green Mountain, and by the early twentieth century, the mountain's slopes were covered with a variety of trees and shrubs from all over the world.

Modern ecologists throw up their hands in horror at what they see as Hooker's environmental anarchy. The exotic species wrecked the indigenous ecosystem, squeezing out the island's endemic plants. In fact, Hooker knew well enough what might happen. However, he saw greater benefit in improving rainfall and encouraging more prolific vegetation on the island. WWW.THEIELTSHUB.COM

But there is a much deeper issue here than the relative benefits of sparse

endemic species versus luxuriant imported ones. And as botanist David Wilkinson of Liverpool John Moores University in the UK pointed out after a recent visit to the island, it goes to the heart of some of the most dearly held tenets of ecology. Conservationists' understandable concern for the fate of Ascension's handful of unique species has, he says, blinded them to something quite astonishing the fact that the introduced species have been a roaring success.

Today's Green Mountain, says Wilkinson, is 'a fully functioning man-made tropical cloud forest' that has grown from scratch from a ragbag of species collected more or less at random from all over the planet. But how could it have happened? Conventional ecological theory says that complex ecosystems such as cloud forests can emerge only through evolutionary processes in which each organism develops in concert with others to fill particular niches. Plants eco-evolve with their pollinators and seed dispersers, while microbes in the soil evolve to deal with the leaf litter.

But that's not what happened on Green Mountain. And the experience suggests that perhaps natural rainforests are constructed far more by chance than by evolution. Species, say some ecologists, don't so much evolve to create ecosystems as make the best of what they have. 'The Green Mountain system is a man-made system that has produced a tropical rainforest without any co-evolution between its constituent species,' says Wilkinson.

Not everyone agrees. Alan Gray, an ecologist at the University of Edinburgh in the UK. argues that the surviving endemic species on Green Mountain, though small in number, may still form the framework of the new' ecosystem. The new arrivals may just be an adornment, with little structural importance for the ecosystem. WWW.THEIELTSHUB.COM

But to Wilkinson, this sounds like clutching at straws. And the idea of the instant formation of rainforests sounds increasingly plausible as research reveals that supposedly pristine tropical rainforests from the Amazon to south-east Asia may in places be little more titan the overgrown gardens of past rainforest civilisations.

The most surprising thing of all is that no ecologists have thought to

conduct proper research into this human-made rainforest ecosystem. A survey of the island's flora conducted six years ago by the University of Edinburgh was concerned only with endemic species. They characterised everything else as a threat. And the Ascension authorities are currently turning Green Mountain into a national park where introduced species, at least the invasive ones, are earmarked for culling rather than conservation.

Conservationists have understandable concerns, Wilkinson says. At least four endemic species have gone extinct on Ascension since the exotics started arriving. But in their urgency to protect endemics, ecologists are missing out on the study of a great enigma.

'As you walk through the forest, you see lots of leaves that have had chunks taken out of them by various insects. There are caterpillars and beetles around.' says Wilkinson. 'But where did they come from? Are they endemic or alien? If alien, did they come with the plant on which they feed or discover it on arrival?' Such questions go to the heart of how-rainforests happen.

The Green Mountain forest holds many secrets. And the irony is that the most artificial rainforest in the world could tell us more about rainforest ecology than any number of natural forests.

Questions 27-32

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

In boxes **27-32** 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. When Peter Osbeck visited Ascension, he found no inhabitants on the island.

28. The natural vegetation on the island contained some species which were found nowhere else.

29. Joseph Hooker assumed that human activity had caused the decline in the island's plant life.

30. British sailors on the island took part in a major tree planting project.

31. Hooker sent details of his planting scheme to a number of different countries.

32. The bamboo and prickly pear seeds sent from England were unsuitable for Ascension. WWW.THEIELTSHUB.COM

Questions 33-37

Complete each sentence with the correct ending A-G from the box below. Write the correct letter **A-G** in boxes **33-37** on your answer sheet.

33. The reason for modern conservationists' concern over Hooker's tree planting programme is that

34. David Wilkinson says the creation of the rainforest in Ascension is important because it shows that

35. Wilkinson says the existence of Ascension's rainforest challenges the theory that

36. Alan Gray questions Wilkinson's theory, claiming that

37. Additional support for Wilkinson's theory comes from findings that

- A.** other rainforests may have originally been planted by man.
- B.** many of the island's original species were threatened with destruction.
- C.** the species in the original rainforest were more successful than the newer arrivals.
- D.** rainforests can only develop through a process of slow and complex evolution.
- E.** steps should be taken to prevent the destruction of the original ecosystem.
- F.** randomly introduced species can coexist together.
- G.** the introduced species may have less ecological significance than the original ones.

Questions 38-40

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

Write your answers in boxes **38-40** on your answer sheet.

38. Wilkinson suggests that conservationists' concern about the island is misguided because

- A. it is based on economic rather than environmental principles.
- B. it is not focusing on the most important question.
- C. it is encouraging the destruction of endemic species.
- D. it is not supported by the local authorities. WWW.THEIELTSHUB.COM

39. According to Wilkinson, studies of insects on the island could demonstrate

- A. the possibility of new ecological relationships.
- B. a future threat to the ecosystem of the island.
- C. the existence of previously unknown species.
- D. a chance for the survival of rainforest ecology.

40. Overall, what feature of the Ascension rainforest does the writer stress?

- A. the conflict of natural and artificial systems
- B. the unusual nature of its ecological structure
- C. the harm done by interfering with nature
- D. the speed and success of its development

Answer:

1. B
2. D
3. A
4. C
5. A
6. ceiling vents
7. (the) (brick) chimneys
8. cement arches
9. (the) big fans
10. (the) (small) heaters
11. 12. & 13. A, D, E [in any order]
14. v
15. i
16. ix
17. viii
18. iii
19. vi
20. F
21. D
22. A
23. brands
24. untruthful
25. unconscious
26. Children
27. NOT GIVEN
28. TRUE
29. FALSE
30. TRUE
31. NOT GIVEN
32. FALSE
33. B
34. F
35. D
36. G
37. A
38. B
39. A
40. D

