Passage 1. The robots are coming - or are they?

Can robots advance so far that they become the ultimate threat to our existence? Some scientists say no, and dismiss the very idea of Artificial Intelligence. The human brain, they argue, is the most complicated system ever created, and any machine designed to reproduce human thought is bound to fail. Physicist Roger Penrose of Oxford University and others believe that machines are physically incapable of human thought. Colin McGinn of Rutgers University backs this up when he says that Artificial Intelligence 'is like sheep trying to do complicated psychoanalysis. They just don't have the conceptual equipment they need in their limited brains.'

Artificial Intelligence, or AI, is different from most technologies in that scientists still understand very little about how intelligence works. Physicists have a good understanding of Newtonian mechanics and the quantum theory of atoms and molecules, whereas the basic laws of intelligence remain a mystery. But a sizeable number of mathematicians and computer scientists, who are specialists in the area, are optimistic about the possibilities. To them it is only a matter of time before a thinking machine walks out of the laboratory. Over the years, various problems have impeded all efforts to create robots. To attack these difficulties, researchers tried to use the 'top-down approach', using a computer in an attempt to program all the essential rules onto a single disc. By inserting this into a machine, it would then become self-aware and attain a human-like intelligence.

In the 1950s and 1960s great progress was made, but the shortcomings of these prototype robots soon became clear. They were huge and took hours to navigate across a room. Meanwhile, a fruit fly, with a brain containing only a fraction of the computing power, can effortlessly navigate in three dimensions. Our brains, like the fruit fly's, unconsciously recognise what we see by performing countless calculations. This unconscious awareness of patterns is exactly what computers are missing. The second problem is robots' lack of common sense. Humans know that water is wet and that mothers are older than their daughters. But there is no mathematics that can express these truths. Children learn the intuitive laws of biology and physics by interacting with the real world. Robots know only what has been programmed into them.

Because of the limitations of the top-down approach to Artificial Intelligence, attempts have been made to use a 'bottom-up' approach instead - that is, to try to imitate evolution and the way a baby learns. Rodney Brooks was the director of MIT's Artificial Intelligence laboratory, famous for its lumbering 'top-down' walking robots. He changed the course of research when he explored the unorthodox idea of tiny 'insectoid' robots that learned to walk by bumping into things instead of computing mathematically the precise position of their feet. Today many of the descendants of Brooks' insectoid boots are on Mars gathering data for NASA (the National Aeronautics and Space Administration), running across the dusty landscape of the planet. For all their successes, in mimicking the behaviour of insects, however, robots using neural networks have performed miserably when their programmers have tried to duplicate in them the behaviour of higher organisms such as mammals. MIT's Marvin Minsky summarises the problems of AI: 'The history of AI is sort of funny because the first real accomplishment were beautiful things, like a machine that could do well in a maths course. But then we started to try to make machines that could answer questions about simple children's stories. There's no machine today that can do that.'

There are people who believe that eventually there will be a combination between the top-down and bottom-up, which may provide the key to Artificial Intelligence. As adults, we blend the two approaches. It has been suggested that our emotions represent the quality that most distinguishes us as human, that it is impossible for machines ever to have emotions. Computer expert Hans Moravec thinks that in the future robots will be programmed with emotions such as fear to protect themselves so that they can signal to humans when their batteries are running low, for example. Emotions are vital in decision-making. People who have suffered a certain kind of brain injury lose the ability to experience emotions and become unable to make decisions. Without emotions to guide them, they debate endlessly over their options. Moravec points out that as robots become more intelligent and are able to make choices, they could likewise become paralysed with indecision. To aid them, robots of the future might need to have emotions hardwired into their brains.

There is no universal consensus as to whether machines can be conscious, or even, in human terms, what consciousness means. Minsky suggests the thinking process in our brain is not localised but spread out, with different centres competing with one another at any given time. Consciousness may then be viewed as a sequence of thoughts and images issuing from these different, smaller 'minds', each one competing for our attention. Robots might eventually attain a 'silicon consciousness'. Robots, in fact, might one day embody an architecture for thinking and processing information that is different from ours - but also indistinguishable. If that happens, the question of whether they really 'understand' becomes largely irrelevant. A robot that has perfect mastery of syntax, for all practical purposes, understands what is being said.

Passage 2. Light Pollution is a threat to Wildlife, Safety and the Starry Sky

After hours of driving south in the pitch-black darkness of the Nevada desert, a dome of hazy gold suddenly appears on the horizon. Soon, a road sign confirms the obvious: Las Vegas 30 miles. Looking skyward, you notice that the Big Dipper is harder to find than it was an hour ago.

Light pollution—the artificial light that illuminates more than its intended target area—has become a problem of increasing concern across the country over the past 15 years. In the suburbs, where over-lit shopping mall parking lots are the norm, only 200 of the Milky Way's 2,500 stars are visible on a clear night. Even fewer can be seen from large cities. In almost every town, big and small, street lights beam just as much light up and out as they do down, illuminating much more than just the street. Almost 50 percent of the light emanating from streetlamps misses its intended target, and billboards, shopping centres, private homes and skyscrapers are similarly over-illuminated.

America has become so bright that in a satellite image of the United States at night, the outline of the country is visible from its lights alone. The major cities are all there, in bright clusters: New York, Boston, Miami, Houston, Los Angeles, Seattle, Chicago, and, of course, Las Vegas. Mark Adams, superintendent of the McDonald Observatory in west Texas, says that the very fact that city lights are visible from on high is proof of their wastefulness. "When you're up in an airplane, all that light you see on the ground from the city is wasted. It's going up into the night sky. That's why you can see it."

But don't we need all those lights to ensure our safety? The answer from light engineers, light pollution control advocates and astronomers is an emphatic "no." Elizabeth Alvarez of the International Dark Sky Association (IDA), a non-profit organization in Tucson, Arizona, says that overly bright security lights can actually force neighbours to close the shutters, which means that if any criminal activity does occur on the street, no one will see it. And the old assumption that bright lights deter crime appears to have been a false one: A new Department of Justice report concludes that there is no documented correlation between the level of lighting and the level of crime in an area. And contrary to popular belief, more crimes occur in broad daylight than at night.

For drivers, light can actually create a safety hazard. Glaring lights can temporarily blind drivers, increasing the likelihood of an accident. To help prevent such accidents, some cities and states prohibit the use of lights that impair night-time vision. For instance, New Hampshire law forbids the use of "any light along a highway so positioned as to blind or dazzle the vision of travellers on the adjacent highway."

Badly designed lighting can pose a threat to wildlife as well as people. Newly hatched turtles in Florida move toward beach lights instead of the more muted silver shimmer of the ocean. Migrating birds, confused by lights on skyscrapers, broadcast towers and lighthouses, are injured, sometimes fatally, after colliding with high, lighted structures. And light pollution harms air quality as well: Because most of the country's power plants are still powered by fossil fuels, more light means more air pollution.

So what can be done? Tucson, Arizona is taking back the night. The city has one of the best lighting ordinances in the country, and, not coincidentally, the highest concentration of observatories in the world. Kitt Peak National Optical Astronomy Observatory has 24 telescopes aimed skyward around the city's perimeter, and its cadre of astronomers needs a dark sky to work with.

For a while, that darkness was threatened. "We were totally losing the night sky," Jim Singleton of Tucson's Lighting Committee told Tulsa, Oklahoma's KOTV last March. Now, after retrofitting inefficient mercury lighting with low-sodium lights that block light from "trespassing" into unwanted areas like bedroom windows, and by doing away with some unnecessary lights altogether, the city is softly glowing rather than brightly beaming. The same thing is happening in a handful of other states, including Texas, which just passed a light pollution bill last summer. "Astronomers can get what they need at the same time that citizens get what they need: safety, security and good visibility at night," says McDonald Observatory's Mark Adams, who provided testimony at the hearings for the bill.

And in the long run, everyone benefits from reduced energy costs. Wasted energy from inefficient lighting costs us between $1 and $2 billion a year, according to IDA. The city of San Diego, which installed new, high-efficiency street lights after passing a light pollution law in 1985, now saves about $3 million a year in energy costs.

Legislation isn't the only answer to light pollution problems. Brian Greer, Central Ohio representative for the Ohio Light Pollution Advisory Council, says that education is just as important, if not more so. "There are some special situations where regulation is the only fix," he says. "But the vast majority of bad lighting is simply the result of not knowing any better." Simple actions like replacing old bulbs and fixtures with more efficient and better-designed ones

can make a big difference in preserving the night sky.

Passage 3. Television Addiction

The term "TV addiction" is imprecise, but it captures the essence of a very real phenomenon. Psychologists formally define addiction as a disorder characterized by criteria that include spending a great deal of time using the thing; using it more often than one intends; thinking about reducing use or making repeated unsuccessful efforts to reduce use; giving up important activities to use it; and reporting withdrawal symptoms when one stops using it.

All these criteria can apply to people who watch a lot of television. That does not mean that watching television, in itself, is problematic. Television can teach and amuse; it can be highly artistic; it can provide much needed distraction and escape. The difficulty arises when people strongly sense that they ought not to watch as much as they do and yet find they are unable to reduce their viewing. Some knowledge of how television becomes so addictive may help heavy viewers gain better control over their lives.

The amount of time people spend watching television is astonishing. On average, individuals in the industrialized world devote three hours a day to the activity – fully half of their leisure time, and more than on any single activity except work and sleep. At this rate, someone who lives to 75 would spend nine years in front of the television. Possibly, this devotion means simply that people enjoy TV and make a conscious decision to watch it. But if that is the whole story, why do so many people worry about how much they view? In surveys in 1992 and 1999, two out of five adults and seven out of ten teenagers said they spent too much time watching TV. Other surveys have consistently shown that roughly ten per cent of adults call themselves TV addicts.

To study people’s reactions to TV, researchers have undertaken laboratory experiments in which they have monitored the brain waves, skin resistance or heart rate of people watching television. To study behavior and emotion in the normal course of life, as opposed to the artificial conditions of the laboratory, we have used the Experience Sampling Method (ESM). Participants carried a beeper*, and we signaled them six to eight times a day, at random, over the period of a week; whenever they heard the beep, they wrote down what they were doing and how they were feeling.

As one might expect, people who were watching TV when we beeped them reported feeling relaxed and passive. The EEG studies similarly show less mental stimulation, as measured by alpha brain-wave production, during viewing than during reading.

What is more surprising is that the sense of relaxation ends when the set is turned off, but the feelings of passivity and lowered alertness continue. Survey participants commonly reflect that television has somehow absorbed or sucked out their energy, leaving them depleted. They say they have more difficulty concentrating after viewing than before. In contrast, they rarely indicate such difficulty after reading. After playing sports or engaging in hobbies, people report improvements in mood. After watching TV, people's moods are about the same or worse than before.

Within moments of sitting or lying down and pushing the "power" button, viewers report feeling more relaxed. Because the relaxation occurs quickly, people are conditioned to associate viewing with rest and lack of tension. The association is positively reinforced because viewers remain relaxed throughout viewing.

Thus, the irony of TV: people watch a great deal longer than they plan to, even though prolonged viewing is less rewarding. In our ESM studies the longer people sat in front of the set, the less satisfaction they said they derived from it. When signaled, heavy viewers (those who consistently watch more than four hours a day) tended to report on their ESM sheets that they enjoy TV less than light viewers did (less than two hours a day). For some, a twinge of unease or guilt that they aren't doing something more productive may also accompany and depreciate the enjoyment of prolonged viewing. Researchers in Japan, the U.K. and the U.S. have found that this guilt occurs much more among middle-class viewers than among less affluent ones.

The orienting response is an instinctive reaction to any sudden or new, such as movement or possible attack by a predator. Typical orienting reactions include the following the arteries to the brain grow wider allowing more blood to reach it, the heart slows down and arteries to the large muscles become narrower so as to reduce blood supply to them. Brain waves are also interrupted for a few seconds. These changes allow the brain to focus its attention on gathering more information and becoming more alert while the rest of the body becomes quieter.

Passage 4. The US City and the Natural Environment

While cities and their metropolitan areas have always interacted with and shaped the natural environment, it is only recently that historians have begun to consider this relationship. During our own time, the tension between natural and urbanized areas has increased, as the spread of metropolitan populations and urban land uses has reshaped and destroyed natural landscapes and environments.

The relationship between the city and the natural environment has been circular, with cities having massive effects on the natural environment, while the natural environment, in turn, has profoundly shaped urban configurations. Urban history is filled with stories about how city dwellers contended with the forces of nature that threatened their lives. Nature not only caused many of the annoyances of daily urban life, such as bad weather and pests, but it also gave rise to natural disasters and catastrophes such as floods, fires, and earthquakes. In order to protect themselves and their settlements against the forces of nature, cities built many defences including flood walls and dams, earthquake-resistant buildings, and storage places for food and water. At times, such protective steps sheltered urbanites against the worst natural furies, but often their own actions – such as building under the shadow of volcanoes, or in earthquake-prone zones – exposed them to danger from natural hazards.

City populations require food, water, fuel, and construction materials, while urban industries need natural materials for production purposes. In order to fulfill these needs, urbanites increasingly had to reach far beyond their boundaries. In the nineteenth century, for instance, the demands of city

dwellers for food produced rings of garden farms around cities. In the twentieth century, as urban populations increased, the demand for food drove the rise of large factory farms. Cities also require fresh water supplies in order to exist – engineers built waterworks, dug wells deeper and deeper into the earth looking for groundwater, and dammed and diverted rivers to obtain water supplies for domestic and industrial uses. In the process of obtaining water from distant locales, cities often transformed them, making deserts where there had been fertile agricultural areas.

Urbanites had to seek locations to dispose of the wastes they produced. Initially, they placed wastes on sites within the city, polluting the air, land, and water with industrial and domestic effluents. As cities grew larger, they disposed of their wastes by transporting them to more distant locations. Thus, cities constructed sewerage systems for domestic wastes. They usually discharged the sewage into neighbouring waterways, often polluting the water supply of downstream cities.

The air and the land also became dumps for waste disposal. In the late nineteenth century, coal became the preferred fuel for industrial, transportation, and domestic use. But while providing an inexpensive and plentiful energy supply, coal was also very dirty. The cities that used it suffered from air contamination and reduced sunlight, while the cleaning tasks of householders were greatly increased.

In the late nineteenth and early twentieth centuries, reformers began demanding urban environmental cleanups and public health improvements. Women's groups often took the lead in agitating for clean air and clean water, showing a greater concern than men in regard to quality of life and health-related issues. The replacement of the horse, first by electric trolleys and then by the car, brought about substantial improvements in street and air sanitation. The movements demanding clean air, however, and reduction of waterway pollution were largely unsuccessful. On balance, urban sanitary conditions were probably somewhat better in the 1920s than in the late nineteenth century, but the cost of improvement often was the exploitation of urban hinterlands for water supplies, increased downstream water pollution, and growing automobile congestion and pollution.

In the decades after the 1940s, city environments suffered from heavy pollution as they sought to cope with increased automobile usage, pollution from industrial production, new varieties of chemical pesticides and the wastes of an increasingly consumer-oriented economy. Cleaner fuels and smoke control laws largely freed cities during the 1940s and 1950s of the dense smoke that they had previously suffered from. Improved urban air quality resulted largely from the substitution of natural gas and oil for coal and the replacement of the steam locomotive by the diesel-electric. However, great increases in automobile usage in some larger cities produced the new phenomenon of smog, and air pollution replaced smoke as a major concern.

During these decades, the suburban out-migration, which had begun in the nineteenth century with commuter trains and streetcars and accelerated because of the availability and convenience of the automobile, now increased to a torrent, putting major strains on the formerly rural and undeveloped metropolitan fringes. To a great extent, suburban layouts ignored environmental considerations, making little provision for open space, producing endless rows of resource-consuming and fertilizer-dependent lawns, contaminating groundwater through leaking septic tanks, and absorbing excessive amounts of fresh water and energy. The growth of the outer city since the 1970s reflected a continued preference on the part of many people in the western world for space-

intensive single-family houses surrounded by lawns, for private automobiles over public transit, and for the development of previously untouched areas. Without better planning for land use and environmental protection, urban life will, as it has in the past, continue to damage and stress the natural environment.

Passage 5. Investigating Children's Language

For over 200 years, there has been an interest in the way children learn to speak and understand their first language. Scholars carried out several small-scale studies, especially towards the end of the 19th century, using data they recorded in parental diaries. But detailed, systematic investigation did not begin until the middle decades of the 20th century, when the tape recorder came into routine use. This made it possible to keep a permanent record of samples of child speech, so that analysts could listen repeatedly to obscure extracts, and thus produce a detailed and accurate description. Since then, the subject has attracted enormous multi-disciplinary interest, notably from linguists and psychologists, who have used a variety of observational and experimental techniques to study the process of language acquisition in depth.

Central to the success of this rapidly emerging field lies the ability of researchers to devise satisfactory methods for eliciting linguistic data from children. The problems that have to be faced are quite different from those encountered when working with adults. Many of the linguist's routine techniques of enquiry cannot be used with children. It is not possible to carry out certain kinds of experiments, because aspects of children's cognitive development – such as their ability to pay attention, or to remember instructions – may not be sufficiently advanced. Nor is it easy to get children to make systematic judgments about language, a task that is virtually impossible below the age of three. And anyone who has tried to obtain even the most basic kind of data – a tape recording of a representative sample of a child's speech – knows how frustrating this can be. Some children, it seems, are innately programmed to switch off as soon as they notice a tape recorder being switched on.

Since the 1960s, however, several sophisticated recording techniques and experimental designs have been devised. Children can be observed and recorded through one-way-vision windows or using radio microphones, so that the effects of having an investigator in the same room as the child can be eliminated. Large-scale sampling programmes have been carried out, with children sometimes being recorded for several years. Particular attention has been paid to devising experimental techniques that fall well within a child's intellectual level and social experience. Even pre-linguistic infants have been brought into the research: acoustic techniques are used to analyse their vocalisations, and their ability to perceive the world around them is monitored using special recording equipment. The result has been a growing body of reliable data on the stages of language acquisition from birth until puberty.

There is no single way of studying children's language. Linguistics and psychology have each brought their own approach to the subject, and many variations have been introduced to cope with the variety of activities in which children engage, and the great age range that they present. Two main research paradigms are found.

One of these is known as ‘naturalistic sampling’. A sample of a child’s spontaneous use of language is recorded in familiar and comfortable surroundings. One of the best places to make the recording is in the child’s own home, but it is not always easy to maintain good acoustic quality, and the presence of the researcher or the recording equipment can be a distraction (especially if the proceedings are being filmed). Alternatively, the recording can be made in a research centre, where the child is allowed to play freely with toys while talking to parents or other children, and the observers and their equipment are unobtrusive.

A good quality, representative, naturalistic sample is generally considered an ideal datum for child language study. However, the method has several limitations. These samples are informative about speech production, but they give little guidance about children’s comprehension of what they hear around them. Moreover, samples cannot contain everything, and they can easily miss some important features of a child’s linguistic ability. They may also not provide enough instances of a developing feature to enable the analyst to make a decision about the way the child is learning. For such reasons, the description of samples of child speech has to be supplemented by other methods.

The other main approach is through experimentation, and the methods of experimental psychology have been widely applied to child language research. The investigator formulates a specific hypothesis about children’s ability to use or understand an aspect of language, and devises a relevant task for a group of subjects to undertake. A statistical analysis is made of the subjects’ behaviour, and the results provide evidence that supports or falsifies the original hypothesis.

Using this approach, as well as other methods of controlled observation, researchers have come up with many detailed findings about the production and comprehension of groups of children. However, it is not easy to generalise the findings of these studies. What may obtain in a carefully controlled setting may not apply in the rush of daily interaction. Different kinds of subjects, experimental situations, and statistical procedures may produce different results or interpretations. Experimental research is therefore a slow, painstaking business; it may take years before researchers are convinced that all variables have been considered and a finding is genuine.

Passage 6. Is Science Dangerous?

The idea that scientific knowledge is dangerous is deeply embedded in our culture. Adam and Eve were forbidden to eat from the Tree of Knowledge, and in Milton's Paradise Lost the serpent addresses the tree as the 'Mother of Science'. Indeed the whole of western literature has not been kind to scientists and is filled with images of them meddling with nature with disastrous results. Just consider Shelley's Frankenstein, Goethe's Faust and Huxley's Brave New World. One will search with very little success for a novel in which scientists come out well - the persistent image is that of scientists as a soulless group unconcerned with ethical issues. And where is there a film sympathetic to science?

Part of the problem is the conflation of science and technology. The distinction between science and technology, between knowledge and understanding on the one hand and the application of that knowledge to making something, or using it in some practical way, is fundamental.

Science produces ideas about how the world works, whereas the ideas in technology result in usable objects. Technology is much older than anything one could regard as science and unaided by any science. Technology gave rise to the crafts of early humans, like agriculture and metalworking. It is technology that carries with it ethical issues, from motorcar production to cloning a human.

By contrast, reliable scientific knowledge is value-free and has no moral or ethical value. Science merely tells us how the world is. That we are not at the centre of the universe is neither good nor bad, nor is the possibility that genes can influence our intelligence or our behaviour.

The social obligations that scientists have as distinct from those responsibilities they share with all citizens comes from them having access to specialised knowledge of how the world works, not easily accessible to others. Their obligation is to both make public any social implications of their work and its possible applications and to give some assessment of its reliability.

It is not easy to find examples of scientists as a group behaving immorally or in a dangerous manner, the classic paradigm being the eugenics movement. The scientific assumptions behind this proposal are crucial; the assumption is that most desirable and undesirable human attributes are inherited. Not only was talent perceived of

as being inherited, but so too were insanity and any kind of so-called feeblemindedness. They completely failed to give an assessment of the reliability of their ideas. Quite the contrary, and even more blameworthy, their conclusions seem to have been driven by what they saw as the desirable social implications. By contrast, in relation to the building of the atomic bomb, scientists behaved morally and fulfilled their social obligations by informing their governments about the implications of atomic theory. It was an enormous engineering feat to build the bomb but the decision to do this was taken by politicians, not scientists.

The moralists have been out in force telling us of the horrors of cloning. Many others, national leaders included, have joined in a chorus of horror. But what horrors? What ethical issues? In all the righteous indignation not a single relevant new ethical issue has been spelled out.

Those who propose to clone a human are medical technologists not scientists. It is not, as the bio-moralists claim, that scientific innovation has outstripped our social and moral codes. Just the opposite is the case. Their obsession with the life of the embryo has deflected our attention away from the real issue, which is how children are raised and nurtured. The ills in our society have nothing to do with assisting or preventing reproduction but are profoundly affected by how children are treated.

So what danger does genetics pose? Gene therapy, introducing genes to cure a genetic disease like cystic fibrosis, carries risks, as do all new medical treatments. There may well be problems with the testing of new treatments, but are these difficulties any different from those related to trying out new drugs for AIDS? Anxieties about creating designer babies are at present premature as it is too risky, and we may have, in the first instance, to accept what has been called procreative autonomy, a couple's right to control their own role in reproduction unless the state has a compelling reason for denying them that control. Should the ethical issues relating to the applications of genetics, for example, lead to stopping research in this field? The individual

scientist cannot decide, for science, like genetics, is a collective activity with no single individual controlling the process of discovery. It is ethically unacceptable and impractical to censor any aspect of trying to understand the nature of our world.

Passage 7. The Truth About ART

Modern art has had something of a bad press recently - or, to be more precise, it has always had a bad press in certain newspapers and amongst certain sectors of the public. In the public mind, it seems, art (that is, graphic art - pictures - and spatial art - sculpture) is divided into two broad categories. The first is 'classic' art, by which is meant representational painting, drawing and sculpture; the second is 'modern' art, also known as abstract or non-representational. British popular taste runs decidedly in favour of the former, if one believes a recent survey conducted by Charlie Moore, owner of the Loft Gallery and Workshops in Kent, and one of Britain's most influential artistic commentators. He found that the man (or woman) in the street has a distrust of cubism, abstracts, sculptures made of bricks and all types of so-called 'found' art, He likes Turner and Constable, the great representatives of British watercolour and oil painting respectively, or the French Impressionists, and his taste for statues is limited to the realistic figures of the great and good that litter the British landscape - Robin Hood in Nottingham and Oliver Cromwell outside the Houses of Parliament. This everyman does not believe in primary colours, abstraction and geometry in nature - the most common comment is that such-and-such a painting is "something a child could have done".

Lewis Williams, director of the Beaconsfield Galleries in Hampshire, which specialises in modern painting, agrees. "Look around you at what art is available every day," he says. "Our great museums and galleries specialise in work which is designed to appeal to the lowest common denominator. It may be representational, it may be 'realistic' in one sense, but a lot of it wouldn't make it into the great European galleries. Britain has had maybe two or three major world painters in the last 1000 years, so we make up the space with a lot of second-rate material."

Williams believes that our ignorance of what modern art is has been caused by this lack of exposure to truly great art. He compares the experience of the average British city-dweller with that of a citizen of Italy, France or Spain.

"Of course, we don't appreciate any kind of art in the same way because of the paucity of good art in Britain. We don't have galleries of the quality of those in Madrid, Paris, Versailles, Florence, New York or even some places in Russia. We distrust good art - by which I mean both modern and traditional artistic forms - because we don't have enough of it to learn about it. In other countries, people are surrounded by it from birth. Indeed they take it as a birthright, and are proud of it. The British tend to be suspicious of it. It's not valued here."

Not everyone agrees. Emily Cope, who runs the Osborne Art House, believes that while the British do not have the same history of artistic experience as many European countries, their senses are as finely attuned to art as anyone else's.

"Look at what sells - in the great art auction houses, in greetings cards, in posters. Look at what's going on in local amateur art classes up and down the country. Of course, the British are not the same as other countries, but that's true of all nationalities. The French artistic experience and

outlook is not the same as the Italian. In Britain, we have artistic influences from all over the world. There's the Irish, Welsh, and Scottish influences, as well as Caribbean, African and European. We also have strong links with the Far East, in particular the Indian subcontinent. All these influences come to bear in creating a British artistic outlook. There's this tendency to say that British people only want garish pictures of clowns crying or ships sailing into battle, and that anything new or different is misunderstood. That's not my experience at all. The British public is poorly educated in art, but that's not the same as being uninterested in it."

Cope points to Britain's long tradition of visionary artists such as William Blake, the London engraver and poet who died in 1827. Artists like Blake tended to be one-offs rather than members of a school, and their work is diverse and often word-based so it is difficult to export.

Perhaps, as ever, the truth is somewhere in between these two opinions. It is true that visits to traditional galleries like the National and the National Portrait Gallery outnumber attendance at more modern shows, but this is the case in every country except Spain, perhaps because of the influence of the two most famous non-traditional Spanish painters of the 20th century, Picasso and Dali. However, what is also true is that Britain has produced a long line of individual artists with unique, almost unclassifiable styles such as Blake, Samuel Palmer and Henry Moore.

Passage 8. Australian Aborigines Demand Return of Remains

As a former British colony, Australia has close cultural and historical links with the United Kingdom, due to the British and Irish settlers who arrived in droves in the 19th and 20th centuries. One aspect of this contact is the role of Britain, and British archaeologists and collectors, in taking Aboriginal bones, relics and artefacts from Australia to museums and collections in the UK. Now leaders of the indigenous people of Australia, the Aborigines, are demanding that any Aboriginal remains in the UK are returned to Australia.

In 19th century Britain, there was a mania for collecting all kinds of objects from other countries. These were sent home, where they were kept in museums such as the British Museum and the Natural History Museum. Museums in the UK have a huge number of such objects - objects which, say protesters, were basically stolen during Britain's long colonial history, with little or no regard for the feelings or rights of the people to whom the objects originally belonged.

Now the Australian Prime Minister is supporting Aboriginal calls for the objects and remains to be returned to their original home. A spokesman for the Aboriginal Council of New South Wales, Stevie McCoy, said: "The bones do not belong abroad. They belong here. This is about beliefs, and a traditional Aboriginal belief is that our ancestors can only find peace if their remains are buried in the homeland."

There are certainly lots of Aboriginal remains in the UK, although their exact locations are not entirely clear. What is known is that, between them, the British Museum and the Natural History Museum have some 2,000 - 2,5000 artefacts composed of human remains, although the museums point out that only about 500 of these are of Aboriginal origin. Dr William Cowell Bell, for the London Museum Association, adds that "A lot of the objects are not human remains in their original form, but are made out of human remains. These include decorated skulls and bones from

which charms and amulets have been created." A smaller number of similar artefacts are known to be held in collections in Oxford and Cambridge.

There is some sensitivity to Aboriginal demands in the archaeological world. Lady Amanda Spurway, life president of the Glover Museum in London, says that the museum has had its small collection of Aboriginal remains packed ready for return for a decade, and is only waiting for information about where they must go.

The National College of Surgeons says it will return the remains of any individual who can be named (although it is obviously difficult to put names to them after such a long time). This growing sensitivity to the hitherto ignored rights of indigenous peoples around the world has caused some relics to be restored to their original country, particularly in Scotland, where a group of Aboriginal remains has already been returned. Edinburgh University has returned skulls and bones to Tasmania and New Zealand.

One problem, according to legal expert Ewan Mather, is that the law allowing museums to decide what to do with these objects is more relaxed in Scotland. English museums, on the other hand, are not allowed (either by law or by the groups of trustees who run them) to just hand back remains of their own accord. However, British supporters of the Aborigines claim that such restrictive laws are inhumane in the modern world, and that it would be a simple enough matter to change them in order to allow the items to be returned.

A further objection to handing back relics is because of their scientific value, claim some museum directors. Dr Bell believes that the size of the collection in the Natural History Museum in Lincoln made it a very valuable resource in the analysis of the way of life of Aborigines, and could be used to study the origin and development of the people. Breaking up the collection might mean that such knowledge could be lost forever.

Aboriginal groups, however, respond by pointing out that the scientific importance of the remains has to be seen against a backdrop of human rights. "I doubt whether the British government would allow several thousand bones of British soldiers to be used for 'scientific purposes' in any other country," said Stevie McCoy, with a hint of irony. "Would the families allow it? I think there would be a public outcry, no matter how old the remains were. This practice [of taking bones and human remains] went on from the first moment the white man came to Australia right up to the early part of the 20th century. It is a scandal."

The British government, meanwhile, has announced that it will set up a working party to discuss the possibility of changes to the law. This might allow museums to negotiate on their own with Aboriginal and other groups around the world.

Passage 9. Is there more to video games than people realize?

Many people who spend a lot of time playing video games insist that they have helped them in areas like confidence-building, presentation skills and debating. Yet this way of thinking about video games can be found almost nowhere within the mainstream media, which still tend to treat games as an odd mix of the slightly menacing and the alien. This lack of awareness has become

increasingly inappropriate, as video games and the culture that surrounds them have become very big business indeed.

Recently, the British government released the Byron report into the effects of electronic media on children. Its conclusions set out a clear, rational basis for exploring the regulation of video games. The ensuing debate, however, has descended into the same old squabbling between partisan factions: the preachers of mental and moral decline, and the innovative game designers. In between are the gamers, busily buying and playing while nonsense is talked over their heads.

Susan Greenfield, renowned neuroscientist, outlines her concerns in a new book. Every individual's mind is the product of a brain that has been personalized by the sum total of their experiences; with an increasing quantity of our experiences from very early childhood taking place 'on screen' rather than in the world, there is potentially a profound shift in the way children's minds work. She suggests that the fast-paced, second-hand experiences created by video games and the Internet may inculcate a worldview that is less empathetic, more risk-taking and less contemplative than what we tend to think of as healthy.

Greenfield's prose is full of mixed metaphors and self-contradictions and is perhaps the worst enemy of her attempts to persuade. This is unfortunate, because however much technophiles may snort, she is articulating widely held fears that have a basis in fact. Unlike even their immediate antecedents, the latest electronic media are at once domestic and work-related, their mobility blurring the boundaries between these spaces, and video games are at their forefront. A generational divide has opened that is in many ways more profound than the equivalent shifts associated with radio or television, more alienating for those unfamiliar with new' technologies, more absorbing for those who are. So how do our lawmakers regulate something that is too fluid to be fully comprehended or controlled?

Adam Martin, a lead programmer for an online games developer, says:' Computer games teach and people don't even notice they're being taught.' But isn't the kind of learning that goes on in games rather narrow? 'A large part of the addictiveness of games does come from the fact that as you play you are mastering a set of challenges. But humanity's larger understanding of the world comes primarily through communication and experimentation, through answering the question "What if?' Games excel at teaching this too.'

Steven Johnson's thesis is not that electronic games constitute a great, popular art, but that the mean level of mass culture has been demanding steadily more intellectual engagement from consumers. Games, he points out, generate satisfaction via the complexity of their virtual worlds, not by their robotic predictability. Testing the nature and limits of the laws of such imaginary worlds has more in common with scientific methods than with a pointless addiction, while the complexity of the problems children encounter within games exceeds that of anything they might find at school.

Greenfield argues that there are ways of thinking that playing video games simply cannot teach. She has a point. We should never forget, for instance, the unique ability of books to engage and expand the human imagination, and to give us the means of more fully expressing our situations in the world. Intriguingly, the video games industry is now growing in ways that have more in common with an old-fashioned world of companionable pastimes than with a cyber future of

lonely, isolated obsessives. Games in which friends and relations gather round a console to compete at activities are growing in popularity. The agenda is increasingly being set by the concerns of mainstream consumers – what they consider acceptable for their children, what they want to play at parties and across generations.

These trends embody a familiar but important truth: games are human products, and lie within our control. This doesn't mean we yet control or understand them fully, but it should remind us that there is nothing inevitable or incomprehensible about them. No matter how deeply it may be felt, instinctive fear is an inappropriate response to technology of any kind.

So far, the dire predictions many traditionalists have made about the 'death' of old-fashioned narratives and imaginative thought at the hands of video games cannot be upheld. Television and cinema may be suffering, economically, at the hands of interactive media. But literacy standards have failed to decline. Young people still enjoy sport, going out and listening to music And most research – including a recent $1.5m study funded by the US government – suggests that even pre-teens are not in the habit of blurring game worlds and real worlds.

The sheer pace and scale of the changes we face, however, leave little room for complacency. Richard Battle, a British writer and game researcher, says Times change: accept it; embrace it.' Just as, today, we have no living memories of a time before radio, we will soon live in a world in which no one living experienced growing up without computers. It is for this reason that we must try to examine what we stand to lose and gain, before it is too late.

Passage 10. Crop-growing skyscrapers

By the year 2050, nearly 80% of the Earth's population will live in urban centres. Applying the most conservative estimates to current demographic trends, the human population will increase by about three billion people by then. An estimated 10 hectares of new land (about 20% larger than Brazil) will be needed to grow enough food to feed them, if traditional farming methods continue as they are practised today. At present, throughout the world, over 80% of the land that is suitable for raising crops is in use. Historically, some 15% of that has been laid waste by poor management practices. What can be done to ensure enough food for the world's population to live on?

The concept of indoor farming is not new, since hothouse production of tomatoes and other produce has been in vogue for some time. What is new is the urgent need to scale up this technology to accommodate another three billion people. Many believe an entirely new approach to indoor farming is required, employing cutting-edge technologies. One such proposal is for the 'Vertical Farm'. The concept is of multi-storey buildings in which food crops are grown in environmentally controlled conditions. Situated in the heart of urban centres, they would drastically reduce the amount of transportation required to bring food to consumers. Vertical farms would need to be efficient, cheap to construct and safe to operate. If successfully implemented, proponents claim, vertical farms offer the promise of urban renewal, sustainable production of a safe and varied food supply (through year-round production of all crops), and the eventual repair of ecosystems that have been sacrificed for horizontal farming.

It took humans 10,000 years to learn how to grow most of the crops we now take for granted. Along the way, we despoiled most of the land we worked, often turning verdant, natural ecozones

into semi-arid deserts. Within that same time frame, we evolved into an urban species, in which 60% of the human population now lives vertically in cities. This means that, for the majority, we humans have shelter from the elements, yet we subject our food-bearing plants to the rigours of the great outdoors and can do no more than hope for a good weather year. However, more often than not now, due to a rapidly changing climate, that is not what happens. Massive floods, long droughts, hurricanes and severe monsoons take their toll each year, destroying millions of tons of valuable crops.

The supporters of vertical farming claim many potential advantages for the system. For instance, crops would be produced all year round, as they would be kept in artificially controlled, optimum growing conditions. There would be no weather-related crop failures due to droughts, floods or pests. All the food could be grown organically, eliminating the need for herbicides, pesticides and fertilisers. The system would greatly reduce the incidence of many infectious diseases that are acquired at the agricultural interface. Although the system would consume energy, it would return energy to the grid via methane generation from composting non-edible parts of plants. It would also dramatically reduce fossil fuel use, by cutting out the need for tractors, ploughs and shipping.

A major drawback of vertical farming, however, is that the plants would require artificial light. Without it, those plants nearest the windows would be exposed to more sunlight and grow more quickly, reducing the efficiency of the system. Single-storey greenhouses have the benefit of natural overhead light: even so, many still need artificial lighting. A multi-storey facility with no natural overhead light would require far more. Generating enough light could be prohibitively expensive, unless cheap, renewable energy is available, and this appears to be rather a future aspiration than a likelihood for the near future.

One variation on vertical farming that has been developed is to grow plants in stacked trays that move on rails. Moving the trays allows the plants to get enough sunlight. This system is already in operation, and works well within a single-storey greenhouse with light reaching it from above: it is not certain, however, that it can be made to work without that overhead natural light.

Vertical farming is an attempt to address the undoubted problems that we face in producing enough food for a growing population. At the moment, though, more needs to be done to reduce the detrimental impact it would have on the environment, particularly as regards the use of energy. While it is possible that much of our food will be grown in skyscrapers in future, most experts currently believe it is far more likely that we will simply use the space available on urban rooftops.