

English for Science

Unit 3: Scientific Reading and Debate

Student's File EFS 3.3

The following article is about one offshoot of scientific investigation into DNA. This is not a new phenomenon. As with many advances in science, it makes us challenge long held beliefs. Very often new scientific research and discoveries make us think hard about what we believe in. After all, for a long time people thought the earth was flat.

The article is broken up into several sections. You will be asked to answer questions along the way to help you understand the passage better.

Although this passage is much longer than anything you would be asked to read in the UE exam, being able to read and understand long and difficult texts is a very useful skill to develop if you are planning to study at university.

Student's File EFS 3.3 (cont...)

Task 1 What is it all about?

Read the article down to the bottom of the third paragraph and then answer the following questions.

1 *What is the article about?*

2 *What do the scientists referred to in the article no longer believe in?*

3 *Do you agree with the idea?*

Redefining the Human Race

Whether humans are white, black, brown or yellow, new discoveries are leading scientists to reject the notion of separate races, reports **Robert Boyd**.

Thanks to spectacular advances in molecular biology and genetics, most scientists now reject the concept of race as a valid way to divide human beings into separate groups. Contrary to widespread public opinion, researchers no longer believe that races are distinct biological categories created by differences in the genes that people inherit from their parents. Genes vary, they say, but not in ways that correspond to the popular notion of black, white, yellow, red or brown races.

"Race has no basic biological reality," said Jonathan Marks, a Yale University biologist. "The human species simply doesn't come packaged that way."

Student's File EFS 3.3 (cont...)

Now go on to read the next six paragraphs. While you are reading make a note of four words that you do not know the meaning of and feel that you really must know them to help you understand the paragraphs.

Instead, a majority of biologists and anthropologists, drawing on a growing body of evidence accumulated since the 1970s, have concluded that race is a social, cultural and political concept based largely on superficial appearances.

"In the social sense, race is a reality; in the scientific sense, it is not," said Michael Omi, a specialist in ethnic studies at the University of California in Berkeley.

Luigi Cavalli-Sforza, an eminent professor of genetics at Stanford University, agreed.

"The characteristics that we see with the naked eye that help us to distinguish individuals from different continents are, in reality, skin-deep," he said. "Whenever we look under the veneer, we find that the differences that seem so conspicuous to us are really trivial." Scientists concede that people do look different, primarily because of the varied environments in which their ancestors lived. And they agree that as a social concept, race matters a great deal.

The colour of a person's skin, the texture of his hair, or the shape of his eyes can be sources of love, pride and partnership, hatred and injustice. Indeed, the idea that races are not the product of human genes may seem to contradict common sense.

"The average citizen reacts with frank disbelief when told there is no such thing as race," said Loring Brace, an American anthropologist. "The sceptical layman will shake his head and regard this as further evidence of the innate silliness of those who call themselves intellectuals."

Now answer the following questions.

4 *What do these scientists say that "race" is a product of?*

5 *What traditionally has been used to distinguish between races?*

6 *What do these scientists think about traditional distinguishing features between races?*

Student's File EFS 3.3 (cont...)

Now read the next seven paragraphs. Notice that some of them are only one sentence long. This is not typical of paragraphs in general, but it is common in journalism.

While you are reading make a note of four words that you do not know the meaning of and feel that you really must know them to help you understand the paragraphs.

The new understanding of race draws on work in many fields.

"Vast new data in human biology, prehistory and paleontology ... have completely revamped the traditional notions," said Solomon Katz, another American anthropologist.

This is a switch from the prevailing scientific dogma of the 19th and much of the 20th century. During that period, most scientists believed that humans could be sorted into a few (usually three, four or five) inherited racial types distinguished primarily by skin colour.

As recently as 1985, American anthropologists split 50-50 when asked in a survey if they believe in the existence of separate biological races.

A dwindling number of scholars still cling to notions of gene-based racial superiority.

In his controversial 1994 book, *The Bell Curve*, Charles Murray, a political scientist, asserted that American blacks inherit lower intelligence than persons of Asian or European descent.

In response to the uproar over *The Bell Curve*, the American Anthropological Association adopted a statement declaring that "differentiating species into biologically defined 'races' has proven meaningless and unscientific as a way of explaining variation, whether in intelligence or other traits".

Now answer the following questions.

7 *In the third paragraph of this section the writer says that traditionally humans were divided up into "three, four or five inherited racial types". What do you think these were?*

8 *What do you think the fifth paragraph in this section means?*

9 *What do you think about this article so far?*

Student's File EFS 3.3 (cont...)

Now read the next five paragraphs. They contain two opposing points of view.

While you are reading make a note of four words that you do not know the meaning of and feel that you really must know them to help you understand the paragraphs.

A leading holdout is Canadian geneticist Philippe Rushton, who continues to claim that crime and violence are biologically determined tendencies.

"Among humans, three major races of Mongoloids, Caucasoids and Negroids are typically considered," Rushton wrote in the *February 1996 Journal of Current Anthropology*. "Genetic research has built a strong case for the importance of heritable factors (meaning genes) in personality, psychopathology, violent crime and other social variables."

"Rushton is dead wrong," snapped John Moore, Chairman of the Anthropology Department at the University of Florida, reflecting the majority view.

In part, the new consensus is an effort by scientists to stop the misuse of race to justify the evils of racism.

"Misconceptions about race have led to forms of racism that have caused much social, psychological and physical harm," said Katz. "These misconceptions have their origin in various papers and books that depend heavily on old and outmoded biological concepts of race."

Now answer the following questions.

10 *What is racism?*

11 *Which of the two opposing arguments above tends to support racism?*

12 *Have you, or anyone you know, ever been a victim of racist behaviour?*

Student's File EFS 3.3 (cont...)

Now read the next six paragraphs and note down four words that you need to know the meaning of in order to understand the section.

But the revised concept of race also reflects recent scientific work with DNA, the complex molecule that contains the genes in every living cell.

"We are beginning to get good data at the DNA level," said a Yale geneticist, Kenneth Kidd, who studied minute variations in the genes of people from 42 different population groups around the globe. "The DNA data support the concept that you can't draw boundaries around races."

Kidd said there is actually more genetic variation within a single African population - which can be anything from a tribe to a nation - than in all non-African peoples put together.

That is because those Africans who stayed in place gradually accumulated tiny variations in their DNA over thousands of generations. About 100,000 years ago, a few tribes emigrated to Europe, the Middle East and Asia, taking only a small subset of those genes with them. Since the migration, these travellers have not developed as many variations out of their smaller gene pool.

"Genetically, I am more similar to someone from China or the Amazon Basin than two Africans living in the same village are to each other," Kidd said.

"This substantiates the point that there is no such thing biologically as race."

Now answer the following questions.

13 *Do the DNA data indicate that there are many different races of humans?*

14 *Why is there more genetic variation in African people than in all other people?*

15 *What does this section say about a definition of race?*

Student's File EFS 3.3 (cont...)

The next section of the article is quite short. There may only be one or two words that you need to make a note of this time.

According to the current scientific consensus, physical traits such as skin colour, eye shape and susceptibility to disease vary gradually between neighbouring populations. Instead of abrupt changes, there are almost imperceptible shadings.

Only when people travel rapidly over great distances - as when slaves were brought from West Africa to America, or a Londoner jets to Tokyo - do the differences become distinct.

This is especially true in the United States, which is occupied by immigrants from widely scattered zones of Europe, Africa and Asia, as well as Native Americans who arrived at least 10,000 years ago.

Now answer the following questions.

16 *What are the similarities between someone from London flying to Tokyo today and the enforced transportation of African slaves to America during the last century?*

17 *Who, according to the article, were the first inhabitants of North America?*

18 *What does this section say about how quickly physical traits change between people living close to each other?*

Student's File EFS 3.3 (cont...)

Now read the article through to the end. You can choose up to six words from this section if you need to.

Researchers say differences in skin colour - the most common marker for race - arose from a combination of environmental pressures and random genetic mutations.

Most scientists have come to accept the evolutionary theory, based on DNA evidence, that modern humans (the species *homo sapiens*) originated in equatorial Africa about 200,000 years ago.

Our primitive ancestors' genes were programmed to produce dark skin. Their pigment protected them from the tropical sun's ultraviolet rays, which can cause cancer.

The group of Africans who later migrated north into Europe benefitted from more sunlight, rather than less, because ultraviolet rays also make vitamin D, preventing rickets and other diseases.

By a flip of the genetic dice, some of the newcomers had a variant gene that gave them slightly lighter skin.

These lucky ones tended to get more vitamins, live longer and have more children, who in turn passed the trait on to their descendants. The trend continued for generation after generation, eventually producing Anglo-Saxons, Swedes and other fair-skinned northern Europeans.

"Skin colour genes are turned off and on very quickly in evolution," Moore explained. "People can go from black to white, or white to black, in 10,000 years."

Significantly, populations who live near the Equator - in southern India, New Guinea or northern Australia - are just as dark as natives of West Africa, demonstrating that black skin depends more on environment than heredity.

The farther you go from the Equator, north or south, the paler people look.

The Bushmen of southern Africa have quite light complexions. Africans from north of the Sahara Desert resemble southern Europeans.

"From one end of this range to the other, there is no hint of a skin-colour boundary," said Brace.

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Student's File EFS 3.3 (cont...)

Now answer the following questions

19 *What is the most common thing used to distinguish between races?*

20 *What do people from southern India and northern Australia have in common with those from West Africa and New Guinea?*

21 *What reason does the writer give for the colour of people's skin in northern Europe?*

22 *How long does the article say it takes skin to go from white to black?*

23 *What are your thoughts about this article? Do you believe that there is no real need to define someone as coming from a particular race? Do you think that everyone will soon believe that there is no need for race?*

Student's File EFS 3.4

Gene-spliced beans on menu

Scientists regard genetically-altered food as a revolution, but many consumers are challenging its worth, says **Michael Durham**

They are bringing in the harvest in Missouri. On the banks of the Mississippi, a few kilometres outside St Louis, farmers began cutting hectares of soya bean last week, as they do every year. But these soya beans are different. This is gene food - the first of its kind in the world.

By late November it will be on dinner plates around the world, but few people will be aware of the fact, much less able to exercise a choice. Genetically-altered food - first soya beans and then corn, rape seed oil and sugar - are about to become a fact of life.

After years of tinkering in vast laboratories and locked greenhouses, agrochemical companies are ready to unleash their discoveries on the world: genetically changed plants and vegetables, programmed by the addition or subtraction of tiny slices of DNA to grow and behave in exactly the way scientists want them to.

Suddenly there are soya bean plants tailor-made to withstand heavy doses of herbicide, so weeds around them wither while the beans live on. There are ears of corn designed to kill any pest that takes a bite, while leaving benign insects unscathed. Already there are tomatoes that never go squashy; soon there will be potatoes that don't soak up fat in a chip pan.

But will the public wish to eat such genetic simulacra, knowing they are foodstuffs that have been tinkered with by scientists, refashioned according to a relatively new technology and usually for the benefit of biochemical companies and farmers rather than the consumers?

There are signs that the gene food "revolution" will not go unchallenged: consumers in the United States are being urged to avoid genetically modified soy and maize.

In Britain, supermarkets have fought, albeit without success, to prevent their indiscriminate introduction. But neither will the revolution go away. The food lobbyists and gene scientists are preparing for war - and the outcome will influence the future of food as we know it.

There is nothing unusual, on the face of it, about John Doe's soya beans: the little yellow spheres grow, three to a pod, on plants indistinguishable from normal ones; perhaps they are slightly greener and a shade taller, mainly because they have no weeds to compete with. Yet the gene food plants are the product of 11 years of research.

Scientists working for the US agrochemical company Monsanto followed a simple belief - to create a soya bean plant that would not die when sprayed with the company's own herbicide, trade-named Roundup. The advantages are evident: farmers could plant "Roundup Ready" (RR) seeds, then spray the plants as often as they wished with a non-selective herbicide which would kill everything else.

The advantages to Monsanto are even clearer: the farmers must buy Monsanto's seeds, then spray them with Monsanto's Roundup.

Monsanto says farmers will gain by achieving a higher yield, offsetting the extra costs - a claim so far untested because the first harvest is not complete.

The company says farmers will use less herbicide, helping the environment.

About 10,000 farmers in America's Midwest have signed up, dreaming of clean fields and higher profits, while others have adopted a "wait and see" attitude or were put off by the chemical company's draconian contract, giving it the right to inspect farms and test crops for up to three years.

But what may be a blessing to farmers has only been achieved by scary genetic tinkering. To create the new plant, Monsanto's white coated scientists laboured over Petri dishes and spliced in a small strand of DNA from a common soil-resident microbe which they knew would endow the plant with its immunity to Roundup.

Similar acts of genetic reconstruction are becoming commonplace.

Monsanto has developed other Roundup Ready crops - sugar beet and rape - as well as insect-resistant potatoes, maize and cotton. Other agrochemical companies are devising genetically modified vegetables immune to their herbicides and chemicals.

In many cases, all they await are permission from governments for their introduction. Within five years, the potential is there for most food production to become the horticultural equivalent of Frankenstein's monster.

Will consumers, supermarkets or even governments go along with this worrying genetic meddling? And will shoppers put up with being told they have no choice, while being given bland reassurances that there is no cause for concern?

Ronnie Cummins of the Pure Food Campaign, a US pressure group calling for a consumer boycott of American-produced genetically-engineered soya and maize, said: "In the past, biotechnology has fallen flat on its face. Eighty per cent of consumers don't want it. There is a big battle ahead and we are going to win."

Monsanto's representatives endlessly repeat the mantra: "The beans are the same beans. They are indistinguishable.

"You cannot tell them apart."

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