



ADVANCED GCE
CRITICAL THINKING
Unit 4: Critical Reasoning

F494/RB

RESOURCE BOOKLET

Thursday 17 June 2010
Morning

Duration: 1 hour 45 minutes



INSTRUCTIONS TO CANDIDATES

- You should spend about 10 minutes reading the article 'Who's afraid of a synthetic human?' and use it to answer Section B.

INFORMATION FOR CANDIDATES

- This document consists of 4 pages. Any blank pages are indicated.

Background information

John Harris is Professor of Bioethics at the University of Manchester and author of *Enhancing Evolution* (Princeton University).

The Human Fertilisation and Embryology Bill was passed into law on 13 November 2008. It updates the previous 1990 Act, and, among other things, ensures regulation of any inter-species mixing of genetic material with human embryos for research purposes.

Luddite

In the early nineteenth century, a group of spinners and weavers broke machines which had made them unemployed and affected their livelihood. They were called Luddites, and since then, this term has come to mean unthinking rejection of technological advance.

Who's afraid of a synthetic human?

In the future there will be no more human beings. This is not something we should worry about. Much of today's scientific research may enable us eventually to repair the terrible vulnerability to which our present state of evolution has exposed us. It is widely thought inevitable that we will have to face the end of humanity as we know it. We will either have died out altogether, killed off by self-created global warming or disease, or, we may hope, we will have been replaced by our successors.

1

The Human Fertilisation and Embryology Bill would allow for inter-species embryos that will not only enable medical science to overcome the acute shortage of human eggs for research, but would provide models for the understanding of many disease processes, an essential first step to the development of effective therapies. Darwinian evolution has taken millions of years to create human beings; the next phase of evolution, a phase I call 'enhancement evolution', could occur before the end of the century. The result may be the emergence of a new species that will initially live alongside us and eventually may entirely replace humankind.

2

This prospect horrifies some and exhilarates others. Yet the question of whether or not we should make improvements to human beings and possibly to human nature is the most vital, urgent and significant of all the questions facing us.

3

Now is the time to try to answer this question, because many recent discoveries are beginning to make the prospect of radical human enhancement a reality. Stem cell research, which may lead to human tissue repairing itself; new genes resistant to cancer and HIV; new drugs that improve concentration and memory or enable us to function for much longer periods without sleep; brain-computer interfaces that may harness the power and memory of computers, perhaps by the insertion of tiny 'nanobots' into the human brain; and techniques that will radically extend life expectancy from tens to hundreds of years – these are all on today's scientific agenda and some are already in use.

4

Some of these possibilities are so radical that the creatures benefiting from them would no longer be 'human', in the way we think of it. The end of humanity then is not in itself a concern; making sure that those who replace us are better than we are is a huge and timely concern.

5

One of the most dramatic and important of the new technologies that will produce new creatures is synthetic biology. When people talk about synthetic biology and synthetic life, they may have in mind Frankenstein scientists in the lab, or perhaps some bubbling vat of biochemical 'primeval soup' out of which will arise either a monster or a perfect specimen of humanity. Synthetic biology is in fact the name now used for a cluster of new technologies in which, as John McCarthy, the computer scientist, says, biomolecular components (natural or synthetic) are newly combined or reorganised to create novel genetic and biochemical circuitry, pathways, and ultimately organisms. It is, in a sense, a hybrid discipline between science and engineering.

6

Synthetic biology has caught the imagination not least because it marks the beginnings of potentially creating tailor-made creatures in our own image. If it works this may give us unprecedented powers. If we can try to understand how to make better creatures than ourselves, longer-lived, more resistant to disease and injury, healthier and better adapted to a changing environment, we should surely do so. Enhancement technologies give those who can use them an edge and have often been criticised for the injustice that this supposedly creates. But we have always enhanced ourselves and our environment in ways that are not immediately available to all.

7

Education and medicine are obvious examples of the ways we have enhanced ourselves, but synthetic sunshine is perhaps closest to synthetic biology. Before fires, candles, lamps and other forms of man-made light, most people went to sleep when it got dark. Candles enabled social life and work to continue into and through the night and conferred all sorts of advantages on those able and willing to benefit from it, at the expense of those who couldn't or didn't.

8

Contemporary and future biological enhancements may create problems of injustice both in that they provide a means for some to gain an advantage (those who could read by candlelight gained in a way that others did not), and because they may create unfair pressures as a result of the capabilities conferred by enhancement (like the pressure to stay up late and read or work because one can). The solution is establishing 'fair' working hours and provision, at public expense if necessary, of sources of light – not banning candles. The solution is a combination of regulation and distributive justice, not a Luddite rejection of technology. 9

From John Harris, 'Who's afraid of a synthetic human?', 17 May 2008, The Times
www.timesonline.co.uk



Copyright Information

OCR is committed to seeking permission to reproduce all third-party content that it uses in its assessment materials. OCR has attempted to identify and contact all copyright holders whose work is used in this paper. To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced in the OCR Copyright Acknowledgements Booklet. This is produced for each series of examinations, is given to all schools that receive assessment material and is freely available to download from our public website (www.ocr.org.uk) after the live examination series.

If OCR has unwittingly failed to correctly acknowledge or clear any third-party content in this assessment material, OCR will be happy to correct its mistake at the earliest possible opportunity.

For queries or further information please contact the Copyright Team, First Floor, 9 Hills Road, Cambridge CB2 1GE.

OCR is part of the Cambridge Assessment Group; Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.