SCIENCE AND TECHNOLOGY

PRE-READING TASKS

1. “You’re being watched.”
   a) How do you feel about this statement?
   b) How true is it?
   c) How are you being watched?
2. Research – what or who are the following:
   a) NSA
   b) GCHQ
   c) Edward SnowdenREader

I SPY WITH MY LITTLE ALGORITHM

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Every morning when you put your cell phone in your pocket you’re making an implicit bargain with the carrier: ‘I want to make and receive mobile calls; in exchange, I allow this company to know where I am at all times.’

The bargain isn’t specified in any contract, but it’s inherent in how the system works.

This is a very intimate form of surveillance. Your cell phone tracks where you live and where you work. Since it knows about all the other phones in the area, it tracks whom you spend your days with, whom you meet for lunch, and whom you sleep with. The accumulated data can probably paint a better picture of how you spend your time than you can. In 2012, researchers were

able to use this data to predict where people would be 24 hours later to within 20 metres.

Your location information is valuable. There is a whole industry dedicated to tracking you in real time. Companies use your phone to track you in stores, to learn how you shop, track you on the road to determine how close you might be to a particular store, and deliver retail advertising to your phone based on where you are right now. Your location data is so valuable that cell-phone companies are now selling it to data brokers, who resell it to anyone willing to pay for it. Companies like Sense Networks specialize in using this data to build personal profiles of each of us.

US company Verint sells phone-tracking systems to corporations and governments worldwide. Its website says that Verint is ‘a global leader in Actionable Intelligence solutions for customer engagement optimization, security intelligence and fraud, risk and compliance with clients in more than 10,000 organizations in over 180 countries’.

Cobham sells a system that allows someone to send a ‘blind’ call to a phone – one that doesn’t ring and isn’t detectable. The blind call forces the phone to transmit on a certain frequency, allowing the sender to track the phone to within one metre. The British company boasts government customers in Algeria, Brunei, Ghana, Pakistan, Saudi Arabia, Singapore and the US.

Defentek, a company registered in Panama, sells a system that can ‘locate and track any phone number in the world… undetected and unknown to the network, carrier or target’.

A feudal relationship

It’s not just cell-phone location data. Most of us don’t realize the degree to which computers are integrated into everything we do, or that computer storage has become cheap enough to make it feasible to save indefinitely all the data we churn out.

All this data is used for surveillance. It happens automatically and it's largely hidden from view. This is ubiquitous mass surveillance.

Surveillance data is largely collected by corporations we interact with as customers or users. In 2012, the *New York Times* published a story about how corporations analyse our data for advertising advantage. The story included an anecdote about a Minneapolis man who had complained to a Target store that sent baby-related coupons to his teenage daughter… only to find out later that Target was right.

If you want to know who's tracking you, install one of the browser plugins [such as Lightbeam or DoNotTrackMe] that let you monitor cookies. I guarantee you will be startled. One reporter discovered 105 different companies tracked his internet use during one 36-hour period.*

Surveillance is the business model of the internet for two primary reasons: people like 'free' and people like 'convenient'. 'Free' is a special price, and people don't act rationally around it. Free warps our sense of cost versus benefit, and people end up trading their personal data for less than it is worth. If something is free, you're not the customer: you're the product.

Our relationship with many of the internet companies we rely on is not a traditional company-customer relationship. That's primarily because we're the products those companies sell to their real customers. The companies are analogous to feudal lords, and we are their vassals, producing data that they then sell for profit.

Spying states

Governments want to spy on everyone to find terrorists and criminals, and – depending on the government – political or environmental activists, consumer advocates, freethinkers.

Corporate and government surveillance are intertwined: the two support each other in a public-private surveillance partnership that spans the world. This isn't a formal agreement; it's more an alliance of interests.

Although Edward Snowden's revelations about US National Security Agency (NSA) surveillance have caused rifts in the partnership, it's still strong. The NSA legally compels internet companies like Microsoft, Google, Apple and Yahoo to provide data on several thousand individuals of interest. Sometimes they're forced by the courts to hand over data, largely in secret. At other times, the NSA has hacked into those corporations' infrastructure without their permission.

Britain's communications headquarters GCHQ pays companies like BT and Vodafone to give it access to bulk telecommunications all over the world. Vodafone gives Albania, Egypt, Hungary, Ireland and Qatar – possibly 29 countries in total – direct access to internet traffic flowing inside their countries.

Italian cyber-weapons manufacturer Hacking Team sells hacking systems to governments worldwide for use against computer and smartphone operating systems. Customers include the governments of Azerbaijan, Colombia, Egypt, Saudi Arabia, Turkey and Morocco.

Most of the big US defence contractors, such as Raytheon, Northrop Grumman and Harris Corporation, build cyber weapons for the US military. Syria used German company Siemens. The Qadafi regime in Libya used China's ZTE and South Africa's VASTech.

We don't know whether governments attempt surreptitiously to insert 'backdoors' into products of companies over which they have no direct political or legal control, but many computer security experts believe it is happening.

At a 2013 technology conference, Google CEO Eric Schmidt tried to reassure the audience by saying that he was 'pretty sure that information within Google is now safe from any government's prying eyes'.

A more accurate statement might have been: 'Your data is safe from governments, except for the ways we don't know about and the ways we

cannot tell you about.' The other thing Schmidt didn't say is: 'And of course, we still have complete access to it all, and can sell it to whomever we want… and you will have no recourse.'

Why it matters

Defenders of surveillance – from the Stasi to Augusto Pinochet to Google's Eric Schmidt – have always relied on the old saying: 'If you have nothing to hide, then you have nothing to fear.'

This is a dangerously narrow conception of the value of privacy. Privacy is an essential human need and central to our ability to control how we relate to the world. Being stripped of privacy is fundamentally dehumanizing, and it makes no difference whether the surveillance is conducted by undercover police or by a computer algorithm.

Government mass surveillance is often portrayed as a security benefit, something that protects us from terrorism. But there is no actual proof of any real successes against terrorism as a result of mass surveillance, and significant evidence of harm. Enabling ubiquitous mass surveillance requires maintaining an insecure internet, which makes us all less safe from rival governments, criminals and hackers.

We need to protect ourselves from government and corporate surveillance and to be proactive about how we deal with new technologies.

The remedies are as complicated as the issue. They require a shift in how we perceive surveillance and value privacy, because we're not going to get any serious legal reforms until society starts demanding them.

For now, fear trumps privacy. And fear of terrorism trumps fear of tyranny.

This is excerpted from *Data and Goliath: The Hidden Battles to Collect Your Data and Control Your World* (Norton, 2015). **Bruce Schneier** is a security technologist and a Fellow at the Kennedy School of Government at Harvard University. You can find him online at schneier.com

*Most of the companies tracking you may have names you have never heard of: Rubicon Project, AdSomar, Quantcast, Plus 260, Undertone, Traffic Marketplace.

(Source: New Internationalist, July/August 2016)

Find this article at:

https://newint.org/features/2016/07/01/i-spy-with-my-little-algorithm/

COMPREHENSION

1. Why is the implicit bargain you are making with your carrier "a very intimate form of surveillance"?
2. Explain:
   a) "If something is free, you're not the customer, you're the product."
   b) the author's analogies of feudal lords for companies and vassals for internet users.
3. What is the author's advice to us regarding surveillance and privacy?

OPINION

Is it possible to live without being connected?

ESSAY TOPICS

1. Whether it's done by secret police or computer algorithms, being stripped of privacy is fundamentally dehumanizing. – Discuss!

2. If you have nothing to hide, then you have nothing to fear. – Discuss!

PROJECT

Try this at home (at your own risk).

1. Download Lightbeam or Blur (formerly DoNotTrackMe) and see if you are indeed "startled" as Bruce Schneier claims.
2. Report your experience back to the class.

PRE-READING TASKS

1. How would you explain the concept of “the cloud” to a layperson?
2. Get together in groups of three or four and discuss the following questions. Take notes and be prepared to report back to the class:
   a) Do you like video games? Why? Why not?
   b) Agree on a list of three really famous video games.
   c) Do you think these games have become part of our (globally) shared culture?

NEW GAMING BATTLEGROUND LIES IN THE CLOUD

Maurizio Sciglio has a problem. For three years he has been developing a technology that harnesses the power of the internet to supercharge the capabilities of games consoles, PCs, and even smartphones.

The problem? His technology falls under the catch-all term "cloud gaming", a somewhat toxic phrase associated with false dawns and failures.

It's a dilemma akin to creating a next-generation operating system - and having to call it Windows 8.

In 2013, Mr Sciglio co-founded Edinburgh-based Cloudgine. His company uses the near-limitless power of cloud server farms to compute complex tasks and send the results to a device in milliseconds.

In theory that means a games console could share, or completely offload, complicated calculations while it focuses its brainpower on something else. "We identified that there was not enough compute power available on consoles and PCs," Mr Sciglio tells the BBC.

A PC's Central Processing Unit (CPU) - the brains where the calculations take place - are pretty limited against the "essentially unlimited power of resource" of Microsoft's Azure or Google Cloud, he says.

"To be honest, pretty much everything in a game is difficult to run from a CPU perspective. So what we do is offload the tasks and run them in the cloud. We're essentially borrowing power from the internet," he says.

Delayed reaction

If Mr Sciglio's comments seem familiar, that might be because it echoes the rhetoric of cloud computing firm Onlive, which in 2009 promised a future where games were rendered on server farms and seamlessly streamed to homes over the internet.

It was meant to be the games equivalent of Spotify, opening the chance to enjoy the latest interactive entertainment on even modestly powered machines.

The next Grand Theft Auto, the theory went, would be played on an Apple TV, or any middleweight device, providing it had a high-speed broadband connection.

Some analysts valued Onlive at $1.8bn. But after two years of underperformance, in August 2012 the company laid off all its workers, and its assets were eventually sold for less than $5m.

"We've been thinking hard about what to call our technology," Mr Sciglio says. "If we call it cloud gaming then people will think of Onlive and it won't really help our reputation."

Onlive had many challenges. but perhaps the most difficult was latency, or time delay. It is the perceivable amount of time players wait for a game to send commands to a data centre and then send back the results.

For games where triumph and failure hinge on split-second decisions - and so many of them do - even a tiny delay was unacceptable. For many people, cloud gaming just didn't measure up.

Goldilocks

But from the ashes of Onlive, a new cloud computing paradigm has emerged. Boyd Multerer, one of the key architects of the Xbox One, who left Microsoft in 2014, refers to it as a hybrid model.

Mr Multerer, now an independent coder based in Seattle, believes that rendering an entire game over the internet without any latency was always futile.

"There are a couple of things in the way. The speed of light, and the second law of thermodynamics. Those two are very difficult things to overcome," he says.

"The question for developers is, can you do things, when designing your game, which work around these problems? This is where all the excitement is. This is where all the effort is."

Mr Multerer's theory is that, while a standalone games console has its power limits, and cloud gaming has latency problems, perhaps a Goldilocks approach - striking a warm balance between both - could unlock the full potential of cloud gaming.

Take Street Fighter, for example, a hugely-popular fighting game where a major time delay is likely to end in players being knocked out of the action. "The gameplay is extremely latency sensitive," Mr Multerer says. "If the end-to-end latency is above 30 milliseconds, you're dead."

That's no exaggeration. It seems unbelievable, but battle-hardened Street Fighter players often use a technique called a one-frame-link, which is effectively an inescapable attack combo where the inputs are as precise as a sixtieth of a second, or roughly 17 milliseconds.

It's a move so fast that it is not performed by reaction or forethought, but instead muscle memory. At optimal levels, Onlive rarely managed a latency better than 135 milliseconds.

"But here's the thing with Street Fighter, the entire background image isn't latency sensitive at all. It's just the fighters that need to be rendered superfast. Now, is the background most of the pixels? Yes. So in a hybrid model, the background can be a beautiful image rendered in the cloud, while the console can focus all its power on the fighters. That's the best place to be," Mr Multerer says.

Sin city

The first game to fully adopt this hybrid cloud computing tech is Crackdown, on Xbox One, which is scheduled for release in 2017.

Crackdown allows players to fire rockets into skyscrapers and watch them buckle and collapse in real-time. Such detailed scenes of destruction would usually overburden a console's memory and processors, meaning the picture would lag or the game itself even crash.

But now it is achievable because Crackdown sends those complex calculations to Microsoft's Azure servers, which sends back the results within a few milliseconds.

There is still a delay when the data is sent to Microsoft's servers, calculated and sent back, but that's not something so easily perceptible when watching a building collapse.

Meanwhile, Crackdown's controls and character animations will still be handled offline by the console, meaning it will be as fast and responsive as ever.

"Do you care if there's a three millisecond delay when a building is collapsing?" Mr Sciglio asks. "No, of course not. The latency is hidden."

Crackdown is marketed by Microsoft as a major release for its Xbox One, and will serve as the acid test for server-enhanced gaming. If successful, it could pave the way for more projects that take a similar approach.

Mr Sciglio is, of course, bullish about its prospects: "We think in one way or another, most games will be using cloud computing within five years."

He adds that, for the past six months, his team has been applying the tech to an unannounced virtual reality (VR) game.

"VR is a technology that is even more relevant for us, because it demands so much - 90 frames-per-second, stereo rendering. You're putting so much pressure on your local device. We feel cloud computing can help greatly in this area. We haven't announced anything yet, but we're working on a high-profile virtual reality game."

But Mr Multerer foresees a different direction for the technology. He believes one of the best modestly-powered devices that can take advantage of cloud computing is the one in our pockets.

"Why can't I just hook my phone up to my TV? I'll need a cable and a controller, but I won't need to buy anything else. My phone is my games console."

(Source: BBC News app and website)

Find this article at:
http://www.bbc.com/news/business-36854291

COMPREHENSION

1. According to the text, why would you use the cloud for gaming purposes?
2. Explain Boyd Multerer's idea of a hybrid model in your own words.
3. What prediction does the author make about gaming at the end?

OPINION

Video games are addictive and should therefore be banned.

ESSAY TOPICS

4. Video games and violence. Cause or scapegoat?

5. Gender stereotyping in video games is discriminating. – Discuss!

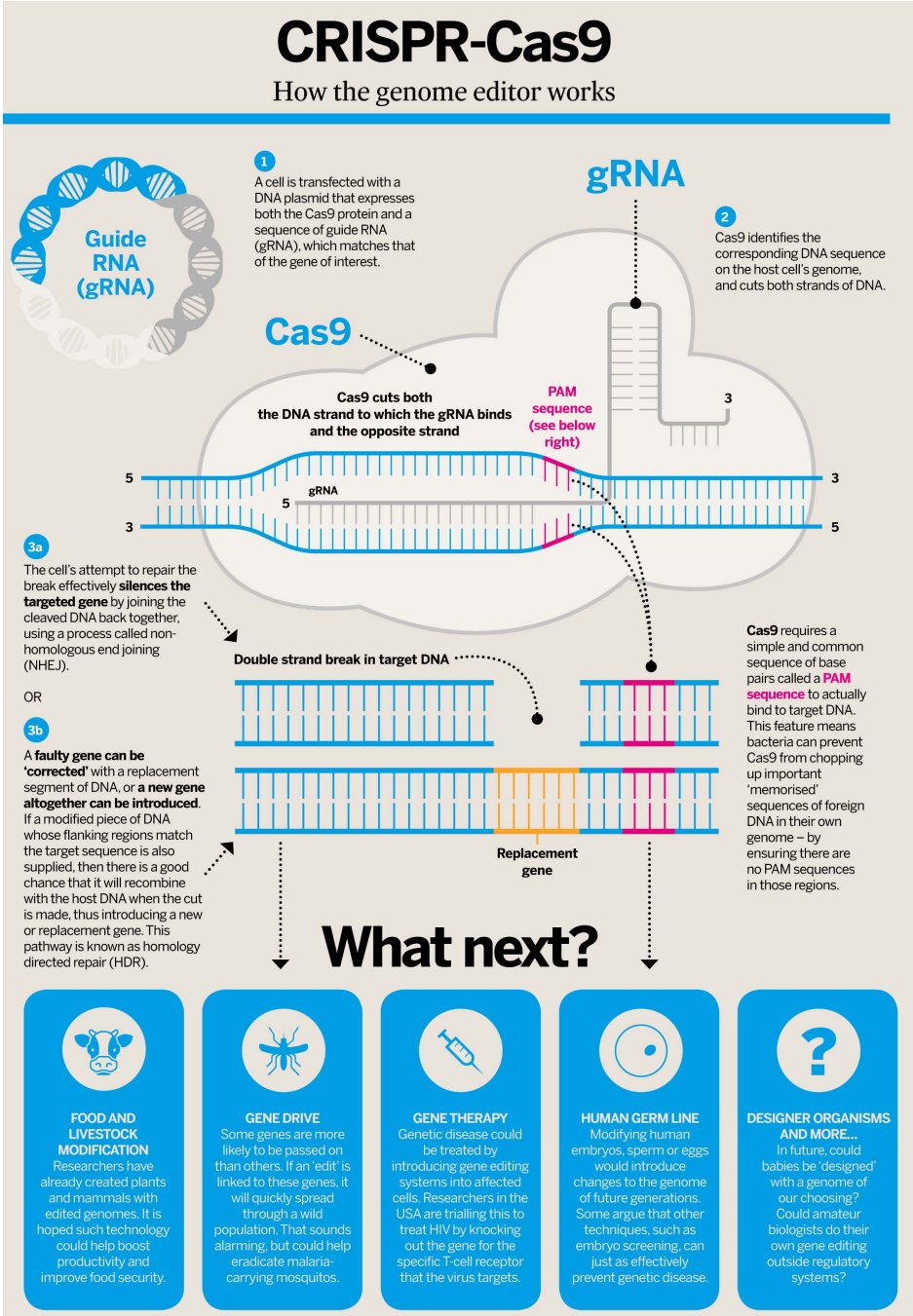
DEBATE

In randomly allocated teams debate the following statement:

Video games are a waste of time and valuable resources.

PRE-READING TASKS

1. What are GMOs?
2. Do you think GMOs could be beneficial, or maybe even save humanity? Why (not)?
3. Have a look at the following image. It is about a revolutionary system that makes it relatively easy and cheap to "edit" genomes. Any spontaneous thoughts?



EVERYTHING YOU NEED TO KNOW ABOUT CRISPR GENE EDITING'S MONSTER YEAR

The explosion of gene-editing methods is transforming medicine, agriculture, and possibly the future of the human species. Muscle-bound beagles. Hornless cows. Better potatoes. Genetically modified human embryos. The last 12 months have been incredible ones for genetic engineering. That's mostly due to a new technology called CRISPR—an easy, cheap, and very precise way to "edit" the DNA of living cells.

This week several hundred scientists and bioethicists are meeting at the National Academy of Sciences in Washington, DC, to debate one of the most charged questions raised by CRISPR: whether we should ever use it to correct disease-causing genes in people before they're born.

That idea is called "germ-line" editing, because it involves changing the DNA in sperm, eggs, or embryos. One day, gene editing might be used to avoid terrifying genetic conditions like Huntington's disease or muscular dystrophy. Or maybe, as critics fear, it will lead to armies of blue-eyed super-intelligent babies.

But designer babies aren't the whole story, or even the most important part. Gene editing is racing ahead in several areas that people should be aware of. Here's our guide to everything you need to know about gene editing, from *MIT Technology Review*'s own coverage over the last 12 months.

Rewriting humans: In March [2015], *MIT Technology Review* was first to take readers inside the emerging science and debate over editing of human genes. Now the experts gathered in Washington will consider whether society should bar the technology's use in people, at least for now.

Reshaping animals: To understand what gene editing is capable of, look no further than the way scientists are already changing familiar animals. The menagerie of genetically modified creatures already includes flies, worms, ferrets, and even beagles engineered in China to be extra muscular. One project worth paying attention to is the effort by a startup called

Recombinetics to engineer dairy cows so they don't have any horns. The first two cows produced in this way posed for their first photo shoot last month.

Engineering plants: Big Ag is tripping over itself to get involved in gene editing, and we know one reason why: no regulation. The GM crops we're familiar with—such as corn made resistant to weed killers—are subject to expensive safety testing and approval processes because they contain genes from bacteria. But it looks as if gene-edited crops may escape regulation in the U.S. entirely if scientists stick to playing around with plant genes, as they did when they created a gene-edited potato. DuPont, one of the largest sellers of GMOs, thinks the first gene-edited foods will be on dinner tables within five years.

Patent wars: Given the world-shaping potential of CRISPR gene editing, it's no surprise there's a fight over who really invented it. One on side is the University of California, Berkeley, where biologist Jennifer Doudna and colleagues from Europe say it's their invention. On the other is Feng Zhang of the Broad Institute of MIT and Harvard, who says no, he hit on the idea first: he has won patents on its use in human cells. Berkeley has asked the U.S. Patent Office to rule on who should really own the valuable patents on CRISPR.

Gene therapy: It's still early days, but the ability to tweak DNA more precisely is going to revolutionize gene therapy, the idea of installing healthy, working genes in adults and children with devastating genetic diseases like hemophilia. It's risky and difficult medicine—in part because viruses are used to move the new DNA into a person's body. No gene treatment has ever reached the market in the U.S. But gene editing is changing things by expanding the tool kit researchers have to work with. That's because the technology lets them delete or correct genes as well as add them more precisely. Companies predict that within two years CRISPR will see its first tests in humans.

Basic research: The most important consequences of CRISPR are the least attention-getting: the effects in university research labs. It just makes so many

experiments so much easier to carry out. That's starting to speed basic research on cancer and autism. One clear indicator: the exponential growth in publications on CRISPR during the last few years.

Environmental release: Last month, biologists in California created mosquitoes that not only resist malaria but spread this trait to other mosquitoes. Their technology, called a "gene drive," is a way to install the gene-editing machinery in a living thing so that it will spread specific DNA every time it reproduces. The researchers involved hope to release such mosquitoes to end malaria, but plenty of people are worried about that idea. Once released, such changes to species could be hard to undo.

Democratizing genetic engineering: This one should keep you up at night. CRISPR is so accessible—you can order the components online for $60—that it is putting the power of genetic engineering into the hands of many more scientists. But the next wave of users could be at-home hobbyists. This year, developers of a do-it-yourself genetic engineering kit began offering it for $700, less than the price of some computers. The trend might lead to an explosion of innovation—or to dangerous, uncontrolled experiments by newbies. Watch out, world.

Find this article at:

https://www.technologyreview.com/s/543941/everything-you-need-to-know-about-crispr-gene-editings-monster-year/

COMPREHENSION

1. What are the possible benefits of the new technology called CRISPR for human beings?
2. Considering the tone of the article, how do you think the author sees the new technology?
3. "Watch out, world" is a kind of warning. What is the author warning us about?

OPINION

Editing or modifying or manipulating genes is like playing god, something human beings should not do.

ESSAY TOPICS

1. Why don't we let scientists do what they need to do and not run ahead of ourselves by coming up with far-fetched scenarios?

2. CRISPR and the 'gene drive' mechanism are to biology and medicine what nuclear weapons were to physics: This technology gives humanity more power than it has the wisdom to use. – Discuss!

PROJECT

1. Keep up to date with developments regarding CRISPR-Cas9. Find out what has happened since December 2015 and report back to the class.

2. Mock trial:
   A scientist used CRISPR to edit a genome in a plant to make it drought-resistant and inadvertently made it poisonous for human beings. Thousands of people have died.

   Make two teams, defence and prosecution, and convince the judge that the scientist deserves to go to jail or be released.

PRE-READING TASKS

1. How would you feel if you needed a heart transplant and had to live with someone else's organ to survive?
2. How would you feel if the organ came from an animal instead of from another human being?
3. Why is it so difficult to find enough organs for all the people who need a transplant?

GM ENGINEERED ORGANS

There are too many heavily funded, highly praised scientists who think they can outwit nature and play God. A recent medical science development in Japan is leading the way to using animals for creating organs to be transplanted into humans. Though hailed as a solution for many who await organ transplants, this actually extends medical science's departure from natural healing further with more rationale for animal suffering.

Growing GM Engineered Organs in Animals to Replace Human Parts

A medical research team in Japan has revealed they have made what is hailed as scientific progress down the slippery slope of cheating nature and playing God. They are on the verge of being able to make human organs by injecting human stems cells into animal embryos.

Professor Hiromitsu Nakauchi of Tokyo University declared at the European Society of Human Genetics: "Our ultimate goal is to generate human organs from induced pluripotent stem cells. The technique, called blastocyst complementation, provides us with a novel approach for organ supply. We have successfully tried it between mice and rats. We are now rather confident in generating functional human organs using this approach."

Pluripotent stem cells are able to reproduce as other types of cells rather than repeat themselves or replicate embryonic cells. Blastocyst refers to early mammalian embryonic development.

Since inducing pigs to generate human blood has already been established

with this procedure, the switch from rats and mice to pigs and humans is the next logical step. The pigs could be injected with human stem cells to produce a replicate organ for a human who requires a transplant. (1)

What About the Animals?

The experiments involved mice that couldn't grow a pancreas. Why? *They were genetically engineered that way*. That made newborn mice diabetic because they couldn't produce insulin. The mice were injected with stem cells from rats with healthy pancreases and as the mice matured they grew pancreases and were no longer diabetic. So a pig would have to be missing a pig organ for it to grow a human organ that would be taken out for placing into a human.

This is double suffering and subsequent often gruesome death for many pigs. Sure, this farm animal suffering and death for greedy human consumption is rampant with factory farming and large slaughterhouses. But that should also be stopped.

To paraphrase Ghandi: "A society's morality can be determined by its treatment of animals." If you've seen any covertly filmed footage of CAFOs (confined agricultural feed operations) or factory farms, or demonic slaughterhouse activity, you'd be shocked or grief stricken if you have any compassion at all. (2)

Ignoring Natural Healing to Cut, Grab, and Stitch

A serious physical trauma that damages an organ beyond repair creates an understandable motive for human organ transplanting. But any other reason is highly questionable. For example, the diabetic mouse pancreas transplant evoked awe from a physician who saw this as step toward curing diabetes. Replacing the pancreas is the only cure for diabetes?

The idea that curing even diabetes naturally is possible is wilfully ignored by

most medical professionals. Preventing diabetes is addressed poorly by the mainstream medical profession as well. They very rarely open up to any other paradigm. They are more involved with wielding their prescription pads and scalpels. (3)

Few consider acupuncture, healing protocols, herbs, detoxification, and diet. Even Western alternative medicine has developed energy medicine inspired by acupuncture and chakra healing to reverse diabetes. (4)

Current Transplant Activity

The list for people in need of a liver, kidney and heart is long. Many at the bottom of a list engage in "organ tourism" in which someone pays big bucks for some poor sap to give up an organ to a black market surgeon.

Black market organ transplanting also leads to snatching body parts from cadavers, temporarily kidnapping and operating to remove a desired organ, and even killing someone to get a good organ for the highest bidder. (5) (8)

People who receive successful transplants commonly feel they're "fixed" now. But they're put on a protocol of meds that often make life a little uncomfortable. Some feel they can go back to their old lifestyles, which often include drinking and smoking, consuming lots of sugar and processed foods. In a few years, it's not uncommon for some of these folks to need another transplant or simply perish. (6)

Then there are transplants that fail. One cause is the body's excessive immune reaction to a foreign substance. Another reason is that the transplanted organ is faulty or diseased to begin with. There was a rash of fatty livers transplanted in the UK over the last few years. The possibility of undetected infectious disease looms as well, especially with organs groomed in animals. (7)

So is organ roulette a wise move toward improved health and longevity? Of

course not. The right ways for prevention and healing have been the most ignored ways. Embracing real knowledge of proper nutrition, healthy lifestyle, and traditional healing should be where modern medicine looks and what the mainstream media heralds.

Sources for this (slightly edited) article include:

(1) UK Telegraph article reporting Japanese organ growing experiment http://www.telegraph.co.uk/science/science-news/8584443/Pigs-could-gr...

(2) Animal Rights http://albanyanimalrights.com/2010/08/04/stealing-organs/

(3) Energetic healing for diabetes http://www.enaturalhealthcures.com/energy-healing-for-diabetes.html

(4) Western technology embraces traditional Eastern energetic medicine http://www.naturalnews.com/032445_energy_medicine_voltage.html

(5) Organ black market menace http://www.thedailybeast.com/newsweek/2009/01/09/not-just-urban-legen...

(6) Med tips for post transplants http://www.webmd.com/a-to-z-guides/life-after-transplant-tips-managin...

(7) Transplanted organs spreading disease http://www.naturalnews.com/027444_organs_WHO_disease.html

(8) Black market organ transplant looks to go legal as an industry http://www.naturalnews.com/021894.html#ixzz1VngqylBJ
Explaining Stems Cells http://stemcells.nih.gov/info/basics/basics1.asp

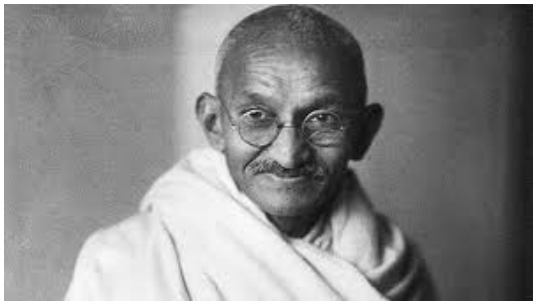
(http://www.naturalnews.com/033407_genetically_modified_pigs_organs.html#ixzz24OcJSl5B)

COMPREHENSION

1. How are scientists cheating nature and playing God?
2. Why is there double suffering for animals?
3. What are the medical professions accused of in the third part of the text (Ignoring Natural Healing to Cut, Grab, and Stitch)?
4. Why do some people resort to the black market when they need a transplant?
5. How can a successful transplant still fail??
6. Why do some transplants fail?
7. What is the underlying message of the article concerning organ transplants?

ESSAY TOPICS

1. "A society's morality can be determined by its treatment of animals." – Discuss!



2. People lead unhealthy lifestyles because they hope or think that medical progress will enable them to live on regardless. – Discuss!
3. Scientists should cheat nature and play God so humanity can progress. – Discuss!

PROJECT

Read the book *Pig-Heart Boy* by Malorie Blackman (teen fiction)

1. What other issues concerning transplants from animals to humans are treated in this book (apart from those mentioned in the article)?
2. Would you take a pig's heart if it allowed you to survive? Why? Why not?