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Prospective Views on Future Cultures Regarding to Human Practices and Beliefs
未来の物質的・精神的文明に対する予見

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理論的には、文明とは修養、科学的な行為並びに高尚な思想を意味する。現代社会において、さまざまな人々が科学的・思想的に優秀且つ崇高な活動を行っている。こういう行為は言うまでもなく、素晴らしい精神力(考え方や知識)によってもたらされるものである。思想上の変化と昇華は実践的行動から生まれる。現代の有識者たちの活動、すなわち優れた医学上の、食料生産上の、IT 革命等の実践は、未来の新思想や新信念の形成に重要な影響を与えているに違いない。この意識革命によって、将来、普遍的平和環境及び経済的な共栄状況は必ずや世界の文化の主流になるであろう。汚染などに脅かされる地球を救う市民運動も文明の中心になろう。

In this article I have finally got the ideal definition on the key word—Culture. I will elaborate how current human practices can deeply affect the future culture. If we observe carefully, we could realize that many of our modern positive actions will bring higher levels of world-wide civilization. These practices refer to medical sciences, healthy food-productions, IT technologies, as well as the mysterious nanotechnology. As we are conducting these actions and performances, some kind of stable, universal beliefs will assuredly appear. And these accepted ideas refer to a strong appreciation of a broad world peace, and to the urge for saving the Earth being under the severe pollution and damage.

First of all it will be appropriate for me to clarify what “Culture” means in this article. According to “Iwanami English—Japanese Grand Dictionary”, the word *culture* means *refinemen*t and is to do with *civilization*. Then basing on “A New English—Chinese Dictionary”, *culture* indicates *spiritual civilization* or *refinement*.

Furthermore, the "Webster's New World Dictionary" explains that *culture* refers to the *improvement of mind, manner, etc.* and *civilization*. Finally, according to "Heinemann Australian Dictionary", this Culture refers to *the distinctive practices and beliefs of a society, a development or improvement of the intellect or behavior due to education, training or experience.* Here I am interested in those two key words, *practices* and *beliefs* from "Heinemann Australian Dictionary".

First of all let us look into a medical break-through which will affect the future medical treatments. This discovery is called the creation of the ES cells (Embryo Stem cells). It is said that these cells can be developed into cranial nerves, ventricle muscles, bones, all kinds of tissues, and organs. It is declared that this invention is the promise for the cure of Parkinson disease, cardiac infarction, diabetes, damaged organs and tissues. According to the Sankei Shinbun dated May28th, 2003, the team led by Professor Nakatsu of Kyoto University has obtained some ES cells for the first time in Japanese medical history. The cells are extracted from embryo placenta membranes which are originated from the split of the fertilized eggs. These eggs are performed through the in vitro fertilization. This process is referred to the illustration of Box1.[1]

Box1: **The process of the ES cell extraction**

Actually, the first ES cells were created in the US in 1998. Then the medical

scientists, in these countries such as Australia, Sweden, German, Britain, Israel, India and Korea, followed suit. Before Japan can make her own, she imported ES cells from the US. “Although there is still a long way to go for obtaining large quantities of these cells, the possibility for achieving the above goal is very high.” says the newspaper.[2] So basing on this report, I can expect that in the future more and more people could live a longer life because their damaged organ could be replaced.

Another medical breakthrough is the cracking of the human genome sequence. For the 5 thousand years that man has existed, no previous age or civilization has been able to identify the exact DNA code that is the very essence of human life. In 2001, for the first time in history, part of the genetic sequence that makes the human body, the human genome, was published, providing a map of life for future medical research. The human genome is the full amount of DNA sequence in all our bodies to be built. And this information can be read as a series of letters. It is a long series of three thousand million letters of code.

Furthermore, the Wellcome Sanger Centre in Cambridge, England, contributed to cracking a third of the human genome sequence. According to Time, Aristides Patrinos, a scientist at the Department of Energy who directs that agency's share of the Human Genome Project, was invited to engage a joint-research plan by Francis Collins, director of the National Institutes of Health's National Human Genome Research Institute. This invitation signaled the long-standing scientific feud finally had a chance of being resolved. In this case, many people optimistically estimated that the full sequence of the human genome would be completed by 2003. According to Professor Mike Stratton　(Cancer Genome Project of Wellcome Sanger Centre), “all cancer arise due to abnormalities as DNA. Now it has been a central aim of cancer research over the last 20 years to identify those key genes which are abnormal, we call them mutated, and which are driving the cancer cells to behave as cancers.”[3]

And also, “the work that we do is to take a gene in the human genome, and then to take a cancer, and we analyze the sequence of that gene from cancer DNA. We then have to take DNA from exactly the same person but from a normal tissue, from blood or some other normal tissue, and we generate the DNA sequence from that as well.

And then in an automated, computerized fashion we compare those two sequences” continued Professor Mike Stratton. Then by using this information to tailor specific drugs targeted at the cancer genes, clinical trials have so far shown encouraging success in defeating the cancer. It is a new strategy, which could revolutionize cancer treatment in the future. So, from these practices I can conclude that the future mankind could have a healthier, longer life.

Now, in this section let us take a look at another exciting scientific outcome. This is to do with genetically modified food. These foods can prevent or cure diseases such as diabetes, pollen allergy, stomach ulcer, etc. According to Sankei Shinbun, the Research Institute of Agricultural and Biological Resources (in Japan) has invented a rice species that can control the occurrence of diabetes, pollen allergy, cancer of the large intestine. Hokaisankyo Integrated Research Institute of Industrial Technology has declared their creation of a kind of strawberry which can control occurrences of cancer of the large intestine (see the photo in Box2).[4]

Box2: **Strawberry by Hokaisankyo Integrated Research Institute of Industrial Technology**

Furthermore, Ise Food Corp. has invented a kind of egg by which human can prevent and cure stomach and duodenum ulcers. “According to a medical experiment, 80% of the patients suffered from stomach ulcer have shown effectiveness toward this king of egg,” says the newspaper.[5] So, because of these practices, people can prevent or cure their diseases just by taking healthy food. It is for sure that in the future many more people could live healthier and longer than nowadays.

We have seen in the above the medical-research and healthy-food-production practices and the future predictions. This time let us concern about the current practices in the field of the IT technology. Talking about the digital technology(which is to do with the IT technology), one thing that comes across our mind is a question,”Will everything be digital?” To answer this question, one has to remember an important thing—bits are bits. In the digital world there are no movies or magazines or pieces of music. There are just 1s and 0s, for which we did not even have a name until 1946 when Princeton statistician John Tukey concatenated the words binary and digit into the term, bit.[6] For the next 25 years, bits were of interest only to a few specialized members of the scientific community. But of late, bits have become important to everybody, because we can represent anything as bits—*anything.*

Today we can reduce the text of books, magazines, and newspapers to bits (which we cannot see or hear), take this new representation and store it, manipulate it or transmit it, and then later render it on a computer display or a piece of paper. The same is true of music, movies, still photographs. While this is widely recognized, few people have a sense of the quantity of bits needed to achieve one representation vs. another. For example when you read a book, you consume about 3 million bits an hour. When you look at television, you consume 3 million a second.

Here let us talk about *bandwidth and broadband.* Bandwidth is the ability to move bits. Broadband is the ability to move a lot of bits per second. One of the most profound changes afforded by the digital world is the ability to be asynchronous in the smallest and largest time scales. In the smallest sense, this allows us to use efficiently our channels of communications; for example interleaving people's conversations—packetizing them—so that many people share the same channel without being aware

that they are. In the large sense, we can expand, contract and shift our personal time in new ways, leaving and receiving messages at mutual convenience. On a yet larger scale, social behavior will also become more asynchronous, with all of us moving in much less lockstep rhythm and with more personal cadence than we do today. Our great-great-grandchildren will find it very odd that their ancestors commuted in traffic or huddled around a TV set at a particular time.

Nevertheless, in this new world, more bandwidth is not necessarily good, or even what we want. And, when we do want it, it is not necessarily in order to sit in front of a device and consume a few billion bits an hour. It is more likely that we will want a million bits in a fraction of a second followed by a pause. Our *future* consumption of bits will be very conversational and bursty.

Another profound change induced by the digital world is worth mentioning. This is to do with a possible wireless world. Plugs are the past. The need to be tethered is disappearing for two reasons: better battery technologies (and less power-hungry devices) and improved use of radio frequencies, so-called RFs. Eventually, everything electric will talk with everything else electric, using very fine-grained, wireless communications. Ultimately, all long-distance traffic will be fiber and all short-distance traffic will be RF. Today you may have one or two dozen wireless devices (radio, cell phone, TV, pager, car key, a gaggle of remote-control units). Tomorrow, you will probably have thousands of them.

One place you will find these micro wireless devices will be on packaging, when RF identification tags replace the universal product code—those little vertical bars read by supermarket checkout scanners. With emerging print technologies, it will be possible to print active tags directly onto containers—tiny computers that broadcast their ID, price and other characteristics. A refrigerator or a medicine cabinet can thus know what is inside it. Computers are coming out of the box. Our grandchildren will look back at the personal computer as a quaint artifact, as common tomorrow as an ice chest is today. The answer to the above question—” Will everything be digital?” is yes and yes in the future.

Now let us shift our agenda toward the silicon-based computer technology which

plays the main role in the IT era. The economic destiny and prosperity of entire nations may rest on one question: Can silicon-based computer technology sustain Moore's law beyond 2020? Moore's law is the engine pulling a trillion-dollar industry. "The secret behind Moore's law is that chipmakers double every 18 months or so the number of transistors that can be crammed onto a silicon wafer the size of a fingernail. They do this by etching microscopic grooves onto crystalline silicon with beams of ultraviolet radiation. A typical wire in a Pentium chip is now 1/500 the width of a human hair; the insulating layer is only 25 atoms thick."[7]

But the laws of physics suggest that this doubling cannot be sustained forever. Eventually transistors will become so tiny that their silicon components will approach the size of molecules. At these incredibly tiny distances, the bizarre rules of quantum mechanic take over, permitting electrons to jump from one place to another without passing through the space between. Like water from a leaky fire hose, electrons will spurt across atom-size wires and insulators, causing fatal short circuits.

Of course, cyber Cassandras have been tolling the bell for Moore's law for decades. Physicist Carver Mead admits that by 2014 the laws of physics may have their final revenge. Transistor components are fast approaching the dreaded point-one limit—when the width of transistor components reaches .1 microns and their insulating layers are only a few atoms thick. Last year Intel engineer Paul Packan publicly sounded the alarm in Science magazine, warning that Moore's law could collapse. He wrote, "There are currently no known solutions to these problems." The key word is known. The search for a successor to silicon has become a kind of crusade. Among physicists, the race to create the Silicon Valley for the next century has already begun. Some of the theoretical options are being explored.

"1. **The Optical Computer.** This computer replaces electricity with laser light beams. Unlike wires, light beams can pass through one another, making possible three-dimensional microprocessors. An optical transistor has already been invented; unfortunately, the components are still rather large and clumsy. The optical counterpart of a desktop computer would be the size of a car.

2. **The DNA computer.** One of the most ingenious ideas being pursued is to

compute using DNA, treating the double-stranded molecule as a kind of biological computer tape(except that instead of encoding 0s and 1s in binary, it uses the four nucleic acids, represented by A, T, C, G). This approach holds much promise for crunching big numbers. Hence large banks and institutions may one day use it. However, a DNA computer is an unwieldy contraption, consisting of a jungle of tubes of organic liquid, and is unlikely to replace a laptop in the near future.

3. **Molecular and dot computers.** Other exotic designs include the molecular computer and the quantum dot computer (which replace the silicon transistor with a single molecule and a single electron, respectively). But these approaches face formidable technical problems, such as mass-producing atomic wires and insulators. No viable prototypes yet exist.
4. **The quantum computer.** The darkest horse to emerge in this race is the quantum computer, sometimes dubbed the ultimate computer. The idea is to direct a laser or radio beam on a carefully arranged collection of atomic nuclei, each of which is spinning like a top. As the beam bounces off the atoms, it flips the spins of some of them. Complex computations can be performed by analyzing how the spins have been flipped.”[8]

Clearly, none of these designs are ready for prime time. Most are still on the drawing board, and even those with working prototypes are too crude to rival the convenience and efficiency of silicon. There may be a silver lining to all this. If Moore's law somehow continues unabated, then by some estimates our computers by 2050 will be calculating well beyond 500 trillion bytes per sec., at which point, as Ray Kurzweil suggests, they will be considerably smarter than we are. Maybe the collapse of Moore's law is not such a bad thing after all. If none of those exotic designs pan out, our computers will not automatically increase in power every new year's day. But perhaps that is a small price to pay for our freedom.

This time let us focus on the nanotechnology. Michael D. Lemonick says, “Nanobots will build diamonds one atom at a time. That's just the starters. They will also make ships, shoes, steaks—and more nanobots. The trick is getting them to

stop."[9] On its face, the notion seems utterly preposterous: a single technology so incredibly versatile that it can fight disease, stave off aging, clean up toxic waste, boost the world's food supply and builds roads, automobiles and skyscrapers—and that's only to start with. Yet that is just what the proponents of nanotechnology claim is going to be possible, maybe even before the century is half over. Crazy though it sounds, the idea of nanotechnology is very much in the scientific mainstream, with research labs all over the world trying to make it work. In 2001, President Clinton even declared a National Nanotechnology Initiative, promising $500 million for the effort.

In fact, nanotechnology has an impeccable and longstanding scientific pedigree. It was back in 1959 that Richard Feynman, arguably the most brilliant theoretical physicists since Einstein, gave a talk titled "There is Plenty of Room at the Bottom," in which he suggested that it would one day be possible to build machines so tiny they would consist of just a few thousand atoms. The term nanotechnology comes from nanometer, or a billionth of a meter; a typical virus is about 100 nanometers across. What would such a technology be good for? For example, construction projects, on the tiniest scale, using molecules and even individual atoms as building blocks. And that in turn means you can make literally anything at all, from scratch—for the altering and rearrangement of molecules is ultimately what chemistry and biology come down to, and manufacturing is simply the process of taking huge collections of molecules and forming them into useful objects.

Indeed, every cell is a living example of nanotechnology: not only does it convert fuel into energy, but it also fabricates and pumps out proteins and enzymes according to the software encoded in its dna. By recombining dna from different species, genetic engineers have already learned to build new nanodevices—bacterial cells, for example, that pump out medically useful human hormones. But biotechnology is limited by the task cells already known how to carry out. Nanotech visionaries have much more ambitious notions. Imagine a nanomachine that could take raw carbon and arrange it, atom by atom, into a perfect diamond. Imagine a machine that dismembers dioxin molecules, one by one, into their component parts. Or a device that cruises the human

bloodstream, seeks out cholesterol deposits on vessel walls and disassembles them. Or one that takes grass clippings and remanufactures them into bread. Literally every physical object in the world, from computers to cheese, is made of molecules, and in principle a nanomachine could construct all of them.

Yet those benefits are so potentially enormous that nanotech, even more than computers or genetic medicine, could be the defining technology of the *coming century*. It may be that the world will end up needing a nanotech immune system, with police nanobots constantly at microscopic war with destructive bots.

One way or another, nanotechnology is coming.

Now let us talk about future ideologies and faith. In the future almost everyone on this globe believes domestic and cosmopolitan peace is what mankind wants in priority to economical prosperity. More and more people have been being realizing that modern warfares would be tremendously devastating and ecologically desolating. That is the main reason why there was the end of the Cold War. Since the disappearance of the former rivals (two hostile camps—the Communist one and the Free World one), the threat of another world war vanished. It is unlikely this threat will be recurred because former major communist countries are now the members of the WTO or the NATO. So I can predict that in the future all mankind are peace lovers because they believe firmly that only peace (or we call it globalization) is the answer to prosperity, stableness and environmental protection.

Another common new belief in the future is that the rich should help the poor without the desire for beneficial returns. These days, some people suggest that the technology of the genetically-modified-food (large quantity of yieldings—frankenfood) should be introduced freely to those poor and hungry countries. But most of the inventors of those technologies (patent holders) reject this idea. The opponents argue that they have spent millions of dollars to discover those technologies. However, as far as I am concerned, I believe in the future more and more those patent holders will be tempered by the fact that wealthy countries should help the poor to feed fast-growing and underfed populations. The reasons are: ①the statistic figures indicating world poverty are appalling. ②the over-fed people in wealthy countries will be urged by

their conscience to help the poor.

“The statistics on population growth and hunger are disturbing. In 1999 the world’s population reached 6 billion. And by 2050, the United Nations estimates, it will probably near 9 billion. Almost all that growth will occur in developing countries. At the same time, the world’s available cultivable land per person is declining. Arable land has declined steadily since 1960 and will decrease by half over the next 50 years. The U.N. estimates that nearly 800 million people around the world are undernourished. The effects are devastating. About 400 million women of childbearing age are iron deficient, which means their babies are exposed to various birth defects. As many as 100 million children suffer from vitamin A deficiency, a leading cause of blindness. Tens of millions of people suffer from other major ailments and nutritional deficiencies caused by lack of food.”[10]

How can biotech help? Biotechnologists have developed genetically modified rice that is fortified with beta-carotene—which the body converts into vitamin A—and additional iron, and they are working on other kinds of nutritionally improved crops. Biotech can also improve farming productivity in places where food shortages are caused by crop damage attributable to pests, drought, poor soil and crop viruses, bacteria or fungi. So as I can predict, from now on, the above facts and figures can convince more and more people in the developed countries that people in the poor countries need help. And the best way to help them is through teaching them how to produce enough nutritious food to feed their stomach fully. Dr. Sun Yetsen said, “To people eating is heaven.”

Now let us take a look at the last issue—environment and the beliefs associated to it. For more than 40 years, earth has been sending out distress signals. At first they were subtle, like the thin shells of bald-eagle eggs that cracked because they were laced with DDT. Then the signs were unmistakable, like the pall of smoke over the Amazon rain forest, where farmers and ranchers set fires to clear land. It was obvious that Earth’s pain had become humanity’s pain. The collapse of the North Atlantic cod fishery put 30,000 Canadians out of work and ruined the economies of 700 communities. Two years ago, deforestation worsened China’s floods, which killed

3,600 people and left 14 million homeless. Population pressures and overcrowding raised the toll from last year's rains in Latin America, which killed more than 30,000 people and created armies of environmental refugees.

Because of these ever louder environmental distress signals, in September 2000, the U.N. Development Program, the World Bank, the U.N. environment Program and the World Resources Institute launched a survey on the global ecosystems. The key points of their assessments on five major types of ecosystems—forests, freshwater systems, coastal/marine habitats, grasslands and agricultural lands, are as follows.

“**1.Forests.** Home to two-thirds of all species, forests temper climate and capture and store water. Their timber has been a springboard for economic development. Forests store 40% of terrestrial carbon, and can slow the buildup of carbon dioxide in the atmosphere. Except for Russia and Canada, industrial nations have cleared almost all their original forests. Rain forests are also rapidly shrinking. Most at risk is the Pacific Rim. In developing countries, logging rates are faster than tree growth. As forest patches shrink, animals vanish.

2.Freshwater Systems. These are the most critical of ecosystems since all organisms need water to survive. Human water consumption rose sixfold in the past century, double the rate of population growth. People now use 54% of available freshwater, and additional demand will further jeopardize all other ecosystems. Water scarcity may soon limit economic development, particularly in parts of China, where supplies are already inadequate to meet the needs of people, industry and agriculture. Fertilizers, silts, sewage and other effluents have killed lakes and poisoned rivers. Half the world's wetlands have been drained, destroying habitat. So much water has been taken from rivers like the Colorado, Yellow and Ganges that they sometimes dry up before reaching the sea.

3.Coastal/marine habitats. Home to 2 billion people, coastal areas play a vital economic role and also feel the full brunt of human impact. Two-thirds of all fish harvested depend at some point in their lives on coastal wetlands,

seagrasses or coral reefs, all of which are fast disappearing. The catch is declining for about one-third of major commercial fish. Collapsing fisheries will directly hurt 1 billion people, particularly in Southeast Asia. Toxic and nutrient runoffs have produced a rash of algal blooms. Fleets are 40% larger than oceans can sustain. Trawling destroys vast areas of sea floor. Warm waters are causing coral reefs to die.

4.**Grasslands**. This system, which covers 40% of the world's land surface, includes savannas, shrublands and tundra. It supports the largest mammals, migrating birds, crops and livestock. All human food grains originated in grasslands, and wild strains of these staples help keep crops resistant to threats. The U.S. has lost almost all its original grassland. Elsewhere, soil erosion and desertification are reducing the ability of the system to support livestock. 80% of the world's grasslands are affected by deteriorating soil.

5.**Agricultural lands.** One-third of global land has been converted to food production, but three-quarters of this area has poor soil. So far, harvests outpace population growth, but the future is clouded by the loss of land to urban development, soil degradation and water scarcity. Chemicals kill helpful creatures, taint groundwater and create dead zones in the oceans. Improper farming causes nutrient loss."[11]

The above facts and figures shock the world. Many environmental experts and activists, especially in developed countries, have been crying out for attention and restrain. They formed Green parties, passed environmental laws, forged a few international treaties, etc. For the past 10 years, many people in the world have been actively engaging the so-called 3R campaign. The 3Rs mean to recycle, to restrain, to reuse. Recycling industrial products are very popular among many countries in the world. But ironically, only a small percentage of the recyclable materials are being processed. It is reported that the recycling business is very costly and the profit margin is low. To restrain stands for the meaning of a social react and action. This is to say that many businessmen are considering or reconsidering with conscience

whether their works are environmentally friendly or not. And they are trying to reduce or stop discharging contaminating materials. It also indicates many consumers are concerning about whether the goods and services they purchase are ecologically appropriate or not.

To reuse means that we should utilize a piece of equipment or a device, through repairing it by using used parts, till every part of it becomes completely torn out. This practice has been proved environmentally clean. In contrast, recycling simply means to turn a piece of completed product into raw materials. This process requires tremendous energy and sophisticated work. Imagine someone has to turn an abandon car-engine into steel materials.

As a result, because of the public awareness of the environmental threat caused by human, from now on more and more people will obey the rules and regulations cleaning the Earth. And they will eventually participate the 3R campaign with passion. So in the future the majority of the people in all nations will believe that the Earth will become a better place to live through the habitual 3R activities and fervent protections against overuses of natural resources.

In conclusion, because of the current medical practice on the creation of the ES cells, the current so-called incurable diseases will be treated well in the future. The practice of the cracking of the human genome sequence is a great promise on curing cancer which is the common fatal disease to millions upon millions of people. The practice of the implantation on disease-prevention food is another great prophecy that human can live a longer, happier life. “Prevention is better than cure.” The relentless practice on improving the IT technology is amazing. The enormous digitalized storage-ability and the quick delivery of data as well as the appearance of thousands of wireless devices will lead to further diversified societies and deeper personal fulfillment in the future.

Furthermore, the silicon-based computer technology has limits. The exploration and creation of a new generation of computers are underway in order to break through the limitation of the silicon. These trials and delving are praiseworthy. The practice and research on nanotechnology are serious. It is predicted that in the future

this nanotechnology will be applied to many fields of human life.

The future mainstream of the thought system is peace and contribution. There will be a stop on major or minor human conflicts by wars in the future. Food-producing technologies on large quantity will gradually be used to help feeding the people suffered from food shortage. The pest-resistant genes in seeds, in the future, can make the yields increase significantly.

Because of the frequent, natural disasters caused by human abuses to the Earth, people have started to evaluate their behaviors, especially after the industrial revolution. Many environmental activists and organizations have done investigations and aroused campaigns. Many people in the developed nations seem to respond to these saving-the-Earth plans seriously, and are taking actions. Still many are lukewarms. People in poor countries either do not know the issue or intentionally ignore it in order to satisfy their bellies. The U.N. and others send out staffs educating or training the poor to protect the Earth. Because of these human efforts, in the future the Earth may deteriorate in a much slower pace or may even be partially resurrected. But I can assure you there is a long, formidable way to go in order to reach this goal.

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[1] "First made Es cells in Japan" *Sankei Shibun,* 28/5/2002, 14th edition, p1.

[2] As above.

[3] NHK Radio, *English Listening Courses for Elementary Level,* February 2003, pp.30-2.

[4] "One Meal for Two Purposes" *Sankei Shinbun*, 29/5/2003, 14th edition, p1.

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[6] "Will Everything be Digital?" *Time*, 19/6/2000, pp.42-3.

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