Neuroethics in cultural and institutional settings: Toward a comparative study

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1. Introduction

Neuroethics has been developed mainly in the U.S. since the year 2000, when William Safire coined the term[1]. Since then, researchers of neuroscience and ethics have been mapping the field of neuroethics. Drawing on the previous works in neuroethics, we may be able to discuss issues in neuroethics in the following 6 areas:

1) research ethics in neuroscience;
2) medical ethics concerning psychiatry and neurosurgery;
3) ethics in brain enhancement;
4) ethics in use of neuroimaging technology in criminal investigation and trial;
5) ethics in brain-machine interface including roboethics;
6) neuroscience of ethics (or naturalized ethics).

While neuroethics studies in Japan also include all of the above areas, it is expected that Japanese perspectives would be different from that of the U.S. and other countries. In order to develop neuroethics studies in Japan, we should take into account the cultural and institutional differences as well as universal properties. We may be able to point out the following as factors for differences:

1) attitude toward the brain and the "mind-body" relation;
2) concepts of agency, autonomy, and responsibility;
3) situation of research ethics and bio-medial ethics;
4) methods and procedures of criminal investigation and trial;
5) scientific and technological capabilities, governmental R&D strategy, and industrial structure;
6) relation between technology and the society, including regulation of R&D, science literacy, and participatory technology assessment processes.

As it is beyond the range of this short paper to discuss Japanese perspective on neuroethics as a whole, I would like to focus on some aspects thereof.

2. Impact of neuroimaging technologies and institutional settings

First, I would like to focus on the impact of neuroimaging technologies. The advances in non-invasive functional neuroimaging (brain imaging) technologies, such as PET (positron emission tomography), fMRI (functional magnetic resonance imaging) and NIR (near-infrared optimal imaging), made it possible to predict one's personality, preference, attitude and number of abilities to a certain extent. It is true that current research on neuroimaging is far from the level of real-world application. However, neuroimaging technology is expected (and in part realized) to be applied to: 1) homeland security and criminal investigations; 2) recruitment; and 3) marketing.[2] In fact, a private company, Brain Fingerprinting Laboratories, has been trying to develop and sell neuroimaging technologies for "the criminal justice system," "the fight against terrorism," "drug efficacy in the pharmaceutical industry, advertising effectiveness, insurance fraud and security screening."[3] On the other hand, there are organizations that have raised their concerns on the use of commercial and political use of neuroimaging technologies.[4]

In the U.S., there is a discussion and controversy concerning the application of neuroimaging technologies in neuromarketing, criminal survey and juridical processes. However, in Japan, neuroimaging technologies are expected to be applied mainly to the diagnosis of brain diseases and baby and child education[5]. We may be able to point out the difference of the structure of R&D expenditure in the U.S. and Japan to account for the above phenomena. While the U.S. defense-related R&D expenditures amount to about 65.7% (Fiscal Year 2003) of the R &D government financed expenditures, those of Japan amount to only about 5.5% of the R &D government financed expenditures[6]. The Defense Department and CIA, especially, have spent millions of dollars in neuroimaging technologies that may be effective in revealing the identities of terrorists.[7] Moreover, the difference of the juridical system between Japan and the U.S. may also influence the different expectations of neuroimaging. While in the U.S. the jury system was enforced since the establishment of the judicial system, in Japan only the judges make the judgment (In Japan, Citizen Judge Law was enacted in May 2004 and will be enforced by May 2009. It is an open question how this system reform of juridical processes will influence the adoption of scientific evidences.)

3. Two juridical cases concerning autonomy and responsibility

Neuroimaging technologies and developments of pharmaceuticals for treatment of brain disorder may lead to the change of concepts such as agency, autonomy, and responsibility. In this regard, there are two interesting cases in juridical processes of the U.S. One is the U.S. Supreme Court Case Sell vs. U.S. (2002-2003), where the autonomy over mental medication was argued. Dr. Sell, a dentist from St. Louis, was charged with health care fraud, attempted murder, conspiracy, and solicitation to commit violence. Because he was not competent to stand trial, the government attempted to medicate him with antipsychotic drugs. However, the Supreme Court decided in favor of Dr. Sell, who refused to be medicated.[8] In this case, the Center for Cognitive Liberty & Ethics (CCLE) supported Dr. Sell to protect the civil right of "cognitive liberty," which, CCLE insisted, could be derived from the first amendment of the U.S. constitution. Cognitive liberty refers to: 1) privacy of one's thought; 2) self-determination over one's own cognition; and 3) the liberty of cognitive enhancement. The concept of cognitive liberty challenges Kantian concept of moral agency, which regards moral agents as agents with reason and autonomy. CCLE insists that we have the right not to be rational and reject the assistance of pharmacology to control our behaviors. In this regard, or in the Kantian sense, we have the right not to be autonomous.

Another important case is Roper vs. Simmons (2004-2005) [9], where neuroscientific evidences were used for the argument of responsibility. Simmons committed murder at the age of 17 and was sentenced to death when he turned 18. The U.S. Supreme Court pointed out that the Eight and Fourteenth Amendments forbid imposition of the death penalty on offenders under the age of 18 and affirmed the judgement of the Missouri Supreme Court, setting aside the death sentence imposed upon Simmons[10]. During the trial, on July 19, 2004, American Associations related to psychiatry submitted an amicus brief in support of Simmons. This brief insisted that recent advances in neuroimaging technologies made it possible to identify scientifically "the particular attributes this Court has recognized as critical to those legal judgements"[11]. The brief pointed out that the regions of adolescents' brains involved in risk-taking behaviors and resisting impulses are anatomically immature. While it is not certain if and how much this brief influenced the decision of the Supreme Court, it is noteworthy that the American Associations submitted such an amicus brief. In the near future, scientific evidences presented by neuroimaging technologies may influence the decision in court more and more.

In the brief of Roper vs. Simmons, the question at issue was the anatomical characteristics of adolescents under the age of 18 in general and not individual properties. Could neuroimaging technologies provide scientific evidences in trials when the competence of responsibility of the offender is at issue? In this regard, Patricia S. Churchland developed an interesting argument[12]. She pointed out that recent developments of neuroscience and cognitive science made it possible to formulate a rough hypothesis concerning the neurobiology of 'in-control' and 'not-in-control' brains "in terms of parameter space, the dimensions of which are specified in terms of neurobiological properties, especially of the prefrontal cortex, the limbic system, and the brainstem." [13] Moreover, Michael Gazzaniga[14] pointed out that an attorney of an offender might draw on neuroscientific evidences to insist that the offender's impaired brain caused the crime and the offender is not responsible for it.

4. Meta-autonomy and brain-privacy

Above-mentioned two cases indicate that the application of recent developments in neuroimaging technologies and use of pharmaceuticals for treatment of the impaired brain in the juridical processes may change the concept of agency, autonomy and responsibility. We could point out the following conditions for the traditional concept of autonomy: capabilities of 1) controlling and knowing one's behavior; 2) knowing one's desires and beliefs; and 3) practical reasoning (ability of understanding consequences of one's behavior and taking appropriate methods for certain purposes). If someone lacks some of these capabilities, we regard him/her as not (completely) responsible for his/her behavior. However, advances in neuroscience and pharmacology offered new alternatives concerning responsibility and autonomy. Firstly, they made it possible to enhance the ability of autonomy. In this regard, they offered a possibility of making decision of being or not being more autonomous with the help of medicine. I would like to call the ability of making this decision "meta-autonomy." Secondly, non-invasive neuroimaging technologies made it possible to survey brain deficits and our personalities to a certain degree that used to be surveyed only based on observation of behaviors or postmortem dissection. This means that our private thought and mental properties could be read without the actual acting out of the behavior through words or bodily movements. I would like to call this "brain-privacy"; privacy which can be read with the help of neuroimaging technologies and cannot be manifested by behavioral expressions.

The crucial issues of neuroethics are social regulation of technologies, which could be used in enhancement or recovery of meta-autonomy, and technologies for surveying brain-privacy. These issues are inevitably intertwined with the cultural and institutional backgrounds. In other words, what technologies are introduced and what technologies are regarded as problematic depend on the cultural background and institutional settings.

5. A case study of cultural background and institutional settings concerning pharmaceuticals for treatment of brain disorder

Before turning to the problem of the regulation of neuro-technologies, let us examine in further detail the case of Ritalin as an example, which illustrates the institutional and cultural differences concerning brain enhancement by medicine. Ritalin (Methylphenidate), a central nerves system stimulant, has notably calming and focusing effects similar to caffeine and amphetamine and is a common treatment for attention deficit hyperactivity disorder (ADHD) in the U.S. While it is valuable drug for treatment of ADHD, it has a high potential for abuse. Misuse of Ritalin prevails among high school and college students for all-night study sessions and cramming for exams. One survey of students at a public liberal arts college found that 16% of survey participants had used Ritalin. [15] In Japan, abuse of Ritalin has also become a social issue lately. However, the way it is misused is different; that is, Ritalin abuse in Japan is not so much a brain enhancement but an addiction to psychotropic substances. Most of Japanese Ritalin misusers misuse also other psychotropic substances[16]. In Japan, Ritalin is regarded as a kind of psychotropic and is prescribed for narcolepsy and intractable depressive psychosis (to be used together with other antidepressants). This institutional difference seems to have influence on the way Ritalin is misused. While Ritalin is misused as a drug for short-term brain enhancement in the U.S., in Japan Ritalin is abused as law-evasion drug like other antidepressants.

6. Regulation of neurotechnology

Let us turn to the problem of the regulation of neurotechnology as emerging technology. The first applied ethics in technology is bioethics, which emerged in the 1970's against the backdrop of GM technology and human experiment scandal[17]. Since the 1980's, Information Ethics has emerged according to developments of information technologies. We can say that bioethics and information ethics always followed behind the actual development of the technology, thus were not able to provide any significant measures. In this regard, the ELSI (Ethical, Legal, and Social Issues) program in the Human Genome Project (1990-2003) was a project, which tried to catch up to the advances of technologies. The U.S. Department of Energy (DOE) and the National Institutes of Health (NIH) devoted 3% to 5% of their annual HGP project budgets toward studying the ethical, legal, and social issues (ELSI) surrounding availability of genetic information[18]. However, as Erik Fisher[19] observes, "it has been widely criticized for generally failing to engage policy processes…. [A]lthough ELSI research may occur simultaneously to technological research, no mechanisms exist to connect the two in any pragmatic way."

In this regard, "nanoethics," which deals with ethical issues arising from R&D of nanotechnologies, is an interesting case. In the U.S., the 21st Century Nanotechnology Research and Development Act (NRDA) was established in 2003. This act authorized approximately 3.7 billion dollars in 4 years for R&D of nanotechnology and required that societal concerns be addressed by integrating research with these concerns. This act "suggests a fundamental change in U.S. technology policy"[20]. While it is clear that NRDA has priority in promoting nanotechnology and ensuring U.S. global leadership in the development and application of nanotechnology, it is significant that this act took in account societal and ethical concerns in developing technologies. In many developed countries, which regard nanotechnology as one of the most important fields, many organizations such as universities and NPOs are running projects of Nanoethics[21]. The spread of Nanoethics lead to the publishing of a journal *NanoEthics* (Springer Netherlands).

Projects on nueroethics have also flourished since it was coined in 2000. It seems as though this is not so much because developments of neuroscience evoke ethical issues more than any other emerging technologies, but rather because neuroscience is the next most plausible candidate that can provide a big social impact in its application in the real-world. Otherwise, we could not explain the trend of Nanoethics before nanotechnology has evoked negative images to the public, different from GM technology, for example. Many sectors involved in technology have began to realize that a kind of technological determinism called "technological imperative"[22] —the idea that technological innovation will be applied once it is innovated— does not apply any longer, and that developments of technologies should be based on societal and ethical concerns. Moreover, we have become to realize that societal concerns are difficult to address through inquiry surveys, hearings, and that various kinds of participatory assessment and consensus building processes are necessary to seize and meet societal concerns. Therefore, in order to develop neuroethics in Japan, it is necessary to develop the participatory assessment and consensus building processes suitable to neuroethical issues as well as Japanese cultural and institutional settings.

7. Participatory technology assessment and neuroethics

In western countries, since the 1970's various methods of citizen participation in technology have been executed. In the U.S., Ned Crosby founded the Jefferson Center [23]and started citizen jury processes to strengthen the democratic process. In Germany, Peter C. Dienel developed "Planning Cells (Plannungszelle)", which is similar to citizen jury in 1969. Citizen jury processes have spread to the U.K., Brazil, India, New Zealand, Canada, Austria, Mari, and Spain[24]. Especially in U.K., so much as over 100 processes of citizen jury have been held between 1996 and 2003[25]. In Denmark, since 1987, the Danish Board of Technology has held a number of public participation processes in technology including "consensus conferences." Consensus conferences based on the Danish model have been held in the Netherlands, the U.K., France, Switzerland, Norway, Canada, Australia, Japan, Korea, and Israel.[26] Moreover, in 1997 and 1998, in U.K. and France the first science café was held and science café has spread to the world.

It is remarkable that a citizen participatory assessment on brain science "Meeting of Minds" was held between May 2005 and March 2006. This project was an initiative of international groups comprised of 12 organizations and coordinated by the King Baudouin Foundation (Belgium), with the support of the Belgian National Lottery and the European Commission. The European citizens' panel consists of 126 ordinary citizens from 9 European countries, which include: Belgium, Denmark, France, Germany, Greece, Hungary, Italy, the Netherlands and the U.K. The project consists of three national and two European meetings. The object of this project is "to involve European citizens in assessing and publicly discussing the issue of brain science with relevant research, policy and ethics experts, various stakeholders as well as representatives of European decision-making organizations."[27] This project also aims to "give relevant inputs to European policy-making and wide public debate on brain science." The citizen's deliberation process has ended in January 2006 and citizens' assessment report was presented at the European Parliament.[28] The project is now in phase of dissemination of citizens' findings and recommendations to national and European policymakers.

In Japan, several pilot projects of pubic participatory technology assessment have been held since 1998[29] on gene therapy, GM technology, information technology, transplantation, waste disposal system, among others. As for activities in science communication, it spread extensively since 2005. While it was not until 2004 that science café began in Japan, science café became so popular in the following year in Japan. Now, many universities and NPOs have developed various activities in science communication. However, it is difficult to say that citizens' participatory technology assessment has taken root in Japan. Japanese private funding sources available for non-industrial purposes are limited. Moreover, the government is ready to spend as much money as possible for science communication for improving science literacy of the public and promoting acceptance of emerging technologies, but not for participatory technology assessment processes. This is one of the disadvantages in Japan, which is different from other developed countries such as the U.K. and the U.S.

The above-mentioned project, "Meeting of Minds" points out the effects of participatory technology assessment in three points: "(i) to enhance social learning among experts, stakeholders and citizens; (ii) to stimulate public debate; and (iii) to provide policy advice."[30] In developing neuroethics studies, endeavors of experts are not sufficient, because ethical issues are usually intertwined with issues of social decision-making. We need to promote participatory technology assessment processes on neuroscience and neurotechnologies suitable to Japanese cultural background and institutional settings in order to develop neuroethics from the Japanese perspective.

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5 http://www.hitachi-medical.co.jp/info/opt-e/genri-5.html
6 Cf. MEXT, "Trends in R&D expenditures in selected countries," *White Paper on Science and Technology 2006* (Japanese).
7 Steven Olson, "Neuroimaging: Brain Scans Raise Privacy Concerns," *Science*, Vol. 307, no. 5715, pp. 1548-1550.
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10 Roper vs. Simmons (03-633) 543 U.S. 551 (2005)
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14 Michael S. Gazzaniga, *The Ethical Brain*, 2005, pp. 87-102.
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20 Ibid.
21 For example, see http://www.nanoethics.org/ and http://www.nanosoc.be/
22 Lewis Mumford, *The Pentagon of Power*, 1970, p. 186.
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28 Meeting of Minds, "European Citizens' Deliberation on Brain Science," January 20-23, 2006, Brussels, Belgium. European Citizens' Assessment Report. Public Presentation at the European Parliament, Brussels, 23rd January 2006.

29 Cf. Tadashi Kobayashi, *dare ga kagakugijutsu ni tsuite kangaerunoka (Who should think about technology?)*, 2004.

30 Meeting of Minds, "About the project."