

Uncertain Responsibility for Gene Manipulation

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1 Responsibility from the Japanese Perspective

The concept of responsibility is absolutely indispensable but inevitably uncertain. No one doubts that responsibility essentially matters a lot to us, for, were it not for that concept, we would be unable to survive in this world. But for responsibility, people could do whatever they liked without any consideration for the consequences, which would result in a terribly dangerous situation. Nonetheless, the concept of responsibility is hopelessly uncertain; intrinsically vague and probabilistic. We can immediately raise at least three basic uncertainties about responsibility. First, it appears that responsibility is not applied to the case in which responsibility must be applied most. By this I mean the paradoxical fact that in human history, a person who killed many people to win a war was often not attributed responsibility for murder but rather regarded as a heroic figure. This leads to a question. How many people must be killed to acquit the agents of their crime? We could probably answer this question only in a vague manner. This is also true in the case in which something wrong results from too many people's complicity (including those who have already died), a typical example of which is the bankruptcy of a country caused due to long-term inaction. We could also answer such a question only in a vague manner as "how many accomplices should participate in a wrong behavior in order for them to escape from responsibility?"

It seems to me that this vague nature of responsibility could be universally confirmed in the issue of responsibility for any kind of large-scale, man-made disasters. Actually, another striking example is Fukushima nuclear power plants accident due to the 2011 great earthquake in Japan, although that was initially triggered by tsunami, a natural phenomenon. That is too huge a man-made accident to fix which particular people must take responsibility. It is also an additional, complicated factor in fixing responsibility that people in general living in Tokyo, for instance, have enjoyed lots of electricity produced by Fukushima

nuclear plants, so that, exactly speaking, we cannot completely deny their responsibility for the accidents. Here is intrinsically a kind of vagueness that we must face and cope with.

Second, the probabilistic feature of responsibility can be easily confirmed by focusing on such a self-evident truth that past events to which responsibility is supposed to be attributed are not occurring now. We have no choice but to take into account probabilities for those past events to have actually occurred in evaluating responsibility, which is nothing but the job of historians or courts¹. The issue of legal competence of a suspect probably strengthens my viewpoint on the probabilistic status of responsibility, because legal competence is mostly not judged either perfectly had or completely lacked, but it should be measured by considering the probabilistic degree. Of course, the English word “responsibility” is concerned with not only past events but also future possibilities, since responsibility often implies a type of duty towards the future. However, even so, the probabilistic feature of responsibility still holds, since we cannot be perfectly certain as to what we should do now to fulfill the responsibility for the very reason that it is concerned with the future.

Third, it is not clarified how we could assume responsibility for and deal with the aftermath of the issue in question. For example, Japanese people tend to quickly resign from their positions in order to take responsibility for their acts. This tendency originates from the traditional ethics of Japan called *Bushido*, according to which *Seppuku* (or *Hara-kiri*, i.e., suicide by disembowelment) is “a process by which warriors could expiate their crimes, apologies for errors, escape from disgrace, redeem their friends, or prove their sincerity” (Nitobe, 2002, p. 107)². However, objectively speaking, it is uncertain how resignation or suicide could work as a settlement of the aftermath. Then, how else should we place responsibility? We could probably answer this only in a vague manner again. In any case, I will be conscious of such a Japanese perspective in the background of my argument, since it could bolster my viewpoint, despite providing merely one basis.

2 Gene Ethics

It appears that philosophers consider these uncertainties of responsibility as a matter of fact. They have often enthusiastically and repeatedly taken up the issue of war in ethics and put forth a narrative theory of history. This is because they might be conscious that the responsibility for war and past issues are not

certain but quite vague and only probabilistically reconstructed. The narrative approach, which does not necessarily require an objective standard to distinguish between truth and falsity, could be a strategy towards such uncertainties. Nevertheless, we cannot assume that they have reached the point of clarifying those confused circumstances regarding responsibility. Responsibility for war continues to be perplexing, and historical knowledge still continues to sow the seeds of strife between countries. Then, what should we do? Paradoxically speaking, I feel that we should seriously consider uncertainties such as vagueness and probability as constituting the core or the default of the concept of responsibility.

In this respect, gene ethics can provide a very good direction for us to take a step forward, since, as I shall argue later, gene ethics is expected to bring fundamental issues of responsibility to light, even though these issues have been already included in traditional discussions on responsibility. As far as the theoretical structure of the gene ethics controversy is concerned, it presents a very simple conflict. On the one hand, there is a viewpoint that strongly supports the use and development of gene technology despite the risk involved because of its high utility. This is represented in Dworkin's remark on gene engineering: "Playing God is indeed playing with fire. But that is what we mortals have done since Prometheus... We play with fire and take consequences, because the alternative is cowardice in the face of the unknown" (Dworkin, 2000, p. 446). On the other hand, there are people who stress more on the high risk involved in gene manipulation than on its utility. For example, Hubbard & Wald state that: "Experimental evidence is steadily accumulating that altering one gene, even when we think we know how that gene functions, often produces unexpected and unpredictable effects" (Hubbard & Wald, 1999, p. 167). Therefore, "Germ-line manipulation is as wasteful, dangerous, and unnecessary as it was" (Ibid., p. xx).

Supporters of gene engineering (which is called "genomania,"³ and I believe that their view might be called as "gene faddism" by analogy with "food faddism") highlight its benefits for medical treatment, particularly in terms of germ-line therapy. "We should be honest and say that we shouldn't just accept things that are incurable" (James Watson's remark in Stock & Campbell, 2000, p. 79). This line of argument naturally leads to the positive acceptance of enhancing our functions by gene manipulation beyond the treatment of diseases. John Harris claims that given enhancement technologies, we should protect individuals through such means that would effectively enhance their function

rather than cure their dysfunction; otherwise, we would harm them (Harris, 1993, p. 168). On the contrary, other people such as Hubbard & Wald emphasize the long-term dangers of germ-line manipulation. To this criticism, Alex Mauron, a supporter of gene manipulation, reacts by pointing out that education is also a neuronal phenotype manipulation that could produce nationalism, racial hatred, and religious fanaticism (Mauron, 2000, pp. 118-119). However, if gene manipulation is equated with something already familiar to us such as education or IVF clinics, as Mauron argues, no new concern is raised in gene ethics, at least as far as the structures of ethical argument are concerned. It appears curiously paradoxical that people who strongly support gene technology weaken the unique significance of gene manipulation and gene ethics while defending gene technology.

3 A Responsibility-Based Argument

It appears to me that an evaluation of all these controversies obviously depends on how to precisely measure the uncertainties gene manipulation faces with regard to its future benefits, harms, and probabilities. If we focus on those uncertainties, however, I believe that gene ethics will be found to provide a new perspective, particularly with regard to responsibility. As far as I understand, ethical arguments about gene manipulation have been developed from two directions of interests, namely, right-based arguments and goal-based arguments. In current debates, rights of patients, parents, or children often matter with regard to germ-line therapy or enhancement, and benefits that gene technology could accomplish are always mentioned when discussing whether those goals would justify gene manipulation or not. However, in these contexts where rights and goals are examined, the uncertainties are unlikely to be noticed, since the concept of right is either established or not with no room for intermediate states and people tend to argue about gene engineering on the counterfactual supposition that those goals have been already achieved. On the other hand, as I indicated, responsibility is an appropriate topic to shed light on problems regarding uncertainties. In that sense, I wish to propose a responsibility-based argument of gene manipulation in order to sharply focus upon the issue of how to deal with specific uncertainties latent in the problem of gene manipulation⁴.

What I do in this article is to offer a mapping of the problems in the responsibility-based argument of gene manipulation. I will consider the following three stages of problems in order: **criminological**, **metaphysical**, and

futurological. These stages correspond to three temporal distances from the present, i.e., contemporary, near future, and remote future. At the same time, I will develop my argument through characterizing these three stages in terms of causation, since the concept of cause is the same as that of responsibility—virtually as well as etymologically⁵. In this line of thought I will discuss uncertain causal relations under topics of **uncertain effects**, **uncertain causes**, and **uncertain causes and effects** respectively, each of which corresponds to those three stages above. As described earlier, any problems on responsibility inevitably involve uncertainties; however, in usual cases as I mentioned earlier, philosophers seem to presuppose that the events themselves corresponding to causes and effects can be clearly identified. Namely, they discuss the uncertainties concerning the issue of whether the causal relations can actually be called to account (e.g., about war), whether the relations really could be claimed or not (e.g., about past events), or whether the relations are completed or not (e.g., about *seppuku*).

However, ethical issues in gene manipulation could lead to other types of uncertainties that should be scrutinized on responsibility. That is to say, each problem about gene manipulation offers radical uncertainties concerning what its cause is and what its effect is. Thus, surprisingly, the most basic point as to causation or responsibility is fundamentally uncertain in gene ethics. This is why I had mentioned earlier that gene ethics could bring fundamental issues of responsibility to light. I believe that gene ethics provides a new perspective precisely in this theoretical sense.

4 A Criminological Stage

I will begin by examining the criminological stage. This is concerned with experimentations on many human embryos and animals that are inescapably required for scientists to conduct experiments on gene engineering. As is quite well known and already familiar to us, philosophers and religious thinkers have raised questions with regard to the moral status of human embryos and fetuses. Are these human embryos and fetuses persons with moral existences? When does an embryo or a fetus become a person? These types of questions are naturally linked to another type of question, i.e., do we kill someone when we dispose embryos during experimentation? This question applies to the problem of abortion as well. What is evident is that it is so uncertain whether an embryo is a person that nobody can definitely declare whether it is either true or false that

we kill someone in disposing of embryos. This is obviously an issue of vagueness that raises the Sorites paradox, as pointed out by Sainsbury (Sainsbury, 1990, pp. 252-253). At least, we should bear in mind that there are borderline cases considering whether an embryo or a fetus should be regarded as a person; this can perhaps be determined depending on how many days have passed after the egg's fertilization. This implies that we cannot claim perfect innocence when disposing embryos that we use in experiments, even though scientists conducting such experiments are completely accustomed to it and do it without feeling guilty at all. We might be committing a murder, even if it is to a small extent, if murder implies intentionally killing a person. In this case, the cause, i.e., the behavior of disposing of embryos, is clear, whereas the effect, which appears almost contemporaneously with the cause, is not certain. There is uncertainty about whether it is to be considered as a murder or not.

However, what on earth is a person? This is one of the most fundamental and perplexing questions in philosophy. In particular, Japanese people translate a "person" as "jin-kaku," which literally means "the status of a human being." A "person" thus translated sounds to be restricted to human beings, which is confusing because the concept of a person does not have the connotation of being restricted to humans. It is well known that the word "person" originates from the Latin word, *persona*, which implies "mask" or "role." Then, we should notice that the Latin word, *persona*, at least partly, originates from another Latin verb, *persono* (whose infinitive is *personare*). According to *A Latin Dictionary*, *persona* originates "from per-sono, to sound through, with the second syllable lengthened" (Lewis & Short, 1975, p. 1355). As is suggested, *persono* implies "to sound through and through, to resound," "to make a sound," or "to cry out, call aloud" (Lewis & Short, 1975, p. 1356). In fact, *persona* is a combination of two words, i.e., *per* which means "through" and *sonus* which means "sound." If this is the case, we should suppose that the concept of a person originally implies the subject calling for something by its sound or voice. In other words, a "person" originally denotes an existing entity that calls and responds to others through their sound or voice⁶.

Thus, not only a fetus but also an embryo could be regarded as a person, since they can make some sound in their heart or their blood flows when they react to something, although the judgment depends on our arbitrary use of the notion of sound and voice under the influence of our culture. This mode of thinking must lead to the issue of animal experimentation that is unavoidable in

the case of genetic engineering, because animals could also be classified as persons with respect to the definition of a person, based on its etymological connotation. However, even if we adopt the etymological definition of a person, its vagueness persists. It remains to be clarified whether an embryo or an animal used for experimentations is definitely a person or not. Therefore, we have to consider **the degree of personhood** at this point. We must consider, for example, the different degrees of a person between the stage of an embryo immediately after fertilization and a two-weeks-old embryo. As a result, responsibility for disposing of these embryos must involve degrees. Namely, we must consider **the degree of responsibility**. As long as the notion of diminished responsibility perfectly makes sense in criminal laws of many countries, it is not strange at all to consider degrees with regard to responsibility.

These ideas can be very suitably classified as “criminological,” since those stem from the question about murder. In fact, the concepts of both degrees of a person and responsibility can be also applied to familiar criminological issues related to mentally disordered offenders. In any case, we should not ignore the fact that we are responsible for disposing embryos and animals, even if to some extent, when we manipulate genes. What we can deduce from these arguments is that at least, scientists should not be allowed to manipulate genes with complete freedom. Some restrictions must be imposed on gene manipulation.

5 Nature and Nurture

What determines our lives? What causes us to have certain bodily features, personalities, and psychological characters? It is simple, attractive, and persuasive to point toward “genes” as the answer for these questions, or “genes under the influence of evolutionary process including random genetic drifts,” to be more precise. No one denies that our sexes are determined by our genes, and our lack of gills is also determined by our genes. When this idea is generalized, it leads to “**genetic determinism**”. In other words, it points toward the naturalistic idea that everything about living beings is (pre-) determined by their genes. However, this genetic determinism is very weak or rather a completely hopeless idea, although this, of course, depends on how the word “determine” is interpreted.

For example, what caused me to grow to this height? Undoubtedly, as a negative description of my bodily conditions, we can state that it is absolutely predetermined by my genes that my height cannot be more than 2.5 m. However,

can we, as a positive description of my bodily conditions, state that my genes determined my precise height? Obviously, we cannot state this. At this point, we must remember a classical pair of expressions, namely, “nature and nurture.” Both genes and the environment cooperate to develop some features of humans. In this respect, the next passage of Elliot Sober elucidates the point:

For Jane to reach a certain height, she must be raised in an appropriate environment. Genes are no good, unless supplemented by numerous meals. Nor is environment in itself sufficient, since there are genetic configurations that will impede Jane’s growth, no matter how much milk she drinks. The cliché is that development is the result of gene/environment interaction (Sober, 1988, p. 306).

If this is the case (that no one denies it), then we should declare that genetic determinism is completely ungrounded. Genetic determinism can probably imply only the determination of possibilities rather than actualities. In any case, accepting Sober’s point, we have to consider how to precisely apportion the cause of the result concerned in the mixture of nature/nurture domains. However, in principle, it would be difficult to do so, since it is not possible to isolate and examine the effects of each nature/nurture domain by conceptually separating the two domains. Sober suggests that, “it makes no sense to imagine an individual developing without any environment at all and that an individual will not develop at all, if it has no genes” (Sober, 1988, p. 314). Then, we should face unavoidable uncertainty. What is needed first is to accept this uncertainty and then to search for a solution to deal with it. Perhaps, for instance, the Bayesian method, statistical approaches, or some epidemiological analyses could be a promising alternative (see Ichinose 2006).

Nevertheless, this basic point about uncertainty is often imprudently forgotten and an ungrounded conclusion is drawn in discussing the effects of gene manipulation. I wish to discuss the problem regarding genetic explanation of our behavioral tendencies, particularly with regard to criminal tendencies. Nelkin and Lindee report that the term “born criminal” appeared in many forms in popular eugenics literature, one example of which is in the following remark of La Reine Helen Baker in 1912: “Hereditary nature of the taint of criminality is proved by the history and bodily characteristics of its unhappy victims” (Nelkin & Lindee, 2004, p. 22). In fact, at first sight, this trend appears to be exemplified

in real history. We can remember, for instance, what is referred to as “Jacobs study,” which claims that the XYY genotype is the criminal gene that causes crimes of violence (Hubbard & Wald, 1999, pp. 105-106), or the eugenic study on the Juke family in the US that produced 18 brothel keepers, 128 prostitutes, 76 convicted criminals, and 200 recipients of public relief (Nelkin & Lindee, 2004, p. 25). On second thought, however, these types of arguments sound quite strange, since in these arguments, crimes appear to be treated as natural phenomena, while in reality, crimes are cultural and institutional phenomena (the same behavior might be considered as criminal or innocent depending on the laws and cultures), as the famous legal slogan ‘*nulla poena sine lege*’ (i.e., there is no crime without law) states. Moreover, it is also well known that these cases lack veracity to serve as evidence for born criminals, since the story of the XYY genotype was later found to be simply incorrect in a statistical sense, and the case of the Juke family could be also explained on the basis of the circumstances or the environments that they had to face.

6 A Metaphysical Stage

This argument is exactly an analogy to the contrast between nature and nurture; thus, it is very natural that uncertainty intrinsically appears in this argument. Nevertheless, why do people tend to adopt genetic determinism? It is assumed that this tendency is encouraged by a political reaction against the sociological idea that criminal behaviors are caused due to social circumstances. Social programs by most governments have thus far failed to resolve the problem of violent crimes; thus, governments appear to direct people’s attention to the biological basis of criminals. In other words, criminals themselves are focused upon as independent individuals, irrespective of governments’ political strategy. This situation, when applied to the criminal behavior of children, could make their parents feel ambivalent. On the one hand, their sense of responsibility can be relieved by genetic determinism, since their children’s tendencies toward violence would then appear to be not originating from the parents’ faults in their upbringing but merely from their destiny. However, on the other hand, they may have “another, even deeper, level of parental guilt—the guilt of passing on bad genes” (Nelkin & Lindee, 2004, p. 143). This second type of guilt would swell if, in the future, we could prevent human’s tendencies toward crimes of violence via germ-line therapy, because, in that case, if parents missed the therapy for their children and their children committed crimes, responsibility for these crimes

would be attributed not to the children committing crimes but to their parents who missed the therapy (See Steiner, 1999, pp. 146-148).

We are undoubtedly straying into a labyrinth, since, as can be easily understood, the parents missing the therapy for their children could be also regarded as being determined by the parents' genes, which could have been controlled or treated by the previous generation. As a result, it would be completely obscure as to who is responsible for criminal behavior. At least, this argument leads to the enlargement of exemption from criminal responsibility, since the structure of this argument is quite similar to the insanity defense of mentally disordered offenders, i.e., the typical case of exemptions, in that the behavior is considered to be beyond the offender's control in both cases. Taken to the extreme, gene manipulation might produce a new world in which the notion of responsibility is considered nonsensical. I feel that this is an issue of an uncertain cause with regard to the problem of responsibility. Since the issue is directly linked with the classical debates on free will in metaphysics, this stage of the argument can be referred to as "metaphysical."

In fact, interestingly, the same would result if we refused genetic determinism and appealed to social circumstances to explain criminal behavior. For, in that case as well, criminal responsibility is not attributed to offenders but to social environments and programs, which eventually result in the obscuration of the notion of responsibility. However, as I affirmed at the beginning of this article, we absolutely require the concept of responsibility. What should we do? It appears that the nature/nurture debate on criminal responsibility exposes the ultimate shape of our idea of focusing only on the status of the offender in attributing responsibility, which is the standard terminology adopted in criminal justice procedures. If this is the case, the argument thus far seems to conversely show other completely different (maybe promising) possibilities as to the fundamental issue of responsibility by entering into a labyrinth after pursuing the standard terminology to its ultimate conclusion. I am considering two possibilities. The first is Slobogin's integrationist approach, according to which the problem of legal competency basically disappears, and everyone is judged altogether in the same manner concerning their responsibility only by focusing on the issue of *mens rea* (Slobogin, 2006, esp. p. 56). The second possibility is the scheme of restorative justice rather than criminal justice, in which the restoration of harm between offenders, victims, and the society is a matter of prime concern rather than punishing the offenders. As far as we notice that crimes or offences

originate from occurrences of some harm, this scheme sounds reasonable⁷.

7 A Futurological Stage

We finally reach the last stage, in which we will discuss the possible effects of gene manipulation in the remote future. As I have already mentioned, people such as Dworkin, Watson, or Harris, tend to emphasize a number of benefits of gene engineering, such as germ-line therapy and enhancement. They adopt a liberal viewpoint of accepting any human's right to utilize any gene engineering concept unless they harm others. However, to be honest, it seems to me that their view is restricted only to the near future, i.e., the next forty or fifty years at the most. However, what would happen if we enlarged the view to thousands or ten thousand years later? Would we seriously interfere with our evolutionary process? Is there a possibility that in the remote future, something fatally harmful for humans would occur because of the gene manipulations that we conduct now? Moreover, in that case, who will bear the responsibility?

Of course, some people dispel these concerns as merely imaginary fears. In fact, no one can offer convincing evidence to confirm or disconfirm this fear at this moment; thus, it would be fair to allot a probability of 0.5 to each case, since in cases of ignorance, we have no choice but to employ the classical principle of indifference that Keynes had once formulated (Keynes, 1921, p. 42 et al.). Therefore, it is not reasonable to stress only one side and not on the other. We are, as it were, betting; thus, we may have the courage to try new gene technologies, since that may lead to making us much happier. Now, is this argument sound?

This is a type of futurological problem, in which, on the basis of present evidence, we have to discuss how our future generations will be, and how much we should consider future generations in valuing the moral significance of our behaviors. When we discuss these issues, it is helpful to consider our present problems that have been passed on from the past generations to the present generation, since we are nothing but a future generation from the viewpoint of a past generation. In this respect, however, it appears at least to me that betting rates for either fearful results or happier results from the large-scale development of gene manipulation in the remote future are not equally probable, because we are obviously suffering from a serious environmental crisis that has been caused by past generations from the beginning of modern science. Through simple induction, this situation suggests how serious the consequences of large scale

scientific developments will eventually be. Therefore, the remark of Hubbard and Wald must be considered:

We cannot predict how genes, introduced into the germ line, will function either in the first generation or in the descendants, and the scientists involved in this work pay only glancing attention to the question of what to do if things do not turn out as expected. The long history of unanticipated technological missteps and failures is generally ignored (Hubbard & Wald, 1999, p. xix).

Hans Jonas is a German philosopher who is famous for his proposal of a new concept of responsibility that should be considered as the “ethics of the future.” His new concept of responsibility is based on his recognition that in contrast with traditional ethics that reckoned only with noncumulative behavior from an anthropocentric viewpoint, we should consider that “the cumulative self-propagation of the technological change of the world constantly overtakes the condition of its contributing acts and moves through none but unprecedented situations, for which the lesson of experience are powerless” (Jonas, 1984, p. 7), in order that “all this would have to be cointended in the will of the single action if this is to be a morally responsible one” (Ibid.). In other words, “the indefinite future, rather than the contemporary context of the action, constitutes the relevant horizon of responsibility” (Jonas, 1984, p. 9). However, in this respect, he claims that, “the degree which suffices for the short-range prediction intrinsic to each work of technology by itself—the engineer’s prediction of its working—is on principle inadequate for the long-range prediction of the combined working of all of them” (Jonas, 1984, p. 29). This sounds very similar to the abovementioned remark of Hubbard and Wald.

Jonas’s philosophy of responsibility begins with underlining the observation that all long-term projections are *uncertain* (Jonas, 1984, p. 34 et al.), which obviously harmonizes with the point upon which I base my argument on responsibility. Jonas deduces two strategies from this basic observation, namely, (1) we have to attempt to gain knowledge about the remote future as correctly as possible (as a matter of fact, this is knowledge about probabilities), and (2) “we must bow to the command to allow, in matters of such capital eventualities, more weight to threat than to promise and to avoid apocalyptic prospects even at the price of thereby perhaps missing eschatological fulfillments” (Jonas, 1984, p. 32). Quite interestingly, Jonas mentions Pascal’s wager in developing these two

strategies.

8 Pascal's Wager

Arguments composing Pascal's wager are so perplexing that I will set an exact analysis of those aside now (see Pascal, 1972, pp. 111-117). Here I will focus on his most generalized argument, i.e., what is usually referred to as an argument from generalized expectation. Suppose that we examine whether God exists or not, and we wager for either the existence or the nonexistence of God. If we wager for (i.e., believe in) the existence of God and it is true, we gain infinite happiness by being blessed by God. However, if God does not exist, no matter which option we wager for, we gain only a little, quite finite happiness, if any (or we might be unhappy). Let "p" denote the probability of God's existence (which could be low but not zero); let ∞ denote infinite happiness; and let h_1 , h_2 , h_3 express a finite amount of happiness in each case in table 1 below.

Table 1

	God exists	God does not exist
Wager for God's existence	∞	h_1
Wager for God's nonexistence	h_2	h_3

Following this matrix, we can find the expected utilities (EU) of both wagers.

$$\text{EU (wager for God's existence)} = \infty p + h_1 (1 - p) = \infty$$

$$\text{EU (wager for God's nonexistence)} = h_2 p + h_3 (1 - p)$$

Consequently, $\text{EU (wager for God's existence)} > \text{EU (wager for God's nonexistence)}$, regardless of the values of p , h_1 , h_2 , and h_3 . Therefore, we should make a decision to wager for the existence of God (See Hájek, 2004).

Jonas himself finally refuses to accept an analogy between his strategies and Pascal's wager (Jonas, 1984, p. 37). However, it seems to me that there is a possibility to make an analogy. In order to do this, we should replace "wager for

God’s existence” with “conduct gene manipulation,” “wager for God’s nonexistence” with “refrain from gene manipulation,” “God exists” with “devastating change occurs,” and “God does not exist” with “devastating change does not occur.” In addition, following Jonas’s strategy of being more concerned about harm than benefit, we can suppose that the worst scenario should be considered, namely, the extinction of all lives, as the infinitely miserable result. This idea is similar to the minimax principle in game theory or the so-called “precautionary principle” (abbreviated as PreP). In fact, if human nature or psychological tendencies basically remain the same despite gene manipulation, it is inductively inferred that the smarter and the stronger they are because of gene manipulation, the more possible it will be in the long run for them to promote scientific research and economic activities beyond control and head toward a catastrophe. In any case, then, let “q” denote the probability of the occurrence of a devastating change; let ∞ denote the worst scenario, namely, the infinitely worst harm; and let m_1 , m_2 , and m_3 express the finite amount of harm in each case in table 2 below.

Table 2

	Devastating change occurs	No devastating change occurs
Conduct Gene Manipulation	∞	m_1
Refrain from Gene Manipulation	m_2	m_3

Following this matrix, we can find the expected harm (EH) of both choices.

$$\text{EH (conduct gene manipulation)} = \infty q + m_1 (1 - q) = \infty$$

$$\text{EH (refrain from gene manipulation)} = m_2 q + m_3 (1 - q)$$

Clearly, $\text{EH (conduct gene manipulation)} > \text{EH (refrain from gene manipulation)}$, regardless of the values of q , m_1 , m_2 , and m_3 . Therefore, we decide to refrain from gene manipulation.

9 Two Reasonable Lessons

Obviously, these arguments cannot be immediately accepted. These are attacked by many criticisms such as those against Pascal's wager. In fact, the supposition of the infinitely worst harm appears to sound arbitrary, and we have to take into account the possibility of our extinction without conducting gene manipulation. What "devastating" signifies is also vague. Moreover, we can be dubious about Jonas's second strategy of being more concerned about threat than promise. In fact, it is not realistic that because of table 2, we immediately abandon all efforts to manipulate genes, since this argument could apply to too many scientific activities⁸.

Here I mention two issues discussed in the contemporary contexts in Japan, as their theoretical structures have something to do with the problem of gene manipulation I am discussing now, so that my points above seem to be somehow confirmed by examining those issues. The first issue is the case of iPS cell. As is known all over the world, the study on iPS cells was initially developed by a Japanese scholar, Shinya Yamanaka, in order to promote regenerative medicine (or tissue engineering) towards the future. However, it was instantly detected that iPS cells is highly likely to contract cancer, or rather iPS cells themselves might be regarded as nothing but "man-made cancer cells", according to Shi V. Liu (see Liu 2008). That is not happy news. Then, should we stop any researches on iPS cells for this reason? Many people do not think so. The reasonable reaction to the unhappy results is to conduct further studies in order to put iPS cells to practical use at a clinic.

Actually, Yamanaka himself, in developing iPS cells engineering, has made an effort to invent some methodology to avoid cancer. For example, Yamanaka reported a new method in 2008 that "uses a tiny ring structure called a *plasmid* to deliver genes into mouse cells and turn them into stem cells. The technique eliminates the need to use viruses, which can trigger cancer, to transform cells" (<http://www.bloomberg.com/apps/news?pid=newsarchive&sid=audCgl.ZSJ4Q&refer=home>). Definitely there is a possibility that the study on iPS cells would be promoted in this way, although, at the same time, we should take into account another possibility that other risks than cancer might appear in the long run, or in the remote future. Uncertainty cannot be avoided anyway.

The second issue is concerned with a biological effect of radiation on human embryos or fetus's genes in the case of pregnant women who are exposed to low dose radiation for long time. This is exactly the very problem in Japan that

many pregnant women living in east parts of Japan have been more or less anxious about in the present condition since the Fukushima nuclear power plants accident in 2011. It is true that we mankind have already got some amounts of data on the effect of low dose radiation to human body or gene through some epidemiological research on people exposed to radiation in Hiroshima, Nagasaki, and Chernobyl, in the light of which we could plausibly say that people do not have to worry about bad effects to embryos, fetuses, or newborn babies if we consider the size of Fukushima nuclear plants accident (because most people have been exposed to only far less than 20 mSv radiation in total even in Fukushima prefecture). However, that suggestion based upon the epidemiological research is not absolutely certain. The data we have had cannot be perfectly enough; as the history of studies on radiation is not so long (only 100 years or so have passed). Then, however, if this is the case, should we strongly recommend pregnant women in Fukushima to have an abortion because of quite slight danger? Should we abolish altogether any kind of practical use of radiation? We do not think so. There are both benefits and risks of using radiation in our society. We face a trade off, taking the remote future into account.

10 Precautionary and proactionary principles

The precautionary principle, i.e. PreP (that tends to focus only upon the conspicuous and rare aspect of the issue concerned) does not always work. Rather, if we persist in applying PreP to the only one danger or risk (that is called “the target risk”) in the fundamentalist’s way, other greater danger or risks (that is called “the countervailing risk”) could arise, although, of course, the danger that PreP focuses upon cannot be ignored. We should accept this kind of uncertainty. Then, we must make our lives go on.

Actually, PreP has been severely criticized mainly because of its failing to carefully consider the risk trade-off⁹. Taking those criticisms against PreP into account, Max More proposes another principle of decision-making¹⁰, that is to say, the proactionary principle (abbreviated as ProP), which is contrasted with PreP. According to More,

The freedom to innovate technologically and to engage in new forms of productive activity is valuable to humanity and essential to our future. The burden of proof therefore belongs to those who propose measures to restrict new technologies. All proposed measures should be closely scrutinized.

Rather than moving forward hesitantly, this means boldly stepping ahead while being mindful of where we put our feet (More 2013, p. 264).

Then, More offers the basic idea of ProP in three ways. Namely,

- Progress should not bow to fear, but should proceed with eyes wide open.
- Protect the freedom to innovate and progress while thinking and planning intelligently for collateral effects.
- Encourage innovation that is bold and proactive; manage innovation for maximum human benefit; think about innovation comprehensively, objectively, and with balance.

(More 2013, pp. 264-265)

More obviously considers the risk trade-off when he says

Avoiding all risks is not possible. They must be assessed and compared. The fact that a risk or threat is “natural” should not give it any special status.....Avoiding underweighting natural risks and overweighting technological risks. Inaction can bring harm as well as action. Actions to reduce risks always incur costs and come at the expense of tackling other risks (More 2013, p. 265).

At first sight, possibly, ProP might seem to be a quite optimistic, easy-going decision rule resulting in reckless and stupid measures, but such impression is not entirely correct. ProP is based upon a stern observation about human nature such that; ‘prohibition rarely works. When it does, it abolishes the benefits of technologies. Limited experiments may be better than universal prohibition’ (More 2013, p. 266).

The contrast between PreP and ProP is delineated in a simplified way by Holbrook and Briggie like this;

Precautionary principle **prevents the activity** until cause-effect relation are better understood and conceive of the technology as **guilty until proven innocent** (where the burden of proof lies with proponents of the activity)

Proactionary principle **promote the activity** while learning more about cause-effect relation along the way and conceive of the technology as

innocent until proven guilty (where the burden of proof lies with opponents of the activity)

(Holbrook & Briggles 2013, p. 17)

In a word, PreP highly estimates the value of carefulness, while ProP recognizes boldness or adventurousness to be wholly worthy.

Of course, there are both good points and bad points concerning those two principles. PreP certainly could provide a measure with us to avoid a specific risk that we cannot but pay attention to, although, as I mentioned, PreP thinks little of the risk trade-off and might hinder developments of natural science, as far as its original idea is concerned. On the contrary, ProP certainly helps scientific research to progress, but ProP supports adventurous attempts so positively that there is a possibility for some unknown hazard to be caused in an unexpected way. Eventually, we would be in a state of betting under genuine uncertainty.

Thus, in this sense, I do not believe at all that quitting most scientific researches at once is a reasonable and feasible choice. We should always consider the genuine uncertainty concerning the remote future. In particular, in this context concerning the remote future, both the cause and effect are highly uncertain. Of course, certainly, this situation conversely implies at the same time that the possibility depicted in table 2 must not be totally rejected, since it is surely a possible scenario. However, to be honest, my view leans relatively towards preferring adopting ProP to adopting PreP, as, as I previously mentioned, universal prohibition of human technologies that have been already created sounds to be opposed to human nature. We cannot restrain our human nature from making use of those technologies at the end of the day. If that is the case, it might sound to be more reasonable and smarter to scrutinize how to make use of and develop technologies in a safer way.

In any case, however, it is inevitable that we cannot escape from the uncertainty. How should we face and treat this intrinsic uncertainty? I cannot offer a definite answer at this point (since it is uncertain); however, I can draw at least two reasonable lessons from my argument thus far. First, if we value the ethics of the future, we ought to try our best to measure amounts of harm or hazard and their probabilities as correctly as possible in terms of, probably, our imagination as well as our reasoning. In this respect, we must heed to Jonas's first strategy, namely, we should attempt to gain knowledge about the remote future.

Second, we ought to reconsider the concept of a “person.” As liberal eugenics shows, since the early modern era, people have usually considered a “person” to be an autonomous individual, but this is not necessarily correct. As I mentioned earlier, etymologically speaking, we can understand that a “person” stands for an existence that calls and responds to others through their sound or voice. A “person,” by definition, is always interacting with others, and the “others” here can include people in the future and nonhuman animals (or perhaps the natural environment), because we can feel and imagine that they call and respond to us. Thus, we ought to consider them in discussing moral issues, although, as I stressed, we also take their degree of personhood into account when making decisions. This proposal, which might seem to be incautious, is not limited to me. As a matter of fact, an English scholar, Andrew Dobson, recently proposed a new concept of citizenship, namely, “ecological citizenship,” which is not an individualistic citizenship but a citizenship intrinsically including considerations about the environment and future generations (Dobson, 2003. esp. chap. 3). Obviously, this viewpoint bolsters my argument.

11 Back to the Japanese perspective

In fact, Japanese ethics, *Bushido*, which I mentioned earlier, is originally based on a unique idea of human beings which, to our surprise, could harmonize with the western notion of a “person” in its original sense. According to Nitobe, “The individualism of the West, which recognizes separate interests for father and son, husband and wife, necessarily brings into strong relief the duties owed by one to the other; but Bushido held that the interests of the family and of the members thereof is intact—one and inseparable” (Nitobe, 2002, p. 88). This idea naturally leads to the Japanese way of thinking with regard to a family, which still largely holds true. With regard to Japanese *samurai* in the Middle Ages, it is enormously important to keep their family leading up to the remote future generations. In this case, of course, a generation is understood in terms of unbroken, natural blood relationships in a biological sense, as represented by the succession of Japanese emperors or *shoguns* (i.e., the military leaders of *samurais*). From this Japanese perspective, perhaps, gene manipulation sounds to be so likely to destroy the natural connection of blood relationships and the identity of families at least in the long run that it needs to be extremely carefully considered or suspended. Probably, this deeply rooted line of Japanese thoughts could explain why the Japanese society refuses to legalize surrogate birthing,

since it might shake the identity of families. Of course, the trend could change in the future, so that Japanese people's attitude towards gene manipulation might be altered. Actually, if the gene manipulation were thought to be included in a category of preserving blood relationship even from a Japanese perspective, gene manipulation could be positively used even in the Japanese society in the future. In any case, I believe that that Japanese, traditional viewpoint deserves our considering at least once in the context of gene ethics.

Thus, I conclude my argument by stating that we are morally responsible for developing scientific research appropriately, particularly on gene engineering, by seriously considering its inevitable uncertainty. Perhaps, at least, we should immediately prohibit animal experimentations with primates that results in them experiencing pain and death because their degree of personhood appears to be very high. In addition, we should not easily admit germ-line therapy unless we can obtain evidence for the fact that it would be highly unlikely for the therapy to devastate future generations. However, simultaneously, we should support scientific advancements (including gene manipulation technologies) carefully and positively unless it is highly probable for such the advancement to result in deteriorating human race and our environments. We have no choice but to follow our human nature, so that we should consider seriously how to develop our technologies in a morally justifiable way.

Nevertheless, there is a theoretical possibility that we could totally fail and fall into catastrophic states in the end due to our scientific developments despite our most serious efforts to calculate probabilities and conjecture the future. Nobody knows. But, how should we confront our destiny in that case? There is nothing but for us to accept it gracefully. That is the very meaning of our taking ultimate responsibility. Actually, nothing other than this could be given as a morally honourable option. In this sense, the next thought of *Bushido* appears to include at least something sympathizing with this thoughts, even though not completely acceptable: "To an ambitious samurai a natural departure from life seemed a rather tame affair and a consummation not devoutly to be wished for" (Nitobe, 2002, p. 106), since "life itself was thought cheap if honour and fame could be attained therewith; hence, whenever a cause presented itself which was considered dearer than life, with utmost serenity and celerity was life laid down" (Nitobe, 2002, p. 84).

References

- Cumming, N. 2000. *The Sonic Self*. Bloomington: Indiana University Press.
- Dobson, A. 2003. *Citizenship and Environment*. New York: Oxford University Press.
- Dworkin, R. 1977. *Taking Rights Seriously*. Cambridge: Harvard University Press.
- 2000. *Sovereign Virtue*. Cambridge: Harvard University Press.
- Goklany, I. M. 2001. *The Precautionary Principle: A Critical Appraisal of Environmental Risk Assessment*. The Cato Institute.
- Hájek, A. 2008. 'Pascal's Wager.' *The Stanford Encyclopedia of Philosophy, Spring 2004 Edition*, Edward N. Zalta (ed.) [On-line]. Available online at: <http://plato.stanford.edu/entries/pascal-wager/>
- Harris, J. 1993. 'Is Gene Therapy a Form of Eugenics?' *Bioethics*, Vol. 7, No. 2/3, 137-55. Quoted from H. Kuhse & P. Singer (Eds.), (1999), *Bioethics: An Anthology* (pp. 171-181), Oxford: Blackwell.
- Holbrook, J. B. and Briggie, A. 2013. "Knowing and acting: The precautionary and proactionary principle in relation to policy making", *Social Epistemology Review and Reply Collective* 2 (5) 15-37.
- Hubbard, R. & Wald, E. 1999. *Exploding the Gene Myth*. Boston: Beacon Press.
- Ichinose, I. 2006. 'Bayesianism, Medical Decisions, and Responsibility.' In *Philosophy of Uncertainty and Medical Decisions*. Bulletin of Death and Life Studies. vol.2. 21st Century COE Program DAL5. Graduate School of Humanities and Sociology, The University of Tokyo. 15-42.'
- 2012. 'A Note on the Notion of Expected Utility: In View of A Nuclear Plants Accident and the Problem of Exposure to Low Dose Radiation,' *Philosophical Studies*, vol. 30. The Department of Philosophy. The University of Tokyo. 1-33. (in Japanese)
- 2016. 'A Philosophical Inquiry into the Confusion over the Radiation Exposure Problem' *Journal of Disaster Research Vol.11 No.sp*, September 2016, 770-779.
- Jonas, H. 1984. *The Imperative of Responsibility: In Search of an Ethics for the Technological Age*. Chicago: The University of Chicago Press.
- Keynes, J.M. 1921. *A Treatise on Probability*. Hampshire: Macmillan.
- Lewis, C.T. & Short, C. 1975. *A Latin Dictionary: Founded on Andrew's Edition of Freund's Latin Dictionary*. Oxford: Clarendon Press.
- Liu, Shi V. 2008. 'IPS Cells Are Man-Made Cancer Cells.' *Logical Biology* 8

(1):16-18.

- Mauron, A. 2000. 'Long-Term Possibilities and Dangers: The Question of Purpose,' in Stock & Campbell, *Engineering The Human Germ Line* (pp. 17-119), New York: Oxford University Press.
- McCullagh, C.B. 1984. *Justifying Historical Descriptions*. Bath: Cambridge University Press.
- More, M. 2013. 'The Proactionary Principle: Optimizing Technological Outcomes'. In M. More and N. Vita-More (Eds.), *The Transhumanist Reader*, (pp.258-267). West Sussex: Wiley-Blackwell
- Nelkin, D. & Lindee, M.S. 2004. *The DNA Mystique: The Gene as a Cultural Icon*. Ann Arbor: The University of Michigan Press.
- Nitobe, I. 2002. *Bushido: The Soul of Japan*. Tokyo: Kodansha International Ltd., originally published in 1900. Philadelphia: The Leeds & Biddle Co.
- Pascal, B. 1972. *Pensées*. préface et introduction de Léon Brunschvicg, Montrouge: Le Livre de Poche.
- Sainsbury, R.M. 1990. 'Concepts without boundaries,' an Inaugural Lecture at King's College London, quoted from R. Keefe and P. Smith (Eds.), 1996, *Vagueness: A Reader*, (pp. 251-264). Cambridge: The MIT Press.
- Slobogin, C. 2006. *Minding Justice: Laws That Deprive People with Mental Disability of Life and Liberty*. Cambridge: Harvard University Press.
- Sober, E. 1988. 'Apportioning Causal Responsibility,' *The Journal of Philosophy*, 85(6), 303-318.
- Steel, D. 2015. *Philosophy and the Precautionary Principle: Science, Evidence, and Environmental Policy*. Cambridge: Cambridge University Press.
- Steiner, H. 1999. 'Silver Spoons and Golden Genes: Talent Differentials and Distributive Justice,' in J. Burley (Ed.), *The Genetic Revolution and Human Rights* (pp. 133-150). New York: Oxford University Press.
- Stigler, S.M. 1999. 'John Craig and the Probability of History,' in S. M. Stigler, *Statistics on the Table* (pp. 252-273). Cambridge: Harvard University Press.
- Stock, G. & Campbell, J. 2000. *Engineering The Human Germ Line*. New York: Oxford University Press.
- Walgrave, L. 2001. 'On Restoration and Punishment: Favourable Similarities and Fortunate Differences,' in A. Morris & G. Maxwell (Eds.), *Restorative Justice for Juvenile* (pp. 17-37). Portland: Hart Publishing.

¹ E.g., see Stigler 1999 or McCullagh 1984, chap. 3. As shown by these studies, the

probabilistic approach to historical knowledge is actually popular.

² This traditional tendency explains why Japan has still retained the system of death penalty despite international pressure for its abolishment. It appears to be inherently difficult for Japanese people to accept the abolishment of the death penalty, regardless of whether it is morally correct or not from a contemporary viewpoint.

³ As I will mention later, many Japanese people, interestingly, have deliberated extensively on the unbroken genetic line of male emperors. At first sight, this suggests the idea of basing the sovereignty of a country on a particular gene, which might be regarded as a type of genomania. However, the actual situation is quite different. The Japanese people focus on the *unbroken and natural* blood relationship, which could be unlikely to have an affinity with gene manipulation, at least at present. It might be a kind of religious attitude towards nature.

⁴ Of course, my classification of right-based arguments, goal-based arguments, and responsibility-based arguments follows a famous division about political theories given by Dworkin (Dworkin 1977, p. 171 ff.), although I refer to my idea as “responsibility-based” instead of Dworkin’s idea of “duty-based.”

⁵ An English expression, “be responsible for”, could be used to denote a causal relation as well as a relation of a kind of liability. Actually, a Greek word, “aitia”, which is the etymological origin of “responsibility”, signifies “cause” as well.

⁶ In fact, the expressive self in music is regarded as person or *persona* even today. See Cumming et al. 2000, p. 232.

⁷ Nonetheless, I do not completely agree with the idea of restorative justice, since the idea would involve many practical difficulties. This issue is deeply concerned with the conflict between the Purist and Maximalist models of restorative justice. See Walgrave 2001.

⁸ I made a kind of criticism against the precautionary principle in terms of refining the notion of expected utility, where I discussed some issues caused by Fukushima nuclear power plants accident of 2011 as the main material. See Ichinose 2012. In addition, I published my entire view on problems of low dose radiation exposure in Ichinose 2016.

⁹ A typical argument that criticizes the precautionary principle in the light of its failing to consider the risk trade-off is given, for example, by Goklany (Goklany 2001). Of course, it is possible to refine the precautionary principle by making it deal with the risk trade-off, but in that case, it seems to me that the precautionary principle in its original idea either might collapse or result in being not different from

a usual cost-benefit analysis. In any case, one refined version of the precautionary principle is proposed and explored in Steel 2015.

¹⁰ However, it seems that we must be very careful to simply regard precautionary/proactionary principles as principles of decision-making. According to Steel, the precautionary principle is worth examination insofar as the principle is interpreted as “meta” decision-rule. He says; ‘This principle is called “meta” because it is not a rule that indicates which of several environmental policy options to select.Instead, it places a restriction on what sorts of rules should be used for that purpose’ (Steel 2015, p. 9).