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The Ethics of Human Genetic Enhancement: Extending the Public Policy Debate

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ABSTRACT

THE ETHICS OF HUMAN GENETIC ENHANCEMENT: EXTENDING THE PUBLIC POLICY DEBATE

By John J. Baumann, Ph.D

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Virginia Commonwealth University. Virginia Commonwealth University, 1999.

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Mammalian one-cell embryos can be genetically altered, implanted into the female's uterus, and subsequently develop into biologically mature organisms in the usual manner. If the resultant adult organisms reproduce, the genetic change may be passed on to future generations. In humans, the procedure is known alternatively as "human genetic engineering" or "human germline gene therapy." Bioethicists distinguish between genetic engineering intended for the prevention or treatment of disease ("treatment germline gene therapy") and genetic engineering intended for non-medical enhancement of certain characteristics ("enhancement germline gene therapy"). Human genetic engineering has the potential to effectively replace deleterious genes such as the gene for cystic fibrosis or sickle cell disease – with a normal gene. Thus, not only is

disease avoided in the next generation, but all future generations are spared the effects of the disease-causing gene as well.

The current public policy consensus is that human genetic engineering, whether intended for treatment or enhancement, is ethically impermissible. The primary reason is that present genetic engineering technology carries an unacceptable level of risk for use in humans. There is, however, good reason to believe that genetic engineering will become acceptably safe for use in humans, thereby eliminating the major ethical barrier to the technology. In fact, several policy statements already have suggested that, once safe, *treatment* genetic engineering ought to be permitted while *enhancement* genetic engineering ought not to be permitted.

Part of the concern surrounding genetic enhancement is that bad consequences – such as morally objectionable eugenics practices – might ensue. But another objection is that human genetic enhancement is intrinsically problematic. In other words, at least very *radical* genetic enhancements violate what it is that makes human beings intrinsically valuable. Drawing on a Wittgensteinian view of human beings, the present work proposes a conception of ethically significant humanness – "human beingness" – that is potentially threatened by certain kinds or degrees of human genetic enhancement. The impact of human beingness on the future direction of human gene therapy policy, and in other policy areas, is discussed.

CHAPTER ONE: INTRODUCTION

That the growing power of molecular genetics confronts us with future prospects of being able to change the nature of our species is a fact that seldom appears to be addressed in depth.[1]

Since the 1960s, when the prospect of technically feasible human genetic engineering (GE) first came into view, it has been met with a variety of ethical objections. At the forefront have been concerns that human GE would lead to unintended harms or other bad consequences. In particular, there has been the fear that things will go horribly awry and monstrous subhumans will be created (see also President's Commission, excerpted in Jonsen, Veatch, & Walters, 1998, p. 300; Rollin, 1995).

In addition to fear of harm, there have been other objections. For example, some have argued that human GE for any purpose would put us on the slippery slope towards ethically objectionable eugenics – that is, towards efforts to improve the human race through genetic means. Such efforts in the past have been based on racial and other prejudices, and have involved such means as forced sterilization of certain "undesirables." Others have argued that human GE is morally wrong because it would involve the destruction of embryos along the way. Since current human GE technology involves the introduction of genes into one-cell embryos in a process that is not one hundred percent efficient, many one-cell embryos would be lost both in preliminary research and in clinical application. Still others have argued that human GE is wrong

[1] Editors of the journal *Nature*, March 7, 1996 (quoted in Silver, 1997, p. 10).

because it violates the rights of future generations to have a genetic inheritance that has not been tampered with. And still other objections have been made as well.

We will be concerned with a different sort of objection, namely, that human GE has the potential to violate what is intrinsically valuable, or "sacred" (where that can be understood in a secular sense; see Chapter 4 on Dworkin), in human beings. While not all alterations to the human genome are ethically objectionable, certain kinds or degrees of genetic alteration in humans are intrinsically morally regrettable – that is, regrettable regardless of whether the consequences are good or bad.

Investigating this ethical objection to human GE is important for two interrelated reasons – the first having to do with public policy, and the second with bioethics generally With respect to public policy, it will be argued that the current ethical basis for restricting certain kinds of human GE is unstable. The ethical objections that collectively compose that basis are either time-bound, or not likely to carry sufficient weight to justify restricting human GE. Most important of these is the objection that human GE is morally impermissible because it is unsafe. This objection is at present not a matter of serious dispute, and is central to the justification for restricting even medically beneficial human GE. But there are good reasons for believing that human GE will become safe in the foreseeable future (see Chapter 2). Once safe, we will need to rely on other ethical objections to support the imposition of limits on the kinds of genetic alterations that may be made to human beings. The other possibilities, as just noted, are not particularly compelling. These arguments related to the tenuous foundation for our current ethical consensus on human GE will be taken up in Chapter 3.

With respect to bioethics generally, the question is whether the ethical issues are exhausted by the list of objections that we will be considering. Perhaps even after one accounts for the possibility of harmful consequences, and the moral status of embryos, and the possibility of eugenics-related abuses, and so on, there is at the heart of our moral intuitions about human GE, an ethical "remainder," so to speak. Put differently, even in an idealized case in which human GE could be done safely and the other ethical objections did not apply, many would intuitively feel that *some* limit on the genetic alteration of humans still ought to apply – that something of ethical significance remains that ought not be violated. (We already have used the terms "intrinsic human value" and "sacredness" to refer to this hypothesized ethical remainder. Others have spoken of "human dignity" or "humanity" or "human beingness", which seem in certain contexts to be related concepts. For the time being we will use the term ***humanness*** as a placeholder.) To the extent that there are rational underpinnings to our intuitions about humanness – intuitions that may be illuminated by considering the case of human GE – an understanding of those underpinnings will broaden the base of ethical concerns that can legitimately be raised in bioethics.

Thus, the present inquiry addresses the following central questions:

1) What is the current ethical basis for public policy restrictions on certain kinds of human GE, and is that basis stable?
2) Can a rational basis be found to support the intuition that certain kinds or degrees of non-harmful human genetic enhancement violate what is intrinsically valuable in human beings?

The remainder of this chapter will be concerned with the nature of this motivating intuition. Novel genetic and biomedical technologies are often accused of violating "who we are." But some technologies seem to evoke stronger reactions of this sort than others. We will focus on these more troubling cases and ask what it is that seems to be jeopardized in these cases in contrast to the others. Having narrowed the scope in this way, two senses of "who we are" will emerge. Of these two senses of "who we are" only one will appear to be threatened by certain kinds or degrees of human genetic enhancement – namely, what we are provisionally calling "humanness." But is "humanness" merely biological humanness, i.e., membership in the species *Homo sapiens*? If so, how can this be of ethical significance? If "humanness" is something other than species membership, then what is it? Finally, a thought experiment is introduced to assist in our consideration of these questions in subsequent chapters.

The scientific background to human GE will be introduced in Chapter 2. Aside from serving as an introduction to GE technology, Chapter 2 also gives reasons in support of the claim that GE is likely to become technically feasible and acceptably safe for use in humans, thus eliminating the main ethical objection to human GE. Chapter 3 introduces the current "orthodox" position on human GE, and argues that – once GE becomes acceptably safe for use in humans the other ethical objections to human GE are not likely to justify a restrictive policy. Chapter 4 considers the view that, given the arguments of Chapters 2 and 3, restrictions on human GE are not justifiable. That is, if human GE becomes acceptably safe and other common objections are not compelling, perhaps we are not justified in our intuition that altering humankind is ethically

regrettable. Chapter 5 offers a conception of humanness that, arguably, could serve as a basis for restricting at least certain kinds or degrees of (non-harmful) human genetic enhancements. Finally, Chapter 6 considers some of the implications of this conception of humanness – not only for human GE policy, but for other policy areas as well.

The Essence of Humanness

The idea that human beings have an essence or distinctive nature has been a prominent part of our Western philosophical heritage. Aristotle held that all things in the world have a function, or *telos*, that is peculiar to them. The good life, or *eudaimonia*, is achieved through the successful performance of that function. But only things which possess the relevant *arete* (usually translated as "virtue" or "excellence") will be capable of successfully performing their peculiar function (Rowe, 1991, p. 124). Thus, for example, only good acorns (those possessing the relevant *arete*) will successfully fulfill their peculiar function, namely, becoming a strong, well shaped oak tree (Magill, 1990). The function of human beings, according to Aristotle, is "an active life of that which possesses reason" (quoted in Rowe, 1991, p. 124). The successful performance of this function requires the relevant *aretai*, the most important of which is "the intellect functioning in isolation," although the practical or "moral" virtues (such as justice, courage and wittiness) have a role to play as well (ibid., p. 124). St. Thomas Aquinas drew on Aristotle's work, which had recently become available in the Christian West. On Aquinas' view,

> ... right action is conduct that either tends to promote or actually realizes human flourishing. On this view there is a distinctive and essential human nature, and associated with it a set of values constituting excellence in the conduct of life. Hence, virtues are those habits of action which are conducive to the fulfillment of an agent's rational nature. (Haldane, 1991, p. 141)

Kant rejects both the conception of a human nature that transcends our experience, and the accounts of the virtues held by his predecessors. Kant does, however, tie the moral worth of human beings to their possession of the faculty of reason. It is reason that permits the development of a good will, for "only a rational being has the power of acting according to the idea of a law, i.e., by Will" (Russell, 1945, p. 710). The good will, in turn, is a sort of moral fountainhead from which all properly motivated moral actions spring. Kant claims that "Nothing in the world – indeed nothing even beyond the world – can possibly be conceived which could be called good without qualification except a *good will*" (quoted in Magill, 1990, p. 336). The intellectual and "moral" virtues of Aristotle and Aquinas are not good in themselves. Intelligence, courage, moderation, and so on, can be put to ill purposes as well as good. From this notion of the rational man's good will, Kant derives an ethics centered on moral duty.

The repudiation of transcendental understandings of human nature seen in Kant is sympathetically received in an increasingly scientific world. The tools of science have allowed us to probe "human nature" in ways that Aristotle could not have imagined, and the descriptions of this nature are in the language of biology and chemistry, not metaphysics. We don't see souls or essences; we see organs, cells and chromosomes. As the Nobel Prize-winning geneticist Joshua Lederberg once noted, "Humanistic culture

rests on a definition of man which we already know to be biologically vulnerable" (1966, p 530).

Nevertheless, "human nature" need not imply the existence of mysterious metaphysical entities. In our everyday world there is no problem in distinguishing human beings from other things. Although it may not be easy to identify with certainty the one or more defining characteristics of human beings, the sense that there *are* such characteristics is not easily abandoned. As we have seen, the conception of human beings as essentially *rational* creatures has been prominent in our thought about ourselves. But whether our humanness inheres just in rationality or in something else (or something more), we tend to think that the notion of human nature, or essential humanness, is meaningful. And we think not only that it is meaningful semantically, but that it is meaningful morally as well.

To say that a particular philosophical view – essentialism – has been prominent in Western thought is merely to make an historical point. It remains to be seen whether some notion of ethically significant humanness is defensible (see Chapters 4 and 5). Let us turn first to our intuitive moral aversion to certain genetic and other biomedical technologies. What is the nature of this aversion? Which technologies seem most problematic? And what exactly appears to be threatened by these technologies?

Moral Aversion to Biological Novelties

With many biotechnological breakthroughs – certainly those directly involving humans – there have been public outcries of alarm and dismay of variable duration and vociferousness. The offending technologies are typically accused of being "unnatural," or of threatening "who we are," our "identity." Joseph Fletcher, writing almost three decades ago, captured this sense of alarm at a time when organ transplantation and kidney dialysis machines were new technologies, the use of psychotropic medicines had become common, and molecular genetics was just getting under way (Fletcher, 1970, pp 122-123):

> Take the notion of 'identity,' a notion so prominent in the current rhetoric of psychology.... Given the present and future trends in cyborg medicine, one may well ask: Who is it that functions physiologically with borrowed or artificial veins and arteries (whether synthetic or plastic), bone structures, prosthetic devices, cardiac implants – including even donated aortas or whole hearts – audio and visual aids, manipulators and pedipulators, donated kidneys, or artificial dialysis for kidney function, artificial kidneys and hearts powered by isotopic energy, and many other technological devices, logically ending in a sort of *ultima ratio* with transplanted brains? Who is the child born as a result of predetermined sex, germinal selection, genetic control, and artificial mutations – and after birth modified not only by cyborg technology but by chemical and electronic means, for example, by effective appetite controls and weight controls, electric brain stimulation by electrodes and surgical subcuts, endocrine alterations, and the like? For just as we once reached the point at which diabetics could regulate the sugar in their blood systems, so we will have autocontrol of mood and intelligence. Who, then, is who? How will we think of it when theoretical brain transplants become operational? As they say, today's 'science fiction' is tomorrow's science. Who is the recipient patient – is he the preoperative person or the donor? This kind of basic conceptual question, like the one about when and what is death, will inevitably change not only the language but also the mental constructs with which we think about moral values, ethical responsibility, and even the very notion of the moral agent himself.

Fletcher covers the gamut of biological novelties of the time, citing bodily alterations (e.g., transplantation, prosthetics, dialysis), psychological alterations (e.g., psychotropic medications, brain surgery), and genetic or reproductive alterations. Similar reactions have also been seen, to greater or lesser extents, in response to in vitro fertilization (IVF), somatic cell gene therapy, and human cloning. (Somatic cell gene therapy involves the correction of a genetic defect in the non-reproductive cells of a patient – e.g., the introduction of normally functioning genes into the lung cells of persons with cystic fibrosis. These genetic corrections cannot be passed on to offspring. See Chapter 2.)

But it is relatively easy to chip away at this sort of sweeping objection. Certainly no one regards the recipient of a transplanted heart, liver or kidney as a person whose identity has become indefinite as a result of that transplant. If it was Aunt Mary who entered the operating room, it is the same Aunt Mary who comes out. Whatever it is that is essential to Aunt Mary is not changed by having exchanged a diseased kidney for a healthy one Similarly, in the case of IVF, how can the fact that fertilization is extrauterine make any moral difference? The same child would have resulted from a given union of sperm and egg if that union had occurred in the Fallopian tube of the prospective mother rather than in a laboratory dish. In the case of somatic cell gene therapy, if we can restore normal lung cell function in a patient suffering from cystic fibrosis, what does it matter that this is accomplished through the introduction to lung cells of "normal" genes that won't be passed on to that patient's offspring? Somatic cell

gene therapy seems to raise no new ethical issues over and above those that attend non-genetic therapies – expected benefit-to-risk ratio, informed consent, and so on.

Although the popular verdict is still out on human cloning, some see it as no more morally troublesome than IVF or somatic cell gene therapy (see Kluger, 1997, p. 70). An objection that some have made is that, by creating a genetic duplicate, the "identity" (in the sense of self-image or self-conception) of that clone would be compromised. As Annas (1998, p. 123) says, "The danger is that through human cloning we will lose something vital to our humanity, the uniqueness (and therefore the value and dignity) of every human." The underlying premise seems to be that *genetic* uniqueness is necessary for an uncompromised "identity" of this sort. But clones are essentially later-born identical twins – that is, the cloned offspring is identical to the "original" (the donor of the cell nucleus used to create the embryo) in the same way that identical twins are identical. And the latter we do not typically view as lacking in uniqueness as individual persons, nor as victims of morally regrettable reproductive circumstances.

These brief comments on cloning, somatic cell gene therapy, IVF, and transplantation are not intended to substitute for a full ethical debate. They are mentioned here merely to point out what they have in common. In each of these cases, the result is either a normal human offspring, or a medically improved (closer to normal) patient. When the result of biomedical intervention is a relatively healthy, normal human being who has not undergone a significant transformation of the personality or "self," the initial sense of revulsion about the intervention seems not to have much staying power. The charge of "changing who we are" seems implausible.

For many controversial biotechnologies, perhaps there is nothing more to be said. Upon reflection, we may agree that the novel technique in question does not change "who we are." Our initial reaction, we may conclude, was nothing more than a "revulsion against anomalies," as Glover puts it (1984, p. 40), or maybe a concern about the potential for harm or abuse, or a bit of both.

Threats to "Identity"

Yet there are other technologies that cannot be so easily dismissed, that *do* seem to have the potential to threaten who we are, in some sense of that phrase. Let's briefly consider three that Fletcher alluded to – "cosmetic psychopharmacology" (Kramer, 1993, p. xvi), brain surgery, and genetic engineering. In doing so, we will gain a better purchase on what might be meant by the phrase "who we are." That is, we will see which kinds of identity are potentially placed in jeopardy by human GE, and which kinds are not. Since we wish to consider the ethical ramifications of potential threats to identity in isolation from other ethical issues, we will concern ourselves only with non-harmful interventions, i.e., with enhancements.

Cosmetic Psychopharmacology

Psychiatrist Peter Kramer, in his book *Listening to Prozac* (1993) describes several patients who were treated with Prozac at a time when that drug was new on the market. Prozac was used in patients who were having difficulties that could, in a very

broad sense of the term, be classified as compulsions In one case, a patient's compulsions had to do with remaining committed to close personal relationships. In the past, these compulsions had had favorable effects. The patient managed at a young age to fill a parental role in her family after her parents failed to do so, seeing to it that her siblings completed their education and generally turned out well. She herself managed against all odds to succeed professionally Later, however, her compulsive tendencies led her to remain committed to a relationship with an abusive man, and then emotionally attached to him after the relationship ended.

On Prozac, this patient was able to shed her emotional ties to her former boyfriend. In addition, on the job she was able to handle difficult and very stressful labor negotiations with an improved degree of confidence and skill. Her social life picked up. She began dating much more frequently, and enjoying these occasions.

This transformation of the self was typical of Kramer's patients on Prozac. Kramer noted with some alarm that patients tended to characterize themselves as being "better than well" when on the drug. Some, when taken off Prozac, reverted to that set of behaviors and dispositions that had been typical of their life prior to medication, at which they would lament that they no longer felt themselves. This complaint caused Kramer to wonder, naturally, who they had been all those years before Prozac if not themselves? One patient was so taken with the drug that she ebulliently announced that she now referred to herself as "Ms Prozac" – an appellation that had never in the author's experience been constructed using the name of any other drug.

In the case of Prozac, we might be inclined to say that the effect is more on the order of "enhancement of mood" rather than "transformation of self." But then it is not difficult to imagine another drug – a "Super Prozac" – the effects of which are even more pronounced, though still considered enhancements, at least from the perspective of the patient. With Super Prozac, whatever we have gained in the form of the enhanced person, we are tempted to say that there has been a loss in the form of the pre-treatment person.

Brain Surgery

The second technology that has been viewed as a potential threat to identity is brain surgery. In brain surgery, a distinction is made between surgery intended to correct or alleviate psychiatric disorders and surgery intended to correct or alleviate non-psychiatric disorders. The former was until recently known as *psychosurgery*, and is now commonly known as *psychiatric surgery*. (The term "psychosurgery" fell into disfavor owing to the crude nature of early psychosurgical techniques – most notoriously the frontal lobotomy – which eventually drew vehement protest (see, e.g., Valenstein, 1986).) The latter category is known simply as *brain surgery*.

Kleinig (1985, p. 73) speaks of a "rigid moral dichotomisation of brain surgery and psychosurgery." Brain surgery tends to be seen as morally unobjectionable because the intent is to restore brain function, often by removing damaged or diseased tissue. Psychiatric surgery, on the other hand, usually involves the destruction of histologically normal brain tissue and is, by definition, intended to alter personality.

A morally troubling feature of psychiatric surgery is the potential for a substantial transformation – rather than moderate alteration – of the personality. The concern is that "[t]he patient enters the [operating] theatre as one person and emerges as another" (ibid., p. 77). The procedure is justified, of course, by viewing the transformation as restorative, rather than destructive, of the self.

An example of (non-psychiatric) brain surgery is the use of grafts of neural tissue for the treatment of Parkinson's disease, a relatively common neurodegenerative disorder named for the physician who first described it as the "shaking palsy" (Youdim & Riederer, 1997, p. 52). Northoff (1996) reviews the standard arguments for and against the claim that brain tissue transplantation alters personal identity over time. Opponents tend to rely on "'strict identity' between brain and person so that even inserting a small number of new cells within the brain *necessarily* affects personal identity" (ibid., p. 175; emphasis added). Some argue that alterations to the brain necessarily affect the mind as well (ibid., p. 177). Some argue that the distinction between motor functions and psychological functions is blurry, and that tissue transplantations designed to restore the former necessarily affect the latter (ibid., p. 166). Proponents, on the other hand, say that when relatively small amounts of tissue are transplanted, the effect is one of restoring normal function, not altering personal identity (ibid., p. 174). Brain function – its restoration, loss, or alteration – is emphasized by proponents as being critical to personal identity. There has been no evidence that tissue transplantation (i.e., small amounts) alters the psychological functions or phenomenal experiences of Parkinsonic patients (ibid., pp. 176-177). Thus far, these brain tissue grafts have not provoked much in the

way of controversy because the amounts of tissue have been small, the goal has been the restoration of normal brain function, and evidently the strict identity arguments of opponents have not been persuasive.[2]

For our purposes, it is not necessary to resolve the dispute over whether transplantation of small amounts of brain tissue jeopardizes personal identity. The underlying philosophical views on personal identity over time are complicated, and are somewhat tangential to our main concerns. Instead we can work from the common ground between the camps. Both proponents and opponents of tissue transplantation agree that the transplantation of a substantial amount of brain tissue (e.g., whole lobes) would threaten personal identity. Of course, one is not at liberty to test this hypothesis in humans, but an example in birds makes the point. A recent experiment showed that, by transplanting portions of the brain of a Japanese quail into chickens, one can transfer to chickens the crowing and associated head movements typical of the quail (Balaban, 1997).

At the extreme end of the spectrum, whole brain transplants, if surgically successful, would presumably result in a radical change in (or relocation of?) the self – the transfer of one (psychological) person to another body. The prospect of human brain transplants might seem annoyingly fantastic and so far out of moral bounds as not to warrant serious discussion. While the subject of brain transplants will not be pursued herein, a few brief observations may suffice to show that the possibility of human brain transplants is not as far-fetched as one might suspect, either as a technical or a moral

[2] What controversy there is has to do with the source of the graft tissue aborted fetuses (Hoffer &

matter. Whole-brain transplants have been done in monkeys (White et al., 1996), suggesting that they could well be technically feasible in humans. Although in monkeys, the post-operative animal was paralyzed from the neck down, it is not difficult to imagine at least one scenario in which we might want – indeed, be ethically compelled – to exercise this option. Let us imagine that A suffers from disease Z that leaves him paralyzed from the neck down and is characterized further by a progressive, inevitably fatal, deterioration of the body excluding the brain. (The plight of world-renowned physicist Stephen Hawking comes to mind here.) B is an accident victim who, as a result of his head injuries, is declared "brain dead," but who retains normal function in all other organs including the brain stem. Assuming B's loved ones give permission, etc., it is by no means obvious why the transplantation of A's brain into B's body should be deemed morally impermissible. The outcome for B is no worse B is dead in either case. The outcome for A is better – while still paralyzed from the neck down, B's body is free from disease Z which, it will be recalled, is fatal. By proceeding with the transplant, we will have saved A's life. Obviously, we have for simplicity just ignored a long list of social and philosophical complications, the pursuit of which is beyond the scope of the present inquiry. Nevertheless, it seems fair to say that, at the very least, a justification for denying A the operation is called for.

The main point for our purposes is simply that certain kinds of brain surgery may compromise our identity even though they otherwise relieve certain diseases or disabilities and are generally beneficial.

Olson, 1991).

Genetic Engineering

The third biotechnology that has the potential to threaten our "identity" is genetic engineering. GE involves the introduction of exogenous genes into the chromosomes of either the recently fertilized egg, or the sperm or egg prior to fertilization. When successful, this procedure results in offspring that possess, in addition to their own genes, the artificially introduced genes as well. Since genes are made of the same chemical stuff in all organisms, genes from human or non-human sources may be used. The technical details of human GE will be presented in Chapter 2. For now, it is sufficient to note that the prospect of crossing species boundaries has elicited expressions of moral dismay from various quarters, and is generally viewed as morally impermissible, at least where the human species is involved. Recently, for example, President Clinton reacted to news that a human cell had been fused with a cow egg cell, reportedly giving rise to an embryonic stem cell, i.e., a cell that has the capacity to develop into a fully formed organism. Writing to the Chair of the National Bioethics Advisory Commission, the President expressed the nature of his ethical misgivings concisely (Clinton, 1998):

> This week's report of the creation of an embryonic stem cell that is part human and part cow raises the most serious of ethical, medical, and legal concerns. I am deeply troubled by this news of experiments involving the mingling of human and non-human species.

We will have more to say on the subject of crossing species boundaries shortly. Now, however, it will be useful to contrast the threat to our "identity" posed by human genetic engineering with that posed by psychopharmacology or brain surgery.

Human GE Does Not Threaten *Particular* Personhood (Personal Identity over Time)

In genetically altering recently fertilized eggs, one might conceivably alter *general* personhood or humanness – i.e., one's very status as a person or a human – but not *particular* personhood or humanness. That is, assuming that the recently fertilized egg (a.k.a., the one-cell embryo, or zygote) is not a person or human being, genetically altering it might give rise to an organism that is not a person or not a human being. However, such an alteration will not result in a loss of (or threat to) personal identity over time, as was illustrated in the cases of brain surgery and (arguably) cosmetic psychopharmacology. What is threatened in those latter cases is the continued existence of a particular, essentially psychological, person. Where there was, prior to treatment with Prozac (or a "Super Prozac"), Jane, there is now some other individual who is not (or is only partially) Jane. And intentionally bringing about the loss of part or all of this unique individual person is ethically regrettable. The same might be said of certain types of brain surgery that similarly result in significant differences and psychological discontinuities between the pre-operative and post-operative patient. The relevant examples considered above were the transplantation of whole lobes or whole brains.

But *particular* personhood – or personal identity over time – cannot be what is lost in the case of human GE *because the thing that is altered (the zygote) is not a person*. There is no Jane that exists in the first place, and thus no particular person who could be lost through some radical pharmaceutical, surgical or other alteration. It has just been

asserted without argument that the zygote, or one cell embryo, is not a person. Those who find this assertion implausible might insist that some justification – some account of personhood – is required here While a justification could well be articulated, we can instead concede the point and make an alternative claim. Even if we allow that the zygote is a person – and thus that personal identity over time *is* potentially threatened by genetic alterations of the zygote – we can stipulate instead that the *gamete* (i.e., the sperm or egg) is the object of genetic manipulation (see Chapter 2 for technical details). It is difficult to imagine an account of personhood on which gametes qualify as persons. At a minimum, we may say that the burden has now shifted to those who would make such a claim.

Isolating the Ethical Variable of Interest – Humanness

We have been searching for what we intuitively feel is potentially intrinsically wrong with human GE. This search is important, we have said, for two interconnected reasons. First, our policy statements reflect the popular sentiment that, while some medically beneficial human GE ought to be permitted, there are some moral lines that should not be crossed with the technology. Thus far a restrictive policy has been able to rely on the risk of harm and other common ethical objections as the basis for the ethical consensus against human GE. However, there is reason to believe that the technology will become safe, and other common objections, we will argue, are not likely to stop the momentum that favors a permissive policy on human GE

Second, as an ethical issue, the current debate over human GE seems incomplete. The concerns about harm, the moral status of the embryo, eugenics, and so on, do not capture the deeper ethical misgivings – the sense that at least certain kinds or degrees of genetic intervention threaten "who we are." We have noted that this intuitive sense that human GE threatens our sense of identity or "who we are" cannot be understood to mean *particular* personhood (personal identity over time). However, GE can, in principle, threaten *general* personhood or humanness That is, assuming that it became technically feasible, substantial alterations of the human genome could give rise to a novel organism that would not be recognizably human. The hypothesis, then, is that it is the potential of human GE to threaten our humanness that is at the heart of our intuitive moral aversion.

At this juncture, a point should be made regarding the selection of human genetic enhancement from among several controversial biotechnologies that have evoked similar moral reactions This selection was made not only because human genetic enhancement is an important and timely public policy issue in its own right. There was a strategic reason as well. As might already be obvious, the motivation had to do with isolating the ethical variable of interest. By focusing on *enhancement*, as opposed to genetic engineering generally, we are by definition ruling out moral objections based on bad consequences. By choosing *germline genetic* alterations, we eliminate moral objections having to do with a loss of personal identity over time. (Per above, we are starting with a one-cell embryo or gamete – a non-person and so loss of personal identity is impossible.) Thus, in attempting to make sense of the intuitive moral aversion to GE, it is being suggested that even when human GE leads to good consequences and does not

threaten personal identity over time, something (the isolated ethical variable – humanness) of ethical significance remains.

We will have more to say about the notion of humanness shortly. For now we will continue to rely on a common-sense understanding of what it means to be human. What sort of human genetic enhancement might threaten humanness?

Silver's Futuristic Scenario: The GenRich

Silver, in *Remaking Eden* (1997, pp 240-249), describes a scenario that will serve us well in our ethical thought-experiments. In Silver's future world, genetic engineering technology has become routine by the year 2350 and is used for purposes of enhancement. What H G. Wells had predicted at the end of the nineteenth century – the splitting of the human species –is gradually coming to pass. But Wells was speaking of the natural course of evolution and a time scale of 800,000 years Scientists now are predicting species divergence via GE-accelerated evolution by the year 3000. Early on, enhancements were largely related to physical and mental health. Before long, however, non-health related traits – such as cognitive and athletic abilities – were fair game. "Genetic enhancement clinics" are widespread and privately financed, owing to a long-standing ban on funding research on human embryos. Immense profits are at stake in the industry, and consumer demand is strong, making a belated attempt at regulation politically improbable. Aside from all this, all wielders of political and corporate power are themselves genetically enriched. Although not yet a distinct species, this "GenRich"

class has an extra pair of chromosomes – 48 instead of the 46 in the unenhanced, or "Natural" class – designed to hold additional "gene packs" as necessary.

By the 26th century, *Homo sapiens* has evolved into four species. One is the unenhanced Naturals. The other three are GenRich species made distinct from each other as a consequence of corporate competition: The three mega-corporations that dominate the industry use mutually incompatible gene-pack "platforms." Massive overpopulation has made Earth inhospitable, hence the GenRich have been modified to live in extreme conditions, such as in the polar regions and even on Mars where "lung-modified thick-skinned dark green human descendants" live quite comfortably "within enormous bubble-enclosed biospheres" (ibid., p. 247). By the 27th century, there are at least a dozen human-derived species each with 46 to 54 chromosomes. One gene-pack – called AGEBUSTER – has opened up new possibilities for distant space travel by dramatically slowing the aging process.

For present purposes, these few details will suffice. The purpose of the thought-experiment is to provide an extreme case so that what (if anything) is ethically objectionable about a loss of humanness through radical genetic enhancement will be more apparent. By the term *radical genetic enhancement* of humans we have in mind, roughly, a genetic change that is generally beneficial but which produces an organism that is no longer recognizably human and can no longer interbreed with unenhanced humans.

Now it seems clear that many aspects of our present-day humanness (at least, biological humanness) would be altered in our GenRich descendants. But for the sake of

starting the discussion, let us first consider the charge that Silver's scenario is morally objectionable because we have crossed the biological line that separates one species from another.

Crossing Species Boundaries

Several challenges have been made to the claim that crossing species boundaries has special ethical significance.[3] First of all, it cannot be the transfer of "foreign" DNA in transgenics (GE) that is morally problematic, for such transfer happens in nature without human intervention. Second, the claim that the creation of tangelos or mules – bred from tangerines and grapefruits, and horses and donkeys, respectively – is morally wrong seems highly implausible. Third, if the concern is that GE can be used to create *non-sterile* hybrids (unlike mules), then it seems that the fear has to do with a "self-perpetuating mistake," rather than crossing species boundaries *per se*. Fourth, the concern may be about *human*-animal hybrids – specifically, that some horrible Frankenstein-like outcome will result. But if this is the "rational kernel" of the objection, then the rightness or wrongness of creating such a hybrid depends on the consequences That is, once again, the objection is not against crossing species boundaries in itself, but about some anticipated harm. (It has been consequentialist concerns that have dominated in the debate over the ethics of xenotransplantation – transplantation of organs from one species to another. The only significant ethical hurdle has centered on the probability

that xenotransplants will contain latent viruses harmful to humans (Le Tissier, Stoye, Takeuchi, Patience, & Weiss, 1997; Vogel, 1998).)

Fifth, one might claim, instead, that the creation of human-animal hybrids is *intrinsically* wrong. In response, two questions are posed by the President's Commission in *Splicing Life* (ibid., p. 59)

> First, what characteristics are uniquely human, setting humanity apart from all other species? And second, does the wrong lie in bestowing some but not all of these characteristics on the new creation or does it stem from depriving the being that might otherwise have arisen from the human genetic material of the opportunity to have a totally human makeup?

Surprisingly, the report makes no attempt to answer these questions, instead stating that "the information available to the Commission [in 1982] suggests that the ability to create interspecific hybrids of the sort that would present intrinsic moral and religious concerns will not be available in the foreseeable future" (ibid., p. 59). What is expected, according to the report, is the use of *single* human genes, or research that does not result in mature organisms (ibid., pp. 59-60).

Splicing Life was one of the first statements of the "orthodox view" of the ethics of gene therapy. The orthodox view can be summarized as follows:

1. Alterations to the genes of *somatic cells* (any cell except the sperm or egg or their precursors) for the purpose of medical *treatment* is morally permissible.
2. Genetic alterations in the *germline* (e.g., in sperm, egg, or zygote) are morally impermissible, even if intended for medical treatment – at least as long as the technology carries an unacceptable level of risk.
3. Genetic alterations for the purpose of (non-medical) *enhancement* are morally impermissible, whether carried out in somatic or germline cells.

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[3] The following discussion is based on the report *Splicing Life* (U.S. President's Commission for the Study of Ethical Problems in Medicine and Biomedical and Behavioral Research, 1982, pp. 56-58).

More will be said about the development and current status of the orthodox view in a later chapter. For now we can make the following observations about the moral prohibitions against germline or enhancement GE. While some have argued that *germline* GE is intrinsically wrong, the primary reason for this prohibition seems to be a prudential concern about risk of unintended harm. With respect to the impermissibility of *enhancement*, again some have attempted to argue that enhancement, genetic or otherwise, is intrinsically wrong. As we shall see, these arguments are implausible given the fact that we enhance ourselves in many other ways – e.g., through exercise, education, plastic surgery, and ingestion of caffeine. Others argue that enhancement amounts to eugenics, and we should learn from having been on the slippery slope of eugenics before (more on this later).

A lot has happened in the fifteen years between the publication of *Splicing Life* and the publication of Silver's book. Silver and others argue that, owing to unexpectedly rapid technological progress, we can no longer rest on the assumption that the kind of genetic interventions generally taken to be morally troubling will "not be available in the foreseeable future." The orthodox view may have been sufficient justification for a restrictive public policy when human GE was *not* safe and technically feasible. But, there is good reason to believe that the technology *will* become safe and available. This forces us back to the very questions that *Splicing Life* considered moot. What is it about human beings that distinguishes us from non-humans? And what exactly is ethically objectionable about creating human-derived, genetically engineered non-human organisms?

CHAPTER TWO: THE SCIENCE OF GENETIC ENGINEERING

The following four assertions have already been made with respect to human genetic engineering:

1) Human GE is or soon will become technically feasible.
2) Human GE is likely to become acceptably safe for use in humans.
3) Human GE promises tremendous benefits.
4) Human GE has the potential to give rise to human-derived non-human creatures.

The purpose of the present chapter is to give a brief introduction to the biomedical aspects of human GE, and thereby to lend support to each of the above-mentioned claims.

Although human eugenics – or the genetic improvement of humankind – did not have its beginning with genetic engineering, the advent of human GE changed the nature of the ethical concerns. We will compare human eugenics in the pre- and post-GE era to see what new ethical issues arose in the latter. Having placed human GE in the context of eugenics, an overview of the technology will be given. The aim here is to describe genes, chromosomes, embryonic development, and so on, in just enough detail so that a conceptual picture of the creation of a genetically engineered organism emerges. The relevance of some topics – such as human cloning and embryonic stem cells – may be unclear initially. But the question of relevance should disappear near the end of the chapter when the various pieces of the puzzle are assembled into what may resemble a scientific recipe for human beings.

The resemblance to a recipe may be what makes human GE seem so amazing on the one hand, yet disturbing on the other. It is as if human beings had always been

dropped from the sky, like manna from heaven, wholly formed and immutable. And then, in one cataclysmic moment, the secrets of our creation were revealed to us, no longer shrouded in divine mystery, but exposed for all the mundane biochemistry that they are. However that may be, let us forge ahead in hopes that a better understanding of our biological nature will enlighten our subsequent discussion of what, if anything, is "sacred" about human beings, and how human GE might pose a threat to that sacredness.

Altering Evolution: From Improving Humankind to Improving *On* Humankind

The eugenics movement, in two waves

Altering the course of human evolution is not a new idea. Especially since the end of the 19th century, scientists and others have taken up the cause of genetic improvement of the human race. The heyday of eugenics in the United States and western Europe was from the 1880s through 1932 (Carlson, 1981; Kevles, 1992), although a eugenics revival of sorts occurred primarily in the years following World War II. Kevles (1992) refers to the earlier and later movements as "prejudicial eugenics" and "reform eugenics," respectively.

The original Eugenics Movement was founded by Francis Galton, a cousin of Charles Darwin. Galton promoted a plan of "human betterment" through controlled breeding. This entailed both *positive eugenics* (genetic improvement through promoting the propagation of desirable traits) and *negative eugenics* (genetic improvement through preventing the propagation of undesirable traits). Galton himself was a respected

scientist in his day. His emphasis was on positive eugenics as much as negative eugenics. Others such as Charles Davenport of the Eugenics Record Office (U.S.) emphasized negative eugenics. Under the influence of Davenport and his ilk, eugenics was popularized. Immigration policies of the day were informed by eugenicists, called as experts to testify on, for example, the relative "fitness" of immigrants from southeastern Europe as compared with those from northwestern Europe. State fairs awarded prizes to families judged the most eugenic, as opposed to "dysgenic." And the U.S. Supreme Court, in *Buck v. Bell* (1927), upheld the forcible sterilization of the (allegedly) mentally ill, ruling that "three generations of imbeciles are enough" (Kevles & Hood, 1992, p. 10).

Eugenicists of this era were increasingly being criticized for their simplistic treatment of human "traits" such as "pauperism," and "shiftlessness." By what criteria were these categories judged? And even putting aside the definitional problems, did these so-called traits follow Mendelian rules of inheritance? The criticism was increasing in direct proportion to the growing scientific understanding of the physical nature of the genetic material. For example, geneticists working with the fruit fly, *Drosophila*, established that chromosomes in the nucleus of biological cells were the sites of the (still mysterious) genes. Experimental work using X-irradiation of chromosomes showed that physically detectable changes in chromosomes were associated with the appearance or disappearance of genetic traits, such as eye color or wing morphology. These causal links suggested that casting genetic change in the global language of behavior rather than the particular language of cellular biology and biochemistry was taking unjustifiable liberties with the available evidence.

The original Eugenics Movement was eventually discredited, and the motives of many of its adherents were exposed as prejudiced. With the ascension of fascist regimes in Europe in the 1930s, the word "eugenics" became inextricably linked to the abuses committed in its name. As Kevles notes, "plant and animal geneticists were discouraged from having anything to do with human genetics because of its associations with racism, sterilizations, and scientific poppycock" (1992, p 11). For these reasons, serious discussion of the deliberate shaping of the human gene pool was frowned upon for a time.

The reform eugenicists, however, were motivated by a concern that mutations (changes in the nucleotide sequence of the genome) were accumulating in the human gene pool at a rate that could jeopardize humanity at some point in the future. Mutations occur naturally at a low frequency. But other modern developments, it was feared, would increase the frequency of mutations among the population. Chief among these were life saving medical advances and artificially generated radiation. Advances in medicine meant that persons with some genetic diseases were living long enough to reproduce and pass along their deleterious genes to their offspring, whereas in earlier times they had not. The medical use of X-rays, and later radioactive fallout from bomb testings, was cause for alarm since radiation was known to be a highly effective mutagen.

The overall picture, then, was that humanity was facing some distant "Genetic Apocalypse" (Ramsey, 1966, p. 132) that could only be circumvented by humankind's intervening in its own evolution. As one contemporary scientist noted, "[t]he three great problems created by the exponential explosion of man's power over nature are nuclear war, the population explosion, and genetic deterioration" (Shockley, 1966, p. 104). It

was this gloomy outlook that permitted geneticists of the 1960s to publicly speak of eugenics at all in the wake of the Nazi Holocaust (Ramsey, 1966, pp. 109-110). (Concerns about a high rate of accumulation of deleterious mutations have recently resurfaced, although not in "apocalyptic" terms (see Wade, 1999d).)

By what means were we to direct our own evolution and stave off genetic disaster? H.J. Muller, a Nobel laureate and leading reform eugenicist, proposed a system of "germinal choice." This essentially meant the voluntary selection of frozen sperm from desirable donors, with guidance from genetic counselors, for use with artificial insemination. But there was at the same time (ca. 1960s) no shortage of futuristic speculation about human cloning, in vitro fertilization (IVF), cross-species hybrids, and human genetic engineering. At this time, partial success with cloning had been achieved in frogs; experimentation into human IVF was just beginning; cells from different species had been fused; and scientists were well on their way to discovering the complete genetic code. This futuristic speculation was set centuries or even millennia in the future, which no doubt tempered some of the alarm that might otherwise have been expressed. In 1963, for example, the British biologist J.B.S. Haldane gave a speech at a meeting of futurists titled "Biological Possibilities for the Human Species over the Next Ten Thousand Years." Haldane predicted that the cloning of humans would become possible, and would benefit humankind by simplifying the eugenic program of reproducing only the highest achievers, bettering humankind (1963, pp. 352-353). This frank acknowledgement of the eugenic purposes to which reproductive technology might some

day usefully be put was typical of the speeches and debates at this meeting, which was attended by Lederberg, Crick, and other scientists of the highest distinction.

Genetic engineering: a third wave of eugenics?

Muller's germinal choice proposal was viewed by Lederberg as shortsighted. In Lederberg's view, the way to ensure human survival was not through what amounted to technologically assisted human husbandry. Instead, the eugenic project would best be served by investing in the new techniques of molecular biology and genetic engineering In doing so, Lederberg felt, humankind could "accomplish in one or two generations of eugenic practice what would now take ten or one hundred" (Lederberg, 1963, p. 265).

We are now able to go inside the nucleus of cells and change the genetic code. When the cells on which we perform this genetic surgery are the sperm, egg, or zygote, then the genetic change is carried in each nucleus-containing cell of the adult organism – a complete genetic transformation.

Thus, human GE makes possible a eugenics program that is fundamentally different from those of the 1960s. In the 1960s, the possible offspring of, say, Muller's germinal choice strategy were limited to those made possible by the joining of any human egg with any human sperm. Today, with gene-splicing technology, there is no such clearly circumscribed limit. Genes of non-human origin, or artificially synthesized genes, could without great difficulty be introduced to a developing human embryo. Thus, in addition to fears about prejudicial abuses, eugenics-via-human GE is subject to a new

ethical objection, namely, that something morally fundamental to human beings – our very "humanness" – could potentially be lost.

Other breakthroughs in reproductive biology are proving just as remarkable as our ability to alter the genetic code. We are evidently – although the confirmatory experiments are not permitted – now able to create human beings from "seeds" other than the combination of sperm and egg. The seeds we are speaking of are the nuclei of our body cells, which would be used in human cloning, and human embryonic stem (ES) cells. But first, let us turn our attention to the gene itself.

Genes, Chromosomes, and Human Seeds

What is a gene?

Everyone has heard of genes, and many have heard of gene therapy. But I think it will help us if we give ourselves a clear picture at the outset of what genes are and how one might go about altering them.

Our body is composed of at least a trillion cells (Aldridge, 1996, p. 5), and in the center of almost all of them is a nucleus. The nucleus is surrounded by a membrane, just as the whole cell is, so it looks like a little cell within a cell. And the membranes – both cell and nuclear – provide a physical barrier that some things can cross and other things can't. Held within the nuclear membrane are the chromosomes. Most human cells have chromosomes, and in those that do there are 46 (two sets of 23), except for the sperm and egg cells which have just one set of 23 chromosomes. Each chromosome is composed of

an enormously long double-strand of DNA (deoxyribonucleic acid) supported by proteins that serve as a sort of biologically active scaffolding. The double-strand is in the shape of a helix, sort of like a spiral staircase. The chromosomes would be over six feet in length if one could manage to get hold of the ends, stretch them like rubber bands, and lay all 46 of them end to end. (Thus stretched, all the DNA from one human body would reach to the moon and back 8,000 times (Weatherall, quoted in Harris, 1992).) But inside the nucleus of the cell, the total length of the chromosomes is only 0.3 millimeters (Aldridge, 1996, p. 60). A reduction in length from six feet to 0.3 millimeters is analogous to a cord stretching across the U.S. being shortened until its length was only a few city blocks.

What accounts for this 20,000-fold reduction in chromosome length? The answer is that the DNA on its protein scaffold is "supercoiled," or subjected to higher-order coiling. To illustrate higher-order coiling, think of a braided rope. First-order coiling consists in the braids winding around each other to make up the rope. Second-order coiling would be present if one coiled the rope, as when sailors make a roughly cylindrical stack for easy access at sea. If one could imagine such a stack of rope that was very tall and somewhat rigid, then third-order coiling would be accomplished by coiling that tall cylinder around something else.

So that's a chromosome – what's a gene? A gene is any stretch of the chromosome that codes for a protein. In thinking conceptually about genes, we can for our purposes imagine just the DNA double helix and forget about the proteins and the supercoiling of the chromosomes on which the genes lie. What do we mean when we say "codes for a protein"? Let's start with the DNA code first. We said that DNA is a long

double helix. We can now say a bit more about it Each strand of DNA is a long *chain* made up of individual links called nucleotides Each nucleotide has a characteristic chemical structure, which we won't bother ourselves with. There are four nucleotides making up DNA: adenine, thymine, guanine, and cytosine, or A, T, G and C for short. So we can now picture two long nucleotide chains running side by side. For example, one strand might have the following partial sequence:

ATTGCGGAATCGTACCA

If this were the nucleotide sequence on one strand, then its partner or complementary strand would have this sequence:

TAACGCCTTAGCATGGT

So when you put both strands together they look like this:

ATTGCGGAATCGTACCA
TAACGCCTTAGCATGGT

You might have noticed that A always pairs with T and C with G (called "base pairs"). If we think of our DNA double helix as a ladder, the AT and CG bonds between strands are analogous to the rungs G and A can't pair because they're both big; the rung would be too long. C and T can't pair because they're both small; the rung would be too short. (Also, A and T each have two binding sites, while C and G each have three.)

Protein is not made directly from DNA. An intermediary molecule, called messenger RNA (mRNA), is "transcribed" from one of the two DNA strands. RNA is chemically very similar to DNA. It also is a chain (single-strand) made up of nucleotides. These are the same nucleotides as with DNA, except that U (uracil) takes

the place of T. The messenger RNA is in effect a copy of the DNA code. Each mRNA is a tiny fraction of the length of a chromosome, and is not all bound up in the chromosome superstructure. This means that it is free to float off into the nuclear space and make its way across the nuclear membrane to the cytoplasm (the space between the nuclear and cell membranes) where proteins are assembled.

We won't concern ourselves with the fine details of protein synthesis. We will say only a few things. First, the genetic code, as delivered in the form of mRNA, is translated into the amino acid sequence of a protein. Like DNA and mRNA, proteins are chains, too. They are single-stranded and made up of amino acids instead of nucleotides. One amino acid is drawn to a particular triplet of nucleotides at one of the cell's ribosomes. While the mRNA chain ratchets its way through one side of the ribosome (the image of ticker tape comes to mind), an amino acid chain is formed on the adjoining side, with the sequence being determined by the three-by-three sequence of the mRNA.

So what's so great about a protein? Proteins are the workhorses, chemically speaking, of biological life. The immunoglobulins (antibodies) and certain hormones are proteins. Proteins are important structurally. (Chromosome structure is but one example.) Transmission of nerve impulses relies on proteins. Enzymes are perhaps the most important class of proteins. Without enzymes all of our biochemical machinery would come to a halt including, as just one example, the breakdown of our food into biochemical building blocks and the reassembly of those building blocks into macromolecules, cells, organs, and ultimately us.

We said earlier that a gene is any stretch of DNA that codes for a protein. Humans have about 50,000 to 100,000 genes and a gene of average length comprises roughly 1,500 base pairs. But there are about three billion base pairs of DNA making up the chromosomes. This means that only about 2% of the genome appears to "code" for protein, thus there is a lot of non-coding (so-called "junk") DNA (Aldridge, 1996, p. 57). The Human Genome Project has undertaken to sequence the human genome (i.e., the complete sequence of chromosomal DNA). The long-range goals are to distinguish the coding regions (genes) from the non-coding regions, and to figure out what proteins each gene codes for and what those proteins do in the cell. Since many genes/proteins are involved in multiple cellular processes, the full interconnected understanding of biological life is certain to be incredibly complicated.

Some genetic phenomena, however, appear to be relatively straightforward. There are some diseases that result from a defect in a single gene. Sickle cell anemia and cystic fibrosis are two common examples. In sickle cell anemia, a mistake in the DNA code *at just one nucleotide* results in a change in the amino acid sequence of the protein and that single amino acid mistake causes the protein to malfunction. Other single-gene disorders are cystic fibrosis (CF), Tay-Sachs disease, and Huntington's disease (HD). Single-gene disorders lend themselves to gene therapy because a modification would be needed at only a single locus in order to correct the genetic defect. More will be said about these diseases below.

Before considering the potential medical benefits of gene therapy, however, it will be helpful to outline what is involved in gene therapy, technically speaking. In turn a

brief introduction to the stages of embryological development and certain reproductive technologies will make the subsequent explanation of gene therapy easier to follow. Some parts of this introduction also bear on later arguments related to the moral status of the embryo.

Embryonic and fetal development

Fertilization takes place in several steps. First, one or several sperm stick to the outer protective covering – the *zona pellucida* – of the egg, which is making its way through the Fallopian tube on its journey from the ovary to the uterus. The sperm has a roundish head and a whip-like tail which propels it along. The sperm, upon contacting the zona pellucida, releases enzymes that dissolve the zona. In this way, the sperm gains access to the space between the zona and the next barrier, the cell membrane of the egg.

The second step, then, is fusion with the egg cell membrane. Initially the sperm tail and the membrane surrounding the sperm head are intact, but these dissolve after a few minutes, leaving the bare nucleus, or *pronucleus*. Thus there are now two pronuclei inside the egg cell membrane – one from the egg and one from the sperm. The third step involves the erection of chemical barriers to prevent the entry of other sperm. (If a second sperm cell penetrates the egg before these barriers are in place, the fused sperm-egg dies because of the excess genetic material – i.e., three sets of chromosomes [triploidy] instead of the required two [diploidy].) The zona becomes harder, and a repellant electrical "screen" is established at the egg cell membrane.

In the fourth step, the maternal (or egg) DNA is reduced by half. That is, the process of reducing the chromosome number to 23 (one copy of each, or "1N") from 46 (two copies, "2N") is completed after penetration by the sperm. It is a popular misconception that the egg has a 1N chromosome number prior to fusion with the sperm.

The fifth and final step is fusion of the pronucleus of the sperm with that of the egg. Here we encounter a second popular misconception: The two pronuclei do not fuse with one another to form one nucleus at the one-cell embryo (or zygote) stage. Instead each of the two pronuclei is duplicated, *then* the zygote divides. At this point there are two cells, each containing one sperm-derived pronucleus and one egg-derived pronucleus. It is at this *two-cell* stage that the pronuclei in each daughter cell commingle, giving rise to a 2N (i.e., 46-chromosome) state Fertilization is now – at the two-cell stage – complete (Silver, 1997, pp 37-38).

Between days two and six there is further cell division and *differentiation* A cell differentiates when it progresses from a cell type that has the potential to give rise to any (or many different) cell type in the body to one of those final cell types, such as skin, brain, blood or liver cells. Taking the example of an oak tree, the acorn is the undifferentiated precursor cell that has within it the potential to develop into all of the many cell types of the mature tree. The acorn is an example of a *totipotential* cell. In the embryo, all cells are totipotent until the eight-cell stage. Thus, if one took an eight-cell embryo, split it into its eight component cells, and coated each in an artificial zona pellucida, one would have eight genetically identical embryos (or embryo-equivalents) where before there had been just one. Each, if successfully implanted in a uterus, could

give rise to a fetus and the supporting placental tissue. (This human embryo "splitting" was in fact done in 1993 – converting 17 human embryos into 48 – by researchers at George Washington University and, not surprisingly, was met with vehement public opposition (McCormick, 1994; National Advisory Board on Ethics in Reproduction, 1994; Robertson, 1994). The term "cloning" was used in reference to the procedure, further fanning the flames of controversy, although embryo splitting is distinct from the nuclear transfer cloning used to produce Dolly the sheep in 1997 (Cohen & Tomkin, 1994; Wilmut, Schnieke, McWhir, Kind, & Campbell, 1997).) Of greater practical importance, using IVF one can remove one of the cells of the eight-cell embryo and test it for genetic defects. Only those embryos that pass the genetic screening are then implanted into the uterus. This technique is known as *preimplantation (genetic) diagnosis*, or PID.

After the fourth division (at the 16-cell stage) the outer cells of the embryo are no longer totipotent. These outer cells are destined to form the placenta. The inner cells are still totipotent (Silver, 1997, p. 49). At day five, the embryo, still encased in the zona pellucida, enters the uterus (ibid., p. 51). At about day 7 or 8, the embryo "hatches," i.e., it slithers through a break in the zona wall and implants in the uterus, prompting the establishment of blood vessel connections. At this point the inner cells of the embryo are still totipotent, meaning that the formation of twins (triplets, etc.) is still possible (ibid., p. 52).

On day 14 or 15, the inner cells of the embryo at last begin to differentiate. That is, they are destined to be progenitors of fetal cells, rather than placental cells. Thus, as

embryologist C.R. Austin notes, "The whole egg certainly becomes the embryo, and the whole fetus becomes the child, but the whole embryo *does not* become the fetus only a small fraction of the embryo is thus involved, the rest of it continuing as the placenta and other auxiliary structures" (quoted in ibid., p. 53) (This fact has been used to argue that it makes no sense to say that the embryo is a human individual prior to the beginning of the third week of development.) On day 15, the *primitive streak*, or "precursor to the spinal cord and backbone" appears, and twinning is no longer possible (ibid., p. 53).

In week four, the internal organs appear. By the end of that week there is a heartbeat and circulation, and the earliest stages of brain development have occurred. The embryo is less than one-quarter inch in length. Between weeks six and eight, external human-like features appear, prompting a change in terminology from "embryo" to "fetus." By week twelve, all major internal organs have appeared, but neither these nor the central nervous system is yet functional (ibid., pp. 53-54).

Between weeks 24 and 26, the lungs become functional and, therefore, the fetus becomes viable. By "sheer coincidence" at this same time the cerebral cortex also has become functional, meaning that the potential for consciousness exists at this stage (ibid., pp. 55-57).

Now that we have been introduced to human embryonic development and the related notions of embryonic potency and differentiation, we may introduce *embryonic stem cells*. Embryonic stem (ES) cells could play a key role in human GE technology, as we will explain below, relying on Silver (ibid.). Since the publication of Silver's book

(in 1997), two teams of researchers have discovered human ES cells, bringing us one major step closer to technically feasible human GE.

Embryonic stem cells

In 1993, scientists removed certain cells from a mouse embryo, wrapped them in other genetically disabled cells meant to resemble a placenta, implanted them in the uterus of a mouse, and produced adult mice (Kolata, 1999). These cells are called embryonic stem cells. Since then, ***human*** ES cells have been discovered (Gearhart, 1998; Thomson et al., 1998). The general presumption is that what can be done with ES cells in mice can be done in humans. That is, human ES cells, if properly handled, would give rise to adult human beings.

Human ES cells have been a sort of Holy Grail for biologists for reasons unrelated to the potential to produce entire human beings. Human ES cells have been called "the raw material for... human tissue engineering" (Marshall, 1998, p. 1014). Since ES cells are primordial cells for *all* the organs and tissues of the body (i.e., they are totipotential), the hope is that scientists will be able to figure out the molecular signals that direct ES cells and their close descendants down the path that ends in, say, pancreatic cells "that could squirt out insulin for a person with diabetes or a fresh layer of skin for a burn patient" (Kolata, 1999). The creation of transplantable ES-derived human tissue has been called the "home run" of ES technology by private-sector financial backers. Genetically engineering ES cells prior to tissue engineering would provide a means to alter the transplantable tissue so that it cannot be rejected by the immune system of the host

patient (Marshall, 1998, p. 1015). Human ES cells will also benefit the research and development of new pharmaceuticals. Instead of having to screen potentially useful drugs using non-human or abnormal (i.e., cancerous) human cells in culture, the hope is that normal human tissue of any type (e.g., liver, brain) can be produced from ES cells and then used to screen drug candidates (Marshall, 1998, p. 1015).

At present, the molecular signals that direct human ES cells down particular developmental pathways are unknown. Thus, ironically, while it is technically impossible at present to produce isolated human organs or tissues from ES cells, the prevailing scientific opinion seems to be that creating a complete human organism from ES cells, though illegal, is possible (Kolata, 1999)

Cloning

The significance of cloning, many feel, has little to do with reproducing "carbon copies" of existing persons, and much to do with genetic engineering. As Lee Silver notes, "For the first time, germ-line gene therapy becomes realistic" (Mirsky & Rennie, 1997, p 122). And Theodore Friedmann, director of the gene therapy program at the University of California at San Diego and an early advocate of the technology, echoes this view saying, "The need for enlightened public debate over the merits and risks of germ-line therapy has, however, been made more urgent by the recent cloning of an adult sheep" (1997, p. 96). We shall see why this is so shortly. First, however, we need to explain briefly what cloning is.

The term "human cloning," as commonly used, refers to the creation of a human offspring not from sperm and egg, but from the combination of a modified egg and the nucleus of a body ("somatic") cell, such as a blood, skin, or muscle cell. Recall that the embryo, to be viable, must have 46 chromosomes, two sets of twenty-three. We called this the 2N chromosome number. Normally, the 2N chromosome number is achieved in the fertilized egg (zygote) by the contribution of one set of 23 chromosomes by the egg and one set of 23 by the sperm. There may be a great number of reasons why not just any of the body's cells can fulfill the role of one of the gametes (the egg and sperm). But primary among these is the fact that only the egg and sperm and their immediate precursors have a 1N chromosome number, and thus in combination can add up to the required 46 chromosomes.

What if one were to take the 46 chromosomes from one of the run-of-the-mill somatic cells and place those chromosomes in an egg from which all chromosomes had been removed? The answer, we now know, is that apparently normal mammalian offspring are produced. This is the procedure that led to the birth of Dolly the sheep, the first mammal cloned from adult cells (Wilmut et al., 1997).

Now, the procedure was not as simple as it has just been made to seem. The major breakthrough in the creation of Dolly was not cloning *per se*. After all, other animals had been cloned using the donated nuclei (containing the 46 chromosomes) from *embryonic* cells. But repeated failures to clone *adults* – i.e., using donated nuclei from adult cells – led scientists to believe that the latter was not possible. This was the accepted belief virtually up to the moment that Dolly's birth was announced to the world.

The explanation was that nuclei in adult cells were fully *differentiated*, whereas embryonic cell nuclei were *totipotent*, or at least potent enough that they could be made totipotent once placed in the biochemically accommodating environment of the (enucleated) embryo. As we described it above, the process of differentiation – of going from totipotential embryo to the terminally differentiated skin cell – seemed to be a one-way street. One can go from the acorn to the leaf cell, but not from the leaf cell to the acorn.

The major breakthrough in cloning Dolly, then, was that, in some way, the process of differentiation was reversed. The mammary gland cell nucleus that was used to "fertilize" the enucleated egg was somehow made to regain the potential of an early embryo nucleus.

How this process of "de-differentiation" is stimulated in the laboratory, while of great scientific interest, is not central to our discussion. What is significant about cloning as it concerns human genetic engineering is that it helps make possible the strategy of gene replacement, which has been called the needed technological breakthrough for safe germline gene therapy (i.e., human GE).

Let us turn now to a brief overview of gene therapy. First, we will discuss the common classifications of gene therapy. This will be followed by a brief summary of the potential medical benefits of gene therapy. And finally, we will discuss how exactly genetic alterations are made – at which point we will re-visit cloning, ES cells, and some earlier points of discussion.

What is Gene Therapy?

Gene therapy refers to making biological improvements in an organism through direct biochemical modification of genes. There are two important distinctions that are now commonplace in the bioethics literature on gene therapy. The first distinction is between *germline* and *somatic cell* gene therapy. In germline gene therapy (GGT), the genetic modification is made in the chromosomes of the just-fertilized egg (a.k.a., zygote, or one-cell embryo). (In principle, the change could be made in the sperm or egg prior to fertilization.) Once the chromosomal DNA is modified in the one-cell embryo, that modification is carried to each of the cells that result from the multiple cell divisions that are part of embryonic and fetal development – first two cells, then four, eight, sixteen, and so on. The modified genome, then, is present in all of the cells of the adult organism. This includes, significantly, the gametes (sperm or eggs) of the adult, meaning that the genetic modification will be passed on to future generations should the adult reproduce.

In somatic cell gene therapy (SGT), the genetic modification is made to the chromosomes of somatic cells of the (fetus or) adult, i.e., any cells except the sperm or eggs or their precursor cells. This of course means that the genetic modification cannot be passed on to future generations. Should there be some unanticipated ill effect from SGT, the harm comes only to the treated patient. The case of cystic fibrosis provides a good example. Researchers are trying to figure out a way to deliver the normal cystic fibrosis gene (which is really the *non*-cystic fibrosis gene) to the lung cells of affected patients. If they can succeed in delivering the normal genes, the hope is that those genes

will take up residence at suitable sites on the chromosomes of the affected lung cells and begin to produce normal protein. The normal protein, in this case, is called CFTR, which stands for cystic fibrosis transmembrane conductance regulator. It situates itself in the cell membrane, sort of like a gate in a wall, and regulates the flow of water and ions into and out of the cell. The abnormal protein, coded for by the (abnormal) cystic fibrosis gene, also situates itself in the cell membrane. But it fails to properly regulate the flow, resulting in viscous deposits in the lungs that promote infections and interfere with respiration. CF is the most common single-gene disorder, affecting one in 2,000 persons (Aldridge, 1996, pp. 141-143).

The second distinction is between *treatment* (and prevention) gene therapy and *enhancement* gene therapy. Treatment gene therapy, as one might suspect, is gene therapy intended to treat (or prevent) a medical condition. Enhancement gene therapy is intended to improve or enhance biological functioning over normal functioning. There is some difficulty in distinguishing between these two types of gene therapy, owing to the difficulty in distinguishing disease from a merely undesired or unpreferred biological state. (We will return to this point in a later chapter.) These two distinctions leave us with four types of gene therapy:

1) Treatment somatic cell gene therapy
2) Enhancement somatic cell gene therapy
3) Treatment germline gene therapy
4) Enhancement germline gene therapy

Terminology

We have used the terms *gene therapy* and *genetic engineering*. *Genetic engineering* (GE) as used herein is synonymous with germline gene therapy, but not somatic cell gene therapy. The term (germline) *gene therapy* is perhaps more commonly used, especially in public policy circles. Because of that convention, we will continue to use the term in this paper, especially in those sections that make frequent reference to policy statements and the bioethics literature. However, the word "therapy" (notwithstanding the antecedent qualifiers "treatment" or "enhancement") implies that the genetic alteration has a medical purpose. Since our discussion of genetic engineering will encompass both therapeutic and non-therapeutic purposes – and will emphasize non-therapeutic purposes especially in the latter sections – avoiding the word "therapy" is preferable and we will make use of *genetic engineering*

One final term is sometimes taken to be synonymous with *genetic engineering* or *germline gene therapy* and that is *transgenics*. Velander's usage, however, is more typical. According to Velander (Velander, Lubon, & Drohan, 1997, p. 70) "transgenics" is GE in which the *non-human* recipient embryo is supplied with a gene *from another species* whose proper expression in the adult (non-human) organism is in some way useful. Following this convention, we will use for the term *transgenics* only when referring to GE in non-human animals.

What are the potential benefits of human genetic engineering (germline gene therapy)?

It is the promise of medical benefits that proponents of germline gene therapy (GGT) point to when pleading their case. Diseases such as Tay-Sachs, Lesch-Nyhan syndrome, sickle cell anemia, cystic fibrosis, and Huntington's disease, all of which are associated with horrible suffering and premature death, can not only be prevented in the genetically-altered "patient" (as with somatic cell gene therapy), they can also be *eliminated from the gene pool entirely*. The prospect of the total eradication of certain genetic diseases provides much of the momentum behind the pro-GGT arguments (Walters & Palmer, 1997, p. 76). It is worth digressing at this point to briefly describe some of these diseases, for only if we have a full appreciation for the benefits of human GE will we be able to responsibly assess, in the light of the ethical objections to be stated below, what we ought to do.

Lesch-Nyhan syndrome is a disease in boys that causes mental retardation, a chronic, gout-like pain, and an irresistible urge to self-mutilate. Typically, this self-mutilation consists of gnawing at the lips and finger tips to the point that those tissues are raw and bleeding (Kitcher, 1996, pp. 82-83).

Tay-Sachs disease results in neural degeneration in the first year and death invariably by the age of four. This recessive genetic disease is most common in Ashkenazi Jews (Kitcher, 1996, pp. 25, 351).[4] Sickle-cell disease is another recessive

[4]In humans, there are 23 pairs of chromosomes. Each gene is present in two copies, one on each of a chromosome pair. Recessive traits are traits that only appear in the organism when both copies of the gene are defective. Dominant traits are traits that appear in the organism even when only one copy of the gene is defective.

genetic disease and is caused by a mutation in the gene for a component of hemoglobin. Under anoxic conditions (e.g., prolonged physical exertion) the red blood cells that carry hemoglobin collapse, taking on a characteristic sickle shape. Such crises can lead to premature death (ibid., pp. 106, 351).

Cystic fibrosis (CF) was introduced above in molecular and cellular terms. In clinical terms, disease symptoms are caused by thick mucus from mucus-producing cells – a consequence of the inadequate water concentration in those cells. While several organs may be affected, the lungs usually are most affected, with the mucus acting as a trap for infectious microbes. Persons with CF have typically died in adolescence or young adulthood; 90% of CF deaths are from acute respiratory failure (Kitcher, 1996, p 40; Walters & Palmer, 1997, p. 29).

Huntington's disease is a dominant genetic disorder. The symptoms are a particularly cruel deterioration of neural tissue and, thus, mental functioning. Since symptoms don't appear until later in life – usually between ages 30 and 50 – a parent may conceive children without knowing that a) he or she carries the gene; b) he or she will therefore suffer the disease later in life; and c) he or she has at least a 50-50 chance of passing along the gene and disease to his or her children (Kitcher, 1996, p 39).

How are genes modified in genetic engineering (germline gene therapy)?

There are three general approaches to GE. The currently used, less desirable approach is *gene addition*. The preferred approach, not yet technically feasible, is called

gene replacement. A third approach, no doubt in the even more distant future, would make use of *artificial chromosomes*. We will consider each of these in turn.

In gene addition, the added gene is introduced (e.g., microinjected) into a one-cell embryo (Walters & Palmer, 1997). When successful, this results in the added gene randomly incorporating into the chromosomal DNA. We can imagine this as a small length of chain – the gene and important adjacent DNA – being "spliced" into the very much longer chromosomal DNA chain of one or more chromosomes. (Thus, the origin of the once-popular term "gene-splicing ") In fact, multiple copies of the exogenous gene are typically spliced into multiple genomic sites. As the embryo divides from one cell to billions in the mature animal, the added genes are faithfully passed along to each daughter cell, and if all works well at the chromosomal level, the genes are properly expressed and the therapeutic or other desired result is achieved. The gametes in this mature, genetically engineered animal also contain the transferred genes. This means that the genotypic and phenotypic changes arising from the GE will be expressed not only in the individual[5] receiving the treatment, but also in all of those of his or her descendants who are fortunate enough to inherit the correction.

The strategy of gene addition has some significant disadvantages. First, owing to the randomness of the integration of vector DNA into the host-cell chromosomal DNA, the added genes may be located at sites that are not conducive to their expression – i.e., transcription into mRNA and subsequent translation into protein. A second disadvantage,

[5] Note that "individual" is used as a neutral term with respect to status as a human being or person. The individual actually receiving genes in this procedure is, as indicated, a single-cell gamete or fertilized egg.

also associated with the randomness of the site of chromosomal integration, is that the added gene might situate itself within or near an important or essential cellular gene, thereby disrupting that gene's expression with potentially deleterious consequences for the organism. (Such a disruption is called an *insertional mutation* (ibid., p. 67).) A third disadvantage is that the defective gene is still present in the host cell or cells, and the presence of the corrective gene may not be able to (completely) overcome the deleterious effects of the defective gene. A final disadvantage – which applies to germline gene therapy and is related to the desirability of gene replacement – is that the defective gene persists in the gene pool. In the ideal case, the defective cellular gene would be *replaced* with the corrective, or therapeutic gene, rather than having the latter merely added to the mix with the defective gene persisting in the genome. Because the defect is not replaced, the corrective gene and the defective cellular gene may segregate from one another during meiotic cell division (ibid., p. 68) so that the therapeutic effect of the added gene may not be conferred to some or all of the descendants.

A strategy of *gene replacement* is, therefore, preferable to that of gene addition. Gene replacement, as the name implies, means removing the deleterious gene and – in the same physical site on the chromosome from which the deleterious gene was removed – inserting the corrective gene. Gene replacement has been called the "needed technical breakthrough" that would likely make germline gene therapy (human GE) acceptably safe in humans (Walters & Palmer, 1997, p. 72). It is here that cloning and ES cells come into play.

Silver (1997, pp. 232-233) explains how gene replacement would work. First, an egg would be fertilized using standard in vitro fertilization (IVF) techniques. The embryo is next grown in conditions in which cells continue to divide, but differentiation into the various cell types is blocked. The cells that result are called "embryonic stem cells."[6] The "stem cell" component of that term refers to the retained capacity (or "potency") to develop into any kind of embryonic or fetal cell – lung, brain, heart, etc.

Next, the ES cells in a laboratory culture dish are exposed to DNA containing the corrective replacement gene. Cells in a culture dish will internalize DNA under certain conditions. The procedure, known as *transfection*, is commonly used. A precise replacement is exceedingly rare, occurring in about one cell per million. But the sheer number of transfected cells makes it likely that a replacement event will be detected. Herein lies the critical advantage of ES cells over one-cell embryos: In order to perform gene replacement, one needs to transfect millions of cells in order to find a cell in which the precise gene replacement has occurred. There is no ready source of millions of human one-cell embryos. But human ES cells in culture can be grown to virtually unlimited numbers of cells.

Once a cell containing the replacement gene has been identified, it is isolated and cultured, and then nuclei from these genetically identical cultured cells can be used to clone the desired genetically altered organism. The cloning technique is essentially that used by Wilmut et al. (1997) to produce Dolly the sheep – nuclear transplantation, or

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[6] As previously noted, human embryonic stem cells have been successfully isolated since Silver published his book.

nuclear transfer (see above). This entire gene replacement GE protocol has already been used successfully in mice (Silver, 1997, p 232 and citations therein).

Artificial chromosomes are a relatively new item in the GE toolbox. These are artificially constructed chromosomes or chromosome segments that contain both genes of interest and sequences essential to the perpetuation of the artificial chromosome itself. There are two main advantages that come with using artificial chromosomes: First, genes can be added without disrupting the host cell genes – that is, without the problem of insertional mutations, noted above. Second, many genes can be carried on one artificial chromosome.

Artificial chromosomes may be used either as part of a gene addition strategy, or possibly as a part of gene replacement strategy In gene addition, the desired transgene(s) is introduced to the recipient cell as part of the artificial chromosome. The critical advantage of gene addition-via-artificial chromosome is that the host cell chromosomes aren't physically disrupted leading to the potentially serious consequences mentioned above.

With respect to a gene replacement strategy, Silver claims that artificial chromosomes could be used as part of a different sort of gene replacement – one involving the replacement of gene *function* rather than the physical substitution of the corrective gene in place of the defective. This gene-function replacement uses an approach called "anti-gene therapy." Although we will not delve into the technical details of anti-gene therapy, Silver's example conveys the general idea (1997, p. 233):

> Based on this approach, an anti-sickle-cell gene and a normal hemoglobin replacement gene could both be added together – as a gene-pack [i.e., on the same

> artificial chromosome] – into an embryo with a sickle cell disease genotype. The anti-gene would prevent the production of sickle cell protein while the normal transgene would make normal protein to take its place. The child that emerged from this embryo would be completely healthy even though he would still carry two defective sickle cell alleles (that are now silenced).

Researchers have already constructed "the first wholly synthetic, self-replicating, human 'microchromosomes,' one-fifth to one-tenth the size of normal human chromosomes" (Harrington, Van Bokkelen, Mays, Gustashaw, & Willard, 1997; Roush, 1997). Not only that, when human minichromosomes were transferred into mouse ES cells, and those ES cells were added to mouse eight-cell embryos, the resultant chimeric embryos gave rise to viable mouse offspring Various tests showed that the human genes residing on the artificial chromosomes functioned normally in the mouse cells. This study demonstrated that artificial chromosomes could be used in GE, and that the genetic changes thus introduced would be stably inherited from generation to generation (Rastan, 1997; Tomizuka et al., 1997).

This chapter has sought to accomplish several things. First, of course, was simply the goal of elucidating the nature of the biological alterations in question. Second, it is hoped that knowledge of some of the pertinent scientific details will help in evaluating a range of moral objections (see below), perhaps especially those having to do with the moral status of the embryo Third, highlighting some of the medical benefits of human GE was intended to make clear what it is that will give human GE its momentum as a public policy issue. (The opponent to human GE might say instead that it is the promise of medical benefits that will put us on the slippery slope to human GE.) Fourth and last,

it is hoped that, the claim that safe human GE will likely become available in the foreseeable future now seems plausible.

If human GE, as expected, becomes acceptably safe, then we will have dealt with one of the primary ethical objections to it. But the potential for direct harm to genetically engineered offspring is not the only objection. The current policy prohibited germline genetic intervention in humans has a broad ethical base The question remains, however – is that base secure?

CHAPTER THREE: The Tenuous Consensus on Human Gene Therapy Policy

The intuitive moral aversion that many feel to human genetic engineering persists, we have suggested, even when we account for many of the more obvious ethical objections. Two of these objections – threat to personal identity and risk of harm – have already been discussed (in Chapters 1 and 2, respectively). The sense that human GE threatens "who we are" persists even if it is conceded that, by the phrase "who we are" we cannot mean *particular* personhood (i.e., personal identity over time). Unlike surgical or drug-induced psychiatric interventions on already existing persons, GE alters single-celled zygotes or gametes (sperm or eggs), not persons. (Other objections based on the moral status of embryos, rather than personal identity, are taken up below.) And our moral aversion persists even if we stipulate that human GE will become acceptably safe – a stipulation that is plausible, as discussed in the previous chapter. However, we have not yet spoken to a number of other objections that have been made against human GE (i.e., germline gene therapy).

In the present chapter we will first trace the development of U.S. policy on human genetic engineering. Of interest here will be the early appearance and then later re-appearance of concerns about the intrinsic wrongness of human GE. Second, the current "orthodox position" on the ethics of human gene therapy will be shown to be lacking long-term stability. The ethical objections on which the orthodox position is based, it will be argued, are either time-bound or are probably not strong enough to undergird continued ethics-based restrictions on the technology. Third, it will be shown how this

need for an alternative ethical foundation for a restrictive policy on human GE leads us again to Silver's futuristic scenario and the question, "Is (safe) radical human genetic enhancement intrinsically wrong?"

The Development of U.S. Policy on Human Genetic Engineering

The Mondale and Kennedy Hearings (1968-1973)

In 1968, Senator Walter Mondale of Minnesota introduced Senate Joint Resolution 145, which proposed the formation of a President's Commission on Health Science and Society (Jonsen, 1998, p. 90). Mondale's proposal came at a time when medical advances seemed to be racing ahead, leaving unresolved in their wake some troubling ethical questions. Organ transplantation raised questions of fair allocation of the scarce organs. Research involving human experimentation led to calls for an elevated regard for patient autonomy, and to demands that informed consent be taken seriously. Advances in life-sustaining technologies, combined with the first successful heart transplants, called for a revised conception of death from a biological state defined by cardiopulmonary criteria to one defined by neurological criteria. And the world's leading scientists spoke futuristically of lending a technological hand to the creation of human beings through such novel means as cloning and genetic engineering.

In light of this exciting yet morally disquieting surge of biomedical activity, the involvement of Congress should have come as no surprise. Mondale, citing popular support, recommended that the Commission study "organ transplantation, genetic

engineering, behavior control, experimentation on humans, and the financing of research" (Jonsen, 1998, p. 91).

Mondale's resolution faced surprisingly vehement opposition from physicians and scientists, who had been used to having the final word on research and patient care and were fearful of an uninformed regulation by laypersons. Christiaan Barnard, the renowned South African physician responsible for the first human heart transplant, was especially critical of the proposal (Jonsen, 1998, p. 91). Under this pressure, the resolution failed.

Mondale returned, however, in 1971, spurred in part by news of a scandal. From 1970 to 1973, Stanfield Rogers, an American physician and researcher, assisted a German colleague in the treatment of three German girls with hyperargininemia – elevated blood levels of the amino acid arginine. Rogers treated with a virus called Shope papilloma virus (SPV). Laboratory workers who handled SPV were observed to have relatively low levels of arginine, thus it was hoped that a similar effect could be brought about in the girls by SPV treatment. Much of the ensuing controversy had to do with the ethical treatment of human research subjects generally. Nonetheless, given that the intent was to correct the abnormal expression of certain genes through SPV treatment, an element of the debate had to do with the ethics of the genetic alteration of humans (Fletcher, 1990, pp. 58-59)

In 1971, prompted by news reports of the Rogers case, Senator Walter Mondale again called for the formation of a national commission to investigate the "legal, social,

and ethical implications of medical research, including the aims of geneticists. Mondale's testimony referred to the dangers of genetic manipulation" (ibid., p. 59).

It was not until 1973 that a version of Mondale's original proposal was given Congressional approval. Once again, political controversy provided legislative incentive. This time the controversy was over a recommendation from an NIH advisory panel to keep late-term aborted fetuses alive for the purposes of research. The recommendation had been reported in the *Washington Post*, and prompted not only a quick about-face by the NIH, but also and once again Congressional hearings. Senator Edward Kennedy of Massachusetts presided. During the course of the hearings, other scandals became prominent. Of particular note were the use of prisoners as research subjects, and the Tuskegee Syphilis Study Report (Jonsen, 1998, pp. 94-98). In the latter study, which became public in 1972, a cohort of African-American men infected with syphilis were left untreated for decades so that the clinical course of the disease could be studied (Kolata, 1998, pp. 77-78).

Finally, in July, 1974, the National Research Act was signed into law by President Nixon, and with that the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research was created (Jonsen, 1998, p. 99). The National Commission ended its work in October, 1978, when its term expired. In just over four years, it produced a number of reports. Several had to do with the protection of research subjects from special populations, e.g., children, prisoners, and the institutionalized mentally disabled. There were also reports on psychosurgery, health care delivery, and institutional review boards (Jonsen, 1998, p. 104). In 1980, the National Commission

was succeeded by the President's Commission for the Study of Ethical Problems in Medicine and Biomedical and Behavioral Research. The President's Commission also produced a number of reports, extending the scope of study beyond the subject of protection of research subjects. *Securing Access to Health Care* was published in 1982. *Defining Death* and *Deciding to Forego* [sic] *Life-Sustaining Treatment* were published in 1981 and 1983, respectively. These reports were undertaken in large part as a result of the social upheaval caused by the Karen Ann Quinlan case. It was Quinlan that finally forced the issue of what to do with the irreversibly comatose who were being kept alive on respirators. The Quinlan case also solidified the standing of the new field of bioethics, as Rothman notes: "After Quinlan... every national commission addressing medical issues would have among its members a bioethicist, and no media account of a medical breakthrough would be complete without a bioethicist commenting on its implications" (Rothman, 1991, p 241).

Two reports – *Screening and Counseling for Genetic Conditions* and *Splicing Life: A Report on the Social and Ethical Issues of Genetic Engineering with Human Beings* – had to do with human genetics. Both were released in 1982. *Splicing Life* was not originally on the agenda of the President's Commission. However, in 1980 President Jimmy Carter received a letter from concerned theologians asking for an ethical review of the new genetic technologies. Thus prompted, Carter assigned the task to the Commission. We will have more to say about this letter and *Splicing Life* shortly

The Recombinant DNA Debate

At the same time that Mondale and Kennedy were advocating for the creation of the National Commission, a new biotechnology was being discovered and developed. This technology was known as recombinant DNA (rDNA), or gene splicing. The discovery of a few key bacterial and viral enzymes made rDNA possible, for these enzymes could cut, copy and paste specific segments of DNA as if they were typed sentences in a word processing program.

In 1972, DNA from two different species was spliced into one contiguous rDNA molecule. One year later, rDNA molecules were successfully grown in bacteria in the laboratory (U.S. Congress Office of Technology Assessment, 1984, p. 3). The rDNA molecules were *plasmids*, or circular DNA molecules capable of replicating themselves independently of the much larger bacterial chromosome. By growing large numbers of plasmid-containing bacteria, one has a virtually limitless source of plasmid DNA. This accomplishment came to the attention of the broader scientific community at the Gordon Research Conference on Nucleic Acids, held in New Hampshire in June, 1973. The chairpersons of that conference, Maxine Singer of the U.S. National Institutes of Health (NIH) and Dieter Soll of Yale University, expressed the concerns of a majority of the conferees over the propagation of rDNA molecules in an innocuous strain (called K12) of the common intestinal bacterium *E. coli*. Some of the rDNA molecules of interest at that time were genes of tumorigenic viruses and genes coding for antibiotic resistance. Thus, the fear was that genetically engineered K12 *E. coli* could cause cancers or be resistant to common antimicrobial agents. Singer and Soll communicated these concerns in a letter

to the presidents of the U.S. National Academy of Sciences (NAS) and the Institute of Medicine, which also appeared in the journal *Science* (Singer & Soll, 1973).

In response, a committee of the NAS, chaired by Stanford's Paul Berg (in whose lab the first rDNA molecule was made), called for a moratorium on rDNA experiments that posed theoretical risks of carcinogenesis or antibiotic resistance. The Berg, or Moratorium, letter was published both in *Science* and its British counterpart *Nature* in mid-1974 (Berg et al., 1974). The letter also called for an international conference to discuss the issue of potential biohazards related to rDNA research and appropriate safety measures. That meeting was held at the Asilomar Conference Center south of San Francisco in February, 1975. The Conference report was issued several months later It recommended a four-tiered categorization of risk and a corresponding four-tiered system of biological containment, and called for voluntary compliance among scientists internationally until their respective governments could formalize their own guidelines or recommendations (Berg, Baltimore, Brenner, Roblin, & Singer, 1975)

Throughout the 1970s, especially from the conference at Asilomar on, the public policy focus was on "inadvertent biohazard." NIH had formed, prior to Asilomar, the Recombinant DNA Molecule Program Advisory Committee (a.k.a. RAC), and it was this body that was charged with developing U.S. guidelines for rDNA research. These were finally published in June, 1976, and were more stringent than the Asilomar recommendations which scientists had been following voluntarily (Watson & Tooze, 1981, pp 63-66) A final revision followed in December, 1978, and reflected in them was the sentiment expressed by NIH Director Donald Frederickson, in the introduction to

the revised guidelines, "that the burden of proof is shifting towards those who would restrict recombinant DNA research" (quoted in Watson & Tooze, 1981, p. 431). In the end, much of the oversight responsibility was delegated to local biosafety committees (Walters & Palmer, 1997, p. 145)

With inadvertent biohazard now moved to the back burner, scientists in the early 1980s moved from genetic engineering in bacteria to genetic engineering in higher animals.

Transgenics: Genetic Engineering in Non-Human Animals

The biotechnological accomplishment with the strongest implications for human GE is the creation of genetically engineered – or *transgenic* – animals. Ruddle and Gordon (1980) first successfully transferred foreign genes to mice by microinjection into a one-cell embryo. Shortly thereafter, other researchers microinjected the rabbit hemoglobin gene into mouse zygotes and were able to produce a mouse that had incorporated the rabbit gene into its chromosomal DNA, and passed along the gene to its progeny. The gene functioned normally (Velander et al., 1997, p. 71). Since then, according to Silver (1997, p. 230) "hundreds of thousands of transgenic mice, pigs, cows, and sheep [have] been produced." What are the incentives to produce such a vast number of transgenic animals?

Three applications of transgenics, in particular, have enormous potential to benefit humankind. Those three applications are *xenotransplantation*, *molecular "pharming,"* and designing transgenic animals to be used in *biomedical research*. Xenotransplantation

is the transplantation of organs or tissues from members of one animal species into recipient animals of another species. The availability of transplantable organs for human patients from human donors has been, and is projected to be, insufficient to meet demand. In 1993, approximately 33,000 persons in the U.S. were waiting for an organ transplant, and there were only 7,600 donors. Approximately 3,000 persons died that year while on the waiting list. And about half of those on the list will eventually die due to lack of a suitable organ for transplant (Institute of Medicine, 1996, pp. 10-11). The discovery and use of immunosuppressive drugs effectively increased the pool of possible donors for a given patient to include genetically unrelated donors (Lanza, Cooper, & Chick, 1997, pp. 54-55). Yet the gap between supply and demand remains. The pool of non-human animals is, for all practical purposes, unlimited. Genetic engineering of donor animals is one of the leading strategies for circumventing the problem of hyperacute immune rejection. The genetic modification involves the introduction into (e.g.) a pig zygote – and thus into the transplantable organs of the adult pig – of a human gene that codes for a protein that inhibits the normal immune response (Institute of Medicine, 1996, pp. 30-31).

A technique for producing virtually limitless quantities of certain pharmaceuticals in transgenic (non-human) animals is on the very near horizon (Reed, 1998; Velander et al., 1997). The technique, dubbed "pharming," is being employed for the production of certain proteins that heretofore have had to be purified from large quantities of donated blood at great expense. One such protein is protein C, which controls clotting in persons with an inborn deficiency (ibid., p. 70). Also valuable as a clotting factor is factor VIII,

used by hemophiliacs. Tissue plasminogen activator is a blood protein that dissolves blood clots, and is typically used for heart attack and stroke patients. And alpha-1-antitrypsin is used to ease breathing in emphysema patients. Not only is pharming expected to be much more cost-effective than current blood purification methods, but, according to Velander (ibid., p 71), it "circumvents the risk of contamination with infectious agents."

Using transgenic animals as bioreactors (i.e., pharming) or as organ sources in xenotransplantation are not the only ways in which these creatures are of potential benefit to humans. In some cases, transgenics may be developed to serve as animal models for certain human diseases, such as Alzheimer's (Shuldiner, 1996), sickle cell anemia (Nagel, 1998), or multiple sclerosis. In the latter case, Leroy Hood and his colleagues, then at the California Institute of Technology, produced a genetically engineered mouse containing a transgene that appeared to eliminate symptoms of incessant shivering (Walters & Palmer, 1997, pp. 60-61, and references therein). These "shiverer" mice had been found to lack myelin basic protein (MBP), a protein important in the conduction of electricity along nerves. The transgene contained a function MBP gene, and it was the expression of this transgene that was responsible for elimination of shivering symptoms. The shiverer phenotype and multiple sclerosis in humans are both characterized by dysmyelination, suggesting that germline gene therapy might offer a useful approach to curing the latter disease as well. Reiss and Straughan (1996, p. 169) list as examples eleven human diseases for which there are transgenic mouse models, including cystic

fibrosis, muscular dystrophy, Lesch-Nyhan syndrome, sickle cell anemia, atherosclerosis, and various cancers.

Thus we see that remarkable progress has been made in the genetic engineering of non-human animals in less than two decades, and this using the less precise GE method of gene addition discussed in Chapter 2. Once the more precise (i.e., less risky) method of gene replacement becomes available, it seems entirely possible that safety will fade from its currently prominent place on the list of ethical concerns, just as it did in the recombinant DNA debates of the 1970s

Revisiting Genetic Engineering in Humans

The achievement of recombinant DNA in the early 1970s precipitated a swift change in the scope of the ethical debates. Whereas, just prior to that achievement, the debates often had to do with the prospect of the biotechnological manipulation of ***humans***, once rDNA plasmids were constructed the issue of risks associated with ecologically devastating, cancer-causing, or otherwise pathogenic *bacteria* thrust itself to the top of the agenda By the end of the decade, notwithstanding the increasingly entrenched position of environmental groups, there was sufficient political consensus that rDNA (at least in the K12 strain of *E. coli* being used) was not a significant hazard that the scope of the ethical debate with respect to GE could once again be broadened.

Two events in 1980 re-focused attention on the ethics of GE in humans. First there was the unauthorized gene therapy treatment of two patients by Martin J. Cline, Chief of the Division of Hematology-Oncology at UCLA (Murray, 1990, p. 50). In 1980,

Cline had attempted to treat two thalassemia patients, one in Italy and one in Israel, with genetically altered bone marrow cells (Thalassemia is a hereditary blood disorder) Cline had originally submitted a treatment protocol to two committees at UCLA. One committee was responsible for biosafety, and had oversight responsibilities because the protocol called for DNA to be introduced to the patient in a particular recombinant form that was viewed at the time as potentially hazardous. The other committee, UCLA's Institutional Review Board (IRB), had oversight over the human experimentation aspects of the proposal. Meanwhile, in order to circumvent the requirement for review by the biosafety committee, Cline altered his experimental design so that the DNA to be used was a non-recombinant form. This maneuver was made moot by the IRB's rejection of the proposal. It was after, and because of, this administrative rejection that Cline arranged to do the treatments overseas. After Israeli authorities confirmed with Cline and with UCLA that Cline's protocol *as revised* did not involve rDNA, approval was given. Cline, however, after gaining clearance to proceed, reverted to the *original* protocol and injected the suspect rDNA form of the genes (Fletcher, 1990, pp 60-61; Walters & Palmer, 1997, pp. 145-146).

Cline's deceptions were discovered, and various punitive actions were meted out by NIH and UCLA (Walters & Palmer, 1997, p. 146). As with Rogers, the ethics of human experimentation was the primary issue, with the ethics of the genetic manipulation of humans a secondary, though still important, issue. What Cline and Rogers had both attempted to do, each in a different way, was to manipulate the expression of genes in the *somatic* cells of patients. Manipulation of the genes of somatic cells became known as

somatic cell gene therapy, and of germ cells or very early embryos, germline gene therapy.

The second event came in the form of a letter from the general secretaries of representative Catholic, Protestant and Jewish national organizations to President Jimmy Carter expressing concern about genetic engineering. The letter was prompted in part by the Supreme Court decision (*Diamond v. Chakrabarty*) allowing GE-microbes to be patented. The general secretaries felt that "fundamental ethical questions" were at stake – questions that dealt with "the fundamental nature of human life and the dignity and worth of the individual human being" (U S. President's Commission for the Study of Ethical Problems in Medicine and Biomedical and Behavioral Research, 1982, pp. 95-96). Therefore they called on the President to assemble a broadly representative task force to look at the need for governmental regulation and to address these issues [ibid.; Walters, 1997 #115, p. 145].

The Report Splicing Life: *The Orthodox Position on Human Gene Therapy*

The President's Commission responded by initiating a study on the science and ethics of GE. This study culminated in 1982 with the report *Splicing Life*, which was made public in hearings chaired by then-Congressman Al Gore of Tennessee. Much of interest came before Gore's committee, including an appearance by Dr. Martin Cline. But the most salient points, for our purposes, address the distinctions with respect to gene therapy – somatic cell versus germline, and enhancement versus treatment. *The Commission found germline gene therapy to be ethically unacceptable* given the state of

the technology at that time, although it recommended against banning the technology outright. The overriding consideration was the fact that, since genetic changes were heritable, mistakes once made could be perpetuated in future generations. Somatic cell gene therapy, in contrast, had no such complications, and was effectively cleared for further research and development.

The Commission found enhancement gene therapy morally problematic as well, on the grounds that it might lead to eugenic applications:

> Interventions aimed at enhancing "normal" people, as opposed to remedying recognized genetic defects, are also problematic, especially since distinguishing "medical treatment" from "nonmedical enhancement" is a very subjective matter; the difficulty of drawing a line suggests the danger of drifting toward attempts to "perfect" human beings once the door of "enhancement" is opened. [U.S. President's Commission for the Study of Ethical Problems in Medicine and Biomedical and Behavioral Research, 1982 #117, p. 3]

The position of the Commission – that somatic cell gene therapy for purposes of treatment was ethically acceptable, while germline or enhancement gene therapy were not became established as a widely shared consensus position internationally. In a more recent statement, the European Commission's Group of Advisers on the Ethical Implications of Gene Therapy stated that "[b]ecause of the important controversial and unprecedented questions raised by germ-line gene therapy, and considering the actual state of the art, *germ-line gene therapy on humans is not at the present time ethically acceptable*" [, 1995 #151, p. 268; emphasis added].[7] Walters and Palmer (1997, pp 47

[7]This objection seems to imply (though not clearly) that there may be some ethical concerns ("important controversial and unprecedented questions") over and above concerns about safety (alluded to by reference to the "actual state of the art").

49, 90-91) reviewed an international sample of 28 government policy statements on gene therapy, dating from 1980 through 1993, and found that "most expressed grave reservations about germ-line techniques." Few addressed enhancement germline gene therapy directly – the presumption was that gene therapy implied treatment. Those that did mention enhancement (e.g., United Kingdom, Canada) found it ethically unacceptable (Walters & Palmer, 1997, p. 134).

Splicing Life thus cleared the way in the U.S. for the submission of human *somatic cell* gene therapy research protocols. A committee at the National Institutes of Health prepared guidelines – called the "Points to Consider in the Design and Submission of Human Somatic-Cell Gene Therapy Protocols" – for researchers considering such projects. These guidelines are still in use and are still consistent with the consensus, or "orthodox," position on human gene therapy. That is, only protocols for clinical research in somatic cells are considered, and only if the ultimate goal is medical treatment (or prevention). Germline or enhancement gene therapy protocols are not considered for funding

The Tenuous Consensus: A Critique of the Ethical Grounding for the Orthodox View on Human Gene Therapy

A number of ethical objections have been raised against human genetic engineering, and it is to these that we now turn. Following the distinctions emphasized in *Splicing Life*, we will consider first the objections to *germline* genetic intervention, and second the objections to *enhancement*.

Objections to Germline Genetic Intervention

Walters and Palmer (Walters & Palmer, 1997, pp 82-86) list eight common objections to germline gene therapy (GGT), and respond to each of the eight. Unless otherwise specified in the language of the objection, it will be assumed that we are referring to gene therapy for treatment, not enhancement.

Objection #1: Irreversible harm

The first argument is that GGT carries with it a significant risk of harm to future generations. Because of our limited knowledge, and the subtle, sometimes delayed effects of alterations to the genome, irreversible mistakes are likely to be made that will put our descendants in harm's way. (Harm to embryos will be considered below. See Objection #5.)

As argued in the previous chapter, the response to this objection is that technology is likely to advance to a point where germline interventions are acceptably safe. It is worth briefly reviewing some of the relevant scientific reasons for making this claim First, genetic engineering has been done successfully in non-human animals, although the strategy used – gene addition (see Chapter 2) – is not at an acceptable level of safety for use in humans. Second, as discussed in the previous chapter, there is good reason to believe that an acceptably safe GE technique – gene replacement – will become feasible in the foreseeable future. Third, initially human GE can be expected to target well characterized, single-gene disorders such as cystic fibrosis. As expertise is gained in the

genetic treatment of these relatively straightforward genetic diseases, a broader knowledge of human genetics will become available as research into the human genome progresses. The Human Genome Project, as the collective effort is known, is expected to have identified all 100,000 human genes by the year 2020, and all common versions (or alleles) of those genes by 2030 (Silver, 1997, p. 208).

Fourth, an added measure of safety may become available for genetically-engineered organisms, including humans. Recent research has shown that genes that are altered or added (the transgenes) can be present in the cells in an "off" mode. That is, the gene is present in the cell, but its ability to become active (i.e., produce the protein it encodes) can be placed under external control. Specifically, such a transgene will only turn on when the person carrying the gene takes a certain pill (Wade, 1999a; Ye et al., 1999).

Finally, one expects that the usual protections for human subjects that have become so prominent in clinical trials for novel drugs and medical procedures will be even more prominent in germline gene therapy trials. This has certainly proved to be the case so far with somatic cell gene therapy.

Objection #2: Alternatives to GGT available

The second argument is that there is no need to incur the risks of GGT when other options are available to those who wish to avoid having children with certain genetic diseases. One option is to use in vitro fertilization (IVF) in combination with preimplantation diagnosis (PID). The IVF-PID option involves removing a cell or cells

from the very early embryo and testing for genetic defects. If no defects are present in the tested cells, then no defects will be present in the embryo from which the cells were removed, since all the descendant cells of the fertilized egg are genetically identical. (For our purposes, we may ignore differences in mitochondrial DNA.) The embryo may then be implanted in the prospective mother's womb where, if all goes well, a normal pregnancy will follow. The second option is prenatal diagnosis in combination with selective abortion. Here cells of fetal origin are removed from the amniotic fluid and subjected to genetic testing. Parents may opt to abort the pregnancy if the test results are unfavorable.

Walters and Palmer argue that treatment GGT is more consistent with the ethical mission of medicine than are discarding unused or affected embryos or aborting affected fetuses. In addition, a strategy of genetic treatment is more respectful of those members of society who are challenged by genetic diseases, or by disabilities generally. To this counter-argument, one might add quite simply that it is mere speculation to assume that GGT will always be riskier (or more expensive) than the two options in question. IVF is expensive and often fails even after several attempts. Abortion is not without medical risk, and in any case is, for most women, an unpleasant or even traumatic experience. Finally, most disease-causing genes reside in the cells of heterozygote carriers, i e , persons who carry only one copy of a recessive gene when two copies are required to cause disease. These carriers are unaffected by disease, but could have children who are affected should they happen to conceive with another carrier. Only germline GE will permanently remove the disease-causing genes from heterozygote carriers – that is, from

the gene pool at large. Whether or not such a eugenic goal is morally defensible is a separate question. (We will have more to say about eugenics below.) But the eradication of certain well-characterized recessive genetic disorders such as cystic fibrosis from the human population seems on its face to be a worthy and humanitarian goal, akin to the eradication of smallpox or polio.

Objection #3: High cost, limited availability

A third objection to GGT assumes that it will be an expensive and therefore scarce commodity. As such, the wealthy will have access and the poor will not. The counter-argument is that it is, again, pure speculation to say that GGT, once available, will remain prohibitively expensive. In any case, the costs of GGT must be compared with costs associated with genetic diseases not treated by GGT. Finally, GGT could be (more) equitably distributed if subsidized.

Society has many commodities – medical and otherwise – that are scarce and in high demand. And society finds solutions to the problem of how best to distribute those commodities. The solutions are rarely ideal, and often there is inequity between the wealthy and the poor. However, for better or worse, some level of inequity is generally tolerated. Rarely if ever is the commodity denied to all on the grounds that its distribution is inequitable. One would expect, then, that human germline gene therapy will be made available even if problems of inequity accompany it.

Thus, although the issue of equity in the distribution of scarce medical resources is an important one, it is not unique to human GE, nor is it likely to be seen as a sufficient ethical justification for prohibiting the technology.

Objection #4: Use for enhancement

A fourth argument relies on the third – assuming that human GE will be preferentially available to the wealthy – and on the second – assuming that less expensive options for "treatment" (avoiding disease) will be available. In this scenario, no one will use human GE to avoid genetic disease. Instead, they will use human GE for enhancement. Only the wealthy will pursue genetic enhancement, since the government is unlikely to subsidize enhancement as opposed to treatment, and the poor will be effectively denied access to genetic enhancement. Over the course of time, society will be divided into two or more classes of genetically-enhanced "haves" and unenhanced "have-nots." Silver (1997) presents such a scenario in some detail, and sees this as being an important objection to human GE (see Chapter 1).

There seem to be three components of this objection. First, there is the basic inequity – the wealthy have access to a valuable resource while the poor do not. This issue was addressed above (see Objection #3). Second, although it is not explicitly stated, one might take part of the objection to be against genetic enhancement *per se*. As has been noted above, this objection to enhancement is one of the two foci of the orthodox position on gene therapy. We will take up this issue in the next section. Third, the objection might be against the divergence into two genetic classes. Here the issue is

not so much that one class is better off than the other. It is not that one class (the enhanced) is *super*-human while the other is merely human. The issue is that we have gone from one class of beings all of whom were equally human to two classes: one (unenhanced) human and the other (enhanced) modified-human.

Silver's (ibid.) GenRich v. Natural scenario introduced in Chapter 1 is just this kind of scenario: a world filled with genetically-enhanced GenRich descended from the wealthy and unenhanced Naturals descended from the poor. Silver finds nothing inherently wrong with enhancement, even enhancement so radical as to result in species divergence. (Recall that in Silver's future world there were several GenRich species.) The issue for Silver is equity. Glover (1984) views the problem similarly.

> The suggestion that, once problems of equity are resolved, there is nothing ethically regrettable about a world in which, in a relatively short period of time, humanity has been fragmented into a number of non-human (or at least quasi-human) offshoots is a bit difficult to swallow. As indicated in the introductory chapter, an alternative hypothesis is that our moral aversion to (radical) genetic enhancement is grounded in a belief that there is something intrinsically valuable in humanness.

This ethical concern is, of course, central to this inquiry and therefore will be taken up in later chapters.

Objection #5: Moral status of human pre-embryos

GGT is held to be morally objectionable because, both in the clinical research stages and as part of post-research treatment, human embryos will be discarded or

otherwise destroyed. This harm to embryos is morally objectionable, it is argued, because a human embryo is the sort of thing that is due an elevated moral respect. Let us recall from Chapter 2 that GGT (human GE) is performed on a single cell – typically the zygote, but possibly also the embryonic stem cell, or the as-yet-unfertilized egg. For the purpose of addressing this objection, let us assume that the target cell is the zygote (or one-cell embryo). The human embryo during its first fourteen days of development is often referred to as a "pre-embryo," presumably because it is only *after* fourteen days that the early embryo is incapable of twinning. Also, it is only *after* fourteen days that each of the cells of the early embryo have committed either to become placental cells or to become fetal cells. (Silver suggests that political motivations are at play also in the adoption of the new term "pre-embryo" (1997, p. 39).)

According to the Ethics Committee of the American Fertility Society, there are three principal views on the moral status of human pre-embryos (American Fertility Society, 1986, p. 359). The first is that pre-embryos "are entitled to protection as human beings from the time of fertilization forward." Two scientific reasons are given in support of this claim. First, a new genotype – that is, a unique combination of genes – is created at the moment of fertilization. And second, pre-embryos have the potential to develop into fetuses, children and adult human beings.

The second view "denies that human pre-embryos have any moral status." Scientific reasons are given in support of this view as well. First of all, only about a third of all human pre-embryos conceived through sexual intercourse attach to the uterine wall, develop and are delivered as live infants. Since the "natural" fate of two-thirds of pre-

embryos is a death *that no one seems to find ethically regrettable*, one is led to conclude that pre-embryos are not the sort of thing to which we have ethical duties or obligations. Secondly, as noted above, pre-embryos can divide into twins, triplets, etc. Not only that, in the IVF laboratory several pre-embryos – each the product of different sperm-egg pairs – can literally be stuck together to form one pre-embryo. Silver (1997, p. 46) asks us to imagine a scenario in which parents initially intend to have twins created using IVF and splitting the single pre-embryo into two prior to implantation. After the split, however, they have a change of heart and request that the twin pre-embryos now be physically unified in the culture dish. The physician complies with the request. Silver finds it implausible to say that such a series of actions is morally objectionable. We have, he notes, destroyed a potential life without killing anything.

The third view takes an intermediate position. While acknowledging that the potential to become an adult human being gives the pre-embryo a more elevated moral status than nonembryonic human tissues, it is held that other moral duties and obligations can outweigh our duties and obligations to the human pre-embryo.

There are problems with the first view (and that part of the third view that defers to the first view) over and above those already mentioned. The first problem has to do with the claim that the human pre-embryo has a unique genotype beginning at the moment of fertilization. As we learned in the previous chapter, fertilization is a multi-step process that is not complete until the zygote has divided once, forming the *two-cell* pre-embryo. It is only at the two-cell stage that the genes from the sperm and those from the egg commingle and a new genotype is achieved. If that is the moment at which the

pre-embryo becomes morally important, then human GE is not touched by this objection since it must occur at the one-cell stage. Moreover, germline genetic interventions may be made in other cells – either gametes prior to fertilization [already done in cattle; see \Moffat, 1998 #195]; or human ES cells (Gearhart, 1998; Wilmut, 1998); or human somatic cell nuclei to be used for cloning (Wilmut, 1998).

Technology is racing ahead of ethics on these questions. Since 1995 the U.S. Congress has effectively banned embryo research in federally funded facilities. The ban has been attached to the bills authorizing spending for the National Institutes of Health, which funds the vast majority of the nation's biomedical research. The use of federal funds is prohibited for "research in which a human embryo or embryos are destroyed, discarded or knowingly subjected to risk of injury or death greater than that allowed for research on fetuses in utero" (quoted in Wade, 1999b).

The picture is clouded, however, since embryos evidently are no longer the only cells that can give rise to fully developed human beings. Human ES cells, discovered in late 1998 (Thomson et al., 1998), were recently ruled by the Department of Health and Human Services (DHHS) to fall outside the Congressional ban. The distinction that DHHS and its general counsel made was that an ES cell, if implanted into a uterine wall, could not develop into a human being whereas an embryo could. In earlier experiments – in which adult mice offspring came from ES cells – the ES cell needed to be surrounded by an "artificial placenta" in order to implant in the uterus (Kolata, 1999). The DHHS ruling means, according to NIH Director Harold Varmus, that it would be illegal for

federally funded labs to derive human ES cells, since that would involve embryo research, but they could use ES cells produced in private labs (Wade, 1999b). The matter was immediately taken up by 70 members of the House of Representatives who, in February 1999, asked the Secretary of Health and Human Service to rescind the ruling (Wade, 1999c).

Thus, those who would argue against human GE on the grounds that it violates the moral integrity of the embryo would have to stipulate a very broad definition of "embryo." Essentially they would need to protect all totipotential cells (Walters & Palmer, 1997, pp. 83-84). But what we are discovering is that "all totipotential cells" may include everything from human embryonic stem cells growing in culture, to somatic cells such as skin or blood cells (which can be used in cloning), to cells removed from an early embryo for genetic testing.

While there is certainly much more that remains to be said regarding this objection, it appears unlikely that, in the long term, human GE will be prohibited because of a perceived violation of the moral status of the human embryo and other totipotential cells. It is not only the dubious scientific grounding for the arguments that prompts this conclusion. Current biomedical practices indicate a public willingness to allow manipulation of pre-embryos. IVF is common, and the disposal of unneeded embryos, while not without controversy, has not aroused the passions of the majority. Genetic screening, which involves the discarding of embryos, has been done in humans (see, e.g., Mulkay, 1997, pp. 139-140). Abortion, though controversial, remains legal. Initially, the focus of human GE will be on *treatment* gene therapy, which as discussed in Chapter 2

– promises to alleviate much pain and suffering from genetic diseases. Emphasizing this point, Walters and Palmer (1997, p 86) argue that "there is a presumption in favor of fostering continued development of human embryos and fetuses, but that presumption can in our view be overridden by other considerations like serious harm to the developing individual or others and the needs of preclinical research." Already there has been political movement on the part of advocates for persons with certain genetic diseases who would like to see less restrictive regulations on the use of human embryos in research. And finally, there will be pressure from corporations that stand to profit from treatment GGT.

Objection #6: Concentration of power

A sixth objection is that making human GE commonplace would give to a relatively small number of people a tremendous amount of power over the direction of the course of human evolution. Let us assume that those in power are well-intentioned, conscientious individuals. (The "mad dictator" scenario is dealt with below.) Let us also assume that this objection does not have to do with the possibility that those in power will, through ignorance or accident, cause harm to future generations. (The issue of irreversible harm was addressed above.) The issue here is this: given that a huge number of possible evolutionary courses may be available to genetic engineers of the future, all generally beneficial, who should make the decisions that collectively determine the course?

The response is that it is unlikely that authority over human GE will be centralized (Glover, 1984; Silver, 1997). Human GE is unlike other technologies (e.g., nuclear) that require huge capital investments and therefore are not left to the unimpeded marketplace of individual consumers. The private market for reproductive and genetic technologies already exists, and that industry – at least in developed countries is flourishing. The course of human evolution, thus, will be set by many individuals acting independently in a free market. The potential for harm (i.e., consumers making genetic choices that would bring harm to fuure generations) can be minimized by a limited number of government restrictions – based on the best genetic science – on decisions that are legally permissible. Glover (ibid., p. 51) proposes just such a "mixed system," a system of parental initiative in making genetic choice in combination with a centralized veto power.

Human GE will have its start with *treatment* germline gene therapy, not enhancement. To deny to those suffering from horrible genetic diseases the medical benefits of treatment GGT cannot be justified on these grounds.

Objection #7: Misuse by dictators

The seventh objection reflects what some have in mind when they use the term "eugenics" in a pejorative sense. They imagine that a mad dictator, or someone with excessive political authority, will attempt to genetically engineer a class of humans with desired skills or characteristics. One imagines a super-race of persons exceptionally skilled at, and amenable to, warfare. Or, on the other hand, the most useful product of the

human GE apparatus might be a particularly docile and servile underclass, much like the epsilons of Huxley's *Brave New World*. The counter-argument is that this scenario is both politically unlikely (Nazi Germany notwithstanding) and would be an inefficient and ineffective means of achieving the mad dictator's goal. It would be inefficient even assuming we had a vast and comprehensive understanding of the human genome because the fruits of one's GE labor take roughly twenty years to grow to useful adulthood. The program would be ineffective because, to put it simply, we are more than just our genes and so giving humans the desired genotype does not guarantee the desired person.

Objection #8: Human rights and tampering

The eighth objection is that we all possess a right to a genetic inheritance that has not been artificially tampered with. Here it is interesting to contrast the policy statements emanating from Europe with those of the United States. The American treatment of the ethics of genetic engineering thus far has had a consequentialist bent. That is, roughly speaking, the moral rightness or wrongness of GE hinges on whether the consequences were good or bad. The European treatment has had an additional component *Recommendation 934: On Genetic Engineering* was issued by the Council of Europe's Parliamentary Assembly in January, 1982, just prior to *Splicing Life*. Of particular significance in this policy statement is the assertion of a "right to inherit a genetic pattern which has not been artificially changed" (Council of Europe, in Jonsen et al., 1998). This right, it was claimed, is derived from the "rights to life and to human dignity protected by

Articles 2 and 3 of the European Convention on Human Rights" (ibid., p. 297). In the formal recommendations, however, this right is importantly qualified. Recognition is asked for a "right to a genetic inheritance which has not been artificially interfered with, except in accordance with certain principles which are recognised as being fully compatible with respect for human rights (as, for example, in the field of therapeutic applications)" (ibid., p. 297). Thus the door is left open, it seems, for human GE for purposes of medical treatment.

Splicing Life, while also adopting the orthodox position on gene therapy, made no reference to a right to an unaltered inheritance, as had Recommendation 934 and other European statements. Instead it compared gene therapy with conventional medical treatments. The President's Commission could find no basis for the suggestion that human genetic engineering was intrinsically wrong. The ethical emphasis, it argued, should properly be placed on the potential uses, both beneficial and harmful, to which the technology might be put

The motivation for this objection, according to Walters and Palmer (1997, pp. 84-86), is that human GE should not be allowed because future generations are incapable of giving consent The proper moral consideration of future persons is a complex matter With respect to making a decision about a genetic alteration of a one-cell embryo that will one day be one's child, it is enough to observe that we routinely make medical decisions for our children who are not competent to do so. The fact is, however, that multiple future generations may be affected by one's decision to proceed (or ***not*** proceed) with a genetic intervention. Does this mean that it is morally incumbent on us to preserve

the genetic lineage in its "natural" state? As Walters and Palmer (ibid., p. 86) have argued, at least certain interventions are unlikely to be viewed, by future generations, as violations of rights:

> Insofar as we can anticipate the needs and wants of future generations, we think that any reasonable future person would prefer health to serious disease and would therefore welcome a germ-line intervention in his or her family line that effectively prevented cystic fibrosis from being transmitted to him or her. In our view, such a person would not regard this intervention as tampering and would regard as odd the claim that his or her genetic patrimony has been artificially tampered with. Cystic fibrosis was not a part of his or her family's heritage that the future person was eager to receive or to claim.

In the end, it seems that a right to an unaltered inheritance is in need of further defense. The recognition that our actions today will affect *many* future persons, rather than one, ought to sharpen our desire to arrive at the best decision. That, however, says nothing about whether the best decision will be in favor of, or against, GE.

Objection #9: "Playing God"

The objection that human GE is morally objectionable because it amounts to "playing God" was not one of those listed by Walters and Palmer. This omission is very likely due to the ambiguity of the objection. So many others, however, have made the charge that it is worth a brief inspection.

The faith-based version of the "playing God" objection relies on a literal belief in God. This objection, we may surmise, is just that the creation of life lies within God's domain, and by genetically engineering human (and perhaps other) organisms, we have infringed on God's domain. But we already interfere in many ways with the creation of human life, for example, with birth control pills, or in vitro fertilization (IVF). Assuming

that many of those who would raise this objection would not find the use of birth control pills or IVF morally offensive, we must look for an alternative interpretation of "interference."

Perhaps the objection is that what falls within God's domain is not whether a child should be conceived, or even how it should be conceived, but rather, how it will biologically develop from a fertilized egg to a newborn. In other words, we ought not interfere with, or alter, the gene-directed embryological and fetal development of the (future) child. If that were God's domain, then this might constitute a legitimate challenge to GE, for this is precisely what GE does.

This view does not, however, appear to be shared by the majority of those theologians who have engaged in the public policy debate. Peters [, 1995 #228; 1997 #123], for instance, argues from a religious perspective that we have no reason to believe that the creation of human life is the domain of God alone. He argues that it is not inconsistent with the faithful life to believe (as Peters himself does) that we are intended by God to be "created co-creators." A similar stand is taken by the World Council of Churches, which has declared, "[a]s Christians we believe that we are both creatures of God and co-creators with him in fulfilling the image He has given us" (Abrecht & Shinn, 1980, p. 49).

The Catholic, Protestant and Jewish theologians contributing to the aforementioned report, *Splicing Life*, were of a like mind on this question (U.S. President's Commission for the Study of Ethical Problems in Medicine and Biomedical and Behavioral Research, 1982, p. 53):

> In the view of the theologians, contemporary developments in molecular biology raise issues of responsibility rather than being matters to be prohibited because they usurp powers that human beings should not possess. The Biblical religions teach that human beings are, in some sense, co-creators with the Supreme Creator

It is beyond the scope of this paper to explore theological doctrine on the question whether humans should or should not be "co-creators" in the relevant sense. For our purposes, it is enough simply to point out that the leading religious commentators in the public policy debate thus far do not agree that all "interference" of the sort involved with GE is morally objectionable.

Hubris is frequently associated with the charge of playing God. Some have termed this an "arrogant interference in nature," meaning that "in 'creating new life forms' scientists are abusing their learning by interfering with nature" (U.S. President's Commission for the Study of Ethical Problems in Medicine and Biomedical and Behavioral Research, 1982, p. 55). (We will consider "interfering with nature" just below.) Chadwick, in her article on cloning, considers the "playing God" objection to be that, in "try[ing] to gain some control over life and death... [m]an is seen as overreaching himself" (Chadwick, 1982, p. 203).

If the argument is against hubris, or overreaching, on the part of humankind, then it seems that some account of humankind's morally proper place is needed. Is the argument that there is a threshold over which one must not cross in the pursuit of knowledge related to GE, or in acting on that knowledge? Surely there must be a reason for circumscribing human GE in this way and declaring it morally off-limits.

Chadwick's attempt to give a reason seems plausible. According to Chadwick, actions that are associated with the terms "hubris" or "overreaching" are actions that have unforeseeable consequences that are undesirable either because they tend to "arouse anxiety" in people, or because they may actually lead to bad consequences (ibid., pp. 203-204). What is the proper response when faced with an action that might reasonably be considered overreaching? "Rather than ruling out the action with no more ado. . it may be preferable to consider the possible consequences, and adopt some kind of risk-assessment" (ibid., p 204)

A third interpretation of the "playing God" objection is roughly a secularized version of the first, with nature's rightful domain taking the place of God's domain. The claim implies that nature is sacred or inviolable. The most obvious problem with this objection is that we seem to violate nature all the time. Is prescribing eyeglasses for myopia a violation of nature (U.S. President's Commission for the Study of Ethical Problems in Medicine and Biomedical and Behavioral Research, 1982, p. 55)? What about using the modern, artificial marvels of medicine to interrupt the "natural" course of cancer and other major diseases? Or, for that matter, what about damming rivers, educating our children, or spaying our pets? It seems that we must conclude that not all human-directed change in nature entails a violation of nature. So which changes are violations and which are not?

Chadwick considers the objection that certain actions or procedures are wrong because they are "unnatural." As one plausible interpretation, she says that this claim is equivalent to claiming that the action in question, if carried out, prevents members of the

species from functioning properly She gives as an example the moral objection against keeping hens in battery cages because it prevents them from spreading their wings, a natural function for hens. Analogously, then, the argument from function would claim that there are "certain very basic features with which we associate being human" that are threatened by some practice such as GE (Chadwick, 1982, p. 202).

Chadwick cites two main problems with the argument from function. First, it is difficult to give criteria for basic human features or functions. Second, a moral assessment based on "naturalness" seems to be at a disadvantage compared with an assessment based on people's preferences or desires. At the very least, the latter are easier to identify (ibid., p. 203).

The issue of naturalness – specifically, the question of the "sacredness" of human nature – will be revisited below. For the time being, however, we are forced to conclude that the playing God objections as formulated above are not particularly compelling.

In spite of the political consensus having been reached that *germline* gene therapy in humans was off-limits, the groundwork has been laid for revisiting the question of the moral permissibility of this technology. The prohibition against germline genetic intervention, as articulated in *Splicing Life*, appeared to be based mainly on the fact that technology heretofore has not been at an acceptable level of risk for use in humans. This implies that once technological advances minimize the risk sufficiently, this primary obstacle to human GE will have been removed. We have argued above (see Objection #1) and in Chapter 2 that there is good reason to expect the necessary technological

advances. *We will assume, therefore, that human GE will become safe in the foreseeable future.*

Although risk of harm was the most prominent of the objections to germline gene therapy (human GE), it was certainly not the only objection. Thus, we were led to consider eight other common ethical objections to human GE (Objections #2 through #9, above). While space does not permit an exhaustive treatment of each objection, the foregoing discussion indicates that none of these other objections are particularly compelling. This implies that, once human GE becomes acceptably safe, there will be little ethical momentum, so to speak, on the side of those who would wish to continue to restrict germline gene therapy.

One need not look far to see evidence of this open-mindedness towards human GE. In fact, by the late 1980s and early 1990s, some academics again opened the question of the moral acceptability of germline genetic interventions (Walters, in Jonsen et al., 1998, p. 257). These academic discussions led in 1990 to a consensus statement called the Declaration of Inuyama, which was remarkable for its openness to the prospect of treatment germline gene therapy, as the following clause indicates:

> The modification of human germ cells for therapeutic or preventive purposes would be technically much more difficult than that of somatic cells and is not at present in prospect. Such therapy might, however, be the only means of treating certain conditions, so continued discussion of both its technical and ethical aspects is essential. Before germ-line therapy is undertaken, its safety must be very well established, for changes in germ cells would affect the descendants of patients (in Jonsen et al., 1998, p. 323).

The foregoing discussion indicates that the moral prohibition against germline genetic interventions will be relaxed once these interventions become acceptably safe.

This leaves the prohibition against enhancement – the second cornerstone of the orthodox view on human gene therapy – as the lone remaining ethical constraint on human GE We now turn to a discussion of the objections against human genetic enhancement.

Objections to Genetic Enhancement

The objection to human genetic enhancement is not as well formulated as are the objections to germline interventions generally In this section we will highlight some difficulties with the claim that human genetic enhancement as such is ethically objectionable.

The treatment-enhancement distinction is problematic

In the bioethics literature on enhancement, a central problem is the difficulty in defining exactly what is meant by the terms *treatment* and *enhancement* (REFS). Nevertheless, the examples given are consistent with our common-sense expectations. Examples of treatment GE (germline gene therapy) are the proposed genetic modifications that would pre-empt cystic fibrosis, Huntington's disease, Lesch-Nyhan syndrome, and the other single-gene disorders mentioned in the previous chapter. Examples of enhancement GE are increased physical height, decreased need for sleep, increased longevity or lifespan, increased memory, decreased aggression, and improved general cognitive ability (Walters & Palmer, 1997, pp. 101-107; Whitehouse, Juengst, Mehlman, & Murray, 1997). In other words, treatment – the proper domain of medicine – has to do with improvements from a state of below-normal functioning (disease or

disability) to normal or at least closer-to-normal functioning, while enhancement has to do with improvements from normal functioning to above normal or at least higher functioning. Let us take this common-sense understanding of the terms *treatment* and *enhancement* as our starting point.

The question now is this: can we be ethically opposed to enhancement if we are not opposed to treatment? In other words, can we justify being opposed to improvements from normal-to-"supernormal" when we are not opposed to improvements from "subnormal"-to-normal? Aren't improvements just improvements?

A common view is that "health" means freedom from disease or disability. According to this view, the purpose of health care or medical treatment (including preventive treatments) is to "maintain, restore, or compensate for the restricted opportunity and loss of function caused by disease and disability" (Sabin & Daniels, 1994, p. 10). An alternative view is that embodied in the controversial World Health Organization definition of health – "a state of complete physical, mental, and social well-being" (quoted in Parens, 1998, p S2). Sabin and Daniels call these views "hard-line" and "expansive," respectively (1994, p. 5). The distinction in the literature between treatment and enhancement seems to assume the hard-line – or normal function – view.

There are problems with the hard-line, or normal-function, distinction between treatment and enhancement (see Parens, 1998, pp. S3-S4). First, it is often unclear when a certain biological state should be classified as a disease or disability, and when it should be classified as normal though disadvantageous. That translates directly into an unclear boundary between treatment and enhancement. Since both treatment and enhancement

are improvements, perhaps it makes more sense, following Walters and Palmer (1997, pp. 109-110), to distinguish between health-related and non-health-related enhancements. On the other hand, this only seems to postpone the question of what constitutes "health." To better illustrate this difficulty, consider the following cases involving the use of human growth hormone (see Lantos, Siegler, & Cuttler, 1989; Parens, 1998):

1) Child A suffers from a brain tumor that causes a deficiency in the secretion of growth hormone (GH), and has a predicted adult height (without GH treatment) of 5 feet 3 inches
2) Child B, whose parents are both very short, is not GH-deficient and has a predicted adult height (without GH treatment) of 5 feet 3 inches

Of Child A, the advocate of the normal-function view of health and disease would presumably say that this is a case of disease, and administering growth hormone to this child would therefore constitute medical treatment. But what then should be said of the other case? Assuming that Child A and Child B will both suffer equally from short stature, and benefit equally from growth hormone therapy, do we say that only in the case of Child A do we have disease, and therefore only in that case is growth hormone supplementation justifiable? Is it not the effect, rather than the cause, that is morally relevant here? This criterion – i.e., level of growth hormone – for moral line-drawing seems unsatisfactory.

Another problem with the normal-function model is that it implies a *theoretical*, and not merely a statistical, account of the organism. That is, it requires that we be able to give definitive criteria for the (normal) human being, implying that the "human being" is an unchanging part of the universe – a *natural kind* rather than a convenient classification for an organism whose "nature" continues to change over evolutionary

time. We will pursue the question of human nature further in subsequent chapters. For present purposes, suffice it to say that attempts to defend the view that human beings are a natural kind have generally been unconvincing.

Thus, our inability to define human normality, health, disease, and so on, make it impossible to make a logically consistent distinction between treatment and enhancement.

In response, it might be argued that, despite the imprecision of concepts such as "normality" or "species-typical functioning," it defies common sense to say of at least some cases that they cannot be clearly identified as either enhancement or treatment. Continuing with examples related to hormone use, consider the following two examples:

> Example 1: A professional baseball player ingests hormones and thereby boosts his strength to such a degree that he smashes the record for home runs in a single season.
> Example 2: A breast cancer patient takes certain hormones and thereby causes her cancer to go into remission.

Is it plausible to say of these examples that we cannot distinguish one from the other? Can we deny that the first is an instance of enhancement and the second an instance of treatment? Perhaps the objection is that there will frequently be cases – such as the growth hormone deficiency example – that are not so clear-cut. But just because there are borderline cases does not mean that there are not also clear cases, and in clear cases a morally relevant distinction between treatment and enhancement can and should be made.

In spite of our not having satisfactorily resolved this question, let us for the sake of argument grant that a distinction can be made between treatment and enhancement. We do so for two reasons. First of all, there have been clues that our attempts at moral line-drawing may be directed at the wrong target. Recall that, in referring to potentially objectionable genetic enhancements, we have frequently used the parenthetical phrase "certain kinds or degrees of" to qualify "enhancement." In addition, it has been asserted that relatively minor enhancements, such as plastic surgery, do not seem morally problematic. These two observations taken together suggest that, if there is a line to be drawn between morally significant and insignificant (genetic) alterations, then the line is not the same as that separating treatment from enhancement. This suggestion will be taken up in later sections. The second reason the Permissive View proponent might, for the sake of argument, be willing to concede this point (i.e., that treatment and enhancement can be distinguished) is that she may issue a more direct challenge to the defender of the Restrictive View. That challenge is taken up in the next section.

Even if we can make the distinction between treatment and enhancement, what is morally wrong with enhancement?

Earlier the example of Prozac, or a Super Prozac, was used to suggest that enhancement *of already existing persons* becomes morally problematic when the degree of change involved reaches a critical threshold, at which point the "self," or personal identity, is threatened. Whether or not such a view can be defended in the case of pharmacological enhancement of already existing persons, it was argued that loss of

personal identity over time was *not* at stake in the case of *genetic* enhancement because the thing that is enhanced is a one-cell embryo and not a person. And harm, it was argued, was not at issue with (safe) human genetic enhancement for the simple reason that an enhancement, by definition, is a beneficial modification.

If personal identity over time is not threatened nor harm entailed by (germline) genetic enhancement, what of ethical significance *is* threatened?

In our earlier discussion of eugenics, we observed that the old (pre-GE) eugenics aimed at *improving humans*. Whatever the improvement, the offspring would be a human being. The new (GE-) eugenics could potentially aim at *improving on humankind*. Some improvements could conceivably yield an offspring that is not a human being. We asked earlier: Is it only certain kinds or degrees of enhancement that are morally problematic? Maybe the answer is yes -- *those enhancements that threaten our humanness*.

Is (safe) radical human genetic enhancement intrinsically regrettable?

It seems that there are two possible positions on the above-stated question:

1) *Even very radical* genetic enhancements are not ethically regrettable.
2) Very radical genetic enhancements *are* ethically regrettable (although minor enhancements are not).

The first position seems to conflict with our pre-philosophical intuitions – that is, roughly, the intuitions we have prior to in-depth philosophical reflection or argumentation. This claim is saying that human GE would be ethically acceptable even if

we created a human-derived organism that bore no or few recognizable human features – such as Silver's GenRich – and it rejects the claim that genetic enhancement is inherently wrong or ethically problematic. Let us call this the *Permissive View* on human GE.

The second position, on the other hand, is problematic even though it sits well with our pre-philosophical intuitions. Let us call this view – i.e., that there is something inherently wrong or objectionable with at least certain kinds or degrees of genetic enhancement – the *Restrictive View* on human GE. The difficulty with the Restrictive View is that, once we have granted that neither germline GE nor enhancement *per se* are inherently wrong, it is not obvious what of ethical significance is lost with radical genetic enhancement. For the moment, this Restrictive View has been supported only by appealing to the implausibility of the Permissive View. But what positive argument can be given in support of the Restrictive View?

The Restrictive View implies that something of ethical significance *is* at stake when we consider certain types or degrees of (even beneficial) genetic alteration. This is the case, it will be recalled, not because we have violated the moral status of the one-cell embryo, nor because there has been a loss of personal identity, nor because someone has been harmed. We have found those and other arguments unpersuasive, and hence have agreed to set those arguments aside. The Restrictive View holds that radical genetic alterations – even enhancements – destroy or diminish something intrinsically valuable.

Despite its intuitive appeal, it remains an open question whether the Restrictive View and the core intuition that motivates it are rationally defensible, or whether, on balance, the Permissive View is on firmer ground. It is to this question that we next turn.

Before doing so, however, it will be useful to reconsider both the practical and philosophical importance of the question at hand.

Is the Permissive View a straw man?

It might be argued that the Permissive View is a straw man, since no serious-minded person would hold such a view, and, as we have already noted, there is broad-based consensus that undertaking genetic enhancement, radical or otherwise, is morally impermissible. So whom are we trying to persuade? And, as a practical matter, why is it urgent or even necessary to explicitly formulate grounds for the Restrictive View if all agree that the latter is correct? In response, it can be said that few have actually seriously considered the Permissive View – at least not explicitly and in a public forum. Some serious-minded commentators (Glover and Silver are two) have, and have found that view defensible, although each has had significant ethical reservations about potential *consequences* stemming from genetic enhancement. Further, the ethical challenges posed by enhancement are now taken seriously in a way they weren't even as recently as the early 1990s. As Erik Parens relates (1998, p. S2), at a 1993 meeting at the Hastings Center (an independent center for studies in bioethics), senior scholars refused to take the issue of enhancement seriously. Yet four years later, "the first NIH Gene Therapy Policy Conference was devoted to that very topic."

In fact, it seems to be the case that the Permissive View is more easily defensible than the Restrictive View. The Restrictive View relies on some notion of humanness. As we shall see, if *humanness* is just *biological humanness*, then the Restrictive View is

difficult to defend. If it is some broader notion of humanness, then it is no small matter to say (and we shall try) what that broader notion is. Weighing in against the Restrictive View is the fairly common position in philosophy that human beings are morally significant in virtue of their being *persons*, where personhood is understood to consist in the possession of certain psychological properties. This seems to make humanness ethically irrelevant to the extent that it has necessary connections to such things as the human form or species membership. (That is, neither possession of human form nor species membership is a necessary condition for psychological personhood.)

The Restrictive View would not deny that (psychological) personhood is ethically important. It would, however, argue that personhood does not capture *all* that is morally important about human beings. Thus, the Permissive View is incomplete because it omits the fundamentally important notion of humanness.

But the question can be put again – *as a practical matter*, is the pursuit of the Restrictive View of any importance in the formulation of public policy?

An affirmative answer may be given for the following reasons. First, if the various "other objections" *do not* hold in the long term – as suggested in this chapter – and there is over time an increasingly greater demand for genetic enhancement, then we will face increasing pressure to justify the Restrictive View if we are to deny this benefit to those who demand it. Second, *even if* one or more of the "other objections" *do* hold – meaning that we need not rely on the admittedly difficult and elusive basis for the Restrictive View to restrict genetic enhancement – it will nevertheless still be important to develop, if possible, the notion of humanness upon which the Restrictive View

depends. If a rational articulation of morally significant humanness can be given, then we will have made clear (or clearer) something of central ethical importance that helps explain our intuitive moral aversion to enhancement generally and genetic enhancement in particular. Future ethical assessments, then, would need to include the impact on humanness as a significant ethical criterion.

All of this assumes that some sense can be made of the Restrictive View and humanness. What if that effort proves futile? Will the insights gained in a fruitless pursuit of the Restrictive View still be important for the formulation of public policy?

If, following Glover and others, we can find no justification for the Restrictive View, then the implications for public policy are, if anything, even more dramatic. What is implied is that the sort of scenarios envisioned by Glover and Silver are not inherently wrong. That is, radical enhancements of humans would be morally permissible if other moral objections (e.g., harm, eugenics abuses, and just distribution of genetic technology resources) are adequately addressed. (The implications for public policy will be taken up in more detail in Chapter 6.)

What conceptions of humanness or intrinsic human value could make the Restrictive View plausible, in light of the formidable obstacles that have been placed in its way in this chapter? And what can be said in favor of the Permissive View? These questions will be taken up in the following chapters.

CHAPTER FOUR: IS THE PERMISSIVE VIEW INCOMPLETE?

We ended the last chapter contrasting the Permissive and Restrictive Views on human genetic engineering. The Permissive View holds that there is nothing intrinsically wrong with even radical human genetic enhancement. The Restrictive View holds that there is something intrinsically wrong with radical genetic enhancement. If we assume, per the arguments in Chapter 3, that the usual consequentialist and other arguments are unlikely to justify restrictions on human GE in the long term, then the Permissive View implies that even very radical, non-harmful departures from present-day humankind, such as the GenRich, are morally permissible. The Restrictive View implies that there is an ethically significant remainder – something remaining which, if violated, would be ethically regrettable. The motivation for the Restrictive View is quite simply the implausibility of the Permissive View and its implications.

The question that this chapter and the next will address is this: Are there any rational underpinnings to the Restrictive View? Is the underlying moral intuition – i.e., that radical genetic enhancements *per se* are ethically objectionable – sound? To make a case for the Restrictive View, three things must be accomplished. First and most important, we are in need of a conception of ethically significant "humanness," human sacredness, or human intrinsic value. Second, this "humanness" must be capable of being violated by radical genetic enhancements. And third, it must be shown that such violations are ethically objectionable. These challenges will be taken up in the Chapter 5.

In the present chapter the Permissive View will be held up for closer scrutiny. Thus far we have said little to suggest that a case can be made for it. While few writers have explicitly argued that *radical* genetic enhancement of humans is not intrinsically wrong, several have argued against the claim that genetic enhancement generally is intrinsically wrong. (Recall that our qualifier "radical" indicates a change that results in a loss of biological humanness. That is, roughly, the offspring in question would not be recognizably human and would be incapable of interbreeding with unaltered human beings.) It will be seen that personhood, understood in psychological terms, plays a central role, whereas our status as human beings seems to be peripheral, coming into play only in virtue of its facilitation of our psychological lives. These arguments against the intrinsic wrongness of genetic enhancement are helpful. Psychological personhood is important, and its preservation of obvious moral significance. However, it will be suggested that the ethical picture that is painted by this wholly person-oriented view is lacking. An alternative view that places human beings in an ethically fundamental position will be proposed. A critical discussion of that proposed view will be the subject of the next chapter.

In Favor of Human Genetic Enhancement

Almost as soon as the orthodox position on human gene therapy was articulated in *Splicing Life* and *Recommendation 934*, the moral prohibition on human genetic enhancement was called into question. Jonathan Glover's 1984 book, *What Sort of*

People Should There Be?, was influential both for its clarity and for its prescience. Glover argues persuasively for a "greater willingness" to consider changing human nature. There are three methods by which we might change the genetic composition of future generations. First, there is environmental change, which might be brought about by such things as medical discoveries and even tax policies. Second, there are eugenic policies of the sort discussed in previous chapters. These may be considered "intended" environmental changes. And third there is genetic engineering (Glover, 1984, pp. 26-27). GE is preferable to conventional eugenics both because it can have an immediate effect that traditional breeding cannot, and because it escapes a number of moral objections associated with conventional eugenics having to do with violations of autonomy (ibid., pp. 27-29).

Glover is sympathetic to the Permissive View. He agrees with proponents of the orthodox view on gene therapy that safe germline gene therapy (human GE) for medical purposes is morally permissible. He differs from orthodox view proponents, however, with respect to human genetic enhancement. Glover seems to be motivated in part by the vagueness of the notion of "human nature," and in part by a dissatisfaction with certain aspects of contemporary humankind (ibid., pp. 55-56):

> The idea of "human nature" is a vague one, whose boundaries are not easy to draw. And, given our history, the idea that we must preserve all the characteristics that are natural to us is not obvious without argument. Some deep changes in human nature may only be possible if we do accept genetic engineering. It is true that our nature is not determined entirely by our genes, but they do set limits to the sort of people we can be.... Given the risks that positive genetic engineering is likely to involve, many people will think that we should reject it, even if that means putting up with human nature as it is. And many others will think that, quite apart from risks and dangers, we ought not to tamper with our nature. I have some sympathy with the first view.... It is less easy to

> sympathize with opposition to the principle of changing our nature. Preserving the human race as it is will seem an acceptable option to all those who can watch the news on television and feel satisfied with the world. It will appeal to those who can talk to their children about the history of the twentieth century without wishing they could leave some things out. When, in the rest of this book, the case for and against various changes is considered, the fact that they *are* changes will be treated as no objection at all.

It is interesting to note that Glover seems to have in mind changes that, however substantial, would leave us human persons. Despite his misgivings about vagueness, he clearly thinks that it is not meaningless to speak of *human nature*. He speaks of "deep changes in *human* nature" and the "sort of *people* we can be." The title of his book, from which the passage quoted above was taken is *What Sort Of People Should There Be?* Of course, this is just suggestive, and it is not clear from this account what Glover would think of the sort of radical changes that we are interested in – i.e., changes so radical that the resultant would uncontroversially be considered non-human.

In addition to the sort of "moral enhancement" (Walters & Palmer, 1997, p. 126) alluded to in the passage quoted above, Glover envisions the possibility of intellectual enhancement. There may be certain concepts that are simply beyond the powers of comprehension of humans today. As Glover puts it, quoting British biologist J.B.S. Haldane, "the universe may be 'not only queerer than we suppose, but queerer than we can suppose'.... Just as calculus is too much for a dog's brain to grasp, so some parts of physics might turn out to be too difficult for us as we are" (1984, p. 180). If our intellectual capacities can be (safely) expanded through genetic engineering, Glover sees no reason why we should not do so.

Glover, in the following example, suggests that foreignness relative to present-day humanness is ethically irrelevant. We are asked to imagine that we wanted to genetically engineer a "half-human slave species" that would be useful to society (ibid., pp. 39-41). This semi-human species would perform society's menial or physically demanding labor, and do so quite contentedly. An initial reaction might be that it is wrong to create "contented mental defectives" rather than normal humans. But, Glover asks, is it more accurate to classify these beings as defective humans or, say, "super-cows" (ibid., p. 39)? The answer is not obvious. If one were (arbitrarily) to classify the half-human species as super-cows, then it seems that one would tend to think of the genetic alteration as a benefit to cows, rather than, as in the other case, a harm to humans.

There is something paradoxical about this example. Normally we would consider deviations from humanness in the direction of *subnormal* functioning as ethically regrettable. Let us imagine that a mad scientist were able to genetically engineer offspring – derived from human and non-human (say, bovine) genetic material – with a range of mental disabilities, from mild to severe. Increasing levels of disability would be achieved by increasing the ratio of non-human to human genes. It goes without saying that, as we move along the continuum from normal to increasingly diminished functioning, we feel an increasing sense of regret, just as we find more severe cases of mental retardation more regrettable than less severe cases. Glover's example seems to suggest, however, that such outcomes are only regrettable *if the offspring are human*. We might reach a point on our scale of hybridization and disability at which we no longer would classify the offspring as human; we would classify it as a cow. And at that point,

the hybrid offspring might be functionally superior to cows. Thus, although we have continued along the scale of increasing disability and associated ethical regret, all of a sudden with the change in biological classification, the outcome is no longer regrettable!

Glover suggests that our moral reaction in this case might simply be hostility to the blurring of our system of classification. If so, then we might dismiss it as a "revulsion against anomalies," similar to revulsion against miscegenation (ibid., p. 40). That is, *biological humanness should be irrelevant to our ethical regard for others* just as race is irrelevant. Glover's "supercow" example is complicated by the question of whether, in creating the half-human slave species, our mad scientist has harmed that future individual. We now see that the question is not quite as straightforward as we seem to assume in our labeling the inadvertent creation of monstrous subhumans "irreversible harms" (see Chapter 3). And we have not yet even raised a *further* complication, namely, the difficulty in saying that we have harmed a subhuman creature by bringing it into existence: it owes its very life (with which it is contented) to our act.

A full discussion of the potential ethical significance of biological classifications and the moral consideration of future persons is beyond the scope of the present work. The issue at hand is human genetic *enhancement*, or alterations in the "superhuman" direction rather than the subhuman – and with that we avoid at least the harm-related complications of the subhuman cases. However, Glover's implication that humanness, in a narrow biological sense, should have no bearing on our moral regard for others *is* relevant to the issue of radical human genetic enhancement. The Restrictive View advocate claims that even if we improve on humankind, it would be regrettable if we lose

humanness. Humanness has a deep ethical significance that race does not. Hence, a revulsion against an anomalous human hybrid is not analogous to a revulsion against miscegenation

Glover takes seriously the possibility of risk – i.e., of making an irreversible genetic mistake – but argues that this justifies a "principle of caution" and not a ban on human genetic enhancement (ibid., p. 42). As noted previously, he advocates a "mixed system" of parental initiative in genetic decisions limited by a centralized veto power (ibid., p. 51).

Walters and Palmer are generally sympathetic to the Permissive View as well While distancing themselves from the ill-fated eugenic goals of the past ("we do not have in mind... a perfect society or ideal human beings" (1997, p. 132)), they "are open to gradual improvements, appropriately distributed, in [some] human characteristics" (ibid., p. 132). Walters and Palmer categorize enhancements as physical, intellectual, or moral. Physical enhancements are further classified as health-related or non-health-related. Those enhancements that are seen as relatively unproblematic are the health-related physical enhancements (e.g., a bolstered immune system), and intellectual enhancements that bring children from subnormal to normal functioning. (Both of these would be considered "treatment" gene therapy according to our distinction between treatment and enhancement – see Chapter 2.) The other kinds of enhancement are viewed as more problematic – *but not intrinsically objectionable*. Walters and Palmer have two concerns. The first is "what might be called a new form of child abuse," i.e., parental decisions about the genetic engineering of future children that are not in the best interests of those

children (ibid., pp. 131-132). This concern, though, could be addressed by some form of regulation, such as Glover's proposed centralized veto power (above). The second concern is over equitable access to genetic enhancement – an ethical issue that is not unique to human GE. But the main point, for our purposes, is that human genetic enhancement is not viewed as inherently wrong.

A third proponent of human genetic enhancement is philosopher John Harris. Like Glover, Harris does not take the simple fact that human genetic enhancement may change human nature to be a sustainable ethical objection. In his book *Wonderwoman and Superman* (1992) he argues that it is clearly fallacious for us to reason that human nature just is the nature that contemporary humans possess:

> The fallacy here, and for once it is proper to talk of something as hard and concrete as a fallacy, is that human nature is constituted by its complete description at a particular moment in time. In other words that human nature just is the nature of the humans now existing. Human nature is changing and evolving constantly and we are very different from our ancestors. Our descendants, if the species survives, will differ from us in ways it would be hard to predict. *We have changed and can still change radically and still be human* (p. 171; emphasis added)

Harris's view – that we can change radically and remain human – seems to be based on the fact that we have changed radically over evolutionary time. But the former statement only follows from the latter if it is true that our very distant ancestors were human. And by any account, our very distant ancestors were *not* human. (The point, after all, of the theory of evolution is that humans evolved from non-humans – from apes.)

Perhaps Harris, in referring to our evolutionary origins, has in mind a time in the not-so-distant past, when humans were very different from their contemporary counterparts, *but were still human*. And perhaps in referring to "radical" change, Harris

has in mind changes that would make our descendants strikingly different from contemporary humans, *but still human*. If this is what Harris has in mind then one might grant him his point. But then, of course, one will also want to know what to think of our *more distant* ancestors and descendants – i.e., our ape ancestors, and our non-human descendants. When one has these evolutionary ancestors and descendants in mind, then a revision to Harris's conclusion is called for: We have changed and can still change to such a degree that "we" (i.e., our descendants) are *no longer* human.

Harris is not alone in being imprecise on this point. His comments are reminiscent of Glover's (above). Walters and Palmer also continue to use the word "human" in reference to our genetically-enhanced descendants (1997, p. 133):

> While there are historical and evolutionary reasons for human nature's being as it is, we do not view the human race as being fated to accept the current state of affairs. Rather we accept the possibility of change in human nature and have tried to argue for the ethical acceptability of certain kinds of planned changes in the characteristics of future human beings. In our view, such genetic enhancements are an important part of the overall task of attempting to provide a better life and a better world to our descendants.

The explanation for the continued use of "human" may simply be that indicated above – namely, that the authors are envisioning a relatively close technological horizon, before which (safe) wholesale changes to humankind are feasible.

Silver, however, recognizes this potential for loss of humanness explicitly in his futuristic scenario, in which the (unenhanced) "Naturals" are one still-human species, and the GenRich clans are several distinct no-longer-human species (1997, pp. 240-249). Even with this explicit recognition, he does not view changes in human nature – *even to the point of a loss of humanness* – as morally significant in themselves. Our attempts to

make human life sacred have been misguided. What we have taken to be sacred about human beings has, Silver argues, dwindled over time. Few insist that the entire human body is sacred (an exception may be certain Christian Scientists). Some insist that the cell nucleus is sacred. Silver has in mind here those who find IVF with microinjection of sperm morally acceptable as a treatment for infertility but would reject human GE. But now for many even the genes are not considered morally inviolable, given the increasing acceptance of the prospect of treatment germline gene therapy. Thus, human sacredness ultimately seems to have vanished. "This frightening notion compels some people to draw a final line ... around the genetic material" (ibid., pp. 234-235).

But it is flawed reasoning that leads us along this progression from body to DNA in search of the "*essence* of human life." The flaw is centered on the ambiguity in the term "life." The two relevant meanings of "life" (so to speak) are what Silver calls "life-in-general" and "life in a special sense" (ibid., pp. 18-23). By "life-in-general," Silver just means biological life, characterized by such things as ability to use energy, reproduce, and evolve. Both humans and bacteria have life in this sense. By "life in a special sense" Silver means conscious life, which requires an "ability to feel and express a range of genuine human emotions and, most important, their attainment of the uniquely human condition of reflective self-awareness" (ibid., p. 22). The essence of human life is not to be found in biological life, Silver claims, but rather in conscious life (ibid., pp. 235-236) And controlling the essence of human life should not be morally off-limits:

> Why not seize this power? Why not control what has been left to chance in the past? Indeed, we control all other aspects of our children's lives and identities through powerful social and environmental influences and, in some cases, with the use of powerful drugs like Ritalin or Prozac. On what basis can we reject

> positive genetic influences on a person's essence when we accept the rights of parents to benefit their children in every other way? (ibid., p. 236)

Thus, there appears to be agreement among most commentators that human genetic enhancement has the potential to change human nature. Our motivating intuition for the Restrictive View was that such changes would be, in themselves, ethically regrettable. This intuition has now been more forcefully challenged, leaving us to wonder, is loss of humanness really ethically important?

A More Plausible View?: Moral Importance Attaches to Psychological Personhood, Not Humanness

Perhaps we have been making too much of humanness in suggesting that some deep ethical significance attaches to it. In practice, it seems that we attribute moral standing to individuals who possess certain mental or psychological characteristics. On a very basic level, creatures capable of feeling pain are, in virtue of that capacity, taken to be worthy of a basic moral consideration – namely, they should not be made to suffer unless there is a compelling ethical justification for doing so. And if there is such a justification, harm should be minimized. The capacity for feeling pain is, of course, dependent on an organism having a certain neurological constitution.

More neurologically advanced organisms have more sophisticated mental and psychological capacities. Examples are the capacity for memory, emotions, rational thought, and self-awareness. According to a common philosophical view, it is the possession of psychological capacities such as these that determines whether or not an

organism is a *person*. A person, according to Locke, is "that conscious thinking thing ... which is sensible or conscious of pleasure and pain, capable of happiness or misery, and so is concerned for itself as far as that consciousness extends" (Locke, 1856, p. 214). There is disagreement about exactly which psychological capacities are essential for personhood, although (following Locke) rationality and self-consciousness seem to be held in particularly high regard (Harris, 1985, p. 15).

Our ethical treatment of one another is in many ways consistent with this psychological view of personhood. Thus, we terminate the lives of the irreversibly comatose (or "brain-dead") and anencephalic babies. Those without neurological (and hence psychological) activity and no possibility of such activity in the future are, in effect, absent. They are non-persons – bodies without minds – and as such are not entitled to the usual moral respect that human persons receive. More precisely, we judge that there is no one there to be entitled to moral respect or anything else.

If persons are essentially psychological, then biological humanness (membership in the species *Homo sapiens*) is not, in principle, a necessary condition for personhood. Thus, on a generous interpretation of "person," one might argue that other non-human organisms (chimpanzees or dolphins, for instance) are persons. Similarly, one can imagine a day when, thanks to phenomenal advances in the field of artificial intelligence, robots are produced that are self-aware, and capable of rational thought and memory. It is of course a matter of sheer speculation as to whether such advances are possible. But the relevant point here is that, if such intelligent robots were created, they would be morally significant persons according to the psychological view. Thus, it is a contingent

fact that persons (morally significant beings) are embodied in human form and exhibit other species-typical characteristics. We can imagine other possibilities and in those cases placing *human* persons on a higher plane than non-human persons would require justification, the basis or even possibility of which is not obvious.

Silver's GenRich super-beings would be persons as well. And if it is personhood, and not biological humanness, to which ethical importance attaches, then the fact that the GenRich are non-human (non-*Homo sapiens*) – according to this view – is irrelevant to their moral standing.

GE-Accelerated Evolution

Yet our intuitive misgivings about the GenRich persists, and they depend not *just* on the degree of foreignness, or loss of biological humanness, of the GenRich. They also depend on the time interval over which our GE-accelerated evolution has occurred. Imagine that, through human GE, we create over the course of the next year (rather than over several centuries, in Silver's version) a GenRich organism. And let's assume that this organism (call it "GenRich-A") is exactly the same kind of organism as that which would have evolved from *Homo sapiens* naturally (i.e., without technological intervention through GE) over the course of the next, say, 100,000 years. GenRich-A is non-human, meaning (roughly) that the difference between GenRich-A's appearance and behavior and that of contemporary *Homo sapiens* is at least as great as the difference between contemporary *Homo sapiens* and chimpanzees. In addition, GenRich-A cannot

interbreed with contemporary humans. Finally let us stipulate that GenRich-A possesses all of the psychological capacities that are definitive for personhood, and possesses them at least to the same degree that contemporary humans do.

What can we say of the ethical ramifications of creating GenRich-A, of its appearance on such short notice? If GenRich-A had appeared 100,000 years hence, the product of "natural" evolution, its appearance on the planet would, in itself, have no ethical implications whatsoever. Can we plausibly say, then, that GenRich-A's appearance next year, *in itself*, has ethical implications? According to the psychological view, the appropriate response would seem to be that only (psychological) personhood matters. And since GenRich-A is a person, there can be nothing *inherently* objectionable in its creation. It is incumbent upon us to get over our "revulsion against anomalies" and see non-human persons for the persons they are. Yet we feel a sense of moral alarm about the appearance of the non-human GenRich-A next year that we do not feel about the appearance of GenRich-A 100,000 years from now. And whether or not that moral alarm is merely a revulsion against its anomalous nature or a revulsion defensible in ethical terms remains an open question.

Suppose that at roughly the same time that GenRich-A was created, it was discovered that whales are possessed of even greater intelligence than anyone had suspected. Suppose that, among other scientific revelations, we managed to decipher whale language and found that their communications provided unequivocal evidence that whales have all of the psychological characteristics that we take to be indicative of personhood. Their psychological life, we find, rivals our own in terms of the level of

intellectual and emotional sophistication. If we imagine whales to be as we have just described, we would want to say two things about them. First, we would say that they are persons in some full sense of the word. That is, whales would be on a par with humans, as opposed to dogs or chimps or other non-human animals that (as far as we can tell) only marginally meet our psychological criteria for personhood. Second, whales, in virtue of their (full) personhood, must now be recognized by humans as moral peers, i.e., as creatures of approximately equal moral significance. So the fact that whales are non-human (non-*Homo sapiens*) is irrelevant to their moral standing; and the fact that humans are human (*Homo sapiens*) is irrelevant to *their* moral standing. More simply, species membership is irrelevant to the moral standing of any creature. Again, only personhood matters, ethically speaking. Getting back to GenRich-A's accelerated appearance: it seems that, just as with the whales, A (and all A-like creatures) must now be recognized by humans as creatures of roughly equal moral importance.

The Moral Standing of Human "Non-Persons"

We have been discussing a view that holds that we are morally important in virtue of our personhood (understood in psychological terms) and not in virtue of our humanness. The argument against the importance of "human being" looks like this (Diamond, 1991, p. 35): a) We are morally important in virtue of certain properties we possess. b) The properties tied to our biological classification as human beings are not all morally relevant. c) Properties that are morally relevant are such things as self-

consciousness, capacity for reasoning, etc. d) Anything that has such properties is morally important. e) "And so it would be better to use a word like 'person' to mean *a being that has these properties*, to bring out the fact that not all human beings have them and that non-human beings conceivably might have them."

What, then, are we to make of human beings that lack the psychological capacities that are taken to be definitive of persons? When one thinks of the kinds of things that might arguably be considered human non-persons one thinks, for example, of the irreversibly comatose, the profoundly retarded, and fetuses. Clearly most people attach some, and often great, moral importance to individuals in each of these three categories.

Since one's status as a person (on this view) depends on the possession of certain psychological capacities, and since those capacities can be present in different individuals in varying degrees, it seems natural to conclude that there must be varying degrees of personhood. (Perring, for one, has so argued (1997).) One might infer from this that there are corresponding degrees of moral standing. Persons of high intelligence would be of greater moral standing, while intellectually disabled persons would be of lesser moral standing (Edwards, 1997). Even if one rejects the idea of a continuum and insists that personhood is a threshold concept, it seems that certain non-human animals (dogs, say) have more to commend them, mentally speaking, than do humans at the end stages of Alzheimer's disease.

Most would find such an assessment of the intellectually disabled offensive. And we can point to many examples of our treatment of the intellectually disabled that belie

the claim that they are of lesser moral status – as when a beloved family member is lovingly and respectfully cared for well past the onset of an all-encompassing dementia. On the other hand, however, there is evidence in support of this claim. Consider, for example, our moral consideration of a fetus or neonate born with Down syndrome. A prenatal diagnosis with Down syndrome is considered sufficient justification for terminating a pregnancy. And until the early 1980s, a diagnosis of Down syndrome or similar mental disability was used to justify withholding nourishment leading to death by starvation (ibid., pp. 31-33). In the case of a normal fetus or infant, such options would be considered unthinkable. While some severely disabled adults are placed in institutions by loving families who visit regularly and generally look after their interests, many are abandoned in squalid institutions or poorly regulated homes by persons who would not dream of treating a *physically* ill family member in such a fashion.

Whether there are plausible justifications for the differential treatment of the intellectually disabled that do not imply a lesser moral status is a matter that will not be debated further here. For our purposes, it is enough to note that a) some human beings do not seem to qualify as persons, and b) the psychological view of personhood implies that (human) non-persons are not intrinsically morally important.

What, if anything, could justify our belief that these human non-persons are intrinsically morally important? One attempt to shed light on this question has been made by Ronald Dworkin, whose views on the abortion debate and the "sacredness" of human life provide a good starting point.

Dworkin's "Sacredness"

Dworkin, in his book about abortion (1993, pp 68-101), has argued that the views of advocates on both sides of the political issue are flawed. They are flawed for two reasons. First, the arguments are based on the claimed existence or non-existence of rights. But it makes no sense to assign rights to beings that cannot be said to have interests, and this is the case with (at least early stage) fetuses (We will not pursue these arguments here.) Second, these rights-based arguments are inconsistent with the stated beliefs of the very people making those arguments According to Dworkin, what people *truly* believe – i.e., what gives an internally consistent account of their positions – is that human life, including fetal life, is intrinsically valuable. The political disagreements arise from a conflict between two different kinds of intrinsic value. Dworkin posits a secular kind of sacredness, or moral inviolability, as the basis for a better, internally consistent explanation of the body of views on abortion.

Dworkin believes that views on abortion are internally inconsistent. Opponents of abortion claim that the fetus has the same right to life as (non-fetal) human persons do. However, most abortion opponents are willing to make exceptions in cases of rape or incest. This entails that they are willing to kill an innocent person (or at least a living human being with a right-to-life equal to adult human persons) in order to spare the pregnant woman a harm that, while substantial, is clearly less severe than loss of life

Abortion proponents claim that the fetus (or at least the early fetus) is not a person (or rights-bearing entity) and therefore has no right to life. But most feel a sense of regret

that increases in direct proportion to the stage of fetal development even at fetal stages prior to viability or sentience – the stages normally taken as the earliest possible for personhood or the possession of interests and rights. This entails that there is something other than personhood that is morally significant.

This collection of views, according to Dworkin, leads to the following *foundational premise*: "It is *intrinsically* regrettable when [even embryonic] human life, once begun, ends prematurely" (ibid., p 69; emphasis in original). That is, human life is intrinsically valuable, or valuable independent of any usefulness or desirability to people. Intrinsic value is contrasted with instrumental value (dependent on usefulness) and subjective or personal value (dependent on people's desires). The example of a Rembrandt painting is given to illustrate the concept of intrinsic value: "We say that we want to look at one of Rembrandt's self-portraits because it is wonderful, not that it is wonderful because we want to look at it" (ibid., p. 72).

The objection might be raised: If human life is intrinsically valuable, then why do we not believe that more human life is necessarily better? Dworkin claims, in response that there are two categories of intrinsic value (ibid., p. 70): Things may possess incremental (intrinsic) value. The more of such things there are, the better. Or things may possess *sacred (or inviolable) value*. These things are intrinsically, but not incrementally, valuable.

We believe that human lives are intrinsically valuable: We view death as a loss even when we attach no instrumental or subjective value to the deceased. So, of the two types of intrinsic value introduced above, what kind is attached to human life? Dworkin

claims that human life is sacred or inviolable, not incrementally intrinsically valuable. "[T]he sacred is intrinsically valuable because – and therefore only once – it exists" (ibid., pp. 73-74)

A thing may become sacred in two ways – first, by association or designation; and second, through history or genesis (ibid., pp. 74-75) An example of something possessing *associational* sacredness is the American flag. (Dworkin considered this relatively unimportant.) Examples of things held to possess the second type of sacredness – which I will call *developmental* rather than historical or genetical[8] – are great paintings, and animal species.

Since humans are an animal species, humans possess developmental sacredness. They are sacred in virtue of their genesis, or the creative process of their development. But their development is, according to Dworkin, of two morally significant types. To refer to the first of these, Dworkin uses the terms *"natural" sacredness*, or the *"natural investment"* inherent in humans. Humans possess natural (developmental) sacredness in virtue of the creative process of human embryonic, fetal (and later) development. Human persons are also sacred in virtue of the creative process of their life in society – the hopes, aspirations and life projects that they have, etc. Thus, the second of the two types of developmental sacredness possessed by humans is what Dworkin calls "human" sacredness, or the "human investment."

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[8]Dworkin's terms may have confusing connotations here: "Historical sacredness" might be taken to mean "held sacred at some point in the past." "Genetical sacredness" - given the emphasis on molecular biology and genetics elsewhere in this paper might be taken to mean "sacredness associated with the genes."

A recapitulation of Dworkin's categorization of values looks like this:

Three types of value:
1) instrumental
2) subjective (or personal)
3) *intrinsic*

Two types of intrinsic value:
1) incremental
2) *sacred* (non-incremental)

Two types of sacredness:
1) associational
2) *developmental*

Two types of developmental sacredness (of humans):
1) *natural*
2) *human*

Thus, we will use the shorthand terms "natural sacredness" and "human sacredness" to refer, respectively, to natural, developmental, non-incremental, intrinsic value; and human, developmental, non-incremental, intrinsic value.

We take the abortion of fetuses to be more problematic the older the fetus is Likewise, most believe it is a greater tragedy when an 8-year-old dies when compared with the death of a newborn (ibid., pp. 86-87). "Most people's sense of that tragedy, if it were [graphed], would slope upward from birth to some point in late childhood or early adolescence, then follow a flat line until at least very early middle age, and then slope down again toward extreme old age" (ibid., p. 87). The *simple loss-of-life view* – the view that the tragedy is greater if the number of expected life-years lost is greater – fails because it focuses only on the future, and ignores past investments, plans for the future,

expectations, etc. It is these past things that make it more tragic to lose a 8-year-old than an infant. The 8-year-old has a greater *human investment*.

Dworkin uses the term "frustration" to "describe this more complex measure of the waste of life [that refers to a] combination of past and future considerations that figure in our assessment of tragic death" (ibid., p 88). The *frustration-of-life view* better fits our views about tragic death than does the simple loss-of-life view. Abortion is worse later in pregnancy because a greater *natural investment* has been wasted.

So Dworkin's dichotomy – natural sacredness inherent in the biological creation and "human" sacredness inherent in the creative endeavors of the human person – provides a view of what is sacred, or of intrinsic value to humans. Does this interpretation of the intrinsic value of human beings accomplish what we need it to accomplish?

With respect to providing a basis for the moral standing of human "non-persons," Dworkin's conception of sacredness arguably fares better than the unadorned psychological view of personhood. Dworkin's "human" sacredness obviously requires that its possessor have certain minimal psychological capacities (or roughly, requires personhood), since a non-person simply is not capable of having future plans, life projects, deep commitments, and so on. However, natural sacredness inheres in the biological creation – the organism. Thus, natural sacredness might serve as a basis for elevating the lower moral status that intellectually disabled persons are claimed to hold. Whether this elevation is sufficient is another matter. Is the natural investment of humans greater than that of other mammals whose biological "creation" rivals the

sophistication of our own? It is not clear why human biological creation should be held in higher regard than the biological creation of dogs or horses. And if the natural sacredness of dogs, horses and humans are more or less comparable, then critics might be expected to find Dworkin's natural sacredness an inadequate foundation for the moral status of human non-persons.

That this lack of a clear connection between "sacredness" (or intrinsic human value) and humanness is problematic can be seen also when we assess whether Dworkin's sacredness has provided grounds for objecting to human genetic enhancement We want to know, *does human genetic enhancement violate (either type of) Dworkinian sacredness*?

The answer at first glance appears to be no. By stipulating that the alterations are enhancements, it seems that natural or human investments would, if anything, be greater in enhanced individuals as compared with unenhanced, all else being equal.

Here again it is hard to know how far Dworkin would have us go. Is it crucial to natural sacredness that the natural or biological creative investment is *human* (i e., of the species *Homo sapiens*)? And is it crucial to "human" sacredness that the creative investment embodied in our projects and deep commitments has to do with our *human* personhood? These notions of sacredness conceptualized as creative investments *do not seem to depend on the preservation of biological humanness*. The intrinsic value seems to reside in the creation or the creative act. If that is the case, then – as just noted – other biologically complicated mammals (e.g., apes and dogs) would possess natural sacredness in much the same way that humans do. And genetically engineered, human-

derived creatures of the future – in virtue of their creative projects and commitments – would possess "human" sacredness in much the same way that contemporary humans do.

So it seems that neither (biological) humanness nor human-personhood is necessary for the possession of sacredness of the sorts that Dworkin postulates. Thus, we have no ground yet for finding the genetic enhancement of humans to be morally impermissible.

The point of introducing Dworkin's theory, in spite of the fact that it is not obviously useful in arguing against radical genetic enhancement, is that it illustrates that, as suspected, *humanness will have to be central in any notion of sacredness that is to be employed in arguing for the Restrictive View*. Can we find a ground for sacredness that has a central role for some notion of humanness, such that even apparent improvements over contemporary humankind would be ethically regrettable?

Human Beings, Not Essentially Psychological Persons, Are of Fundamental Ethical Importance

In our discussion to this point there has been a tacit separation of considerations of the mind from considerations of the body. Personhood is largely or entirely associated with the mind, and humanness with the body. Thus, we take it as uncontroversially true that (human-derived) embryos and early fetuses, anencephalic babies, the irreversibly comatose ("brain-dead"), corpses, and the profoundly intellectually disabled all are human. And our differential treatment of these human "non-persons" indicates that they

have either little or no moral standing relative to human persons. Our sacredness – our intrinsic moral value – depends on the mind; the body is unimportant.

Humanness, as commonly conceived, is essentially a matter of biological classification – species membership. We are one kind of animal among many, each representing a particular branch on the evolutionary tree, some kinds having evolved from others. The fact that human animals came into existence at all had to do with innumerable quirks of evolutionary fate. The claim that human animals (assuming they avoid extinction) will evolve into something else – a non-human species – is widely accepted. This solely biological conception of humanness seems like an extremely poor foundation on which to build arguments in favor of "human" sacredness.

Some philosophers, however, have argued for the central moral importance of the *human being*, and have meant by that term something distinct from "member of the species *Homo sapiens*," or "person" according to some psychological criteria of personhood. The mind-body dichotomy plays no part in this conception of human being. In fact, this dichotomy interferes with our proper moral regard for others.

In the next chapter, we shall see what this conception of humanness looks like and see also whether it provides a sufficiently strong basis for the Restrictive View. As noted earlier, in order to provide that strong foundation, several things must be accomplished. First, a plausible notion of morally significant "humanness" must be described. Second, it must be shown that radical human genetic enhancement violates that "humanness." And third, it must be shown that such a violation is morally regrettable. In light of our discussion of the GenRich-A, we may now add an additional requirement: We must

account for the fact that our moral objection to the appearance of the GenRich depends on the suddenness of their appearance.

CHAPTER FIVE: HUMAN BEING-NESS AS A FOUNDATION FOR THE RESTRICTIVE VIEW

The current policy on human gene therapy is shaped in large part by ethical considerations. A number of ethical objections have been made (per Chapter 3), and on the collective strength of these objections some types of human gene therapy are restricted. First, *germline* gene therapy (or human genetic engineering) is not permitted; and second, *enhancement* gene therapy (whether in germ or somatic cells) is not permitted. As argued above, the objections commonly raised against human gene therapy are either time-bound or cannot be expected to justify a restrictive policy in the long term. In particular, it is expected that human GE will become acceptably safe (per Chapter 2). And since safety is the primary reason for restricting germline genetic interventions in humans, we may expect that the prohibition against human GE will be relaxed in the not-too-distant future. The prohibition against human genetic enhancement also seems to rest on rather shaky ethical foundations. Thus, again in the long term, we may expect an incremental expansion of the range of germline genetic interventions considered ethically acceptable – starting with treatment and moving eventually to enhancement.

The moral line between treatment and enhancement seems to be drawn in the wrong place. Yet there remains a sense that *some* moral line should be drawn. Even if one considers only genetic enhancements, or improvements, radical deviations that threaten humanness seem morally problematic. That is, a *Permissive View* on human GE – declaring even radical human genetic enhancement morally permissible – strikes us as implausible. A *Restrictive View* – claiming that radical human genetic enhancement is

not morally permissible – seems more plausible (per Chapter 4) Yet it has proven difficult to say what of moral significance, if anything, would be violated in such cases. The Restrictive View seems to need grounding in some notion of intrinsic value or "sacredness" that is associated with humanness, although we have yet to find an aspect of, or conception of, morally significant humanness that might be jeopardized by radical genetic enhancement

In our pre-philosophical reflections, we are inclined to think that both biological humanness and psychological personhood are morally significant in some deep sense. But it has proved difficult to defend the view that human sacredness inheres either in biological humanness or in psychological personhood. Is there a view of morally significant humanness – or sacredness – that preserves this pre-philosophical intuition which has motivated the Restrictive View; that is potentially jeopardized by radical genetic enhancement; and that avoids the shortcomings of the other attempts to ground sacredness?

In the present chapter we will consider a view, drawn from the philosophy of Wittgenstein, that attempts to meet these desiderata. That view, as articulated by Cockburn[9] with insight from Cora Diamond on the role of "imaginative understanding" of others, suggests that human sacredness is a property human beings have in virtue of their membership in a network of morally significant relationships – membership in a moral community. Cockburn argues that it is "the tangible persisting ***human being*** – a being with a distinctive bodily form and having its own distinctive kind of value" – that is

morally significant (p. x). It is towards this tangible human being (and not disembodied or essentially psychological persons) that we have instantaneous responses, or *attitudes*, that are of central ethical importance. It will be argued that the human being-centered view accommodates our sense that human sacredness is grounded in biology and our sense that it is grounded in psychology. Moreover, it appears that human being-ness could potentially be jeopardized by certain genetic enhancements, and thus might serve as a guide in our re-drawing the moral line between problematic and unproblematic human GE. Finally, it accounts for our sense of an extended moral community centered on human beings yet with the potential for being extended to include a broader range of others.

"Attitudes" Are Fundamental

Cockburn holds that what a person is "cannot be separated from those attitudes which are expressive of a recognition that an individual is a person" (p. ix).[10] Now "attitude" here has a special meaning. Wittgenstein used the term to refer to the instantaneous feelings and responses we have towards one another, responses that are not the result of conscious deliberation. As an example, think of the anguish a mother feels in observing her child in pain. She responds instantaneously and with deep feeling. The response is non-rational, in the sense that there is no quick assessment of the facts of the

[9] We shall rely on Cockburn's *Other Human Beings* (1990) for an articulation of this view. All page references in this section are to this work unless otherwise noted.

matter followed by a conclusion that the appropriate moral response in these circumstances is anguish. The instantaneous moral recognition of other is seen in other situations as well, such as when the same mother observes her child joyfully playing and responds instantaneously – viscerally, one might say. To say that she is pleased because she infers from her son's behavior that he is enjoying himself – that she is glad about the evidently good state of affairs – gives an incomplete account. And what she feels in response to her son suffering, say, a cut finger, cannot be completely accounted for by the expected bad consequences (p. 4).

Cockburn (p. 6) quotes Wittgenstein: "My attitude towards him is an attitude towards a soul. I am not of the *opinion* that he has a soul." Wittgenstein is not using "soul" in a theological sense. He is referring to the core of the individual human being. The idea here is that "attitudes towards" rather than "beliefs about" others should be central or fundamental to our ethical thought (p. 7). My moral responses to another do not follow from a rational deduction that includes an appraisal of evidence of the other's personhood. In other words, "Wittgenstein seems ... to reject the view that the attitude which we have towards another rests on something else: our grasp of the kind of being that the other is" (p. 9).

How could it be that attitudes are fundamental in this way? After all, it seems that there must be some justification, based on some intrinsic features of the individual, for our moral attitudes towards others. If we have, on the one hand, chickens being gathered for the slaughter, and on the other hand, human beings being gathered for the slaughter,

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[10] In Cockburn's usage, "person" implies moral importance, not the possession of certain psychological

we respond differently to each case. And when asked why we are so strenuously trying to intervene to save the one sort of creature and not the other, our explanation would no doubt include the distinction that the human animals are more than the non-human animals. They are persons and therefore are worthy of special moral consideration. And when asked further how we know that the human animals are persons (and chickens are not), we would most likely recite some version of the now-familiar list of psychological capacities that define personhood. Isn't it the recognition that the object or individual in question is a person that leads to our responsive attitudes towards others?

Appealing to Psychological Persons Does Not Justify Our Moral Treatment of Others

We are looking for an explanation of what makes someone worthy of moral consideration. What leads us to the ethical attitudes, or moral regard, we have towards others? What *justification* do we have for treating others in the way we usually do, as opposed to, e.g., using others as means to our ends?

The special justification given by the advocate of the psychological view of personhood is that there is present in others an imperceptible, essentially psychological person. Cockburn offers two challenges. First he challenges the idea that we even need a special justification for our (Wittgensteinian) attitudes towards – our usual moral treatment of – others. To say that we need a special justification for our usual treatment of others is to imply that some other attitude is the norm. "What, then, is the norm? Are we to say that things in the world are to be *used* in our attempts to achieve our *ends*

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capacities.

unless reason is given, in particular cases, for thinking otherwise?" (p. 15). Cockburn has no argument against this assumption. His aim is simply to expose it as an assumption and juxtapose it with the assumption "that *nothing* in the world is simply a thing to be used in our attempts to achieve our ends.. " (p 16) To the extent that we do not accept the former assumption, we do not accept the need for special justification of our attitude towards others

Cockburn's second challenge is that the special justification itself does not do the work it claims to do. We attach special significance to things that people do, or *actions*, that we do not attach to things that merely happen to people. What distinguishes actions from things that happen to us? The former require *willing* while the latter do not. And willing is something that a (psychological) *person* does. According to the special justification, since nothing in the perceived world can ground our attitudes towards others, there must "be an occurrence in a non-extended entity without mass, solidity or spatial location which lies behind what we actually observe" (p. 19). This essentially psychological person can ground our attitudes.

But Cockburn asks, "how does what happens in this other realm ground – provide reason for – such responses?" (p. 19). We've gone from the question (or "mystery") of how things in the everyday, perceived world ground our attitude toward others to how things in the unperceived, mental world provide such a ground. It seems that we want an explanation of willing, and for that we turn to essentially psychological persons But, Cockburn says, we've all directly *experienced* willing, so how could a further attempt to explain – by invoking psychological persons – help (19)? He concludes, "To leave a

place for the special kinds of significance which we attach to what people do we must then, at the beginning, reject the paradigm of rationality in action which led us to think that 'a man, considered as a moral being, is not really *in* the world at all'" (22).

In response to Cockburn's challenges, it might be objected that appealing to psychological persons, or minds, makes available a justification for our ethical attitudes towards others – a justification that is not available to Cockburn's human being-centered view. Our ethical attitudes are justified by appealing first to our own first-person experiences (e.g., of pain), and next to the argument from analogy.

This type of justification came to prominence in the work of Rene Descartes. Descartes wanted to know how he could have certain knowledge about anything. How, for example, could he be sure that his sense perceptions really corresponded to objects in the real world? Was it not possible that they could be images in a dream, or images conjured by a spiteful demon? If that were possible – and it seemed difficult to prove that it was not – then we have reason to doubt all of our sense perceptions. Or in the words of Descartes, "it is sometimes proved to me that these senses are deceptive, and it is wiser not to trust entirely to any thing by which we have once been deceived" (Descartes, 1993a, p. 28). In turn, we have reason to doubt virtually all of knowledge, for when one begins to give reasons in support of the claimed truth of virtually any piece of knowledge, the chain of reasons leads eventually and inevitably back to sense perceptions. (Purely formal knowledge, such as mathematics, is an exception.) Faced with this all-consuming skepticism, Descartes sought something certain upon which the foundations of knowledge might be built. The realization that Descartes comes to is that

he cannot be deceived about his own existence. "We must come to the definite conclusion that this proposition: I am, I exist, is necessarily true each time that I pronounce it, or that I mentally conceive it" (Descartes, 1993b, p. 194). From this starting point, Descartes "goes on to discover that he is essentially mind and, using the mind's understanding, concludes that he can have infallible knowledge about psychological states" (see Descartes, 1993b, p. 196; Pojman, 1993, p. 193).

Thus, according to Descartes, I can be sure through the immediacy of introspection that I exist – not the body that I perceive, but the immaterial thinking subject *I*. But since others are not available to us through this sort of introspection, how do we know that these perceived others are thinking subjects, or essentially psychological persons? How do we know that "other minds" exist? The traditional view rests on the argument from analogy. Mill, for example, says, "I conclude [that other minds exist] from certain things, which my experience of my own states of feeling proves to me to be marks of it. . . . I conclude that other human beings have feelings like me, because, first, they have bodies like me, which I know, in my own case, to be the antecedent condition of feelings; and because, secondly, they exhibit the acts, and other outward signs, which in my own case I know by experience to be caused by feelings" (quoted in Pojman, 1993, pp. 455-456).

Let us return now to our original problem – i.e., how we justify our (Wittgensteinian) attitude towards others. The advocate of psychological personhood is saying that "[t]he 'arbitrariness' of my attitude towards others is removed by showing that it is the analogue in relations with others of the attitude which is clearly securely

grounded in the case of my thought about myself" (Cockburn, 1990, p. 35). Thus, for example, when I see someone step on a nail, and then see the contorted facial expressions and hear the screams of agony, I take this experience to be analogous to my own first-person experience of pain (Pojman, 1993, p 466).

Cockburn argues, in the same way many others have, that this special justification, appealing to one's own first-person experience and the argument from analogy, fails. It fails because there are first-person/third-person *asymmetries*. Continuing with the example of pain, Cockburn argues that *my own* pain is something to be a) relieved by me, and b) feared by me. But *another's* pain is something to be a) relieved by me, *but* b) *not* feared by me. This points up a flaw in the argument from analogy. When I step on a nail there are three stages: the action (stepping on the nail); the feeling of pain; and the outward expression of pain. What we see in others are the first and third stage, but not the second, making the analogy imperfect (Pojman, 1993, p 466). Since I do not literally feel, or have nerve-mediated sensations of, another's pain, I do not have the visceral reaction of fear that comes with my own experience of impending pain.

Another dissimilarity between the first-person and third-person experience of pain has to do with the importance of the human form. My horror at *another's* pain attaches to her bodily form (especially the expressive face and eyes). But my horror at *my own* pain is unattached to my (visualized) bodily form. This is true also with respect to anger: introspection of *my own* anger won't reveal to me what we typically find disturbing about *another's* angry glare (Cockburn, 1990, pp 37-39)

Following Wittgenstein, Cockburn argues that my own experience of pain does not "*show* me that pain is something to be relieved and something to be feared" (p. 40). Instead, my attitude towards my present pain "pre-empts any questions about justification;" it "does not stand in need of justification" (p. 41).

The Importance of the Human Form

If we are to illuminate the notion of attitudes, we must look first to the role of the human body or human form, for it is frequently the expressive human form that evokes our responsive attitudes. We have already taken note of several examples. There is the parent's anguish in response to her child's pain, and her moment of elation, her thrill that comes in watching her young child absorbed joyfully in his play. When a child opens presents, for instance, "the particular way in which [the parent] is moved cannot be characterized independently of the pleasure that he takes in her manifestations of joy" (p. 67). Our horror at another's pain is tied to the other's bodily form – the look of suffering in the eyes, the contorted facial expressions, etc. The other's bodily form possesses a richness of expression that is important in our responses to the other's states.

People who lack this responsiveness, these appropriate attitudes towards others, have a deficit that is profoundly important. This is how we should regard, taking Cockburn's example, slave-owners who view their slaves as automata and justify their ill-treatment of the slaves by saying – and, we will assume, sincerely believing – that slaves are not the kind of thing that feels pain. For Cockburn, awakening a proper moral regard

in the slave-owners is not (or not merely) a matter of correcting the mistaken belief about susceptibility to pain. What matters most is not that the slave-owner has incorrectly classified the slaves; it is that he has not paid proper attention to them. It is not that – since we both see the same thing and he has an inappropriate attitude – there must be an imperceptible person to explain the discrepancy. It is the extended, tangible human being in front of him that makes him wrong – and that makes this a moral judgment (p. 47).

The slave-owners do not share with us a critical part (p. 47). They are like dogs who inexplicably react angrily only to members of a certain race. They are, in a sense, "alien" (pp. 49-50). And we should say the same of slave-owners whose sole motivation for not inflicting pain on their slaves is that one has a moral duty not to inflict pain on things that feel pain. Such a position is a matter of detached reasoning, and the person who holds it need only be convinced of some flaw in his reasoning in order to consider beating slaves morally permissible. While we might wish to find the ethical behavior of this slave-owner more commendable than that of the first, what separates the two is nothing more than the ability to correctly ascertain the biological fact of the matter (i.e., that slaves feel pain) and reason logically from there. We may be grateful, given that there are slave-owners, to have more of the second type than of the first – bringing about less suffering is of obvious moral relevance. But it is not everything. To the extent that we lack responsive attitudes towards others, we are incomplete and our moral sense is alarmingly shallow.

Thus, the extended, tangible human being with its characteristic form and range of behaviors is returned to a central place in our ethics. "Disembodied minds" are not the proper objects of our moral concern.

The Legacy of the Mind-Body Dichotomy

We have inherited the philosophical notions of mind and body, and they have not served us well as a basis for our ethical thought. *Mind* and *body*, Cockburn argues, "displace the notion of the *human being* from its fundamental place in our ontology" (p. 55). "There is a single divide in nature which can be said to be *the* divide of fundamental moral significance. (A being either has a 'mind' or it does not)" (p. 56). The extended, tangible human being, on the other hand, is "of secondary importance in our relations with each other; the philosophical notion of a 'body' is a direct expression of this tendency" (p. 56).

Physical contact with others, the sight of others, or their presence matters to us. We *react* to the bodily form of others; we don't just regard that form as the source of *evidence* about their state of being. Our reaction upon seeing another in acute pain is not mere squeamishness or aesthetic revulsion. Another's pain *calls for more* than just rational appraisal followed by appropriate moral action (removal of pain). It calls for a sense of horror in the observer. Bodily form (esp. the face) is crucial to the horror-inducing demonstration of pain. Thus, the disembodied or essentially psychological "self" is incomplete (pp. 66-70).

Cockburn's goal has been to "cast doubt" on the idea that it is desirable or admirable to be the sort of person who is unmoved by suffering but efficiently goes about removing it (p. 70). The connection between pain (joy, etc.) and the human form "goes deep"; and the extended, tangible human being is "the *only possible* object [of our] responses to others which are central to our thoughts of them as persons" (p. 73)

But Cockburn's central role for the human form meets a strong moral objection Must we say that our appropriate "responses to persons" are (rightfully) compromised by certain disfigurements and disabilities (pp. 77-78)? Cockburn responds that "there is no more room for the denial that something of fundamental importance is lost with physical damage than there is for the denial that something of fundamental importance, a person, is lost with death" (78). The *character* of our concern changes, but the *degree* ought not (78-79). Cockburn does not elaborate on this response, which seems rather inadequate. After all, the complaint about the psychological view of personhood was that it too easily excluded the mentally disabled from the shared moral community. On Cockburn's view, are we not simply excluding from the moral community persons with certain disfigurements instead of persons with certain mental impairments? This objection can be accommodated by incorporating Diamond's views on the imaginative understanding of others, which we take up in the next section.

"Human Being" Is Not Analyzable

It has been argued that the psychological view of personhood, and the remnants of the mind-body dichotomy generally, are inadequate, and that the extended, tangible human being should resume a place of central importance. The question then arises, "in virtue of what features do you identify this as a human being?" (pp. 119-120). Cockburn responds, "on the basis of what it looks like and how it behaves" (p. 120) – *but necessary and sufficient conditions for being a human being cannot be given.*

It does not follow from being unable to state necessary and sufficient conditions for being a human being (or person) that there are no human beings (persons) (p. 108). After all, we can't cite necessary and sufficient conditions for being a bush (as opposed to a tree), but there are bushes. There is no reason to assume that "human being" or "person" must be analyzable, i.e., must be able to be put into other terms without loss. The notion that a human being just is a mind and body together "is a particularly pernicious version of this confusion" (p. 109).

Any suggested defining feature of personhood seems at times ludicrously inadequate. For example, Cockburn says, "not all human beings will emerge as beings who are not to be killed or eaten" (pp. 112-113). But all human beings will so emerge if we look to *human being-ness* – rather than *features* of human beings – as the foundation for our treatment of others. This is reminiscent of our discussion in the previous chapter of human "non-persons" – i.e., human beings who did not meet the criteria for

personhood according to the psychological view. It is reminiscent also of Cora Diamond's critique of certain arguments against eating meat.

Diamond (1978) objects, not to vegetarianism, but to arguments put forth in favor of vegetarianism by Peter Singer and other philosophers. Singer's argument is centered on rights. We ascribe certain rights to non-rational humans (e.g., severely brain-damaged individuals) that we do not ascribe to non-rational (non-human) animals. For example, we do not eat non-rational humans, nor do we use them for laboratory experiments. Both non-rational humans and animals are capable of having interests since "the capacity to have interests is essentially dependent only on the capacity for suffering and enjoyment. This we evidently share with animals" (ibid., p. 466). Diamond rejects this approach (ibid., p. 467):

> This is a totally wrong way of beginning the discussion, because it ignores certain quite central facts – facts which, if attended to, would make it clear that *rights* are not what is crucial. *We do not eat our dead*, even when they have died in automobile accidents or been struck by lightning, and their flesh might be first class.... Now the fact that we do not eat our dead is not a consequence – not a direct one in any event – of our unwillingness to kill people for food or other purposes. It is not a direct consequence of our unwillingness to cause distress to people. Of course it *would* cause distress to people to think that they might be eaten when they were dead, but it causes distress because of what it is to eat a dead person. Hence we cannot elucidate what (if anything) is wrong – if that is the word – with eating people by appealing to the distress it would cause, in the way we can point to the distress caused by stamping on someone's toe as a reason why we regard it as a wrong to him. Now if we do not eat people who are already dead and also do not kill people for food, it is at least *prima facie* plausible that our reasons in the two cases might be related, and hence must be looked into by anyone who wants to claim that we have no good reasons for not eating people which are not also good reasons for not eating animals.

We treat each other in certain ways – in the giving of names, in birth, in death, in our sexual relationships, in the obligations we have – not out of recognition of the

particular class of beings that we belong to, nor out of recognition of the interests we each have (ibid., p. 469). Rather, it is all these things "that go to determine what sort of concept 'human being' is" (ibid., p. 470).

Some will nevertheless insist that *human being* must be analyzable. In response to these critics, Cockburn observes: "The situation is a familiar one within philosophy. While in one sense it is recognised that chains of reasons must come to an end somewhere it is felt that the point at which we allow them to come to an end in daily life cannot really be a satisfactory stopping place" (p. 113, citing Gass, 1957).

There is a parallel with the foundational role that the notion of duty plays in Kant's ethics. For Kant, when one asks, why should I act morally towards others, the only reply that can be given is, "Because it is your duty." Duty is morally basic. Thus, it is an illegitimate question to ask why one should do one's duty. Similarly, on the human being-centered view, when one asks why we should act morally towards others, the only possible reply is, "Because she is a human being." Human being-ness is morally basic: No further justification is required nor can one be given.

On the one hand, then, we have the view that unanalyzable human being-ness is morally fundamental, where *human being-ness* cannot be reduced to other terms without loss. On the other hand, we have the view that essentially psychological personhood is morally fundamental, where *personhood* can – in principle at least – be reduced to other terms. What are the implications of each view for the kinds of commitments we have to one another?

Commitments and Personal Identity

The psychological view, Cockburn argues, has unsavory implications for our commitments to one another. The psychological view holds that personal identity is preserved as long as psychological continuity is preserved. Thus, the Jane that I saw at lunch yesterday is the same Jane that I saw at lunch today if and only if the two Janes in question are psychologically continuous. Or more precisely, person P1 at time t1 is the same as P2 at t2 if and only if P2t2 is psychologically continuous with P1t1. There is no consensus on what is meant by "psychological continuity," but continuity of memory seems to be key. The idea is that, while I might undergo radical bodily transformations – due to a disfiguring accident, plastic surgery, transplantations, amputations, etc. – that make me completely unrecognizable to those who knew me, as long as my mental life remains intact I remain the same person.

Now, on the face of it, this view of personal identity over time seems to be on target. However, viewing people as "persisting character and memory complexes" (p. 138, quoting Quinton) means that our commitments to persons are completely conditional. When I say, "I love Jane," on the psychological view this is equivalent to saying something like "I love that person with those certain character and memory complexes." Let us imagine that Jane, with whom we have heretofore had a committed and loving relationship, is suddenly struck with Alzheimer's disease. In a matter of months or years, Jane deteriorates to the point that her mental life is totally disconnected from that of her "former self." Since we are now faced with a different Jane, so to speak,

ought we to have the same committed relationship? On the psychological view, there seems ample room to doubt that we should. The commitment seems weak. On Cockburn's view – where the extended, tangible human being is centrally important – it is not just the psychological characteristics that matter.

The Irreplaceability of Persons

If individuality lies in the possession of certain characteristics, then we are all, in principle, replaceable (pp. 150-152). On the psychological view, what it is to be a particular individual is just to possess a certain set of psychological states. Thus, on the psychological view I am, at least in principle, replaceable by another who possesses the same set of psychological states that I now have. Cockburn argues that our relationships take into account *who this is*, not just psychological features. Individuals are not replaceable. But if individuals are irreplaceable, then it seems that they will need some unchanging core. That unchanging core, according to Cockburn, is the series of past events that make up each individual's *personal history*:

> [I]t is not that my concern about 'who this is' is dependent on the significance which this set of psychological characteristics has for me. Rather, the significance which the characteristics have for me is dependent on who this is; and the force of the words 'who this is' can only be brought out in terms of the idea that this is an individual – a human being – with a particular history (p. 158)

By relying on the personal history that attaches to individuals, we can avoid the charge that, since neither body nor mind are changeless, the persisting self is an illusion, or has no deep significance (p. 173).

The centrality of the tangible, extended human being individuated by his or her personal history also accounts for our attitudes towards the recently deceased. That history is essential to particular individuals leads to the idea that there is something significant in a corpse (esp. of a loved one). There is something more than an "emotional hangover" in our feelings upon viewing a corpse (187-188).

Cockburn has given a "central place" to terms such as "attitude," "ethical," "value," and "emotion," emphasizing our *responses*. This is in contradistinction to the empiricist ethical tradition, in which people are (tacitly) held to be "*passively registering*" the events in the world (208). Using those terms, Cockburn says, is "hazardous." By that he means that these terms may be mistaken as being separate from our moral responses to others. *But they are not prior to the response, they are meant to signify the response* (209). If we use those terms (from the empiricist tradition) and they are used as they are *in* that tradition (in the "prior to" sense), then we may be taken to be "taking seriously ideas [e.g., the question of whether one should eat one's dead grandmother] which one does not think should be taken seriously" (210). But if those attitudes, values, and emotions are taken to signify the response, then such a question is not taken seriously from the start.

This brief overview of a Wittgensteinian brand of humanness – which we are now calling "human being-ness" – is not intended to capture all there is to say on the subject. The object has been to introduce a more robust notion of humanness, and to see whether

this notion, human being-ness, provides a better foundation for the Restrictive View on human genetic enhancement. There are several key elements to this more robust view:

- First is the idea that the tangible, extended *human being* is of fundamental moral importance in our ethical thought.
- Second, the legacy of the Descartes – in our everyday conception of human beings as mind-plus-body – has not served us well in our development of a proper moral appreciation for others.
- Third, our attitudes – in the Wittgensteinian sense – to the human being are *part of*, not separate from, our moral response to others.
- Fourth, the human form is important. The expressions of joy, pain, anger, etc., to which we respond are manifested through the human form.
- Fifth, many things – e.g., the significance we attach to birth, death, human sexuality – determine the concept "human being."

The Evolution of "Human Being"

How does Wittgensteinian human being-ness measure up against biological humanness (i.e., membership in the species *Homo sapiens*)?

In previous chapters it was seen that biological humanness could not serve as an adequate foundation for human "sacredness," or intrinsic human value. *Homo sapiens* is a biological category, not a natural kind. We have evolved from non-*Homo sapiens* and presumably will evolve to a different non-*Homo sapiens*. Our species is constantly changing, although the rate of change gives the illusion of stasis. But we can imagine, with Silver (above), a scenario in which we accelerate our evolution to other non-human species. This accelerated evolution scenario points up just how tenuous biological humanness is.

But the human being-ness articulated by Cockburn, Diamond, and others is a different matter. *Human being*, on this view, is not a concept that can be put into others

terms without loss. Thus, for example, it cannot mean "membership in the species *Homo sapiens*." The fact that *human being* is not analyzable does not mean that the concept is empty. There are approximately six billion biological organisms on this planet possessing a certain distinctive appearance and characteristics whom we recognize as human beings. The evidence that *human being* is a meaningful concept is that, when we use the term, we almost always know what we mean.

The fact that we see stepwise variations in evolution – as opposed to, say, a smooth continuum of intermediate creatures between man and monkey – makes convenient the matter of classifying organisms in our language. Moreover it leads to a conceptual reification of those categories. The concept *human being* has evolved in our language as well. The meaning of *human being* includes many subtle connotations that go well beyond the conventional "member of the species *Homo sapiens*." That is, although it would appear that the latter is a necessary element of *human being*, it is not sufficient. Biological humanness (i.e., species membership) does not completely capture the meaning of *human being*, as the latter term has evolved in our language. Nor does the language of personhood according to the psychological view, as has been argued above

It seems then that we have two kinds of evolution with which to concern ourselves. We have evolution in the biological sense – the evolution of the species *Homo sapiens*. But we also have the evolution of the concept *human being* in our language. Diamond speaks of an "imaginative understanding of what it is to have a human life," which she explains with an analogy. When we think of death, we may think of the biological concept (or concepts) of death, or we may think of a non-biological notion of

death. By a non-biological notion, Diamond means "what we *have made* of the notion of *death* in this and other cultural traditions" [Diamond, 1991 #106, p. 60; emphasis in original]. Our encounters with the death of others do not consist merely of the observation that there has been a cessation of vital biological functions in a certain individual. Death is marked, typically, with regret, sadness or grief, depending on how well we knew the deceased. There are rituals, typically memorial services and burials or cremations. Gravestones may be inscribed with words that capture a cherished facet of a loved one's character or personality. Analogously, when we think of human beings, we may think of the biological concept (or concepts) of human beings as one kind of animal, or we may think of a non-biological notion (or notions) of *human being*. That is, just as the non-biological notion of death goes well beyond the biological, similarly, according to Diamond, *human being* in most contexts goes well beyond the limited notion of species-membership.

The notion of human being-ness requires an "imaginative development of the sense of what is mysterious in human life" (ibid., p. 40). Diamond gives two examples to illustrate what she means by a "sense of what is mysterious." The first example makes use of a D H Lawrence review of a book by H. M. Tomlinson. In the book, a hunter on safari in Africa has killed a mother gorilla with its baby "still clinging to the breast." The hunter then proceeds to kill the baby so as to feel no remorse over having left it orphaned. Lawrence calls this a "degenerate insentience" in the hunter. "It is not cruelty, exactly, which makes such a sportsman. It is crass insentience, a crass stupidity and deadness of

fibre" (quoted in ibid., p. 41). An imaginative understanding of the mystery of gorilla life is part (Diamond claims) of understanding the ethical dimensions of this situation.

The second example refers to the transformation of Ebenezer Scrooge in Dickens's *A Christmas Carol*. Scrooge notoriously fails to respond to the plight of those around him. He is unmoved by the poverty and need of others in spite of the Christmas season and its tradition of generosity and good cheer. The visits by the apparitions, during which among other things he revisits scenes from his own boyhood, cause a kind of rebirth in Scrooge. On Diamond's interpretation, Scrooge's "being imaginatively touched by himself as a child is then present in the awakening of humanity in him" (ibid., p. 42). This "being imaginatively touched" is not the same as Scrooge using his imagination to envision, e.g., what his actions might lead to for the Cratchits. On Diamond's view, imagination gives rise to an "opening of the heart" (ibid., p. 49) by which she means "that feeling of unavoidable solidarity; of the solidarity in mysterious origin, in toil, in joy, in hope, in uncertain fate, which binds men to each other and all mankind to the visible world" (quoting Conrad, ibid., p. 50).

One of the shortcomings that we attributed to the purely psychological view of personhood in the previous chapter was that it seemed to imply a lesser moral status for intellectually disabled individuals – or at least those with severe intellectual disabilities. On the view of human being-ness advocated by Cockburn and Diamond, one would not fail to give proper moral recognition to, say, the severely mentally retarded. Diamond argues that there is no need to find a common ground or property on which to base our moral concern for the retarded. "They are seen as with us in being human, where that is

understood not in a biological sense, but imaginatively. Someone may be touched by the response of a severely retarded person to music; and there may be in that being touched an imaginative sense of shared humanity" (ibid., p. 55). That recognition of human being-ness also grounds our sense of outrage at the rape of a severely retarded woman (ibid., pp. 55-56).

Thus, the recognition of human being-ness in others, as Cockburn argues, is a non-discursive recognition of others as morally basic. The Wittgensteinian attitude towards other human beings forms the basis for our shared moral community. Diamond's contribution is to suggest a means through which we might extend the shared moral community beyond normal human beings.

Human Being-ness and the Restrictive View

Our motivation for looking for a broader, non-biological notion of humanness was that biological humanness is inadequate to ground the Restrictive View on human GE. The Restrictive View, it will be recalled, says that radical genetic enhancement of humans is morally problematic. An attempt to ground the Restrictive View in Dworkin's notions of "human" and natural sacredness, while important for other reasons, failed for this purpose since it did not appear that either type of sacredness would necessarily be diminished in human-derived enhanced species. We then sought a conception of humanness that would be jeopardized by radical genetic enhancement, and were led to the Wittgenstein-inspired views on the centrality of the human being

Having now introduced the notion of human being-ness, we are now in a position to return to our main question: *Is human being-ness threatened by radical genetic enhancement?*

The answer is made difficult by the insistence that "human being" is not analyzable – i.e., that any attempt to capture human being-ness in terms of essential features or properties that human beings possess will be inadequate. If this is so, then we cannot simply look to see whether the genetically enhanced human-derived creatures have lost any of the defining features of human beings.

Cockburn and Diamond, in the writings here considered, have in mind the contemporary world, not a Silveresque future in which the human species has diverged into several other species in a fraction of the time it would have taken without GE. It is unclear, therefore, what each would have to say about our question. But the following view seems to follow naturally from the foregoing discussion:

- The capacity to instantaneously respond to (have Wittgensteinian attitudes towards) one another *is* of central ethical importance and *is not* accounted for in other views on what makes us ethically significant.
- Therefore, those genetic enhancements of humans that result in a loss of the capacity to have the appropriate attitudes, or moral responsiveness, to one another are ethically objectionable.

This diminished human being-ness – or loss of the capacity for moral responsiveness – might come about in either of two ways. A genetic alteration might have a first-person effect or a third-person effect. That is, human being-ness might be compromised through a diminished capacity in the moral agent to recognize others as human beings (the first-person effect). Cockburn's slave-owner comes to mind here, as

does the gorilla hunter criticized by D. H. Lawrence (above). Alternatively, human being-ness might be compromised through diminished expressiveness in the observed (the third-person effect). We have indicated the importance of the human form, especially the eyes and face, as visual cues to which we instantaneously respond. Perhaps certain genetic alterations – while having many benefits and generally being viewed as enhancements – would as a side effect result in diminished outward expressiveness.

Another possible third-person effect comes to mind when one recalls Silver's fanciful description of a GenRich creature as a "lung-modified thick-skinned dark green human descendant" (Silver, 1997, p. 247). While it is hard to imagine that anyone would consider such a creature "enhanced," it is not inconceivable If we assume, per Silver's thought experiment, that large communities of this sort of GenRich creature happily coexist; that these communities are not shunned by other communities in our future world, in which GE and its handiwork are no longer novelties; and that it is in virtue of their particular "design" that enviable opportunities for space exploration have become possible; then it is hard to see why we should not call this GenRich species enhanced. But there is one respect in which this sort of radical enhancement might be ethically regrettable. If radical enhancements resulted in human-derived creatures that were sufficiently alien or foreign in appearance, that foreignness might compromise our ability to recognize the visual cues that we so readily respond to in our fellow human beings.

Let us consider again Diamond's example of the gorilla hunter. Diamond emphasized the importance of our capacity for "imaginative understanding" of what

things must be like for the gorilla mother suckling her young. The hunter's failure to come to this sort of deep understanding was taken as evidence of a serious moral deficit on the hunter's part. But one might argue that it takes more effort – a greater capacity for imaginative understanding – when the object in question is non-human. We may not wish to excuse the gorilla hunter, at least if it is the case that gorillas resemble humans in certain relevant behaviors and characteristics that ought to have been recognized. Yet it may nevertheless be true that our capacity for this sort of imaginative understanding is not unlimited. Even with a good faith effort, foreignness (e.g., in physical appearance) may place limits on the depth of our imaginative understanding of others.

What kind of genetic alterations might result in a loss of the capacity to be morally responsive in this way? It is by no means certain that our knowledge of human genetics will ever be great enough to predict which specific genes, if altered, would cause this sort of loss. Perhaps all that can be said is that, should our empirical observations show that certain genetic alterations have such an effect, the effect should be recognized as one that has *ethical* ramifications.

Accelerated Evolution

There is one other matter that we have yet to take account of. In the previous chapter, the case of "GenRich-A" was presented. GenRich-A, we stipulated, is a genetically engineered, human-derived organism that is created in one year's time. It just so happens that GenRich-A is also exactly the same kind of organism as that which

would have evolved naturally (i.e., without GE) in roughly 100,000 years. The fact that we only feel a sense of moral alarm over the prospect of GenRich-A appearing in *one* year, and not in 100,000 years, we observed, means that there is nothing morally problematic about GenRich-A *per se*.

Now perhaps we are in a better position to see how the *rate* of GE-mediated evolution could possibly make a difference in the ethical acceptability of human genetic enhancement. It has just been suggested that certain radical genetic enhancements might create a foreignness between, say, enhanced and unenhanced groups. This foreignness would be ethically significant, we said, if it led to a diminished capacity among us for the kinds of instantaneous responsiveness that is central to our moral treatment of others. It seems clear enough that mutual foreignness generally would increase in direct proportion to the rate of evolution. Another way to put this is to say that GE-accelerated evolution decreases the mutual similarity among us.

Thus, we should not alter our evolution *at such a rate* that there is a continuum of creatures none (or few) of whom feels a *sense of identification-with-kind*. With a continuum, there would be no appearance of kinds, as there is in today's species-filled world. And it is the *appearance of kinds*, not the metaphysical existence of kinds, that is necessary for identification-with-kind, which in turn is necessary for Wittgensteinian attitudes.

Rate of GE-mediated evolution may not be the only factor that could potentially influence mutual similarity (foreignness). The *degree of speciation*, or branching of the evolutionary tree, similarly would increase mutual foreignness (or decrease mutual

similarity). But it is not our aim here to stretch the scientific limits of our thought experiment any further. Instead let us return to the conception of human being-ness articulated in the present chapter for a final observation.

It seems that we have strayed very far indeed from the bare notion of biological humanness as a candidate for what is intrinsically valuable in human beings. Our conception of human being-ness elevates emotions, values and attitudes to a central place in ethics. And the human form, on this view, is no longer seen as devoid of ethical significance. However, it seems that we must sever the connection once and for all between the instantaneous moral responsiveness that we have called "human being-ness" in this chapter and biological humanness, or membership in the species *Homo sapiens*. For it seems that – to the extent that it is a fact – it is a *contingent* fact that it is only human beings who have the capacity for this responsiveness. As noted above, Cockburn and Diamond were not envisioning the world of the GenRich. In that world, the world of our thought experiments, there is no reason to assume that genetically enhanced, human-derived creatures would not be capable of an "imaginative understanding" not only of their own kind, but other kinds as well. And we (Silver's unenhanced Naturals) might be capable of responding to a very broad range of "others."

In the end, the lesson might be just this: that a sense of identification-with-kind – a sense of "who we are" – might be more than vague nonsense. Recalling Diamond's earlier example, we "may be touched by the response of a severely retarded person to music; and there may be in that being touched an imaginative sense of *shared humanity*" [Diamond, 1991 #106, p 55; emphasis added]. Even if we now use "humanity" in a

much broader sense, we may find a world in which this instantaneous responsiveness between individuals does not exist (or is diminished) profoundly regrettable. Shared "humanity," as Diamond observes, is *not* nothing (ibid., p. 57)

CHAPTER SIX: CONCLUSION

The preceding chapters have addressed two central questions. First a two-part question: What is the current ethical basis for public policy restrictions on certain kinds of human GE, and is that basis stable? Second, can a rational basis be found to support the intuition that certain kinds or degrees of non-harmful human genetic enhancement violate what is intrinsically valuable in human beings?

With respect to the first question, it has been argued that the current ethical basis for restricting germline and enhancement GE is unstable. A number of ethical objections, taken collectively, constitute that ethical basis. Foremost among these is the objection that present-day human GE technology involves an unacceptably high level of risk for future generations. However, as argued in Chapter 2, there is reason to expect that the technology will become acceptably safe. Once that happens, restrictions on human GE will need to be justified on other grounds. When we considered (in Chapter 3) what those other grounds might be, it was argued that these other objections to human GE were not particularly compelling. That is, they were not likely to slow the momentum of human GE technology, which promises great medical benefits, as well as considerable profits for the relevant industry. Thus, once human GE becomes acceptably safe, the ethical foundations for our current restrictions on human GE will be seen to be unstable. If our intuition is correct that *some* limits on human GE are ethically called for, then we will have to seek support or justification for holding that view elsewhere

There is certainly room for argument on the foregoing points. First of all, only time and technological progress will tell whether the technological breakthroughs needed to make GE safe will actually occur. During the course of the present research, two major developments have already occurred – the cloning of mammals from adult cells, and the isolation of human embryonic stem cells. But there is no way to rule out the possibility that unforeseen obstacles might make the achievement of safe human GE technically impossible. Second, due to limits of space, a full treatment of the many objections to human GE has not been undertaken here. It may be that one or more of these objections – such as objections to embryo research or eugenics – will prove sufficiently strong to limit human GE, making the question of the intrinsic wrongness of changing human nature moot, at least as far as the pragmatic world of public policy is concerned. In other words, the ethical foundation for current policy on human GE may not be as tenuous as has been argued herein. Further analysis of the current set of ethical objections is therefore appropriate.

With respect to the second question – regarding whether human GE is a potential threat to intrinsically valuable humanness – it has been argued that this question will become important to public policy because of the collective failure of other ethical objections to justify restrictions on human GE. We have engaged in a thought experiment in which we imagined a future world full of human-derived, radically enhanced creatures, conveniently exemplified by Silver's GenRich. The initial motivating intuition was that something was morally wrong with certain kinds or degrees of genetic alteration even when those alterations resulted in significant benefits and no

significant harms. The strategy in using such an extreme example of human genetic enhancement was to isolate the ethical variable that we suspected might be placed in jeopardy by human GE. That variable, it was suggested, had something to do with humanness, although it was not clear at the start whether humanness would be equivalent to biological humanness (species membership) or a broader conception. If violating some notion of humanness *were* ethically objectionable, this surely would be seen in greater relief against the background of the radically deviant GenRich-populated future. We might then say that our thought experiment yielded an important discovery – namely, the discovery that our isolated variable, provisionally called "humanness," is of fundamental ethical importance. That discovery then could be used to determine whether less extreme cases of human GE would be ethically objectionable for the same reason.

While not all enhancements seem to be morally problematic, there is a sense that some limits are ethically called for. There is something intrinsically valuable, or "sacred," about human beings – at least that is the intuition that motivated this inquiry – and humanness ought therefore to be preserved. Radical changes through (safe) human GE would violate human sacredness and thus would be morally objectionable. This position we called the Restrictive View on human genetic enhancement. The Permissive View, in contrast, denies that anything of moral significance attaches to our humanness, and thus denies that even radical genetic enhancements are morally problematic.

Are we justified in holding the Restrictive View? To make a compelling argument, the advocate of the Restrictive View, we said, must show the following: First, a coherent notion of morally important humanness must be articulated. Second, it must

be shown that radical human genetic enhancement violates that notion of humanness. And third, it must be shown that such a violation is ethically objectionable

If we ask now whether we have met these three requirements, the answer is a qualified yes. With respect to the first requirement, human being-ness, it was argued in the previous chapter, is a coherent notion of morally important humanness. Yet there is room for criticism. For example, the claim was made that, although one could not give necessary and sufficient conditions for being a human being, one could nevertheless not fail to recognize human beings. In a future in which genetic engineering has become commonplace, however, the lines between species may become blurred, and human beings may not be so readily distinguishable.

The second requirement – that radical GE violate human being-ness – may also be called into question. It is not clear whether certain radical genetic enhancements in fact would compromise human being-ness. We have argued that it is reasonable to expect that some would, especially given the importance that the human form has in our immediate moral responsiveness to others – but this remains a matter of speculation. Perhaps through "imaginative understanding" we have the potential to respond to a wide variety of others – human and non-human. In fact, it seems that Diamond's call for "imaginative understanding" exists in a kind of tension with our recognition of human being-ness. That is, on the one hand the claim is made that human beings enjoy a morally privileged status. On the other hand, we are called upon to look beyond the world of human beings to non-human others, to whom we might also have

Wittgensteinian attitudes. A clarification of this tension and its implications for the notion of ethically significant human being-ness should be a subject for further study.

Yet these criticisms notwithstanding, the human being-centered view articulated above does seem to provide us with a plausible account of an intrinsically valuable humanness that could ground the Restrictive View. What do these arguments in support of the Restrictive View imply for public policy? We will look first at the implications for policy on human GE (or germline gene therapy), after which we will consider the implications in other policy areas as well.

Implications for Human Genetic Engineering

A Re-Examination of the Orthodox Position on Human Gene Therapy

What we have called the orthodox position on human gene therapy makes clear what is ethically permissible and impermissible. Treatment gene therapy in somatic cells, if safe, is permissible. Germline and/or enhancement gene therapy is prohibited. About this there is a fairly broad-based consensus. The underlying reasons for this position are not always fully and explicitly defended. It is clear that risk of irreversible harm is the primary concern with respect to germline genetic intervention. But should the technology become acceptably safe for use in humans, would there be some residual opposition on grounds unrelated to direct harm to future generations? There very well could be, but – as argued in Chapter 3 – it is unlikely that the other commonly voiced objections to germline gene therapy will prove so compelling that society will willingly

forgo the enormous medical benefits that are potentially in store for us. In fact, a number of policy statements endorsing the prohibition of germline interventions have clearly indicated an openness to reconsidering the question once the technology became acceptably safe. There is every reason to expect that human GE will become acceptably safe (see Chapter 2). This leaves the orthodox view with only the prohibition against genetic enhancement. And since it is not obvious how an enhancement, in itself, could be morally objectionable, the current consensus on human gene therapy appears tenuous indeed.

The foregoing discussion makes a case for re-drawing the moral line. The line currently is drawn between human GE intended for treatment (or prevention) and human GE intended for enhancement. Glover, Harris, and others have argued that genetic enhancement is not intrinsically wrong and, therefore, we should give it serious consideration. Preservation of human nature appears to carry little if any moral weight, on their views (see Chapter 4). The human being-centered view also holds that enhancement as such is not ethically objectionable. It does, however, suggest a distinct moral line between those genetic alterations that preserve human being-ness and those that compromise it. In other words, the new ethical criterion is preservation *of human being-ness*, not biological humanness as the orthodox view implies. In effect, this calls for current policy on human GE to become more permissive.

Incrementalism and the Rate of Evolution

While we have argued for retaining a caveat to the Permissive View – roughly, human genetic enhancement *that does not jeopardize human being-ness* is morally unobjectionable – it seems that this limitation will have little practical effect in the short term. The kinds of genetic enhancements people are likely to want, once the technology becomes safe, are relatively modest, incremental improvements, not radical enhancements. Speculation about the kinds of human traits that future parents might wish to see enhanced in their offspring includes such things as decreasing the need for sleep, increasing intellectual capacities, bolstering the immune system, and so on (Walters & Palmer, 1997, pp 101-108). Assuming that these genetic enhancements can be achieved without compensating losses (Glover, 1984, pp. 33-35), they do not strike one as coming even remotely close to the sorts of changes that might compromise our "shared humanity."

The incremental nature of the expansion from treatment to enhancement GE will also be dictated by the need to gather empirical data on risk (higher risk can be justified more easily for cases of horrible genetic disease than for cases of non-essential enhancement), and by the step-wise progress of human genomics and GE-related technologies. As a practical matter, then, incremental advances in human GE might make the question of radical genetic enhancement moot.

Earlier we argued that loss of human being-ness seemed possible only when the rate of GE-mediated evolution was relatively rapid. Thus, Silver's GenRich scenario, which takes place over the course of a few centuries, might be problematic, whereas a

similar scenario taking place over the course of several millennia might not be problematic. Putting these observations together with our qualified defense of the Restrictive View, it seems that in the long run, policy on human GE will need to take account of the rate of GE-mediated evolution of human beings. That is to say, even in the absence of deleterious effects from genetic alterations, preservation of human being-ness could in itself serve as sufficient justification for limiting non-harmful human GE.

We have just indicated the implications of human being-ness for ethics of human GE. Does this view of human being-ness – of the central ethical importance of our moral responsiveness or "attitude" towards others – have implications for public policy in other spheres?

Implications in Other Areas

Abortion

The most obvious policy area for which our notion of human being-ness has implications is abortion. To begin this discussion – which revisits many of the themes of Chapter 4 – we will consider a debate that took place more than thirty years ago between two of the early and leading commentators on bioethics – Nobel Prize-winning geneticist Joshua Lederberg and theologian Paul Ramsey. We will draw from two papers from Lederberg and one from Ramsey. Lederberg's earlier paper had to do with the direction of human evolution, or eugenics (1966), while the later paper dealt with contraception and abortion (1967). Ramsey's paper (1970) covered a range of topics, including human

cloning, but the relevant segment for our purposes is his critique of the two Lederberg papers.

Lederberg at this time felt that human genetic engineering – which he then called "genetic alchemy" or "algeny" – was not imminent and considered debates over it a distraction (1966, p 521). He once considered addressing a mid-1960s audience about "molecular human biology" but decided against it, saying "it occurred to me that to dally on such question would be an amusing and engaging futuristic escapism" (1967, p. 25). As it turns out, the future was not so distant. In any case, the topics he chose instead were contraception and abortion, which he felt were much more timely and important.

Lederberg criticized the scientists and physicians of the 1940s and 1950s for not having the courage to advocate for contraception. Their lack of leadership on that issue was partly responsible for the problem of world overpopulation, which was felt at that time to be approaching crisis proportions. This aura of crisis is communicated clearly by Lederberg: "It is even possible that the world will not survive as a habitat of the human species simply because of our reticence, because of our pusillanimity, in coming to face [the issue of contraception]" (ibid., p. 25). Abortion in the 1960s was, he felt, the same kind of morally controversial issue that contraception was twenty or thirty years earlier. It was shameful that over one million women per year were seeking illegal back-alley abortions.

Lederberg objected to the fetal right-to-life arguments of abortion opponents. In his view, the question, "When does life begin?" has no clear answer because biological

life has existed on a continuum over evolutionary time. "[I]f life had a beginning at all, it was an event that occurred some 3 billion years ago," i.e., in the primordial soup.

Lederberg pointed out that evolution of the human species and development of the human fetus and infant were analogous. "During the evolution of the species there was no sudden emergence of human personality but the gradual accumulation of those genetic alterations controlling the development of the brain that in turn permit the development of humanity" (ibid., p. 26). Similarly, the brain develops in the fetus and infant, and only at a certain point does the infant "achieve the full measure of humanity" (ibid., p. 26). When does the infant achieve "humanity"?:

> An operationally useful point of divergence of the developing organism would be at approximately the first year of life, when the human infant continues his intellectual development, proceeds to the acquisition of language, and then participates in a meaningful, cognitive interaction with his mother and with the rest of society. At this point only does he enter into the cultural tradition that has been the special attribute of man by which he is set apart from the rest of the species....

What is striking here is the implication that our "humanity" depends entirely on our having attained certain neurological (and hence psychological) capacities. That is, Lederberg seems to subscribe to a completely unqualified psychological view of personhood. Immediately, however, he recognizes a possible implication of this view. He continues:

> ... I do not advocate a discussion of infanticide – a special intervention in the period between the delivery of the infant and the time at which he acquires language. We are all too emotionally involved with infants that this is in itself enough to create an inevitable and a pragmatically useful dividing line. (ibid., pp. 26-27)

As for abortion, Lederberg argued that it is morally permissible and ought to be legalized. He gives two reasons for this view. As noted above, the large number of back-alley abortions and the related high morbidity and mortality were a great concern. If it weren't for this "enormous inhumanity" traditional anti-abortion views and the associated "conceptions of the dignity of human life" could possibly be deferred to (ibid., p. 27). The second reason for favoring the legalization of abortion had to do with the fear that the human gene pool was gradually accumulating harmful mutations and would continue to do so unless society intervened in some way. As mentioned in an earlier chapter, this fear of the increasing "genetic load," as it was called, was taken very seriously at the time, and helped revive discussions of broad-based eugenics programs. Life-saving advances in medicine may have saved a lot of personal grief, but they also increase genetic load by ensuring that more people carrying deleterious genes survive to reproductive age and pass on those genes to future generations. Lederberg argued that the solution to genetic load was to rely on "differential fertility" – i.e., the use of contraception and abortion combined with genetic testing and counseling. "Far from limiting efforts to have children, the availability of voluntary abortion should go a long way to encourage the gamble in risky matings, by putting the stakes under more effective anticipation. Such a policy represents the only human reconciliation of the individual's rights of parenthood and social concern for the containment of genetic disease" (ibid., p. 27).

Let us return, however, to Lederberg's comments regarding a psychological view of "humanity." In the earlier paper, there is more ambivalence on this subject (1966, p 530):

> Humanistic culture rests on a definition of man which we already know to be biologically vulnerable. Nevertheless the goals of our culture rest on a credo of the sanctity of human individuality. But how do we assay for ***man*** to demarcate him from his isolated or scrambled tissues and organs, on one side, from experimental karyotypic [i.e., genetic] hybrids on another. Pragmatically, the legal privileges of humanity will remain with objects that look enough like men to grip their consciences, and whose nurture does not cost too much. Rather than superficial appearance of face or chromosomes, a more rational criterion of human identity might be the potential for communication with the species, which is the foundation on which the unique glory of man is built.

But Lederberg disclaims this last assertion in a footnote: "On further reflection I would attack any insistence on this suggestion (which I have made before) as another example of the intellectual arrogance that I decry a few sentences before – a human foible by no means egregious" (ibid., p. 530).

Ramsey (1970) takes Lederberg to task for his "muddled moral reasoning" regarding a criterion for humanity. Lederberg, in the just-quoted passage from the earlier paper, suggests that the ability to communicate with other humans would be a suitable criterion, and then immediately rejects his having made the suggestion as "intellectual arrogance." With this rejection, Ramsey says, all we are left with is a decision as to whether an offspring looks human. Thus, "mishaps do not constitute a moral problem" (ibid., p. 96).

Lederberg stumbles into the same inconsistency in his later paper on contraception and abortion (1967). In that paper, as noted above, he says that the

developing human being becomes morally significant at about age one, when it begins to engage in meaningful communication with other humans. Then he says he does not advocate infanticide because of our intense emotional involvement with infants. Ramsey comments: "Lederberg has therefore provided himself with no intellectual foundation for the immediately following dictum: 'To discuss the fetus during prenatal life as if he were a human being is merely to reflect the emotional involvement of that observer.' Surely he had just appealed to the same sort of emotional involvement with another life during that part of the continuum from birth to age one as the only ground for not practicing infanticide" (1970, pp. 97-98).

So, if we aren't to rely on the degree of emotional involvement as a criterion for "humanity" or personhood, and we aren't to rely on ability to communicate within the species, what would Lederberg have us rely on?

Lederberg's protracted ambivalence on this point captures perfectly the feelings of moral ambivalence that have characterized our policy positions on human GE. On the one hand, there is the pull of the psychological view of personhood, which assumes that a) it is in virtue of being persons that we are morally important, and b) personhood is essentially psychological. On this view, fetuses are not included as part of humanity, and opinions to the contrary are the product of mere emotionalism.

On the other hand, there is an appeal to emotional attachments to justify our ethical prohibition against infanticide, a practice that – much to Lederberg's chagrin – suggests itself given the elevation of the psychological view and the assumption that our emotional attachments to fetuses are morally irrelevant. And when the incompatibility of

these competing ethical inclinations leaps into full view, demanding resolution, then any attempt to give criteria for "humanity" is dismissed as "intellectual arrogance."

Given the difficult intellectual terrain through which we have traveled in the preceding chapters, one cannot feel wholly unsympathetic to the latter assertion. Nevertheless, as the Lederberg-Ramsey debate so capably demonstrates, much of ethical significance hangs in the balance. The fact that the ferocity of abortion politics has not abated over the course of the ensuing three decades is further testimony to the importance of these questions. And to the extent that we find the notion of *human being-ness* plausible, the ambivalence captured by Lederberg's views may be alleviated, at least in part.

In what ways does human being-ness help to resolve the moral ambivalence that we feel about abortion? On the view Cockburn and Diamond defend, emotions, attitudes, and values are of primary ethical importance. They are not disparaged as just so much static interference getting in the way of a clear signal – the facts of the matter – that would indicate the proper moral response. The fact that we instantaneously and viscerally respond to human fetuses and infants *is* the moral response. Thus, on this view, the charge that our attachment to fetuses and infants is "mere emotionalism" misses the point. They are human beings, and our "emotionalism" is a morally important recognition of our shared humanity.

The psychological view of personhood, which serves us well in many cases, has its shortcomings, and it is those shortcomings upon which Lederberg stumbles. Attempts to give defining criteria for (morally significant) persons by looking to certain features of

human beings inevitably seem inadequate. As we noted in the previous chapter, such attempts have the result that "not all human beings will emerge as beings who are not to be killed" (Cockburn, 1990, p. 112-113). We now have a case in point – infants.

On the psychological view, why is it morally wrong to painlessly kill infants when their future prospects look bleak? Think of the circumstances in which some give serious consideration to abortion. Maybe the infant has Down syndrome. The range of disability in Down syndrome children is great. The degree of mental retardation in some cases is severe, but in other cases is comparatively mild In some cases, there are extensive problems with internal organs, such as the heart, and in other cases not. For parents considering abortion who would not abort in mild cases of Down syndrome, would it not make more sense to wait until the child is born so that a thorough assessment of the disability can be made? If the child is mildly disabled then its life is spared; and if it is severely disabled, then its life is terminated. In contrast, abortion looks like a poor option, for one takes the chance of terminating the life of a fetus with mild Down syndrome. It might be objected that we do not terminate the lives of even profoundly retarded infants because the level of psychological functioning is still high enough to qualify such infants as persons. But, as discussed earlier, relying solely on psychological criteria leaves us in the apparently inconsistent position of killing higher animals and sparing infants even when the former possess greater psychological capacities than the latter either do or will in the future.

Others might opt for abortion even in circumstances in which the future child is not expected to be disabled. Consider a case in which the expectant mother is diagnosed

with a terminal disease. The mother may consider the future prospects for her unborn child to be quite bleak. Perhaps other things make her expectation reasonable – the absence or limited availability of a father, the absence or unwillingness of siblings or others who might provide a loving home, and so on. For those who consider an abortion morally justifiable in this case, would it not also be morally justifiable for the mother to terminate the life of her newborn child if the mother's diagnosis came shortly after delivery?

The suggestion that in cases such as these we might be justified in killing infants strikes most of us as either sheer lunacy or simple barbarism. But the point here is not to call this into question. The point is, if we accept the patent immorality of killing infants, why is it so difficult to give the reasons?

On the human being-centered view, infants are just recognized as human beings. The claim that one's status as a human being must be controversial unless the category *human being* can be reduced to certain defining features is rejected. As it was expressed above, our attitude towards the infant is "an attitude towards a soul;" we are not "of the *opinion* that he has a soul" (Wittgenstein, quoted in Cockburn, 1990, p. 6). When a newborn is in distress – for one of the many mysterious reasons that newborns become distressed – the effect that this can have on a roomful of adults is dramatic. Initially, there may be some sympathetic laughter and general clucking from the wise and experienced ones. But as the episode goes on and one after another technique fails to comfort, the tension in the room becomes palpable. A great scurrying may ensue as all and sundry try their hand. Or alternatively, the child may be whisked into another room

by the stressed parents for some intensive intervention. The desire to console an inconsolable newborn can, like nothing else, arouse pity in us. We respond instantaneously to the cries, the flushed and contorted face. And we do so even when we are convinced that the source of distress is nothing more than a temporary gastrointestinal imbalance.

The human form, as has already been noted, is important here, especially the eyes and face. And just as we are moved by the sight of a newborn, its gestures and expressions, so are we moved by the sight of a fetus. Of course, our opportunities for viewing fetuses are normally quite limited. But even the blurry image of the sonogram, in which the limbs and other physical features can be distinguished, carries with it a deeper significance than would an image of an internal organ or an embryo in utero. Among animal biologists, *embryo* refers to all stages from the single fertilized egg cell through about six to eight weeks gestational age, when recognizable features of the adult organism begin to appear, at which point *fetus* is used (Silver, 1997, p. 39) On the psychological view, there is no ethical significance attached to the appearance of these physical features. On the human being-centered view, these features are ethically significant, and thus the distinction between embryo and fetus is ethically important.

Dworkin's insights into abortion and the nature of human "sacredness," though insightful, seemed to leave no room for the ethical significance of human form. On Dworkin's view (see Chapter 4), there are two kinds of intrinsic human value at play in our reasoning about abortion. We called the two "natural sacredness" and "human sacredness." Natural sacredness is inherent in the biological creation. That is, the

embryo or fetus, in virtue of the biological creative investment embodied in them, possesses a non-incremental intrinsic value, or sacredness. Children and adults, in addition to natural sacredness, also possess "human sacredness" in virtue of the life commitments, projects, plans, and so forth, that are central to their lives as social creatures. What was *not* implied by Dworkin's theory of the natural sacredness of embryos and fetuses was that *human* fetuses were deserving of special ethical significance. If it is the "natural investment" – the creative act of biological development and its product – that grounds natural sacredness, then it seems we should have the same feelings of reverence and awe for the developing mouse or goat fetus as we have for the developing human fetus. And while we may be struck by the magnificence of fetal development generally, there is a heightened responsiveness in the case of the human fetus. We are especially moved by the developing *human* form.

None of this is to say, by ascribing human being-ness to fetuses, that this ought to be the overriding moral consideration in the abortion debate. How much weight it should carry is a subject for another day. What is being claimed here is that human being-ness is, as it was put earlier, "not nothing." Our (Wittgensteinian) attitude towards human fetuses is ethically significant, and therefore deserves to be taken seriously as one of several important considerations that have a legitimate place in our arguments about abortion.

Thus far we have discussed the possible implications of our human being-centered ethics for human genetic engineering and for abortion. The final area that might be influenced by human being-ness is the treatment of disabled persons.

Treatment of the disabled

It has been noted several times that the psychological view seems to imply that at least some of the mentally disabled do not qualify as persons according to that view. Since it is in virtue of our personhood that we are morally important beings, it follows that the intellectually disabled are morally diminished as well.

In contrast, the human being-centered view does not conceive of human beings as minds-plus-bodies. It not only does not accept the skimming off of the mental or psychological as morally significant; by the same token it also does not accept the abandoning of the bodily as morally insignificant. The extended, tangible human being – rather than *mind* and *body* – deserves a fundamental place in our ontology. By rejecting the exclusively psychological criteria for personhood, the human being-centered view avoids any implication that the intellectually disabled might properly be classified as human "non-persons."

We have spoken quite a bit of the psychological view and its influence. But this is not to say that all or even most people adhere to an unqualified view of persons as morally important only in virtue of their psychological capacities. Humanitarian impulses towards others – disabled and non-disabled, human and non-human – are well represented in society. Thus, policies having to do with the treatment of, for example, the institutionalized mentally disabled can be expected to have appropriate protections for human rights.

On the other hand, the actual treatment of the institutionalized mentally disabled varies from place to place. In spite of the expression of a proper moral regard in policy statements, the *implementation* of policy may not faithfully reflect that moral regard. We are a society that, arguably, has become indifferent about caring for the mentally disabled. The policies of deinstitutionalization that were implemented by states beginning in the 1970s were often well intentioned. The idea was to put an end to the warehousing of the mentally ill; to provide care in the least restrictive setting; and to acknowledge their civil rights. In implementation, however, thousands were released from institutions with nowhere to go. It is for this reason that so many of today's homeless are persons with mental disabilities.

What does this have to do with the human being-centered view? Although many causes may contribute to our sometimes negligent or indifferent treatment of the mentally disabled, the influence of the mind-body dichotomy in Western thought should not be dismissed out of hand. Perhaps we as a society would be more inclined to be responsive to persons with mental disabilities if the psychological view were not such a pervasive part of our way of thinking. Perhaps an ethical view that emphasizes an "imaginative understanding" of others would serve us better. If we became more open to the idea that our instantaneous moral responsiveness towards other human beings was important, then our treatment of the mentally disabled – our implementation of our admirably worded policies – might be significantly improved. And more generally, our openness to the human being-centered view might rejuvenate our ethics by adding breadth to our moral community and depth to our moral regard for those in it.

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