Paper Title: Design and Destiny: Philosophical and Religious Perspectives on Human Germline Modification
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Abstract:
Although human germline modification remains some years in the future, interim technologies are already in clinic practice. These include preimplantation genetic diagnosis (PGD) and cytoplasmic transfer. Germline modification is well established in other mammals, including other primates. Most observers believe that it is just a matter of time before it is attempted in human beings.

Issues of safety are paramount in any decision to go ahead with human germline modification, and it may turn out that current standards of safety simply cannot be met, given the possible long-term effects of germline modification. But it is quite reasonable to assume that given enough time, safety issues will be resolved and that as a society we will have to answer the question: Should we intentionally modify the genes of our offspring?

This paper reviews the arguments for and against germline modification that are put forward by bioethicists, philosophers, theologians, and religious leaders. Arguments in favor include possible benefits to future patients and the right of parents to exercise reasonable freedom in reproduction. Arguments against include the potential risks, including risks to distant descendants; possible violation of human nature, dignity, or rights; potential objectification of offspring and distortion of the parent-child relationship; the prospect of the loss of freedom for modified offspring who lose the sole authorship of their lives; and the possible loss of equality among human beings, which is the necessary precondition for human moral community. Each of these objections is criticized, with the conclusion drawn that they do not succeed as a compelling argument against every form or use of germline modification, and therefore do not justify a comprehensive ban.

Next, the paper reviews religious perspectives. Religious objections range from concerns about the status of the embryo to a defense of the sovereign right of God as the sole creator of each individual human life. Many assume, of course, that religion (or at least Christianity) is categorically opposed to this technology. Perhaps surprisingly, however, a number of religious leaders and scholars have remained open to the prospect of human germline modification, assuming of course that safety can be achieved. These opinions, which range from views held by Paul Ramsey to Karl Rahner to Pope John Paul II, will be summarized. In essence, they take two forms: the prospect and duty for therapy and the rightful openness of humanity to self-transcendence (found in Rahner). To these the paper adds a third religious argument in support of the possibility of germline

modification, namely, that human technology may be a means by which divine creation continues and is taken to levels unattainable without technology. In this light, it is possible even to entertain, with caution and yet without theological prohibition, the prospect that we should engineer post-human forms of existence.

Biography:
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Paper Text:

In a few decades, it may become possible for us to modify the genetic inheritance of our offspring in a way that affects all of the cells of their bodies and might be transmitted to their offspring. Speaking of this possibility, Hans Jonas wrote: "Whether we have the right to do it, whether we are qualified for that creative role, is the most serious question that can be posed."[1] Then he immediately asks these questions: "Who will be the image-makers, by what standards, and on the basis of what knowledge?"[2] This paper explores some of the questions raised by Jonas.

The most common term for this is human germline modification, sometimes also referred as human germline gene therapy or inheritable genetic modifications. A popular but pejorative term is "designer children" or "designer babies." In order for human germline modification to become possible, great technical challenges will have to be overcome, and some wonder whether we will even know enough to say that human experimentation is ethical. But most observers agree that given enough time, technical and safety requirements will be satisfied. Germline modification is performed routinely on other mammals and has been successful with nonhuman primates. Advances in human embryology, based on the widely used techniques of *in vitro* fertilization (IVF), make it possible to act directly on the human embryo. Already it is possible for us to test the genes of human embryos before they are implanted in order to avoid disease but also perhaps for other purposes, such as sex selection.

This procedure is called "preimplantation genetic diagnosis" (PGD), and it begins with IVF but subjects the embryos to a genetic test. One cell from each embryo is removed, tested, and the results determine the health status of the embryo. Healthy embryos are implanted and others are discarded. Even more than IVF, PGD is morally controversial,

[1] Hans Jonas, *The Imperative of Responsibility: In Search of an Ethics for the Technological Age*, trans. by Hans Jonas and David Herr (Chicago: University of Chicago Press, 1984), p. 21.
[2] Jonas, *Imperative*, p. 21.

not just among religious conservatives but among secular philosophers who, like Jürgen Habermas, are alarmed that the future child comes before us first as an object to be tested and approved. This, he says, is a "reified interaction with the embryo. The desire for children makes the parents arrange a situation in which they have freely to dispose, on the basis of a scientific prognosis, over the termination or continuation of a prepersonal human life."[3]

Others, perhaps less opposed to PGD, have suggested that its use makes germline modification largely unneeded. They argue that in nearly every case, if the goal of the couple is to begin a pregnancy using their own gametes while avoiding the risk of a specific genetic disease, PGD achieve the goal without the risks and uncertainties of germline modification. So why proceed to germline modification, some ask, unless our goal is to go beyond avoiding disease to the adding of traits, enhancing human health or perhaps even other traits having nothing to do with health? On the other hand, many are troubled by PGD as it now exists. Some have come to the conclusion that in one respect, germline modification is morally preferable to PGD. PGD requires the creation of multiple embryos, genetic selection, and then the discarding of embryos that fail the test. While PGD objectifies and treats most of the embryos in a non-therapeutic way, germline modification might be truly therapeutic, at least in certain possible uses.

This paper critically reviews the debate over germline modification, beginning with arguments that tend to be philosophical or secular in the sense that they make little or no explicit appeal to religious assumption, and moving toward views that are strongly informed by religious views, particularly those of Christianity (due to the limits of the author). First to be considered are secular arguments in favor of germline modification, then arguments in opposition, then religious perspectives.

Philosophical and secular arguments in favor of germline modification tend to fall into two groups. First, it is argued that germline modification might very well offer important health benefit to future human beings, which cannot be achieved by other means. Even if it becomes possible to treat genetic diseases later in life, some diseases work their damaging effects in the earliest stages of life, and therapy after birth or even mid-way through pregnancy is too late to avoid the effects of such diseases. Other genetic diseases affect many parts of the body, and successful treatment after birth requires success in changing genes in multiple tissues. Clearly it is advantageous to change the genes in all the cells at one time, at the embryo stage, so that all cells benefit from the intervention. Critics of this argument point out that in the overwhelming majority of cases, these benefits can be achieved by PGD, which is not only proven safe but will likely remain far more safe than germline modification for many decades. However, it is possible for germline modification to offer health benefits beyond what PGD can achieve. For instance, it might be possible to modify or add genes, perhaps even adding a cluster of genes in an artificial chromosome, in order to improve the overall health of the child. Genes that resist cancer or the diseases of aging might be added. If so, the argument goes, medicine has an obligation to develop these strategies in the service of human health.

[3] Jürgen Habermas, *The Future of Human Nature* (Cambridge: Polity Press, 2003), p. 98.

A second argument in favor of germline modification is based on a view of the state as limited in its authority to control personal decisions about health and human reproduction. In the United States in particular, based on recent interpretations of the constitution, the argument is made that parents enjoy a broad right of privacy in their reproductive choices, including not just the right to decide whether to have children but to decide what sort of children they will have. Whether the argument is well-founded in constitutional law is a matter of debate, and in any case the interpretation of the US Constitution might change in the future. But the argument raises an important point for discussion, not just in the US but everywhere. How far should government regulation extend into decisions about health and procreation? Even if germline modification is generally acknowledged as wrong, is it the sort of thing government should criminalize? In the US and perhaps in many other countries, the debate over the limits of government in respect to moral issues is hotly contested.

Secular arguments against germline modification are more common than arguments in favor. Probably the most common objection is the concern about the risk for harm to the person born as a result of germline modification and to subsequent generation. As genetics research has gone forward over the past fifteen years or so, driven in part by the Human Genome Project, we have deepened our respect for the complexity of genetic processes. It is now understood that success in gene modification does not necessarily bring success in the modification of traits, and that a change of a DNA sequence might have multiple effects, changing the structure or the quantity of various proteins. Whether it will ever be possible to predict reliably the health effects of germline genetic modifications is a matter of debate.

Every responsible observer agrees: Until it is possible to predict these effects with a high degree of reliability, it is unsafe and irresponsible to proceed with germline modification. The lingering debate centers on a definition of the morally necessary threshold for safety and of the reliability of our ability to predict. To some extent this is an empirical question that can only be satisfied by further scientific and technological advances. But it is also a moral question in that different people have different *a priori* views of the moral requirements of safety. The matter is somewhat complicated by the fact that germline modifications might be passed to future generations. If they are beneficial, then future generations might thank us. If they are harmful, then they might have to try to remove what we have done, if they can.

A more complex objection is that germline modification will violate human dignity or human rights, possibly changing human nature itself, something that critics insist must not be done. References to human nature in the germline debate are rare but not completely absent. Leon Kass, for instance, suggests that "Here the final technical conquest of his own nature would almost certainly leave mankind utterly enfeebled."[4] Francis Fukuyama refers to a universally shared human essence, which is finally indefinable and therefore referred to by Fukuyama as "Factor X," which is a list of

[4] Leon R. Kass, *Life, Liberty and the Defense of Dignity: The Challenge for Bioethics* (San Francisco: Encounter Books, 2002) p. 7.

complex traits that makes us human and justifies the moral protections we accord ourselves but do not grant to other species. "Factor X is the human essence, the most basic meaning of what it is to be human. If all human beings are in fact equal in dignity, then X must be some characteristic universally possessed by them."[5] Not just germline modification but other technologies have the power to threaten the integrity of the human essence and therefore should be opposed or limited to non-threatening uses.

The argument that germline modification might modify our human nature in essential or morally significant ways is, to put it mildly, quite sobering. But the argument is not immediately convincing. The first challenge it faces is to put forward an agreed definition of human nature. Advocates of the argument can hardly be persuasive if they cannot define their central term. Fukuyama has tried with "Factor X," but until there is wider agreement on the definition, the argument cannot be effective or generally persuasive. If this objection can be met, and if germline modifications leave future human beings less human, less free, less complex in terms of higher traits, then they should be rejected. But what if it turns out that germline modification makes our descendants more intelligent, for instance? What if, in a limited sense, their use makes future humans *more human*? Far from compromising human nature, their use might take human nature to a higher degree of achievement, thereby fulfilling rather than destroying human nature. Will the objection then become an argument in favor?

Far-fetched, of course, but only slightly more so than the notion that germline modification can in fact damage the essence of the human. The more realistic uses of germline modification might affect human health in limited ways but not the human essence in the way that Fukuyama has defined it, in terms of ours higher capacities. Even if some future uses of germline modification were capable of modifying our essential nature, even in ways that could be seen as threatening or destructive to this nature, it does not follow that *all* germline modification procedures would do so or that all of them must be banned. An argument that is at best selectively applicable can at most justify a selective ban.

We turn to a related argument that is at once more modest in metaphysics and more widely applicable in its scope. It is the view that human beings have a right to be born with a genetic inheritance that has not been modified technologically by other human beings. Sometimes it is also said that germline modification is a threat or an assault to human dignity. The language of human rights and of human dignity surely commands our attention. We cannot ignore such claims: "The new biotechnologies threaten not so much liberty and equality as something we might summarily call 'human dignity.'"[6]

When we look into these arguments, however, we are disappointed to find that human dignity is insufficiently defined and that a supporting basis for the right to be born with

[5] Francis Fukuyama, *Our Posthuman Future: Consequences of the Biotechnology Revolution* (New York: Farrar, Straus and Giroux, 2002), p. 150.
[6] Kass, *Life*, p. 22.

an unaltered genome is not provided.[7] To be fair, some hints are offered, and it is possible to construct an argument of sorts in support of these claims. And the irony of our situation, pointed out by Kass and others, must be admitted: "Liberal democracy, founded on a doctrine of human freedom and dignity, has as its most respected body of thought [science] a teaching that has no room for freedom and dignity."[8] Science eliminates the underpinnings of belief in human dignity, and now (for some at least) technology is poised to finish it off completely.

Any effort here to define human dignity is complicated by the fact that its advocates do not agree on its foundation. Kass and Fukuyama seem to base it in human nature, while Jürgen Habermas is quite clear that it neither has nor needs a scientific or metaphysical foundation. It is grounded instead in the relational symmetry of human beings as moral agents in community, which in turn is the basis for social and political order. Social reciprocity, not genes or nature, is its basis: "'Human dignity'…is in a strict moral and legal sense connected with this relational symmetry. It is not a property like intelligence or blue eyes, that one might 'possess' by nature; it rather indicates the kind of 'inviolability' which come to have a significance only in interpersonal relations of mutual respect, in the egalitarian dealings among persons."[9] The problem is that different versions of the ground of dignity are likely to yield different conclusions about its meaning and about what violates it.

Specifically, how would germline modification violate human dignity? For Fukuyama, the answer seems to be that germline modification might destroy the genetic source of the functional complexity of human life, making altered individuals less complex and therefore less "human." Against this we can turn to the theologian Karl Rahner, who nearly forty years ago pointed out the flaw in such a view: "For example one might say that a genetic manipulation was wrong if it destroyed or damaged considerably the vital substratum needed for genuine human intercommunication…[But] just *when* would a biological alteration seriously damage a man's 'nature' as a person?"[10] Not all modifications threaten this complexity, and on the basis of that threat, it is wrong to ban them all.

One way to respond is to argue that germline modification will make the modified less free. The irony of this objection is forceful: In the name of freedom, some individuals (parents) make other individuals (modified children) forever less free and, in that important sense, less human. Half a century ago, C. S. Lewis wrote that "…what we call Man's power over Nature turns out to be a power exercised by some men over other men with Nature as its instrument."[11] Looking ahead to technologies such as germline modification, Lewis wrote: "…if any one age really attains, by eugenics and scientific education, the power to make its descendants what it pleases, all men who live after it are

[7] Cf the recent debate in the *British Medical Journal* in response to Ruth Macklin, "Dignity is a useless concept," British Medical Journal (Dec 2003) 327: 1419-1420.
[8] Kass, *Life*, p. 45.
[9] Habermas, *Future of Life*, p. 33.
[10] Karl Rahner, "The Problem with Genetic Manipulation," in *Theological Investigations* Vol. XI (1968), pp. 225-257, at 233.
[11] C. S. Lewis, *The Abolition of Man* (New York: Collier Books, 1962 [1947]), p. 69.

the patients of that power. They are weaker, not stronger: for though may have put wonderful machines in their hands we have pre-ordained how they are to use them."[12] In summary, his warning is that "Each new power won *by* man is a power *over* man as well. Each advance leaves him weaker as well as stronger. In every victory, besides being the general who triumphs, he is also the prisoner who follows the triumphal car."[13]

A more biological and scientific version of this objection is raised by Hans Jonas in terms of what he takes to be the uniqueness of human emergence. Human capacities for freedom and creativity have emerged from what is less free and less creative. They depend even now upon the uniqueness of the human as a biological organism. But now we are able to use our freedom and creativity via technology to destroy the biological basis of our freedom and creativity. Our capacity to make ourselves un-free depends upon our freedom, upon "an essential sufficiency of our nature as it has evolved within this world. Now, this innate sufficiency of human nature, which we must posit as the enabling premise for any creative steering of destiny, and which is nothing other than the sufficiency (albeit fallible) for truth, valuation, and freedom, is a thing unique and stupendous to behold in the stream of becoming, out of which it emerged, which in essence it transcends, but by which it can also be swallowed again….Most evidently, the authority which it imparts can never include the disfiguring, endangering, or refashioning of itself. No gain is worth this price, no home of gain justifies this risk."[14]

For this argument—sobering as it is—to be effective, it must be shown that germline modification will really have this effect. Will it really destroy the biological substrate of human freedom? (It must also be shown that the emergence of free creativity is unique in humans and vanishingly rare in nature; recent work by Simon Conway Morris throws some doubt on this assumption.[15]) Will germline modification produce offspring that are genetically and biologically *less free*? Will it produce children who are modified so that they are genetically determined either to conform to the wishes of their makers or genetically impaired in the biological and neurological substrate of human responsibility and moral choice? Furthermore, modified or not, genes limit our capacities. On what basis can anyone claim that modified genes are more deterministic or more limiting than unmodified genes? And will this concern arise in every use of germline modification, or is it morally permissible to allow its use to avoid a disease but not to modify personality traits, for example?

Jürgen Habermas avoids these problems by locating his objection not on the grounds of genetic determinism but on human relationships. He argues that germline modification distorts the symmetry or reciprocity of human relationships, beginning in that most basic of all relationships between parent and child. Of course, children depend upon parents in many ways in what is intrinsically a dependant and asymmetrical relationship. But for Habermas, natural asymmetry is outgrown while germline modification would solidify

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[12] Lewis, *Abolition*, p. 70.
[13] Lewis, *Abolition*, p. 71.
[14] Jonas, *Imperative,* p. 33.
[15] Simon Conway Morris, *Life's Solution: Inevitable Humans in a Lonely Universe* (Cambridge: Cambridge University Press, 2003).

the asymmetry and forever consign the child to inferiority in relationship. "No dependence on another person must be irreversible."[16] Germline modification, for Habermas, is a violation because it is an irreversible source of relational asymmetry.

Habermas is careful to say that the problem of germline modification is not that it necessarily threatens the genetic-neural-mental substrate of human freedom. Having one's DNA modified by another, or "alien determination" as Habermas refers to it, does not necessarily diminish the free function of the one who is modified. "…This is not really the point of the argument against alien determination. It doesn't refer to a form of discrimination that the affected person experiences in her social surroundings, but rather to a prenatally induced self-devaluation; to a harm to her own moral self-understanding. What is affected is a subjective qualification essential for assuming the status of a full member of a moral community."[17] But in that case, he must admit: "The change would take place in the mind."[18] At that point, the danger itself becomes speculative. Would a typical individual with a modified genome see the modification as "a harm to her own moral self-understanding." How would we know except to perform the experiment?

One way, perhaps, to perform the experiment without the risk of learning too late that irreparable harm has been done is to use a somewhat complicated form of germline modification, proposed for instance by Gregory Stock.[19] The idea is to modify the DNA but to leave the modification inactive unless the individual, perhaps at age eighteen or later, requests its activation. If the modified person, now a young adult, so desires, a pharmaceutical "switch" can be administered, triggering expression of the inserted or modified DNA. Habermas is clear that his "alien determination" objection to germline modification is based on the assumption that the modification is irreversible. If Stock is correct that at least some modifications are reversible, then the Habermas objection is removed.

Other interpretations of human dignity are possible. At its core, the word *dignity* means the inherent worth of the individual person, and of course was applied discriminately to suggest that some (the "dignitaries") possessed dignity while most others did not. Discriminate use is explicitly rejected, and indeed the force of the word *dignity* comes from the added claim of universality. The recent draft on bioethics from UNESCO makes this clear. The draft first speaks of "the inherent dignity of the human person,"[20] clearly suggesting that the individual is the bearer of dignity, then adding: "Any decision or practice shall respect the fundamental equality of all human beings in dignity and rights and ensure that they are treated justly and equitable."[21]

Surely almost everyone agrees that all human beings equally possess inherent worth, that this worthiness or dignity should not be violated or disrespected and that there are limits

[16] Habermas, *Future of Life,* p. 63.
[17] Habermas, *Future of Life,* p. 81.
[18] Habermas, *Future of Life,* p. 53.
[19] Gregory Stock, *Redesigning Humans: Our Inevitable Genetic Future* (Boston: Houghton Mifflin, 2002).
[20] United Nations Educational, Scientific and Cultural Organisation, (UNESCO) "Preliminary Draft Declaration on Universal Norms on Bioethics," (Paris: February 9, 2005), Article 4.
[21] UNESCO, Draft, Article 5.

to what we do with human life, especially to be noted when it is present in weakened or vulnerable forms. But what exactly dignity requires and what it forbids is not clear. For some, dignity requires equal access to medical care. For some, it requires respect for autonomy in medical decisions, including reproductive decisions. For some, it requires avoidance of IVF and even of contraception. Varieties of interpretation do not mean that the idea of dignity is empty of meaning, but such diversity does limit its practical force and usefulness as an objection to any specific technology such as germline modification. No one has attempted, much less succeeded, to show how germline modification offends human dignity.

We move on now to one of the more focused objections to human germline modification, the concern that its use will contribute to greater injustice. It is worth noting that in sharp contrast to the objection based on possible harm, the justice objection begins with the assumption that germline modification will not harm but in fact will significantly benefit those on whom it is used. For instance, to be modified so as to avoid cancer or diseases of aging, not to mention to have increased intelligence, will give modified individuals a real advantage in life, one that often will result in their getting ahead of their unmodified peers. The problem is complicated by the fact that the wealthy of the world will be able to purchase these modifications for their children while the vast majority of the world's children will remain merely "normal." In that way, current inequities will have a new technology by which to purchase even greater disparities in a social process that can only be described as unjust.

In her summary of the justice objection, Audrey Chapman concludes that if practiced, germline modification "would have profound negative societal consequences…and would very likely make current injustices and inequalities worse and far more difficult to rectify….From a justice perspective, there seems to be only one option: not to go forward…"[22] Human societies tolerate many inequities and even injustices, but germline modifications will leverage present inequities in novel ways. Not only will the wealthy be able to afford the best schools or best social advantages for their children; they will be able to afford better children. "Unequal access to germ-line technologies will also mean that those persons who can already provide the best 'environments' for their children will also be able to purchase the best 'natures.'"[23]

There is little debate about the assumptions that germline modifications will be expensive, and that even if publicly funded, there will probably always be "high end" applications available only to those who can afford to pay dearly. Somewhat more debatable is the assumption that these modifications will actually result in smarter, stronger, or (in a word) more "competitive" children. Again the irony here is noted. The objections to germline modification reviewed earlier, that germline modification poses a risk to future generations, is now stood on its head. Of course, we cannot know now the answer to this question: Will genetic modifications harm or benefit future generations?

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[22] Audrey R. Chapman, "Implications for Justice," in Audrey R. Chapman and Mark S. Frankel, eds., *Designing our Descendants: The Promises and Perils of Genetic Modifications* (Baltimore: Johns Hopkins University Press, 2003), p. 152.
[23] Chapman, "Implications for Justice," p. 141.

Perhaps the answer will be *both*. That is, perhaps some individuals will be harmed while others are benefited or enhanced, and surely there will be many among us who see any enhancement as a kind of harm, paradoxically improving function while impoverishing humanness. But to make the justice argument work, it has to be assumed that germline modification allows the wealthy to buy real benefits for their children.

The central force of the justice objection is not that there are inequities of wealth or that these inequities turn into unequal access to technology, but that unequal access to *this* technology will very likely result in greater inequities in the future, thereby increasing the likelihood that we create a society many will in time find abhorrent. If we grant ourselves certain assumptions about the possible benefits of the technology, it is hard to escape this conclusion. Arriving at this conclusion, Chapman argues that that the only moral option is "not to go forward…"[24] Others have suggested that we might limit the uses of technology (for instance, simply forbid, if we could, any future applications that might make children more "competitive), or that we might only permit the technology to be used if it is made available with public funds to all who need it or to those who win a real (as opposed to inherited) lottery. Realistically, it is hard to imagine these conditions being adopted, just as it is hard to imagine that moral qualms about justice will stand in the way of the development of any technology, including this one. Perhaps the best that can be hoped for is to encourage the strongest possible sensitivity to justice in the future development and use of this technology.

In Lee Silver's famous but fanciful discussion of justice and germline modification, he speculates that this technology will result in social bifurcation of humanity leading in time to a split into two or more species.[25] From the standpoint of human social solidarity, this would be a disaster. From the standpoint of evolutionary theory, it is hard to object to this prospect. Here as before (in regard to science and human nature), science itself seems to bear on the ethics debate in ways that, at the very least, require our attention. Evolution leads us to see the human species as dynamic, changing, and (historically, at least) splitting off from and into new and distinct species. According to Jonas, we could say that "Since nothing is sanctioned by nature and therefore everything is permitted to us, we have full freedom for creative play that is guided by nothing but the whim of the playing impulse and makes no claim other than to master the rules of the game, that is, the claim of technical competences."[26] All this is in sharp contrast to previous views of species as fixed and the human species, at least, created by the direct act of the divine. Our intellectual preference for the evolutionary view should not hide from us the fact that the change of worldview is morally loaded.

At the very least, it should be recognized that many who find talk about "taking evolution into our own hands" have a new and even stronger motive to object to evolution. Objections to germline modification, evolutionary theory, and other possibilities like human cloning and embryo research are often woven together with complex religious

[24] Chapman, "Implications for Justice," p. 152.
[25] Lee Silver, *Remaking Eden: How Genetic Engineering and Cloning will Transform the American Family* (New York: Avon, 1997, 1998), pp. 281-293.
[26] Jonas, *Imperative*, p. 33.

assumptions about God, nature, and the human place in the world. Even those who claim not to share these beliefs themselves are convinced nonetheless that they are clear, strong, and widely accepted among the religious. For example, Fukuyama writes that according to religion (which one is not specified), there is a "sharp distinction between human and nonhuman creation; [for] only human beings have a capacity for moral choice, free will, and faith, a capacity that gives them a higher moral status than the rest of animal creation."[27] Most of all, Fukuyama argues, "religion provides only the most straightforward motive for opposing certain new technologies."[28]

The assumed religious objection to germline modification might go something like this: Human beings are creatures, not creators of life, and we are to respect the limits of our creaturehood by keeping clear of the processes by which God determines each human life. To intrude upon the genetic composition of a new human life is not so much an insult to the dignity of the new life as it is an affront to the sovereign right of the Creator. Our role is to accept the gift of life as God gives it, to nurture and heal it with the best medicine available, but not to define or control it. What is true of the individual is also true of the species. We are not to wrest control of the future of the species or of life itself from the hands of its Creator. Something like this is generally assumed to be the technological creed of the religious, and its commandments include opposition germline modification.

But when it comes to the writings of Christian theologians and religious leaders on the topic of germline modification, it is more accurate to say: "the religious community in this country [US] has not reacted to the prospect of human self-engineering with great alarm or with fundamental theological reservations….Even the recognition that human germ-line manipulation could accelerate tendencies to commodify children and evaluate them according to standards of quality control does not necessarily trump a theological openness to human self-transcendence."[29] Not just in the US, but indeed around the world, at least some highly influential Christian theologians and leaders allow for at least the possibility of human germline modification.

To be sure, some religious scholars and leaders have objected to germline modification, perhaps none more eloquently so that C. S. Lewis, whose criticisms of germline modification have already been noted. However, writing only a short time later and in response to specific proposals for genetic modification, the influential protestant theological ethicists Paul Ramsey raises general concerns about the "fabrication" of human life and of "playing God." But Ramsey is clear to recognize the therapeutic possibility of germline modification, and he refuses to object:

> The notation to be made concerning genetic surgery, or the introduction of some anti-mutagent chemical intermediary, which will eliminate a genetic defect before

[27] Fukuyama, *Posthuman Future,* p. 88.
[28] Fukuyama, *Posthuman Future*, p. 90.

[29] Audrey R. Chapman, *Unprecedented Choices: Religious Ethics at the Frontiers of Genetic Science* (Minneapolis: Fortress Press, 1999), p. 72.

> it can be passed on through reproduction, is simple. Should the practice of such medical genetics become feasible at some time in the future, it will raise no moral questions at all—or at least note that are not already present in the practice of medicine generally. Morally, genetic medicine enabling a man and a woman to engender a child without some defective gene they carry would seem to be as permissible as treatment to cure infertility when one of the partners bears this defect.[30]

Later in this same volume, which is a collection of essays, Ramsey quotes this passage as if to drive home the point that germline modification (like prenatal surgery) can be entirely therapeutic in its intention and therefore morally acceptable.[31]

At about the same time, the prominent Catholic theologian Karl Rahner offers qualified support for technological self-modification of humanity based on his theological view of the human as essentially self-transcending. It is our God-given human essence, Rahner believed, to transcend our givenness and to some extent create ourselves. "Man is fundamentally 'operable' a legitimately so."[32] Even though he could only guess at the technologies that lay ahead, Rahner argued that we ought "not to take fright at this self-manipulation of man."[33] Speaking of the species "man," he says that this species "can and must change *himself* if he is to come to full stature and find true selfhood."[34]

Not every modification of humanity is permissible, of course, and Rahner is clear to set out broad limits. "Can we deduce a rule for distinguishing between morally justifiable and immoral genetic manipulation…? We can still see that genetic manipulation would be immoral if it tried to destroy or threaten man's nature as a free, subjective self-awareness in the flesh of history." He concludes by saying that "to intend to produce a human being who would never be morally responsible for himself would be immoral."[35] In other writings, Rahner raises other concerns about germline modification, so forcefully in fact that the interpretation of Rahner on this question is not easy. He seems to permit germline modification, even encourage it, and yet elsewhere to oppose it, perhaps because of the early stage at which he was writing and the unsettled nature of the proposals for modification that were being offered.

Perhaps more surprising to many is the fact that for over twenty years, the official statements of the Catholic Church also offer qualified support from germline modification. Catholic teaching on the moral inviolability of the human embryo means, of course, that the embryo may never be used for utilitarian purposes, either for the benefit of research or for the therapeutic benefit of another. Any medical intervention on the embryo must be intended for the benefit of the embryo on which it is performed. This

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[30] Paul Ramsey, *Fabricated Man: The Ethics of Genetic Control* (New Haven: Yale University Press, 1970), p. 44.
[31] Ramsey, *Fabricated Man*, p. 100.
[32] Karl Rahner, "The Experiment with Man: Theological Observations on Man's Self-Modification," in *Theological Investigations* Vol. XI (1968), 205-224, at p. 210.
[33] Rahner, "Experiment," p. 211.
[34] Rahner, "Problem," p. 230, italics in original.
[35] Rahner, "Problem," p. 229.

position is clearly stated by Pope John Paul II: "A strictly therapeutic intervention whose explicit objective is the healing of various maladies such as those stemming from chromosomal defects will, in principle, be considered desirable, provided it is directed to the true promotion of the personal well-being of the individual."[36] In careful terms, the Vatican encyclical *Donum Vitae* offers qualified permission for something like germline modification: *"Medical research must refrain from operations on live embryos, unless there is a moral certainty of not causing harm to the life or integrity of the unborn child and the mother, and on condition that the parents have given their free and informed consent to the procedure.*"[37] An even greater openness is found in the Catholic Catechism, which teaches that "One must hold as licit procedures carried out on the human embryo which respect the life and integrity of the embryo and do not involve disproportionate risks for it, but are directed toward its healing, the improvement of its condition or health, or its individual survival."[38] This is not to say that the Catholic Church recommends germline modification, much less that it does so without careful limits and constraints, but merely that is does not completely close the door on modifications that are clearly therapeutic in the sense that they intend the benefit the embryo.[39]

Protestant theologians tend to support or oppose germline modification, not for reasons associated so much with the human embryo as with broader, contextual, or relational issues such as concerns for justice, family relationships, or based on a theology of the human role in creation. The concern about justice has already been discussed. The question of family relationships is explored by Sondra Wheeler within the deeper framework of the calling of parents by God to the vocation of parenting. Wheeler concludes: "Seeking to select the genetic characteristics of our offspring in accord with cultural values or parental preferences is incompatible with honoring the dignity of a creature whose source and destiny is in God….Therefore, genetic interventions aimed at increasing or enhancing positive characteristics, even real goods such as intelligence or creativity, cannot be defended as essential to well-being and should be forgone."[40] But if it is true that germline modification is the only way to avoid some forms of grave illness, it might be acceptable. "If all the concerns for the reliability of correction, insertion, expression, and inheritance of genetic material can be addressed, and the safety of such limited changes in the gene pool assured to a level comparable with the know risks of leaving/ such defects unaddressed, I see no absolute barrier to such interventions in the limits of human stewardship."[41] Here again as in the Catholic assessments, limited permission is given. While Catholic permission is given for therapy in contrast to the

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[36] John Paul II, "Dangers of Genetic Manipulation," Address to the World Medical Association, 1983.
[37] Donum Vitae, op. cit, I, 4. Italics in original.
[38] *The Catechism of the Catholic Church*, English translation (Washington: United States Catholic Conference, 1994, 1997), N 2275, p. 549.
[39] Albert Moraczewski, "The Moral Tradition of the Catholic Church," in Audrey R. Chapman and Mark S. Frankel, eds., *Designing our Descendants: The Promises and Perils of Genetic Modifications* (Baltimore: Johns Hopkins University Press, 2003), pp. 199-211 at 208.
[40] Sondra Wheeler, "A Theological Appraisal of Parental Power," in Audrey R. Chapman and Mark S. Frankel, eds., *Designing our Descendants: The Promises and Perils of Genetic Modifications* (Baltimore: Johns Hopkins University Press, 2003), pp. 238-251 at 250.
[41] Wheeler, "A Theological Appraisal," pp. 250-251.

utilitarian use of the embryo, Protestant permission (at least by Wheeler) is given to therapy in contrast to enhancement.

Some Protestants believe that germline modification must be stopped entirely. These tend to be traditional or conservative in their general theology and often associated with the new "Christian bioethics" movement, which is also opposed to all uses of human cloning and to human embryo research. In opposition specifically to germline modification, their perspective is based not just in the general Christian belief in the presence of God in Jesus of Nazareth but in morally normative value of the historic genome of the human species represented in Jesus. Because God is present in that genome, it is wrong to go beyond. In addition, they tend to reject the idea that creation is an ongoing process, that God is continuing to call forth new forms of life, that God works through evolutionary processes, and specifically the suggestion that God might create through human technology.

Over against this, theologians such as Ted Peters reject the thought that Christianity demands preservation of the biological status quo. His view "denies that the status quo defines what is good, denies that the present situation has an automatic moral claim to perpetuity."[42] Peters frequently uses the term "co-creation," or sometimes the variant offered by Philip Hefner, "created co-creator," to describe the human technological role in the ongoing process of divine creation. Whether or not "co-creation" rightly defines the human role, and what criteria must be met before human action can be dignified with this label, is a matter of debate.[43] However, if it is believed that God is the sovereign creator of all things and that God creates through intermediaries, then it is hard to rule out the possibility that human germline modification through emerging technology might not be God's means toward the future of creation. [44]

[42] Ted Peters, *Playing God? Genetic Determinism and Human Freedom* (New York: Routledge, 1997), p. 155.
[43] Ronald Cole-Turner, "Biotechnology—A Pastoral Reflection," in *Theology Today* (April 2002).
[44] Ronald Cole-Turner, "Human Limits: Theological Perspectives on Human Germ-Line Modifcation," in Audrey R. Chapman and Mark S. Frankel, eds., *Designing our Descendants: The Promises and Perils of Genetic Modifications* (Baltimore: Johns Hopkins University Press, 2003), pp. 188-198.