

PROCREATIVE LIBERTY IN THE ERA OF GENOMICS

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I. INTRODUCTION: ETHICAL AND POLICY CHALLENGES OF THE GENOME

Twentieth century biology began with the rediscovery of Gregor Mendel's work on peas and ended with the sequencing of the human genome. In between came Thomas Morgan's studies of fruit flies, the grand synthesis between genetics and evolutionary biology in the 1930s, and Watson and Crick's publication in 1953 of the double helix structure of deoxyribose nucleic acid ("DNA"), the substance in the nucleus of cells, which carries the genetic code of all eukaryotic life.¹

The genetics of the second half of the century focused on learning how DNA coded for proteins, how to splice, clone, and recombine pieces of DNA, and how genetic mutations caused disease. In the late 1980s, a project to identify the actual sequence of all 3.2 billion base pairs of the human genome began.² In June 1999, President Clinton and Prime Minister Blair announced that a working draft of the human genome was complete, with the final completed draft to 99.9% accuracy expected in May 2003, fifty years after the publication of Watson and Crick's landmark paper.³

This remarkable achievement now provides scientists with the tools for understanding the molecular details of how living cells function and evolve, and thus the means for diagnosing, treating, and preventing many diseases. It will also lead to applications in reproduction, in personal and kinship identity, and possibly in social control. Increasing "geneticization" of medical, reproductive, and social spheres of life will bring many benefits, but may also lead to public and private

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¹ James Watson & Francis Crick, *A Structure for Deoxyribose Nucleic Acid*, 171 NATURE 737 (1953). For the best history of these events, see HORACE FREELAND JUDSON, *THE EIGHTH DAY OF CREATION* (1996). See also KEVIN DAVIES, *CRACKING THE GENOME: INSIDE THE RACE TO UNLOCK HUMAN DNA* (2001).

² Nicholas Wade, *Reading the Book of Life: The Overview; Genetic Code of Human Life Is Cracked by Scientists*, N.Y. TIMES, June 27, 2000, at A1.

³ Nicholas Wade, *Scientists Complete Rough Draft of Human Genome*, N.Y. TIMES, June 27, 2000, at A1.

misuse, and new forms of power over individuals.⁴ A special threat is genetic reductionism and its effect on how humans view themselves and their place in the universe.⁵

Coming to grips with the social implications of human genomic knowledge presents a series of diverse, but related, challenges about how to make use of genetic information in human affairs in ethically, legally, and socially acceptable ways. One major group of issues concerns ownership and control rights in the genome. Researchers need access to human DNA and patient medical records to identify genes, and to develop drugs and treatments based on them. Intellectual property rights in genes or gene products may also be necessary to spur investment in genomic research. At the same time, the privacy rights of individuals in their bodily tissue, DNA, and medical records demand strong protection.

A different set of issues arises from the many potential medical uses of genomic information. Genomics will play a major role in understanding the mechanics of disease, and in designing drugs and treatments to prevent and treat disease. Screening individuals or populations for genetic susceptibility or late-onset conditions, so that prevention may occur, will become much more common. Pharmacogenomics—genomic factors influencing drug metabolism⁶—may enable physicians to prescribe drugs tailored to a patient's genotype.⁷ But unraveling the body's genetic secrets and turning them into effective therapies poses a major scientific challenge. As Dr. Francis Collins, the director of the National Human Genome Research Institute, has put it, genomics "will occupy science and medicine for the next 50 or 100 years."⁸

A third set of issues—the use of genomic knowledge in reproduction—shows how socially and morally complicated genomic applications can be. Because genes are inherited systems of information passed on to progeny,⁹ genomic knowledge increases the ability to predict or even control the genes of offspring. Persons planning reproduction might want to know something about their genetic makeup or that of their embryos or fetuses before they conceive, bear, or give birth to offspring. While much of the resulting control will operate by excluding undesirable genomes, at some point, attempts to rewrite or engineer sections of the genetic code of prospective offspring may also occur.

⁴ The term "geneticization," coined pejoratively by Abby Lippman, is meant as a criticism or warning of the grave risks that come with increased reliance on genetics in human activities. Abby Lippman, *Prenatal Genetic Testing and Screening: Constructing Needs and Reinforcing Inequities*, 17 AM. J.L. & MED. 15, 18-19 (1991). But "geneticization" will not be sought unless it also brings benefits.

⁵ Alex Mauron, *Is the Genome the Secular Equivalent of the Soul?*, 291 SCIENCE 831 (2001); GREGORY STOCK, *REDESIGNING HUMANS: OUR INEVITABLE GENETIC FUTURE* (2002); ROGER GOSDEN, *DESIGNING BABIES: THE BRAVE NEW WORLD OF REPRODUCTIVE TECHNOLOGY* (1999).

⁶ "Pharmacogenomics is the study of how an individual's genetic inheritance affects the body's response to drugs. The term comes from the words pharmacology and genomics, and is thus the intersection of pharmaceuticals and genetics." U.S. DEP'T. OF ENERGY, HUMAN GENOME PROJECT INFORMATION, PHARMACOGENOMICS, at http://www.ornl.gov/TechResources/Human_Genome/medicine/pharma.html (last modified Oct. 29, 2003).

⁷ David W. Feigal & Steven I. Gutman, *Drug Development, Regulation, and Genetically Guided Therapy*, in PHARMACOGENOMICS: SOCIAL, ETHICAL, & CLINICAL DIMENSIONS 99, 100-01 (Mark A. Rothstein ed., 2003).

⁸ Francis S. Collins, *Shattuck Lecture—Medical and Societal Consequences of the Human Genome Project*, 341 NEW ENG. J. MED. 28 (1999).

⁹ PAT SPALLONE, *GENERATION GAMES: GENETIC ENGINEERING AND THE FUTURE FOR OUR LIVES* 28-29 (1992).

Although each set of genomic issues involves some application of genetic knowledge to human activities, each area has its own particular set of normative challenges and conflicts, and is thus best considered independently. This article will focus on the ethical, legal, and social challenges presented by the use of genetics in reproduction in the genomics era. Those uses raise morally complex and politically charged issues, where slogans and shibboleths often replace the careful analysis needed to resolve them.

Part II of this Article describes the controversies that arise with the use of genetics in reproduction and three approaches to resolving them. Part III explores the concept and meaning of procreative liberty, explains why it is valued, and describes its constitutional status. Part IV then applies a procreative liberty analysis to four key areas of debate and controversy over the use of reprogenetic techniques in reproduction. Section III.A. addresses the use of genetic knowledge in screening of prospective children for health reasons. Section IV.B. looks at non-medical selection, with a focus on sexual orientation and gender. Moving then to positive techniques of genetic choice, Section IV.C. discusses the case for reproductive cloning. Section IV.D then addresses positive alteration of embryo genomes for both medical and non-medical purposes. Finally, Part V discusses the problems of making policy in this area.

II. TECHNOLOGY AND REPRODUCTION: THE CONTROVERSY

Reproductive uses of genetic knowledge have been especially controversial for several reasons. First, they come with a bad pedigree. Attempts at the beginning of the twentieth century to improve the gene pool led to a repressive system of involuntary eugenic sterilization in thirty American states.¹⁰ These laws provided a role model for Hitler's eugenic sterilization program,¹¹ which preceded Nazi efforts to annihilate Jews and other groups with disfavored genes. The shadow of eugenics hangs over all attempts, whether medical or non-medical, to select offspring genes.

Secondly, the use of genes to select offspring is quickly embroiled in social and political battles involving prenatal life, the status of women, and disability rights. Battles over the status of the fetus and abortion arise with the use of techniques to screen embryos or fetuses for genes of interest. Women assume greater burdens than men in the use of most reproductive technologies, thus implicating concerns about the equality and autonomy of women. Persons with disabilities are concerned about biases in genetic screening programs that disfavor persons with disabilities.

Third, the use of genetic information in reproduction inevitably raises questions about the permissibility of any selection of offspring traits, as well as about the particular grounds of selection. The 1996 birth of Dolly, the sheep cloned from the mammary gland of an adult ewe,¹² has upped the ante of concern by stimulating fears that people will attempt to engineer offspring traits, turning children into commodities or objects to serve parental needs. Much of the current concern reflects fears that technologies to silence genes or insert DNA into the genomes of

10 PHILLIP P. REILLY, *THE SURGICAL SOLUTION: A HISTORY OF INVOLUNTARY STERILIZATION IN THE UNITED STATES* 94 (1991). As the noted geneticist J.B.S. Haldane observed, ". . . many of the deeds done in America in the name of eugenics are about as much justified by science as were the proceedings of the Inquisition by the gospels." J.B.S. HALDANE, *POSSIBLE WORLDS AND OTHER ESSAYS* 144 (1930).

11 REILLY, *supra* note 10, at 106.

12 Gina Kolata, *With Cloning of Sheep, the Ethical Ground Shifts*, N.Y. TIMES, Feb. 24, 1997, at A1.

prospective children will become available and will pose serious threats to the well-being of children, society, and the very meaning of reproduction.

How then are we to reconcile the conflicts between reproductive choices and respect for prenatal life, offspring, families, women, other groups, and societal values that arise in using genetic knowledge in reproduction? A central dilemma is that accepting any instance of genetic selection in principle implies accepting most other instances of selection as well. But some uses seem much more questionable and less beneficial than the one initially accepted. Can acceptable lines be drawn, or is it better, as some would argue, to permit little, if any, genetic selection to occur?

To draw sound lines one needs a realistic sense of what those techniques involve, how they might help people in realizing their reproductive plans, and how they might harm them, their offspring, or society. But answers to those questions will be heavily influenced by more basic attitudes or normative stances that one takes toward the use of technology in reproduction. One's understanding of the meaning and significance of reproduction, parenting, the status of offspring, and a variety of other interests will be a key determinant in resolving these issues.

Three different stances (*strict traditionalism*, *modern traditionalism*, and *radical liberty*) have vied for recognition in ethical, legal, and policy discourse about these issues. I describe each of them, and the reasons why this article uses the *modern traditionalist* perspective to evaluate the many uses of genetic knowledge in reproduction.

A. STRICT TRADITIONALISM.

A *strict traditionalist* holds that reproduction is a gift from God, resulting from the loving intimacy of two persons.¹³ They receive the gift of an embryo, fetus, and then child who is to be unconditionally cherished for its own sake. This view would condemn most uses of technology to control or influence the characteristics of offspring because parental selection necessarily conflicts with the idea of "unconditional gift" and suggests that the child is a made or chosen "product."

The leading contemporary articulator of this tradition is Leon Kass, Chair of the President's Council on Bioethics, who has expressed that view in articles and books since the 1970s.¹⁴ Because his views underpin the President's Bioethics Council's 2002 report, *Human Cloning and Human Dignity*,¹⁵ I will take that report as representative of the *strict traditionalist* position.

In referring to children born of technological assistance, the report notes:

we do not, in normal procreation, command their conception, control their makeup, or rule over their development and birth. They are, in an important sense, 'given' to us. Though they are *our* children, they are not our *property*. . . . Though we may seek to have them for our own self-fulfillment, they exist also and especially for their own sakes. Though we seek to educate them, they are not like our other projects, determined strictly according to our plans and serving only our desires.¹⁶

¹³ PRESIDENT'S COUNCIL ON BIOETHICS, HUMAN CLONING AND HUMAN DIGNITY 110-11 (2002) [hereinafter CLONING REPORT].

¹⁴ Leon R. Kass, "Making Babies" Revisited, in THE PUBLIC INTEREST 32 (1979); Leon R. Kass, *Making Babies—the New Biology and the "Old" Morality*, in THE PUBLIC INTEREST 18 (1972).

¹⁵ CLONING REPORT, *supra* note 13, at XIII.

¹⁶ *Id.* at 9.

The report goes on to note that:

If these observations are correct, certain things follow regarding the attitudes we should have toward our children. We treat them rightly when we treat them as gifts rather than as products, and when we treat them as independent beings whom we are duty bound to protect and nurture rather than as extensions of ourselves subject only to our wills and whims.¹⁷

An important implication of the view that offspring are “gifts” and not “products” is that humans should have no say in the outcome or makeup of a child. They must simply accept the “gift” that is provided and make no attempt to change, direct, control, design, or exclude it. Reproductive cloning is the sin extraordinaire because “cloned children would thus be the first human beings whose entire genetic makeup is selected in advance.”¹⁸ Although the report does not address other modes of selection, the gift ethic would seem to condemn all other forms of prenatal selection as well, whether positive or negative, medical or non-medical.¹⁹ All such uses would make children “like other human products, brought into being in accordance with some pre-selected genetic pattern or design, and therefore in some sense ‘made to order’ by their producers or progenitors.”²⁰ Acceptance of such actions would:

provide at best only a partial understanding of the meanings and entailments of human procreation and child-rearing . . . [and undermine] the unconditional acceptance of one’s offspring that is so central to parenthood.²¹

...

In short, the right to decide ‘*whether* to bear or beget a child’ does not include a right have a child *by whatever means*. Nor can this right be said to imply a corollary—the right to decide what kind of child one is going to have.²²

¹⁷ *Id.*

¹⁸ *Id.* at 117.

¹⁹ The report’s mechanistic view of reproductive technology comes out most clearly in its discussion of cloning. It describes cloning as “control of the entire genotype and the production of children to selected specifications.” *Id.* at 118. Cloning is different from *in vitro* fertilization (“IVF”) because “the process begins with a very specific final product in mind and would be tailored to produce that product.” *Id.* at 119. It goes on to note that “the resulting children would be products of a designed manufacturing process, products over whom we might think it proper to exercise ‘quality control.’” *Id.* Using such techniques would teach us “to receive the next generation less with gratitude and surprise than with control and mastery.” *Id.* One possible result would be “the industrialization and commercialization of human reproduction,” a clearly dehumanizing force. *Id.* Much of this article is a refutation of those claims.

²⁰ The report never addresses the extent to which parents through education, religion, medical treatments, and other interventions shape the child. This is deemed acceptable, and within parental freedom while any “shaping” of the child beforehand is inconsistent with the “dignity” of human reproduction. For further discussion of this point, see *infra* notes 184-85 and accompanying text.

²¹ CLONING REPORT, *supra* note 13, at 92.

²² *Id.* at 93. It is unclear, of course, whether the report is actually as extreme as it appears to be, since one could be against “any” method without being against “all” methods. The sentences following that quote are also open to a more narrow understanding, but the report gives no indication or basis for choosing a narrow or broad view. Indeed, it suggests that any use of selection risks violating the gift perspective, which it asserts is essential to human reproduction.

The main problem with this view as a guide to public policy is its roots in a religiously based or metaphysical view of how reproduction should occur and a breadth that would apparently condemn nearly all forms of technological assistance in reproduction. As a religiously based view with which many persons would disagree, it has no claim to special respect in a liberal secular democracy, where individuals define within a broad range their own sense of the good. Its condemnation of “unnatural” ways of reproduction is not required to protect the well-being of offspring, because in nearly all cases resulting offspring appear to benefit from the technologies used.²³ The fact that *techne*²⁴ is used should not itself disqualify techniques that help parents fulfill goals of having healthy children to rear. Disagreements about the ethics of particular cases do not justify having the government impose one “correct” view of how reproduction should occur in all cases.

In addition, this view conflicts with the natural instinct of parents to have healthy children for their own sake and that of the children. In appealing to the natural, the *strict traditionalist* overlooks the most natural fact of all—that people have strong interests in passing on their genes and in having healthy offspring who will do the same. Unless Kassians are adopting the untenable view that any interference with nature is wrong, they must recognize that *techne* can help humans deal with the limits which nature has placed on them, as it does with other limits.²⁵ Within broad bounds, using technology to accomplish that task is no more objectionable than using technology after birth to enable survival to continue. There are limits, such as harm to children or others, but those harms must be serious when a substantial reproductive interest is aided by a technique.

B. RADICAL LIBERTY

The *radical liberty* view is the polar opposite to *strict traditionalism*. It holds that individuals are free to use any reproductive technique they wish for whatever reason, and no limits can appropriately be placed on what they do before the birth of a child.²⁶ Individuals are thus free to select, screen, alter, engineer, or clone offspring as they choose.²⁷ They are the best judges of what is good for them, including what children they have.

The justification of this position appears to be general libertarian principles of freedom without government interference, though one strand of the position draws on utopian notions of humans perfecting themselves by engineering their very nature. Libertarianism in reproduction means that a person has the right to select for specific genes or do anything she chooses in the course of reproduction. For *radical*

²³ The question of what results count as harm to offspring raises a complicated philosophical problem that is discussed at greater length in the Appendix.

²⁴ “Techne” means “[t]he principles or methods employed in making something.” Webster’s Third New International Dictionary 2348 (Philip Babcock Gove ed., 3d ed. 1986).

²⁵ The view that any interference with nature is unnatural is ultimately untenable because it would deny use of medicine, heating, transportation, agriculture, etc. They all interfere with nature in some respect. At the same time, they may all be viewed as part of nature, because nature selected for the cognitive capacities that allow human control and manipulation of nature to occur.

²⁶ See, e.g., John B. Attanasio, *The Constitutionality of Regulating Human Genetic Engineering: Where Procreative Liberty and Equal Opportunity Collide*, 53 U. CHI. L. REV. 1274, 1285-86 (1986).

²⁷ See JOHN A. ROBERTSON, *CHILDREN OF CHOICE: FREEDOM AND THE NEW REPRODUCTIVE TECHNOLOGIES* (1994).

libertarians, the technical ability to “rewrite” or “edit” the genome of offspring is cause for huzzas not homilies.

Radical liberty proponents are probably few in number. The Raelian sect, Randolph Wicker, and others promoting reproductive cloning have made such a claim.²⁸ Dr. Brigitte Boisselier claimed at the National Academy of Sciences hearing on cloning that she “has the right to have any kind of child that she wants.”²⁹ Gregory Stock, and to some extent, Lee Silver, predict that parents will want to use any technique that will enhance the well-being of offspring, and that such will come to be accepted because of the strong parental interest and commitment to their offspring.³⁰ But their views are descriptive, and do not necessarily present arguments for why unlimited choice is desirable.

Although held by relatively few, the *radical liberty* view hovers in the background and casts a shadow over many official, scholarly, and popular accounts of reproductive issues. *Strict traditionalists* often assume that anyone who does not share their view is in favor of *radical liberty* (rather than the *modern traditionalist* view, which does recognize some constraints).³¹ Many popular and policy discussions about reproductive technology often assume that if cloning, genetic enhancement, and other selection or alteration techniques were safe, many people would seek them as a matter of right, thus radically altering reproduction and relations with children to the detriment of all.³²

The problem with the *radical liberty* view is that it is too extreme in its espousal of personal freedom. Just as *strict traditionalism* admits no nuance in assessing possible benefits in reproduction technology, *radical libertarians* see no reason ever to place limits on any choice related to conception, screening, alteration, or the production of children.³³ But such an extreme view denies the validity of the harm principle³⁴—personal liberty is justifiably limited when it causes direct harm to others—applied to reproductive choices just as it does to other exercises of autonomy. Even assuming that reproduction deserves special protection, however,

²⁸ Raelian Leader Says Cloning First Step to Immortality, at <http://www.cnn.com/2002/HEALTH/12/27/human.cloning> (Dec. 28, 2002).

²⁹ NAT'L ACAD. OF SCIENCES, *Scientific and Medical Aspects of Human Reproductive Cloning*, in THE IMPACT OF FEDERAL POLICY ON REALIZING THE POTENTIAL OF STEM CELL RESEARCH: INFORMATIONAL HEARING OF THE SENATE HEALTH AND HUMAN SERVICES COMMITTEE, 35 (2002).

³⁰ STOCK, *supra* note 5; LEE M. SILVER, REMAKING EDEN: CLONING AND BEYOND IN A BRAVE NEW WORLD (1997).

³¹ Other bioethicists also often understand claims about procreative liberty to be those of the *radical libertarian*, rather than those of the more nuanced *modern traditionalist* view. See Thomas H. Murray, *What Are Families For?: Getting to an Ethics of Reproductive Technology*, 32 HASTINGS CENTER REP. 41 (2002); Dena Towner & Roberta Springer Loewy, *Ethics of Preimplantation Diagnosis for a Woman Destined to Develop Early-Onset Alzheimer Disease*, 287 JAMA 1038, 1038-40 (2002) (challenging perceived discursive prominence of radical libertarian viewpoints and advocating for a nuanced approach).

³² See Judith F. Daar, *The Prospect of Human Cloning: Improving Nature or Dooming the Species?*, 33 Seton Hall L. Rev. 511, 526-30 (2003). See also Skylar A. Sherwood, Note, *Don't Hate Me Because I'm Beautiful . . . and Intelligent . . . and Athletic: Constitutional Issues in Genetic Enhancement and the Appropriate Legal Analysis*, 11 HEALTH MATRIX 633, 638-46 (2001).

³³ The opposing views are mirror images of each other. Curiously, each accepts a strongly reductionist or deterministic role for genes and human manipulation of genomes. One view finds this to be good, even utopian, while the other sees a dystopian evil.

³⁴ JOHN STUART MILL, ON LIBERTY 30 (John Gray & G.W. Smith eds., 1991) (stating that the harm principle holds “[t]hat the only purpose for which power can be rightfully exercised over any member of a civilized community, against his will, is to prevent harm to others.”).

the *radical liberty* view provides no way to distinguish which activities surrounding reproduction are truly reproductive and which ones are not. The best or ultimate judge of whether an activity is reproductively important and whether it violates the harm principle cannot be the actor being judged, as the *radical liberty* view asserts.

C. MODERN TRADITIONALISM

Modern traditionalism is midway between the other two positions. Although a heterogeneity of views parade under the *modern traditionalist* banner, that approach has much to offer as a methodology for dealing with genetics in reproduction. It holds that reproductive choice in a liberal, rights-based society is a basic freedom, including the use of genetic and reproductive technologies that are helpful in having healthy, biologically related offspring.³⁵ This view is *modern* in its acceptance of new technologies, but *traditional* in demanding that those techniques ordinarily serve traditional reproductive goals of having biologically related offspring to rear. Its acceptance of reproductive and genetic technologies, however, exists only insofar as they aid the task of successful reproduction, and do not directly harm offspring, families, women, society, or others.

As a result, many uses of reproductive technology will be protected, but not automatically. The connection with reproduction is key, as is the absence of direct harm to others. Some techniques will not be acceptable precisely because their connection to gene transmission and rational investment strategy in offspring will be lacking or unclear. In other cases, harm might result, though what counts as “harm” from reproduction is itself hotly contested.³⁶

The problem for the *modern traditionalist* is to give a persuasive account of why some uses of reproductive technology are acceptable, but others are not. To do this she must provide a convincing method or set of criteria for determining which uses are “reproductive” and what counts as “harm.” Her challenge is to show how her approach gives reasonable answers to the conflicts that genetic uses inevitably raise. Rather than appeal to Procrustean principles that neatly give answers for all cases, *modern traditionalism* adopts instead a pragmatic, context-specific approach that looks at how proposed techniques are likely actually to be used, and the problems, if any, which might then arise. Although less definite, this approach is best suited for handling issues of reproductive technology in the era of genomics, as analysis of several genetic uses in reproduction will show.

III. WHAT IS PROCREATIVE LIBERTY?

The *modern traditionalist* view translates easily into the language of individual rights. Although not the only relevant perspective to take on these issues, a rights-based perspective focuses attention on key aspects of the individual and societal concerns at issue with these techniques. For example, it reminds us of the importance of the more fundamental decision of whether to assign decisions to use reproductive technologies to individuals and their professional advisors or to

³⁵ See NATIONAL BIOETHICS ADVISORY COMMISSION, CLONING HUMAN BEINGS: REPORT AND RECOMMENDATIONS OF THE NATIONAL BIOETHICS ADVISORY COMMISSION 95 (1997) [hereinafter NBAC REPORT]; Maura A. Ryan, *Cloning, Genetic Engineering, and the Limits of Procreative Liberty*, 32 VAL. U. L. REV. 753, 754 (1998).

³⁶ For example, there is a question whether harm can occur to offspring from the use of technologies that make their birth possible. See discussion *infra* Appendix.

legislative majorities. It also focuses analysis on the context of likely use by assessing the reproductive interests that a disputed technology serves, and the severity and probability of the harm or objection that it generates. A coherent account of what procreative liberty is and why it is protected can provide a workable set of principles for a *modern traditionalist* to use in resolving the normative and policy conflicts that arise when genetic knowledge is used in reproductive decision-making.

Procreative liberty is best understood as a liberty or claim-right to decide whether or not to reproduce.³⁷ As such, it has two independently justified aspects: the liberty to avoid having offspring and the liberty to have offspring. Because each aspect has an independent justification, each may be conceived as a different right, connected by their common concern with reproduction.³⁸

The liberty to avoid having offspring involves the freedom to act to avoid the birth of biologic (genetically related) offspring, such as avoiding intercourse, using contraceptives, refusing the transfer of embryos to the uterus, discarding embryos, terminating pregnancies, and being sterilized. In contrast, the liberty or freedom to have offspring involves the freedom to take steps or make choices that result in the birth of biologic offspring, such as having intercourse, providing gametes for artificial or *in vitro* conception, placing embryos in the uterus, preserving gametes or embryos for later use, and avoiding the use of contraception, abortion, or sterilization.

As with other liberties in a rights-based society, an actor is not obligated to exercise a particular liberty right. He or she may or may not choose to reproduce, or to use or not use genetic or reproductive technologies in making those decisions. An actor may have no need to use a technology or lack the means to do so; or he or she may reject uses of particular technologies for a wide range of personal reasons, including moral or ethical concerns about the effect of particular techniques on children, on society, or on deeply held personal values, including values of how reproduction should occur.³⁹ The technological imperative—that if something can be done, it will be done—is not nearly as powerful as often claimed. No one is

³⁷ A person has a liberty-right if she would violate no moral duty by engaging in an action or omission. A claim-right adds the additional ingredient that other persons have a moral duty not to interfere with her exercise of liberty. See RICHARD FLATHMAN, *THE PRACTICE OF RIGHTS* 33-63 (1976). It is generally understood that the great personal importance of procreative liberty makes it a claim-right against state or private interference with its exercise. JOHN A. ROBERTSON, *CHILDREN OF CHOICE: FREEDOM AND THE NEW REPRODUCTIVE TECHNOLOGIES* 35-38 (1994). As will be discussed below, procreative liberty may also have constitutional status as a fundamental right. If so, procreative liberty would be presumptively protected against state action unless there were compelling reasons for restricting it.

³⁸ Whether described as one or two rights, each is independently justified and “stands on its own bottom,” to paraphrase Justice Harlan’s comments about privacy in *Griswold v. Connecticut*, 381 U. S. 479, 499 (1965) (Harlan, J., concurring). Although each comes into play by foregoing or waiving the other, the reasons for protecting each aspect are separate—the one in avoiding the burdens of reproduction, the other in avoiding the burdens of not being able to reproduce.

³⁹ Persons are thus free to reject genetic screening or modification, even if doing so leads to a child born with a congenital handicap. While physicians have ethical and legal duties to inform women of the availability of carrier and prenatal tests, no state has placed a legal duty on parents to be tested or to avoid the birth of such children. Such requirements would presumably be unconstitutional despite the fact that *Buck v. Bell* has not yet been officially overruled. See John A. Robertson, *Genetic Selection of Offspring Characteristics*, 76 B.U. L. REV. 421, 468-74 (1996).

obligated to reproduce or to use particular reproductive and genetic technologies in avoiding reproduction or in reproducing.⁴⁰

Like most moral and legal rights in liberal society, procreative liberty is primarily a negative claim-right—a right against interference by the state or others with reproductive decisions—not a positive right to have the state provide resources or other persons provide the gametes, conception, gestation, or medical services necessary to have or not have offspring. Some persons, however, would argue that it should have positive status as well, with the state or public health system providing reproductive health services, including infertility treatment, genetic screening, or abortion.

As should be clear from this discussion, recognizing procreative liberty as a moral or legal right or important freedom does not mean that it is absolute, but rather that there is a strong presumption in its favor, with the burden on opponents to show that there is a good case for limiting it. Many critics, however, assume that claims of procreative liberty are claims of an inalienable or absolute right.⁴¹ But a right can be inalienable—not transferable to others—without also being absolute. And no serious proponents of procreative liberty argue that it is absolute and can never be limited. Rather, the debate is (or should be) about whether particular exercises or classes of exercise of the right pose risks of such harm to others that they might justly be limited.⁴²

An important set of related issues concerns the scope of procreative liberty—what activities related to avoiding or engaging in reproduction a coherent conception of procreative liberty includes. This can be determined only by assessing the role that those other activities play in avoiding or engaging in reproduction. Some activities seem so closely associated with, or essential to, reproductive decisions that they should be considered part of it and judged by the same standards. An example is a woman's need to acquire and then use genomic information about herself, her partner, her gametes, her embryos, or her fetus before deciding whether or not to reproduce. Because such information will often be determinative of whether a person or couple would or would not reproduce, freedom to acquire and use it would seem to be part of procreative liberty, unless its use posed substantial risks to others.

In contrast, other activities in and around reproduction might not be part of procreative liberty and thus not deserve the same protection (though some of them might deserve strong protection on other grounds). Thus, actions occurring in the course of reproduction, such as home-birthing, having the father present in the delivery room, using drugs during pregnancy, and the like are not part of procreative liberty *per se*; nor is adopting a child or rearing children not related by genetic kinship, because those activities arise only after reproduction has occurred and are not themselves determinative of whether reproduction will occur. As I argue below, some uses of reproductive and genetic technology, such as reproductive cloning when fertile and intentional diminishment of offspring characteristics, may also fall outside the protective canopy of reproductive liberty.

⁴⁰ Thus, allowing one category of uses does not mean that every person in a similar reproductive situation will use that technology.

⁴¹ Towner & Loewy, *supra* note 31, at 1038-40.

⁴² Severe overpopulation might justify restrictions on the number of children, while severe underpopulation might make limiting access to contraceptives acceptable. However, much more would need to be known about societal circumstances and the efficacy of alternative measures to adequately assess the legitimacy of such restrictions.

Unsurprisingly, there may be intense debate about whether something is central or material to reproduction and thus properly regarded as part of, or an aspect of, procreative liberty, just as there is sharp debate about the seriousness and risk of resulting harms. Before reaching questions of harm, however, it is useful first to ask whether a particular use of reproductive technology, such as embryo screening for medical and non-medical traits, genetic engineering of prospective offspring, or reproductive cloning, is itself an exercise of procreative liberty. All such arguments, it seems, relate to how essential or material those activities are to the values that underlay the importance to individuals of their decision to avoid or engage in reproduction.⁴³ While people may disagree over the precise limits, the argument, if properly focused, should be about the closeness of the activity in question to the values that support freedom in reproductive decision-making and whether the effects on others of exercising that freedom justify limiting it.

As argued below, however, while a material connection to the reproductive decision is a necessary condition to qualify the choice as one of procreative freedom, it may not always be a sufficient one.⁴⁴ The connection may not be sufficient if the materiality to the individual is not in keeping with ordinary understandings of why having offspring is so important to individuals.⁴⁵ A certain degree of conformity with common understandings of why reproduction is important is thus necessary for inclusion in procreative liberty. But such conventionalism is limited to clarifying reproductive goals and not to determining the acceptability of means to those goals.⁴⁶ From this perspective, the use of new technologies to overcome infertility or to avoid the birth of children with disease are ways to reach the traditional goal of having healthy children and should not be rejected, as the conventionalism of *strict traditionalism* would, merely because the means are novel or new types of rearing relationships result.

At the same time, not all uses of new technologies should be acceptable just because, as the *radical libertarian* would argue, they are an instance of reproductive choice. If they are used to achieve goals not clearly grounded in our ordinary understandings of why reproduction matters to individuals, for example, they employed means that seemed unnecessary, such as reproductive cloning when fertile, or that did not advance the interests of offspring, such as intentional diminishment of capacities of otherwise healthy offspring, they would not serve the values that make having offspring of such key importance to persons.⁴⁷

⁴³ A more robust theory of procreative liberty might argue that any preference concerning how reproduction occurs or the characteristics of its results should be protected. In this article, I address only the situation of when use of a technique is material or essential to the reproductive choice and not a mere preference that is not itself determinative of whether a choice to reproduce or not would otherwise occur. For further discussion of this methodology, see Robertson, *supra* note 39, at 429-32.

⁴⁴ *Id.* at 432-40.

⁴⁵ Although reproduction is often sought for the experience of rearing, it is not essential in all cases that rearing also be sought or occur. The liberty-right not to reproduce protects the right not to have children and the rearing duties which they ordinarily entail.

⁴⁶ Karen Lebacqz confuses my support for community conceptions of the importance of having offspring as support for communitarian views of the acceptability of means to achieve that goal. Nor, as she asserts, are community conceptions of when a reproductive activity reasonably advances or ill-serves those goals “symbolic.” See Karen Lebacqz, *Choosing Our Children: The Uneasy Alliance of Law and Ethics in John Robertson’s Thought*, in PRINCETON FORUM ON BIOETHICS (2003) (on file with AM. J.L. & MED.).

⁴⁷ See discussion *infra* notes 149-52 and accompanying text, notes 189-95 and accompanying text, and Appendix.

Answering the question of what procreative liberty includes requires us to determine how centrally implicated are the underlying reasons for valuing reproductive choice with the technology under discussion. Rather than adopt *strict traditionalism* that rejects almost all selection technologies or *radical libertarianism* that rejects none, I adopt a *modern traditionalist* approach, which looks closely at the reasons why choice about reproduction is so important for individuals. The more closely an application of genetic or reproductive technology serves the basic reproductive project of haploid gene transmission—or its avoidance—and the rearing experiences that usually follow, the more likely it is to fall within a coherent conception of procreative liberty deserving of special protection. At a certain point, however, answers to questions about the scope or outer limits of procreative liberty will depend upon socially constitutive choices of whether rerogenetic procedures are viewed as plausible ways to help individuals and couples transmit genes to and rear a new generation.

A. WHY PROCREATIVE LIBERTY IS VALUED

Why should procreative liberty have moral or legal rights status? The answer might be so obvious that one wonders why the question is even asked. But asking the question will help us understand the interests and values that undergird the scope of procreative liberty and, by implication, help resolve conflicts that arise from its exercise. Quite simply, reproduction is an experience full of meaning and importance for the identity of an individual and her physical and social flourishing because it produces a new individual from her haploid chromosomes.⁴⁸ If undesired, reproduction imposes great physical burdens on women, and social and psychological burdens on both men and women. If desired and frustrated, one loses the “defence ‘gainst Time’s scythe” that “increase” or replication of one’s haploid genome provides, as well as the physical and social experiences of gestation, childrearing, and parenting of one’s offspring.⁴⁹ Those activities are highly valued because of their connection with reproduction and its role in human flourishing.

Good health in offspring is also greatly prized. Past cultures have sometimes exposed weaker or handicapped newborns to the elements, thus concentrating resources on those who are healthy. We serve some of the same interests by a strong commitment to the health of all children, such as elaborate neonatal intensive care units that go to great expense to save all newborns, and norms for treating all newborns no matter the cost or scope of their handicaps.⁵⁰ Even though parental behavior, and social and legal norms are strongly committed to the well-being of children once they are born, parents strongly prefer having healthy offspring and may use mate or gamete selection, and screening of fetuses and embryos to serve that goal.

It is not surprising that an interlocking set of laws, norms, and practices exist that support reproduction. Deeply engrained social attitudes and practices celebrate

⁴⁸ In sexual reproduction, each procreator contributes a haploid chromosome that combine in humans to form 46 chromosomes.

⁴⁹ William Shakespeare, *Sonnet 12*, in THE OXFORD SHAKESPEARE: THE COMPLETE WORKS OF WILLIAM SHAKESPEARE (W.J. Craig ed., 1922).

⁵⁰ For example, see the controversy that erupted around the issuance of “Baby Doe Rules” that aimed to protect all newborns regardless of their handicaps. *Bowen v. Am. Hosp. Ass’n*, 476 U.S. 610 (1986); Frank I. Clark, *Withdrawal of Life-Support in the Newborn: Whose Baby Is It?*, 23 SW. U. L. REV. 1 (1993); Nancy Rhoden, *Treatment Dilemmas for Imperiled Newborns: Why Quality of Life Counts*, 58 S. CAL. L. REV. 1283 (1985).

the importance of family and children. Laws, ethical norms, and institutions protect and support human desires to have or avoid having offspring, and the rearing that follows. The deep psychological commitment one has to the well-being of one's offspring is reflected in the strong family and constitutional law protections for rearing rights and duties in biologic offspring, in special tort damages for loss of children and parents, in the law of rape, in the rise of an infertility industry, and in the wide acceptance of prenatal screening programs for the health of offspring. Many other social institutions and practices also support individual and social interests in producing healthy offspring who are fit to reproduce in turn. Strong protection of procreative liberty and family autonomy in rearing offspring is yet another way that social recognition of the importance of reproduction is shown.

Although the importance of reproduction for individuals and society is intuitively accepted, the search for a deeper or more ultimate explanation of its importance might turn to evolutionary biology and psychology. A biologic perspective on human behavior suggests that reproductive success is as important an issue for humans as it is for other organisms. Whether gene, organism, group, or species is the unit of selection, natural selection selects those entities that are best suited to reproduce in the environments in which they exist. Although genes encoding sexuality and sexual attractiveness have not yet been identified, it is likely that many aspects of sexual reproduction reflect physical and perhaps even behavioral tendencies for reproductive success selected at earlier stages of human development.⁵¹

Given the importance of culture and environment in shaping human behavior, one should be leery of attempting to explain all aspects of human reproductive decisions in evolutionary terms. Yet there are enough similarities between the reproductive challenges that humans and other organisms face to make further inquiry into the biologic basis of human reproduction worthwhile. Humans, like other sexually reproducing organisms, face specific challenges that differ for each sex.⁵² Typically, each sex faces the challenge of finding healthy members of the opposite sex with whom to mate and produce progeny. Because females typically have larger and fewer gametes that require internal fertilization, they use different strategies than males for identifying good mates and controlling their reproductive capacity.⁵³ In either case, some selection of the gametes or reproductive partners may be necessary to maximize the chance of successful reproduction.⁵⁴ Similarly, each sex must solve the problem of adequate nurture and protection of offspring, so that they may reproduce in turn.

As a result, it should be no surprise that many human reproductive choices and practices reflect efforts to have healthy offspring to carry genes into future generations.⁵⁵ An evolutionary perspective on reproduction cannot itself define the limits or scope of procreative liberty. As the naturalistic fallacy teaches, no "ought"

⁵¹ RICHARD DAWKINS, *THE SELFISH GENE* (1976); GEORGE C. WILLIAMS, *ADAPTATION AND NATURAL SELECTION: A CRITIQUE OF SOME CURRENT EVOLUTIONARY THOUGHT* (1966).

⁵² JOHN TYLER BONNER, *THE EVOLUTION OF CULTURE IN ANIMALS* 77-92 (1980).

⁵³ MARLENE ZUK, *SEXUAL SELECTIONS: WHAT WE CAN AND CAN'T LEARN ABOUT SEX FROM ANIMALS* (2002). Hence the importance of abortion and contraceptive rights for women, who face much greater physical burdens than men in reproduction. See SARAH BLAFFER HRDY, *MOTHER NATURE: MATERNAL INSTINCTS AND HOW THEY SHAPE THE HUMAN SPECIES* (2000).

⁵⁴ See Robert L. Trivers, *Parental Investment and Sexual Selection*, in *SEXUAL SELECTION AND THE DESCENT OF MAN* (Bernard G. Campbell ed., 1972); ZUK, *supra* note 53.

⁵⁵ Larry Arnhart, *Human Nature is Here to Stay*, *NEW ATLANTIS* (Summer 2003), available at <http://www.thenewatlantis.com/archive/2/arnhart.htm>.

follows logically or inexorably from any “is” about the world. But a biologic perspective helps explain why reproductive urges are so powerful and widely respected, and why so many secondary norms, practices, and institutions have grown up around them.

Ultimately, decisions about how to use or not use genomics in human reproduction will be determined, not by biologic necessity or evolutionary theory, but by how those uses fit into the fabric of rights and interests of individual and social choice and responsibility that particular societies recognize. Still, understanding how assisted reproductive and genetic technologies serve issues of reproductive fitness is relevant to the ethical, legal, and social debates that surround use of those techniques. The biological concept of reproductive fitness can help at an ultimate level explain what is intuitively felt and culturally protected, even though more proximate analyses are needed to resolve the ethical, legal, and social conflicts that use of reproductive technologies may pose. At the very least, an evolutionary perspective, if not directly supportive, makes comprehensible the *modern traditionalist* intuition that procreative liberty deserves respect because of the individual importance of having and rearing offspring in order to transmit genes to the next and later generations.

B. IS PROCREATIVE LIBERTY CONSTITUTIONALLY PROTECTED?

Given the immense importance of reproduction to individuals and societies, it is not surprising that many cultures have elaborate rule systems for how and when reproduction should occur, and who may reproduce with whom. It is unclear whether those rules serve the reproductive fitness of a particular culture or group, as can be shown for the division of reproductive roles that exist in ant or bee colonies, or whether they simply serve the interests of those who have gained power and wish to preserve it.

In any event, in recent years much social and political conflict has arisen over reproductive behavior. In the United States, much of that conflict has focused on the freedom of women to avoid reproduction through contraception and abortion.⁵⁶ As technologies for contraception and abortion have improved, steady progress in expanding a woman’s right to methods of avoiding reproduction has occurred both in the United States and in Europe.⁵⁷

Recognition in the United States of a woman’s right to avoid reproduction through contraception and abortion has occurred mainly through constitutional decisions by the U.S. Supreme Court. In a series of celebrated but still contested cases, starting with *Griswold v. Connecticut* (1965),⁵⁸ continuing through *Eisenstadt v. Baird* (1972)⁵⁹ and *Roe v. Wade* (1973),⁶⁰ and then in *Casey v. Planned Parenthood* (1992),⁶¹ the Court established a Fourteenth Amendment fundamental liberty-right to avoid conception when having sex, and if pregnancy has occurred, the right to terminate the pregnancy up until viability.

⁵⁶ See Bradley E. Cunningham, *Implications of FDA Approval of RU-486: Regulating Mifepristone Within the Bonds of the Constitution*, 90 KY. L.J. 229, 238-39 (2001-2002) (discussing the historical debate in the United States over contraception and abortion).

⁵⁷ See Stephanie B. Goldberg, *The Second Woman Justice: Ruth Bader Ginsburg Talks Candidly About a Changing Society*, 79 A.B.A. J. 40, 40, 42 (1993).

⁵⁸ 381 U.S. 479 (1965).

⁵⁹ 405 U.S. 438 (1972).

⁶⁰ 410 U.S. 113 (1973).

⁶¹ 505 U.S. 833 (1992).

The liberty interest in engaging in reproduction has received much less attention, no doubt due in part to the infrequent attempts by the state to limit coital reproduction. Although fornication and adultery laws existed in many states,⁶² one of their main purposes was to keep reproduction within marriage.⁶³ In most cases, they have been repealed or are simply not enforced.⁶⁴ Within marriage, there have been few attempts to limit coital conception and reproduction. In *Buck v. Bell* (1927), the Supreme Court upheld a state law mandating sterilization of a mental defective, thus validating the eugenic sterilization laws then on the books in many states.⁶⁵ But in *Skinner v. Oklahoma* (1943), the Court recognized reproduction as one of the basic civil rights of man, which could not be removed by sterilization, at least if not done equally.⁶⁶ Although federal Courts of Appeals have upheld bans on reproduction by prisoners, many Supreme Court cases have discussed the fundamental right to marry and raise a family, which assumes that conceiving and having a child is a protected right.⁶⁷ Indeed, in *Bragdon v. Abbott*, the Court found that reproduction is “a major life activity” in holding that a person with HIV who was not able to reproduce without risking an infected child fell within the protection of the Americans with Disabilities Act.⁶⁸

Neither the Supreme Court nor lower courts, however, have provided guidance on how far the explicit protection of decisions to avoid reproduction and the implicit protection of decisions to engage in coital reproduction takes us in resolving conflicts over assisted reproductive and genetic technologies. One could reasonably view the Court’s decisions as having established a broad principle of negative reproductive freedom, both to avoid reproduction and to engage in it without state interference, at least until those who would restrict that freedom have shown that important interests would be harmed by the choice in question.

If so, use of a wide range of assisted reproductive and genetic technologies would fall within an individual’s discretion. A person would then have a presumptive right not to transfer embryos or gametes, to selectively abort, and to abort to get tissue for transplant, as well as to have carrier, embryo, and fetal genetic screening to decide whether to conceive, transfer embryos, or continue a pregnancy. The use of noncoital means of conception, such as artificial insemination and *in vitro* fertilization (“IVF”), might also be protected, as would egg donation and gestational

⁶² See Richard Green, *Griswold’s Legacy: Fornication and Adultery as Crimes*, 16 OHIO N.U. L. REV. 545 (1989).

⁶³ See *People v. Bright*, 238 P. 71, 73 (Colo. 1925); Robert A. Brazener, Annotation, *Validity of Statute Making Adultery and Fornication Criminal Offenses*, 41 A.L.R. 3d 1338 (1972); Martin J. Siegel, *For Better or for Worse: Adultery, Crime & the Constitution*, 30 J. FAM. L. 45 (1991/1992).

⁶⁴ *Lawrence v. Texas*, 123 S. Ct. 2472, 2483 (2003).

⁶⁵ 274 U.S. 200 (1927). *Buck v. Bell* has never been overruled.

⁶⁶ 316 U.S. 535, 541 (1942). Technically, the Court found an equal protection violation in the categories drawn by the state to require sterilization of some property offenders but not others, thus leaving open the possibility that sterilizing all property offenders would be acceptable. Given that *Skinner* is now cited for its dicta about the right to procreate as a “basic civil right of man,” requiring sterilization of convicted offenders under any circumstances is not likely to be upheld.

⁶⁷ ROBERTSON, *supra* note 27, at 35-38. See *Gerber v. Hickman*, 291 F.3d 617 (9th Cir. 2002) (en banc) (holding that prison inmate has no right to provide sperm to his wife for artificial insemination outside the prison). See also *Goodwin v. Turner*, 908 F.2d 1395 (8th Cir. 1990).

⁶⁸ 524 U.S. 624 (1998). Although not a constitutional decision, *Bragdon* recognizes that the ability to have healthy offspring is a major life activity, the loss of which constitutes a disability within the meaning of the Americans with Disabilities Act.

surrogacy.⁶⁹ One could even argue for a right to engage in reproductive or therapeutic cloning, or the right to alter the genes of prospective children, with all the issues of enhancement and engineering which that raises. Whether all those actions would fall under the rubric of constitutionally protected procreative liberty, however, would depend upon whether they were centrally or intimately connected with reproductive decision-making. If so, those choices would be presumptively protected under the principles that underlay the Court's decisions and dicta to date, and be subject to limitation only if their use posed great harm to others.

It would be naive, however, to expect the current Supreme Court to accept the full implications of the principles of procreative freedom that are embedded in the Court's reproductive liberty cases. Although past cases and dicta might plausibly be read to adopt a broad principle of procreative freedom in both its aspects, one suspects that the Court would be quite hesitant to do so. The originalist bias of the Court, and its reluctance to find new fundamental rights make it unlikely that five justices would find most specific uses of assisted reproduction or genetics constitutionally protected, even if direct connection with more general principles of reproductive choice could be shown.⁷⁰

The 2003 decision in *Lawrence v. Texas*, striking down laws against sodomy because of their impact on the intimate personal choices of homosexuals, suggests that the Supreme Court might recognize some rights to use technological assistance and genetics in reproduction.⁷¹ Indeed, the *Lawrence* majority drew on the importance of reproductive rights as the basis for finding an unenumerated right to homosexual sex. It would be surprising if cases directly raising questions of technological choice in reproduction did not receive some protection as well.

After all, the justices do agree that Fifth and Fourteenth Amendment liberties include the right to marry and presumably to have biologic offspring.⁷² If unenumerated basic rights are protected, marriage and reproduction are strong contenders for protection. But coital reproduction often is not possible, and the technical means to overcome coital infertility and genetic disease are available. Given these connections, it would be surprising if the Court did not grant protection to some reproductive and genetic technologies if cases involving them arose.⁷³

⁶⁹ A closer analysis of each reproductive variation will be necessary to determine whether it falls within a constitutionally protected right to procreate. Strictly speaking, the gametically infertile person who consents to gamete donation to his or her spouse is not reproducing, though their spouse is reproducing, as is the donor. By contrast, in gestational surrogacy the couple who has provided the gametes for embryos would be reproducing, but the gestating woman who has provided no genetic contribution will not be. If the surrogate provides the egg as well, she also would be reproducing, but the wife of the engaging couple will not.

⁷⁰ For the reluctance of many justices to find new specific rights from general principles of liberty, see *Bowers v. Hardwick*, 478 U.S. 186 (1986), in which Justice White wrote for the majority that a claim that the right to engage in sodomy was "'deeply rooted in this Nation's history and tradition' or 'implicit in the concept of ordered liberty' is, at best, facetious." Justice Blackmun, in dissent, argued that past cases stood for a larger principle—the right of personal intimacy, which would include autonomy in sexual matters. For further discussion of tradition and the level of generality of substantive due process rights, see the dueling opinions of Justices Scalia and Brennan in *Michael H. v. Gerald D.*, 491 U.S. 110 (1989), and Laurence Tribe & Michael Dorf, *Levels of Generality in the Definition of Rights*, 57 U. CHI. L. REV. 1057 (1990).

⁷¹ 123 S.Ct. 2472, 2481-83 (2003).

⁷² E.g., *Loving v. Virginia*, 388 U.S. 1 (1967); *Turner v. Safley*, 482 U.S. 78 (1987).

⁷³ Such a case might arise if a state banned IVF treatment of infertility, artificial insemination, egg donation, or gestational surrogacy. See John A. Robertson, *Embryos, Families, and Procreative Liberty: The Legal Structure of the New Reproduction*, 59 S. CAL. L. REV. 939, 959-61 (1986). A plausible argument for extending constitutional protection to reproductive cloning for gametic

Whether such protection would extend to most non-coital or genetic selection techniques must await further scientific development and social and legal engagement with those issues.

But one need not wait for Supreme Court guidance to determine genetic and reproductive policy or practice. Indeed, Court decisions holding that novel reproductive and genetic technologies are or are not constitutionally protected would designate whether individuals or the state had final say over whether particular uses can occur, and not provide a definitive assessment of their ethical acceptability for individuals and providers. Rather than count on the Supreme Court to provide answers, policymakers and providers should ask whether use of a technique is centrally connected with reproductive choice, and whether its use is likely to cause harm to others, even if it does not fit within the Supreme Court's willingness to define fundamental rights. Those inquiries would then turn on how closely related the activity in question is to prevailing understandings about why reproduction is valued, and whether a contested use reasonably serves that interest without causing undue harm. The less connected a use is to those values, the less likely it is to be respected.

IV. PROCREATIVE LIBERTY AND GENETIC APPLICATIONS

The above discussion analyzes procreative liberty as the freedom to engage in or avoid reproduction because of the great importance to individuals of having (or avoiding) offspring. It has argued for a *modern traditionalist* approach to these issues, rather than *strict traditionalism* or *radical liberty*, and will apply that view to the discussion of particular technologies that follows. Disagreements will arise, of course, as to whether an action is tied closely enough to reproduction to deserve the presumptive protection accorded to procreative liberty. Even if it is, there may also be debate about whether the exercise of procreative choice poses such a risk of harm to the tangible or legitimate interests of others that it can justly be limited or morally condemned in the context at issue.

To assess the role of procreative liberty in the era of genomics, I address four uses of genetic knowledge to choose the genes or genome of offspring. The first two techniques—(1) screening of prospective offspring for susceptibility or late-onset medical conditions and (2) screening for gender and other non-medical characteristics—involve selecting or choosing certain aspects of the genetic makeup of offspring by exclusionary or negative means. The last two techniques—(3) reproductive cloning and (4) positive genetic alteration of offspring genomes—involve positive selection or alteration of genes of offspring.⁷⁴

As noted earlier, the *radical liberty* view would find all of these uses within an individual's freedom. A *strict traditionalist*, on the other hand, would be against most, if not all, of them. The reality, however, of how individuals are likely to use these techniques is much more complicated and contextually based than either pole recognizes. A better approach—the *modern traditionalist* view—is to evaluate each

infertility can also be articulated. See John A. Robertson, *Liberty, Identity, and Human Cloning*, 76 TEX. L. REV. 1371, 1387-1403 (1998) [hereinafter Robertson, *Liberty, Identity, and Human Cloning*].

⁷⁴ Other applications of current interest and debate, such as using reproductive technology to expand reproductive age, to enable reproduction to occur after death, or to obtain cells or tissue for research or therapy, are not discussed here because they are less directly implicated in choices about offspring genes.

set of uses in terms of how it serves basic reproductive interests and whether it harms others, as the following analysis will show.

A. MEDICAL SCREENING OF PROSPECTIVE OFFSPRING

Most uses of genomic knowledge in reproduction will involve preconception, preimplantation, or prenatal screening to prevent the birth of offspring with genetic disease or predisposition to disease. Screening for genetic disease is now standard practice for couples with a family history of that disease or when population screening is justified. The main controversies concern extension of screening to other Mendelian diseases,⁷⁵ and to late-onset and susceptibility conditions.

It is now routine to screen populations or persons with family histories for a variety of autosomal diseases, such as cystic fibrosis, sickle cell anemia, and Tay Sachs.⁷⁶ Carriers of autosomal mutations may also learn whether their reproductive partners are also carriers. If so, they can take the one in four chance that their child will have the disease, adopt, go childless, use donor gametes, or conceive and screen at the embryonic or fetal stage, and then decide not to start or not to continue a pregnancy.⁷⁷ Embryo or prenatal screening might also occur for dominant or X-linked diseases, such as Huntington's disease, hemophilia, or Duchenne's muscular dystrophy.⁷⁸

Growing knowledge of the human genome will increase carrier and prenatal screening by increasing the number of indications for screening. As more genetic mutations for susceptibility to diseases are identified, such as mutations in the P53 tumor suppressor gene or the BRCA1&2 genes, carrier or prenatal screening could extend to them.⁷⁹ Screening might also occur for late-onset conditions, such as early onset Alzheimer's disease or Huntington's disease.⁸⁰ Pre-birth or carrier screening, however, is not presently available for complex polygenic disorders which affect millions of persons, such as diabetes, heart disease, stroke, and autoimmune disorders, though screening may become available at some future time.⁸¹

Parental interest in screening prospective offspring for disease-causing or susceptibility genes is likely to continue and grow as more genes are discovered, and the ease of sampling DNA from embryos and fetuses improves. Such information may often be material or determinative of parental choice whether or not to reproduce. Knowledge of positive status for a disease-causing mutation often results in excruciating dilemmas about whether to proceed with reproduction.⁸² While some persons are content to accept whatever "nature" or God provides, others would

⁷⁵ Mendelian diseases are "the result of a single mutant gene that has a large effect on phenotype and that are inherited in simple patterns similar to or identical with those described by Mendel for certain discrete characteristics in garden peas." THOMAS D. GELEHRTER ET AL., PRINCIPLES OF MEDICAL GENETICS 4 (2d ed. 1998).

⁷⁶ Robertson, *Liberty, Identity, and Human Cloning*, *supra* note 73, at 1407.

⁷⁷ See Lois J. Elsas, II, *Medical Genetics: Present and Future Benefits*, 49 EMORY L.J. 801, 814-15 (2000).

⁷⁸ Lori B. Andrews, *Prenatal Screening and the Culture of Motherhood*, 47 HASTINGS L.J. 967, 969-72 (1996).

⁷⁹ See Frederick P. Li et al., *Recommendations on Predictive Testing for Germ Line p53 Mutations Among Cancer-Prone Individuals*, 84 J. NAT'L CANCER INST. 1156 (1992), available at <http://www.nci.nih.gov/cancerinfo/genetics/predictive-testing-p53-mutations>.

⁸⁰ Robertson, *supra* note 39, at 433.

⁸¹ Wayne W. Grody, *Molecular Genetic Risk Screening*, 54 ANN. REV. MED. 473, 486 (2003).

⁸² There is an extensive literature on this topic. For a recent popular presentation, see Bill Keller, *Charlie's Ghost: Perfect Babies and Imperfect Choices*, N.Y. TIMES, June 29, 2002, at A15.

neither want to have a child if it will have a serious disease, nor would they want to take the risk that the disease might be expressed more mildly. Still others would prefer not to have a child if it will have early onset of a neurodegenerative disease such as Alzheimer's or Huntington's, or if it will face a life of monitoring, worry, or preventive surgery or medications, such as people with BRCA1&2 mutations face.⁸³

In expressing such choices, prospective parents may say that they are concerned about the best interest of their children (though healthy children would be different children). But the choice is also understandable in terms of the burdens and concerns they would experience, such as increased child care and child rearing costs, more worry, etc. In evolutionary biology terms, they do not want to invest in offspring who themselves will have little chance of successfully reproducing or who will detract them from serving the needs of other healthy offspring.⁸⁴

Because wanting information about the genetic makeup of prospective offspring and then acting on it fits squarely within conventional understandings of procreative liberty, the relevant legal and policy question is whether acquiring and acting on such knowledge causes harms that would justify not allowing persons to do so. Carrier screening prior to conception would seem to pose the fewest risks of harm. When carriers or others then request that embryos or fetuses be screened and then excluded from transfer or birth, however, four concerns arise: the impact on prenatal life, the impact on those who are disabled and dispreferred, the impact on resulting children, and the promotion of private eugenics. In addition, there may be objections based on the fact of selection itself. A brief discussion will show that none of those concerns is sufficient to limit use of genetic screening technology for disease or susceptibility conditions.

Impact on Prenatal Life. Concerns with impact on prenatal life largely track positions on abortion and the status of the fertilized egg and embryo. Persons who believe that fertilized eggs, embryos, and fetuses are already persons or entities with interests would argue that screening and exclusion on the basis of genes is the equivalent of eugenic murder and may support public policies banning or discouraging it. On the other hand, persons who believe that fertilized eggs, embryos, and fetuses are themselves too rudimentary in development to have rights or interests and thus are not themselves the subject of moral duties would have no principled objection to such practices based on the moral status of embryos and fetuses.

At the same time, however, they might argue that although lacking rights or inherent moral status, embryos and fetuses are not like any other human tissue and deserve special respect, e.g., one must have good reasons for manipulating and destroying them. Although they might not support public policies blocking such actions, they might be reluctant to terminate a pregnancy because of a susceptibility gene alone, though they would be willing to do so for a more serious genetic disease, such as Tay Sachs or sickle cell anemia.⁸⁵ Screening embryos prior to transfer to the uterus, however, is more acceptable because the embryo is still a clump of undifferentiated cells outside the body, and no abortion is necessary.

Impact on Disabled and Dispreferred. Some persons have argued against current and expanded use of genetic screening of the health of prospective offspring

⁸³ Robertson, *supra* note 39, at 432-33.

⁸⁴ However, once such children are born, evolutionary or culturally instilled notions of doing everything possible for one's children kick-in, despite the drain on private or public resources.

⁸⁵ See Robertson, *supra* note 39, at 444-46.

on the grounds that it sends a message to persons with those conditions or disabilities that their lives are not valued or that it would be preferable that they had not been born.⁸⁶ But preferring children without serious medical conditions does not itself mean that existing persons with those conditions do not have worthwhile lives, nor that their interests and needs should not be respected; nor does allowing private individuals that choice constitute such state involvement that it gives the appearance of the state encouraging or requiring that people take steps to avoid such births.⁸⁷ Society can demonstrate respect and concern for persons with congenital disabilities, for example, by protecting them against discrimination in public accommodations and the workplace without also depriving other persons of the means to avoid having children with those conditions.

Impact on Offspring. Expanded genetic screening of prospective offspring will also not harm the offspring. The purpose is to help the parents have a child whose genes do not condemn him to a “nasty, brutish, and short” life.⁸⁸ Desiring a healthy child, or protections against well-known genetic diseases or susceptibility conditions, would not seem to implicate concerns about “designer children,” or commodifying or treating children as objects to please the parental fancy—charges more plausibly leveled at cloning or positive actions to rewrite the child’s genetic code in order to enhance or diminish its characteristics. But as we shall see, even there, the question of harm to offspring is controversial, because in most instances the child would not have been born if the technique in question had not been used.⁸⁹

Private Eugenics. The history of “eugenics” in the United States is so freighted with abuse and misuse that the charge that a scheme or practice is “eugenic” carries great negative weight. But the abuses of the eugenic era at the beginning of the twentieth century came largely from efforts of state-imposed sterilization to prevent people with “bad genes” from reproduction that consumed societal resources and polluted the gene pool.

The resulting involuntary sterilization of 60,000 persons is now uniformly regarded as an unjustified abuse of reproductive rights that could not be supported either by genetic science or by the social costs that reproduction by “mental defectives” was thought to cause. Private use of genetic screening techniques to ensure a healthy child has none of the abusive features of the earlier eugenic era. It is voluntarily chosen, aims at individual and family rather than social well-being, and leaves persons free to choose to screen or not screen as they choose. The mere fact that many people may choose to screen, resulting in many fewer births of children with genetic handicaps, is not itself evil or undesirable.⁹⁰

⁸⁶ Martha A. Field, *Killing “The Handicapped”—Before and After Birth*, 16 HARV. WOMEN’S L.J. 79, 123-24 (1993); Erik Parens & Adrienne Asch, *The Disabilities Rights Critique of Prenatal Genetic Testing: Reflections and Recommendations*, 29 HASTINGS CENTER REP. S1 (1999).

⁸⁷ Field, *supra* note 86, at 123. Whether insurance companies should be free to require parents to avoid such births or pay higher premiums is another matter.

⁸⁸ See THOMAS HOBBS, *LEVIATHAN* 89 (Richard Tuck ed., 1991). See also Robertson, *supra* note 39, at 471 (“The purpose of genetic screening is to identify at-risk couples so that they may either avoid reproduction or have offspring only after they have screened embryos and pregnancies to prevent the birth of children with disabilities.”).

⁸⁹ See discussion *infra* Appendix.

⁹⁰ A Canadian study showed that increases in prenatal diagnosis and pregnancy termination for congenital anomalies are related to decreases in overall infant mortality. Shiliang Liu et al., *Relationship of Prenatal Diagnosis and Pregnancy Termination to Overall Infant Mortality in Canada*, 287 JAMA 1561 (2002). A charge of eugenics would carry more weight if there were legal duties to be tested and then to exclude embryos and fetuses when tests were positive. A person’s right to reproduce and right to bodily integrity would protect against requiring persons to use genetic tests

Selection Itself. The *modern traditionalist* view applied here assumes that there is nothing inherently wrong with selection of offspring characteristics if the purpose is otherwise justified. Having healthy offspring, who are themselves reproductively fit and happy, is so central to the values of the human reproductive enterprise that choices over whether to reproduce should fall within a person's or couple's freedom.

The *strict traditionalist* view, however, apparently would condemn selection for any purpose, including health, as violating the moral duty to accept unconditionally whatever child the "gift" of reproduction brings. Such a view makes any preconception or prenatal form of selection morally unacceptable (and presumably to be banned), because it involves choosing, controlling, selecting, or designing that child. Yet humans have often selected mates to ensure good health or family connections, and have strong desires to have healthy progeny who will in turn reproduce. Traditional indicia of sexual attractiveness, such as beauty and symmetry, appear to be indicators of genetic health, just as mate selection in the animal world has often depended on external traits, such as the size of the peacock's tail or the loudness or pitch of the frog's mating call, that serve as surrogates for good health and reproductive fitness.⁹¹

Moving selection to the gamete or embryo stage to identify for transfer to the uterus those embryos that are likely to be healthy and reproductively fit performs a related function. The proximate interest of the parent is to have healthy children for both the child's and the parents' sake. Ultimately, however the cause or explanation may be explained by natural selection working witlessly to enable some genes to survive longer than others. An evolutionary explanation does not in itself justify or condemn any particular practice. It provides, however, a further dimension for understanding why using gamete and embryo selection technologies to ensure healthy offspring might be of great importance to individuals.

If screening and selection techniques are accepted as serving important reproductive interests, the question then would be whether selection causes unacceptable harm. Creating and destroying embryos or fetuses on genetic grounds would not, in a world in which those entities lack interests or rights, count as serious harm. Nor does it appear likely that parental efforts to have children free of disease would pose special problems for them or for respect for human dignity more generally. Indeed, the opposite claim—that parents have a moral obligation to take such steps—is likely to be more strongly urged.⁹²

Although the *strict traditionalist's* objection to selection often appears to be purely deontological, it also has a consequentialist aspect. *Strict traditionalists* assert that acceptance of any selection, particularly non-medical selection, will open the door to cloning or other forms of alteration. Their assumption appears to be that if any selection is permitted, then all must be as well. But this is a non sequitur. Rejection of *strict traditionalism* does not mean that *radical liberty* holds sway. Permitting one form of selection does not mean that all forms or situations of

or otherwise avoid the birth of children with genetic disease or anomalies. See Field, *supra* note 86, at 123-24.

⁹¹ "It's all about signaling, of course—the antic/Blue of the booby's feet; the lacewing's knock;/Deep in the reeds, the lowdown bullfrog's steady/*Present, present*, even at the risk that the call/Will materialize not a mate but an owl;/The coded fireflies' cool-burning *Ready, ready*;/The trailing plumes of the angelfish and the peacock. . . ." BRAD LEITHAUSER, *DARLINGTON'S FALL: A NOVEL IN VERSE* 85 (2002).

⁹² See ALLEN BUCHANAN ET AL., *FROM CHANCE TO CHOICE: GENETICS AND JUSTICE* 222-57 (2000); Carl H. Coleman, *Conceiving Harm: Disability Discrimination in Assisted Reproductive Technologies*, 50 *UCLA L. REV.* 17 (2002).

selection must also be permitted. As discussed below, a *modern traditionalist* would have great difficulty including in procreative liberty the right to clone when one is fertile or to enhance or diminish genetically abilities of otherwise healthy offspring.⁹³ Speculation about such future effects should not stop the use of otherwise acceptable technologies now.⁹⁴

In Sum. The earlier the screening occurs and the less intrusive it is, the more likely is it that prospective parents will seek it to ensure that they have healthy offspring who will live satisfying lives and be able to produce and care for offspring themselves. Given the closeness of those desires with conventional (and evolutionary) understandings of why reproduction is important and the lack of direct harm to important interests of others, it would be surprising if law and social policy did not permit a wide range of such practices. In societies that do not accord inherent moral or legal status to embryos or pre-viable fetuses, legal prohibitions on genetic screening of the health of prospective offspring would appear to be an unjustified violation of an individual's procreative liberty.

B. NON-MEDICAL SELECTION: GENDER, PERFECT PITCH, AND SEXUAL ORIENTATION

A much harder set of questions arises with non-medical selection, such as for gender, sexual orientation, hearing, perfect pitch, hair or eye color, intelligence, size, strength, memory, beauty, or other traits, which parents might find desirable. The *strict traditionalist* position would strongly object to any non-medical selection of future children, particularly by screening that causes the death of embryos or fetuses. It views any selection as morally wrong because selection makes the child into a product or object, denying its status as a gift and weakening the attitude of unconditional acceptance that *strict traditionalists*, such as Kass, view as comprising the essence of human reproductive dignity.

The *modern traditionalist*, however, is not prepared to exclude non-medical uses without further inquiry into whether they serve important reproductive or other familial interests. Rather than being shocked at the prospect of non-medical selection, the *modern traditionalist* embraces the possibilities that technology offers if they can be shown to help reproduction occur without undue harm. In reality, technology offers few options here, certainly not enough to justify the enormous heat that contemplating those possibilities generates. But debate about highly speculative kinds of non-medical selection drive much of current policy and ethical concern and thus deserve discussion here.

Among non-medical traits, only selection of gender, which is detectable by looking at the embryo's chromosomes without further analysis of DNA, is now possible. The genes for many "desirable" traits are unknown and are likely to remain unknown for the foreseeable future. Few of those characteristics appear to be inherited in a Mendelian fashion with detectable mutations that could be

⁹³ See discussion *infra* notes 149-52, 189-95 and accompanying text. In those cases, the reproductive connections are much more attenuated than with selection for health and the risk of untoward social effects is much greater.

⁹⁴ For problems with appeals to slippery slopes or the precautionary principle as reasons for not using new technologies, see ROBERTSON, *supra* note 27, at 163-64, and John Harris & Soren Holm, *Extending Human Lifespan and Precautionary Paradox*, 27 J. MED. & PHIL. 355 (2002).

identified in advance.⁹⁵ Small interactions of many genes appear to be involved, which makes unraveling those connections in the near future highly unlikely. Indeed, for many of those traits, environment may be a more powerful determinant than genes, so that looking for a strong genetic basis for them is bound to fail.⁹⁶ Given the lack of success in deciphering the genetic basis of major diseases such as diabetes, Alzheimer's, stroke, and heart attack, it will be quite some time before the genetic basis of complex behavioral or physical traits will be known.⁹⁷

Despite the speculative nature of most non-medical genetic selection, I will look at non-medical selection for gender, perfect pitch, and sexual orientation to see how they would fare under the *modern traditionalist* approach. The key questions are: Does selection for such traits serve plausible reproductive needs? If so, do they use methods that harm the child, other persons, or society? Similar questions would arise if genetic tests for other traits became available.

In discussing these uses, one must have a realistic assessment of who might request such procedures and why they would if they were available. A couple contemplating reproduction would have to ask whether the benefits of non-medical selection outweigh the costs of making the selection. In most instances, it would be rare that the benefits of non-medical selection would outweigh the costs if screening of fetuses and selective abortion were the only viable selection technique.⁹⁸ Embryo screening for non-medical selection, however, may be more acceptable because of the rudimentary development of the embryo and its location in the laboratory, despite the need to undergo a cycle of IVF. A key question in each case is whether there is enough reproductive or parental benefit to induce couples to undergo IVF and screen embryos to reproduce so that embryo selection can occur. A second question is whether that reproductive interest is substantial enough to justify creating and selecting embryos for transfer. I address non-medical selection for gender, perfect pitch, and sexual orientation.

1. Non-medical Gender Selection

A good test of the analytic methodology proposed here is non-medical selection of the gender of offspring.⁹⁹ The topic is controversial for many reasons, including the sexism that it often reflects or fosters and the attitude toward embryos or fetuses that it might convey.¹⁰⁰ Preconception separation of male and female bearing sperm would be least offensive in terms of technique and more easily accessible, but its efficacy has not yet been established.¹⁰¹ Screening of embryos to determine sex is more accurate than sperm separation, but requires an expensive and intrusive cycle

⁹⁵ See STOCK, *supra* note 5, at 62-63; Jeffrey R. Botkin, *Prenatal Diagnosis and the Selection of Children*, 30 FLA. ST. U. L. REV. 265, 282-83 (2003) (suggesting that complex, polygenic traits are further influenced by other genes, environment, development, and random variations).

⁹⁶ Sandra Blakeslee, *A Pregnant Mother's Diet May Turn the Genes Around*, N.Y. TIMES, Oct. 7, 2003, at D1 (reporting that diet affects the genes in mice that determine coat color).

⁹⁷ Investment in research to uncover genes for non-medical traits is unlikely to be forthcoming from public sources because of the lack of medical payoff. Private investors may or may not support such research.

⁹⁸ However, such decisions are often made; sex selection abortions in India are an example.

⁹⁹ Nearly all commentators agree that selection against males carrying an X-linked disease is ethically justified even if only 50% of the males will be affected.

¹⁰⁰ It is noteworthy that the American Civil Liberties Union, in challenging the Pennsylvania abortion law at issue in *Casey* did not challenge the State's ban on sex selection abortions, although that provision would, under the premises of *Roe* and *Casey*, also likely be found unconstitutional.

¹⁰¹ John A. Robertson, *Preconception Gender Selection*, 1 AM. J. BIOETHICS 2 (2001).

of IVF and the willingness to discard embryos. To assess the ethical, legal, and social issues presented by non-medical gender selection, I will focus on sex selection by preimplantation genetic diagnosis (“PGD”).¹⁰²

Requests for PGD for non-medical gender selection have come from two different groups. One is from persons who wish to select the sex of their first-born child (and possibly other children of the same sex). In almost all cases, the preference here is for a male child due to cultural mores that value males more than females, and that assign performance of cultural rituals to males, or from rank sexism.¹⁰³ The second group is persons who already have a child of one gender and wish to have a child of the opposite gender. In many cases, the requests are made after a family has had two or more children of the same gender, with no greater preference for males than for females.¹⁰⁴

A major concern with any form of sex selection is the effect it will have on women, since sex selection practices are likely to strongly favor males.¹⁰⁵ If carried out on a large scale, it could lead to great disparities in the sex ratio of the population. As a result of easy access to sonograms to visualize the fetus and the pressures of a one child per family norm, some parts of rural China have seen 144 boys have been born for every 100 girls, which is far beyond the norm of 106:100 males to females.¹⁰⁶ Because costs and technical requirements will limit access to PGD, its use is only marginally likely to contribute to those disparities, at least by comparison with easier and cheaper methods, such as preconception sperm sorting or more onerous but widely practiced abortion.¹⁰⁷ Its use for first children, however, is likely to reflect culturally founded sexist notions. As middle and upper classes in those cultures grow and have the means to obtain PGD, such demand could increase.

Under the scheme of procreative liberty developed here, bans on gender selection of the first child may not be acceptable, despite the prejudice that they may evince toward women. As the discussion of homosexuality and musical pitch shows, allowing private prejudice is characteristic of individual freedom in the private sphere and may be recognized without causing public discrimination. The state, however, might adopt a policy to balance-off selection of boys and girls. A prohibition on gender selection of the first child would be more tolerable if the parents could choose the gender of the second child.¹⁰⁸

¹⁰² Embryo screening by preimplantation genetic diagnosis (“PGD”) requires a woman to undergo a cycle of ovarian stimulation and retrieval to obtain eggs for *in vitro* fertilization. A cell is removed from a 4-8 cell embryo, and its chromosomes or DNA analyzed. Based on the analysis, the embryo would be transferred to the uterus or discarded. At some point, selection of gametes prior to fertilization could replace the need to screen embryos.

¹⁰³ See Dorothy C. Wertz, *International Perspectives on Ethics and Human Genetics*, 27 SUFFOLK U. L. REV. 1411, 1430-32 (1993).

¹⁰⁴ Ethics Comm. of the Am. Soc’y of Reproductive Med., *Preconception Gender Selection for Nonmedical Reasons*, 75 FERTILITY & STERILITY 861, 862 (2002).

¹⁰⁵ *Id.*

¹⁰⁶ Erik Eckholm, *Desire for Sons Drives Use of Prenatal Scans in China*, N.Y. TIMES, June 21, 2002, at A3. See also Amartrya Sen, *More Than 100 Million Women Are Missing*, N.Y. REV. BOOKS, Dec. 20, 1990, at 61.

¹⁰⁷ Rachel E. Remaley, *The Original Sexist Sin: Regulating Preconception Sex Selection Technology*, 10 HEALTH MATRIX 249, 264 (2000) (finding that PGD costs at least \$12,000 compared to preconception sperm sorting which costs \$2,500).

¹⁰⁸ Depending on the numbers choosing this technique, some sex-ratio disparities could still occur. For example, if couples were content with one child if it were male, they might use PGD for the second child only if the first were a girl. A greater number of males would then result. (I am grateful to Neil Netanel for this point).

The use of PGD or other methods to select the gender of second or subsequent children is much less susceptible to a charge of sexism. Here, a couple seeks variety or “balance” in the gender of offspring, because of the different rearing experiences that come with rearing children of different genders.¹⁰⁹ Biologically based differences between male and female children are now well-recognized. They exhibit different spatial and learning rates and produce different hormones.¹¹⁰ It is not *per se* sexist to wish to have a child or children of either gender, particularly if one has two or more children of the same sex. Although some feminists would argue that any attention to the gender of offspring is inherently sexist, particularly when social attitudes play such an important role in constructing parental and societal sex-role expectations and behaviors, one can recognize difference and celebrate it. U.S. Supreme Court Justice Ruth Bader Ginsburg, a noted feminist lawyer before being appointed to the Court, remarked in an important sex discrimination case that “[i]nherent differences between men and women, we have come to appreciate, remain cause for celebration.”¹¹¹ Desiring the different rearing experiences that one has with boys and girls does not mean that the parents are sexist or likely to devalue one or the other sex.

Because legal bans on gender selection of the second child would rest on even weaker grounds than bans on selection of first children, clinics able to provide safe and effective methods of gender selection will be free to decide which patients they wish to treat. It certainly would be reasonable for a program to bar provision of sex selection for the first child, but provide it for the second. With regard to the first child, one may be promoting or entrenching sexist social mores. A clinic might also take the view that choosing the gender of the first child is not a strong enough reason to meet the special respect owed to embryos. A proponent, however, might argue that couples desiring gender variety in the family are the best judges of the importance of that need. This is particularly true in cultures where having a male heir is highly prized.¹¹² If PGD for the second child is not permitted, pregnancy and abortion, if not infanticide, might occur instead.¹¹³ Other circumstances of gender selection might also arise to meet religious demands or to protect the privacy of a couple seeking a sperm donor, as a recent case in Israel illustrates.¹¹⁴ In western

¹⁰⁹ The choice could also be based on religious beliefs. See ELLIOT N. DORFF, *MATTERS OF LIFE AND DEATH: A JEWISH APPROACH TO MODERN MEDICAL ETHICS* (1998).

¹¹⁰ Robertson, *supra* note 101, at 2-9.

¹¹¹ *United States v. Virginia*, 518 U.S. 515, 533 (1996).

¹¹² Ethics Comm. of the Am. Society of Reproductive Med., *supra* note 104, at 862.

¹¹³ An IVF program in India is now providing PGD to select male offspring as the second child of couples who have already had a daughter. Because of the importance of a male heir in India, those couples might well consider having an abortion if pregnant with a female fetus (even though illegal for that purpose). In that setting, PGD for gender selection for family balancing may well be justified, and be left to the market to provide. See A. Malpani & D. Modi, *Preimplantation Sex Selection for Family Balancing in India*, 17 *HUMAN REPROD.* 11 (2002).

¹¹⁴ An Orthodox Jewish couple with severe male infertility had to resort to a sperm donor but did not want others to know. Because the husband was a Cohen, a male born as a result would not be able to truthfully recite passages at his Bar Mitzvah that only a Cohen could recite. Then, others attending the ceremony would know that the child was not that of the husband. To avoid the unavoidable disclosure of the donor sperm origins of the child that would result, the couple agreed to have a child only if they could be sure that it would be female. Israeli health authorities approved this couple's use of PGD to select female embryos for transfer. Tamara Traubmann & Haim Shadmi, *Couple Allowed to Choose Baby's Gender to Avoid Halakhic Dilemma*, *Haaretz*, Oct. 17, 2002 (on file with author). See also DORFF, *supra* note 109, at 72-79.

societies, providers might be willing to fulfill the couple's request out of respect for their right to make such decisions.

Acceptance of PGD for gender selection, whether for first-born children or only for gender variety, assumes that use for that purpose is sufficiently important to justify the symbolic costs of creating, screening, and discarding embryos on the basis of sex. Persons who believe that gender selection serves no important individual need, even in families with several children of one gender, might then object to postconception methods, such as PGD, as insufficiently respectful of embryos and choose not to seek or provide it.¹¹⁵

The President's Council on Bioethics has recently issued recommendations opposing non-medical gender selection.¹¹⁶ While a conservative approach to gender selection is rational, the Council does not fully confront the case for such a choice or the complexity of determining whether net harm would ensue from permitting such choices. For example, it makes no attempt to assess the importance that gender variety in offspring has to couples who strongly desire the experience of raising both girls and boys, e.g., who would not reproduce again unless they had that choice. They also assume that the desire for a particular trait in offspring would lead to excessive demands or expectations that ultimately harm offspring. Yet it is just as reasonable to view such preferences as less determinative of rearing behavior than the Council fears. A couple might want to have a girl rather than a boy because of the different experiences that rearing her might bring without having a fixed idea of what they expect that child to be or the flexibility to respond to its developing needs.

2. Selecting for Perfect Pitch

Perfect or "absolute" pitch is the ability to identify and recall musical notes from memory.¹¹⁷ Although not all great or successful musicians have perfect pitch, a large number of them do. Experts disagree over whether perfect pitch is solely inborn or may also be developed by early training, though most agree that a person either has it or does not. It also runs in families, apparently in an autosomal dominant pattern.¹¹⁸ The gene or genes coding for this capacity, however, have not been mapped, much less sequenced. Because genes for perfect pitch may also relate to the genetic basis for language or other cognitive abilities, research to find that gene is likely.

Once the gene for perfect pitch or its linked markers are identified, it would be feasible to screen embryos for those alleles and transfer to the uterus only those embryos that test positive. The prevalence of those genes is quite low (perhaps 3 in 100) in the population but higher in certain families.¹¹⁹ Thus, only persons from those families who have a strong interest in the musical ability of their children would be potential candidates for PGD for perfect pitch. Many of them are likely to take their chances with coital conception and exposure of the child to music at an

¹¹⁵ See John A. Robertson, *Sex Selection for Gender Variety by Preimplantation Genetic Diagnosis*, 78 FERTILITY & STERILITY 463 (2002).

¹¹⁶ PRESIDENT'S COUNCIL ON BIOETHICS, BEYOND THERAPY: BIOTECHNOLOGY AND THE PURSUIT OF HAPPINESS 66-71 (Oct. 2003) (pre-publication version), available at <http://www.bioethics.gov/reports/beyondtherapy/fulldoc.html>.

¹¹⁷ Sandra Blakeslee, *Perfect Pitch: The Key May Lie in the Genes*, N.Y. TIMES, Nov. 20, 1990, at C1; Dennis Drayna et al., *Genetic Correlates of Musical Pitch Recognition in Humans*, 291 SCIENCE 1969, 1969-72 (2001).

¹¹⁸ *Id.*

¹¹⁹ *Id.*

early age. Some couples, however, may be willing to undergo IVF and PGD to ensure this foundation for musical ability in their child. Should their request be accepted or denied?

As noted, the answer to this question for the *modern traditionalist* depends on the importance of the reproductive choice being asserted, the burdens of the selection procedure, its impact on offspring, and its implications for de-selected groups and society generally. The strongest case for the parents is if they would not reproduce unless they could select that trait, and they have a plausible explanation for that position.¹²⁰ Although the preference might appear odd to some, it might be understandable in highly musical families, particularly ones in which some members already have perfect pitch. Parents clearly have the right to instill or develop a child's musical ability after birth. If so, they might then plausibly argue that they should have that right before birth as well.

If so, then creating and destroying embryos for this purpose should also be acceptable. If embryos are too rudimentary in development to have inherent rights or interests, then no moral duty is violated by creating and destroying them.¹²¹ Some persons might think that doing so for trivial or unimportant reasons debases the inherent dignity of all human life, but having a child with perfect pitch will not appear debasing to parents seeking this technique. Ultimately, the judgment of triviality or importance of the choice rests within a broad spectrum with the couple. If they have a strong enough preference to seek PGD for this purpose and that preference rationally relates to reproductive goals that deserve respect, then they have demonstrated its great importance to them. Only in the clearest cases, for example, perhaps creating embryos to picking eye or hair color, might a person's individual assessment of the importance of creating embryos be rejected.¹²²

A third relevant factor is whether musical trait selection is consistent with respect for the resulting child. Parents who are willing to undergo the costs and burdens of IVF and PGD to have a child with perfect pitch may be so overly invested in the child having a musical career that they will prevent it from developing its own personality and identity. Parents, however, are free to instill and develop musical ability once the child is born, just as they are entitled to instill particular religious views. It is difficult to say that they cross an impermissible line of moral risk to the welfare of their prospective child in screening embryos for this purpose.¹²³ Parents are still obligated to provide their child with the basic education and care necessary for any life-plan. Wanting a child to have perfect pitch is not inconsistent with parents also wanting their child to be well-rounded and equipped

¹²⁰ That selection of the trait is essential to the parents' reproductive decision is relevant because if they would otherwise reproduce regardless of the ability to select the trait, a ban on selection would not interfere with their ability to have offspring. A more robust theory of procreative liberty might protect less essential preferences as well. However, I will confine my analysis to cases where parents can plausibly establish that they would not reproduce unless they could use the selection technique at issue. See Robertson, *supra* note 39.

¹²¹ Ethics Comm. of the Am. Fertility Soc'y, *Ethical Considerations of Assisted Reproductive Technologies*, 62 FERTILITY & STERILITY 32S (Supp. No. 1 1994).

¹²² A private provider may refuse to screen embryos for those purposes. Whether a state ban on such selection would survive scrutiny would turn on whether selection of hair or eye color was deemed so important to the couple's procreative freedom as to fall within their procreative liberty. If so, respect for embryos or fears of slippery slopes to genetic engineering of offspring genes would probably not justify limiting that choice.

¹²³ If the child would not otherwise have been born, they may not have harmed it at all. See *infra* Appendix.

for life in other contexts. If parents seem likely to be over-invested in the child, physicians should consider not offering them the requested selection services.

A fourth factor, impact on de-selected groups, is much less likely to be an issue in the case of perfect pitch, because there is no stigma or negative association tied to persons without that trait. Persons without perfect pitch suffer no stigma or opprobrium by the couple's choice or public acceptance of it, as is arguably the case with embryo selection on grounds of gender, sexual orientation, intelligence, strength, size, or other traits; nor is PGD for perfect pitch likely to perpetuate unfair class advantages, as selection for intelligence, strength, size, or beauty might.¹²⁴

A final factor is the larger societal impact of permitting embryo screening for a non-medical condition such as perfect pitch. A *strict traditionalist* would argue that accepting non-medical selection for this trait will be a precedent for selecting other traits and eventually enhancing or modifying offspring genomes. Acceptance of any non-medical selection moves us toward a future in which children are primarily valued by the attractiveness of their expected characteristics and not as unconditionally accepted "gifts" from God. This will "coarsen" the dignity of reproduction and those engaged in it.¹²⁵

But that threat is too hypothetical to justify limiting what may otherwise be valid exercises of parental choice. It is highly unlikely that many traits would be controlled by genes that could be easily tested in embryos. Gender is determined by the chromosome, and the gene for perfect pitch, if ever found, would be a rare exception to the multi-factorial complexity of such traits. Screening embryos for perfect pitch, if otherwise acceptable, should not be stopped because of speculation about what might be possible several decades from now.

In sum, musician parents are entitled to instill a love of music and skill in playing in their children just as they are entitled to instill their particular religious views.¹²⁶ Their willingness to resort to genetic technology to enhance those possibilities would not itself show that they are less than fully committed to their child within the world-view and cultural context in which they live. The *modern traditionalist* would find a plausible case, and perhaps even a right of procreative liberty, to make such a selection.

¹²⁴ Similar issues would arise in parental selection for hearing or deafness. If couples with a history of family deafness want to have a hearing child, they could screen out embryos with a mutation in the gene for connexion, which appears to cause 60% of inherited deafness. However, allowing parents this choice in the privacy of an IVF clinic would not denigrate existing persons with deafness. By the same token, deaf parents who selected *for* children with the mutation would not be denigrating hearing persons. A different objection would be that deaf parents would be harming a deaf child by intentionally making its birth possible, when hearing embryos could have been transferred. John C. Fletcher, *Deaf Like Us: The Duchesneau-McCollough Case*, 5 L'OBSERVATOIRE DE LA GÉNÉTIQUE (2002), at http://www.ircm.qc.ca/bioethique/obsgenetique/cadrages/cadr2002/c_no5_02/ca_no5_02_1.html. For analysis of harm to offspring in such cases, see *infra* Appendix. A different outcome might result if the deaf parents sought to silence the gene for connexion in order to have a deaf child. See discussion of intentional diminishment of offspring traits *infra* notes 189-95 and accompanying text.

¹²⁵ Leon Kass and other *strict traditionalists* might also argue that selection practices could alter the societal status of all children by making them appear to be products or commodities. For a similar argument about the effect of surrogate motherhood and paid sex on children generally, see MARGARET JANE RADIN, *CONTESTED COMMODITIES* (1996).

¹²⁶ See *Wisconsin v. Yoder*, 406 U.S. 205 (1972) (holding that Amish parents' interest in instilling certain religious values in their children outweighed State's interest in requiring mandatory public education through age sixteen).

3. Sexual Orientation

A popular play several years ago portrayed the conflict confronting a father whose wife is pregnant with a male fetus with the genetic marker that he will be homosexual.¹²⁷ The drama focused on the protagonist's struggles over whether to abort or not. Because there is not yet a genetic test for sexual orientation, there is no pre-birth test of gametes, embryos, or fetuses for this condition, nor is it clear that one will be developed in the future. If one were available, however, we would face the question of whether parents would be free to abort fetuses, or more likely, to select or to exclude embryos that have a particular sexual orientation.

As with a gene for perfect pitch, such a gene is likely to be manifested in families and thus be of primary interest to those with some family history of that orientation, rather than to the population at large. Persons who are homosexual might seek it out in order to have a child who also will be homosexual. More likely, some heterosexual couples with family members who are homosexual may care deeply enough about it to prefer not to have a child with genes that strongly correlate with homosexuality.

In either case, a couple's or individual's claim to choose their child's sexual orientation would be reproductive if it would strongly and plausibly affect their willingness to reproduce. Under the analytic scheme of this article, the key question would be how important such selection would be for the parental project of successful gene transmission to the next generation. For some parents, the idea of raising a gay child poses a number of problems, including the difficulties that such a child would face in a prejudiced society, the reduced likelihood that such a child would have progeny that would continue the parents' genes, and the parents' own prejudices. Although few people might seek to screen on grounds of sexual orientation, particularly if the screening were costly or physically intrusive, it would be difficult to argue that parents would not be exercising procreative liberty in seeking to screen and exclude on that basis.¹²⁸

It is true that they may be exercising a bias or prejudice against homosexuality (or against heterosexuality by homosexuals who seek a gay child), but freedom of association permits persons in the private sphere to discriminate as they choose. One could strongly support equal rights for gays in all public and institutional spheres, yet still find that this choice is within their procreative and associational discretion. Nor could one easily show that allowing such choices would be a continued public demeaning of homosexuals, who are still publicly discriminated against in many ways. We may hope that the genetics of sexual orientation never lends itself to simple tests to screen children for sexual orientation. But if that knowledge develops, it may be hard to show that it does not fit within the rights of parents to decide about those characteristics of offspring.

Nor would a child, chosen in part to have a particular sexual orientation, be a product or commodity of manufacture any more than a child chosen for gender might be. One has no particular design for the child beyond being healthy and having the sexual orientation chosen. The child would still be free to be his own person in other regards.

¹²⁷ JONATHAN TOLINS, *THE TWILIGHT OF THE GOLDS* (1994).

¹²⁸ The choice of gay parents to have gay children is not inconsistent with a reproductive agenda of gene transmission because those gay offspring might also reproduce, just as their gay parents did. In any event, in selecting for a child with gay genes, gay parents are engaged in the culturally defined project of reproduction as gene transmission and parenting in the next generation.

Finally, permitting parents to use genetic technology to avoid having a child with a homosexual orientation is distinct from the separate question of whether homosexual individuals or couples have the right to reproduce. Indeed, norms of equal respect for all persons would protect the right of homosexual persons to reproduce to the same extent as heterosexuals do, including the use of assisted reproductive and genetic screening techniques.¹²⁹ They would be free then to use genetic screening to attempt to have homosexual offspring and might even be free to use haploidization techniques to enable each partner to contribute haploid genes to a new individual.¹³⁰

C. REPRODUCTIVE CLONING

In addition to testing gametes, embryos, or fetuses before birth to exclude (or include) offspring with particular medical or non-medical traits, reproductive technology may also make possible more active selection of offspring genomes. This section discusses nuclear transfer cloning, which chooses a whole genome rather than gametes or embryos. The next section will discuss alteration of particular sections of the genome.

Reproductive cloning would occur by somatic cell nuclear transfer. A somatic cell is de-differentiated at an earlier state, its nucleus is removed, and then is transplanted into an enucleated egg. After activation, the resulting embryo is placed in the uterus with the hope that it will implant, develop, and come to term.

Since the birth in 1996 of Dolly, the sheep cloned from the mammary glands of an adult ewe, mice, rabbits, cats, cows, and pigs have been cloned.¹³¹ Yet mammalian cloning is not easily achieved and remains unpredictable. Success rates have been quite low. More than 200 embryos were created for every successful pregnancy in sheep, with many failures at every stage in the process.¹³² Many questions remain about whether re-starting the cellular clock of transplanted nuclei inevitably interferes with imprinting and the methylation necessary for proper epigenetic development.¹³³ In addition, very little is known about how well clones will do. Although Dolly had offspring, she died after contracting a lethal sheep virus and, thus, before it could be determined whether she would have suffered from a shortened life-span due to the shortening of her telomeres from previous cell divisions, or whether there would have been other epigenetic effects that impair health.

Given the still rudimentary state of cloning science, it would be highly premature to attempt human cloning now. As we will see, the best case for human cloning is quite limited and would not appear in itself to justify the great amount of

¹²⁹ John A. Robertson, *Two Models of Human Cloning*, 27 HOFSTRA L. REV. 609, 633-37 (1999).

¹³⁰ See Zsolt Peter Nagy et al., *Development of an Efficient Method to Obtain Artificially Produced Haploid Mammalian Oocytes by Transfer of G2/M Phase Somatic Cells to GV Ooplasts*, 78 FERTILITY & STERILITY S1 (Supp. 2002); Antonio Regalado, *Could a Skin Cell Someday Replace Sperm or Egg?*, WALL ST. J., Oct. 17, 2002, at B1.

¹³¹ Lowell Ben Krahn, *Cloning, Public Policy and the Constitution*, 21 J. MARSHALL J. COMPUTER & INFO. L. 271, 274 (2003).

¹³² Ian Wilmut et al., *Somatic Cell Nuclear Transfer*, 419 NATURE 583, 583-86 (2002).

¹³³ Rudolph Jaenisch & Ian Wilmut, *Don't Clone Humans!*, 291 SCIENCE 2552 (2001).

embryo research, miscarriages, and possible early deaths from human cloning,¹³⁴ nor is it very likely that many people would actually seek cloning if it were safe. Yet enormous public attention has been paid to the possibility of human reproductive cloning. Some *radical libertarians* and reproductive physicians working with them have asserted a right to clone and announced efforts to do so.¹³⁵

Coming at a time when the safety of mammalian cloning has not been established, those statements appeared to be especially irresponsible. The statements suggested to the public that there was in fact a serious danger that scientists would start to clone before its safety had been established or sufficient public discussion of its dangers had occurred. These events led to bipartisan legislation that would ban nuclear transfer reproductive cloning for any purpose.¹³⁶ Because some proponents of the ban also want to ban therapeutic cloning, which does not involve transfer of cloned embryos to the uterus and the chance of birth, the legislation has not yet passed.¹³⁷

Although some of the support for a permanent criminal ban is based on safety reasons, others support a ban even if safety and efficacy were established. The widespread opposition to reproductive cloning comes in part from misunderstandings about whether cloning would produce an exact copy of a child and the strength of the demand that is likely for cloning.¹³⁸ Even where environmental effects on phenotype are recognized, opponents seem to think that people will have strongly narcissistic urges to replicate themselves rather than reproduce sexually.¹³⁹ Some opposition also arises from the perception that any transfer of cloned embryos to the uterus would be an unethical experiment.¹⁴⁰ In any event, most opponents think it would always be immoral to permit cloning, no matter how it is used, and that a criminal ban with strong penalties is needed to stop it.¹⁴¹

The most complete case against cloning has been made by Leon Kass, now fleshed out in the President's Bioethics Council's 2002 report, *Human Cloning and*

¹³⁴ The loss of embryos and fetuses from attempts at human reproductive cloning may not violate moral duties owed to those entities, but it could implicate symbolic and expressive values about not cavalierly creating and destroying prenatal human life.

¹³⁵ See Leon R. Kass, *The Wisdom of Repugnance: Why We Should Ban the Cloning of Humans*, 32 VAL. U. L. REV. 679, 688 (1998).

¹³⁶ Human Cloning Prohibition Act of 2003, H.R. 534, 108th Cong. § 302 (2003).

¹³⁷ See discussion *infra* Part V.

¹³⁸ The opponents' perception that a clone will be an exact copy of the DNA source assumes a crude genetic reductionism that overlooks the phenotypic effects of uterine and rearing environments. In many versions, opponents appear to think that the cloned child will simply spring full-born into an identical version of the person cloned, as in the Greek myth of Athena springing full-born from the head of Zeus or the several clones of a busy building contractor that resulted from a surgical procedure in the film *Multiplicity*. Another popular-culture version of cloning, *The Boys from Brazil*, is much more accurate in recognizing that to clone effectively Hitler, one would have to recreate the experiences he had as a child.

¹³⁹ See NBAC REPORT, *supra* note 35, at 69.

¹⁴⁰ In arguing that any transfer of a cloned embryo to the uterus would be an unethical experiment on an unconsenting child, Leon Kass and the President's Bioethics Council assume that knowingly risking the birth of a child with handicaps is always unethical, even if the child could not otherwise have been born and the parents are committed to loving and rearing it. See discussion *infra* Appendix.

¹⁴¹ Paul Tully, Comment, *Dollywood is Not Just a Theme Park in Tennessee Anymore: Unwarranted Prohibitory Human Cloning Legislation and Policy Guidelines for a Regulatory Approach to Cloning*, 31 J. MARSHALL L. REV. 1385, 1405 (1998).

Human Dignity.¹⁴² One argument is that any experimentation with reproductive cloning would necessarily be unethical because there could never be a guarantee that the resulting child would not suffer some physical or other injury.¹⁴³ But even if no direct physical or psychological injury were shown, the report finds that cloning would be unacceptable because of its “challenge to the nature of human procreation and child-rearing.”¹⁴⁴ Reflecting the *strict traditionalist* view, cloning is wrong because it involves making, rather than “begetting” a child, with the child a “product of wills,” chosen for particular characteristics. Because the genome of cloned children is chosen, they are objects or products made to serve the parents’ interests and will, and not valued for themselves. Indeed, they are not treated equally because they are denied the individual identity and uniqueness that other humans have, and that view is central to the human condition. The report then proceeds to discuss issues of the clone’s identity, its status as a manufactured product, eugenics, family, and society.

The report displays several misconceptions about how close the resulting phenotype would be to that of the nuclear DNA source. Even if corrected, however, the *strict traditionalist* premise of the report would still lead to rejection of cloning in all cases. For example, the report misdescribes choosing nuclear DNA for cloning as “choosing” the entire genome or even “designing” the child. In nuclear transfer cloning, a total package of DNA is chosen for replication but not a complete menu of genes, because genes for most traits are unknown. Moreover, most phenotypic traits depend heavily on environment.¹⁴⁵ A cloned child will not simply replicate the phenotype of the DNA source, for it will gestate in a different uterus, be reared by different persons in a different environment, and will be subject to different mitochondrial DNA influences.¹⁴⁶ For the *strict traditionalist*, however, any degree of choice is anathema, and choice of the entire genome, as phenotypically expressed, is a degree of choice beyond that of excluding or including single genes in healthy offspring.¹⁴⁷

In contrast, the *modern traditionalist* would not condemn reproductive cloning in all cases without further inquiry into how it is likely to be used and the effects it is likely to have.¹⁴⁸ Since cloning would involve having and rearing a child and would present special, psychological challenges, people would be unlikely to seek to clone unless they had very good reason to do so. The most plausible demand for reproductive cloning is likely to be from people who are at high risk of having offspring with severe genetic disease or who cannot themselves reproduce sexually,

¹⁴² CLONING REPORT, *supra* note 13.

¹⁴³ See discussion *infra* Appendix.

¹⁴⁴ CLONING REPORT, *supra* note 13, at 110.

¹⁴⁵ Erin Rentz, *Estimating Additive Genetic Variation and Heritability of Phenotypic Traits*, at <http://online.sfsu.edu/~efc/classes/biol710/heritability/heritability.htm> (last updated May 30, 2002).

¹⁴⁶ Nuclear transfer cloning requires transfer of the nucleus to an enucleated oocyte, with mitochondrial DNA in the cytoplasm that will be different than that of the DNA source.

¹⁴⁷ The other major misconception is that a cloned child is necessarily harmed by being cloned (as would be cloned children who die early or are born with defects). But cloned children would not otherwise have been born and from their perspective, once born, they have an interest in living. See discussion *infra* Appendix. Rather than focus on harm to offspring, one might more usefully ask whether parents would be violating norms of good parenting if they were committed to rearing the resulting child, whatever its impairments.

¹⁴⁸ The *radical libertarian* would accept cloning even if a person is fertile as part of the right to select whatever genes of offspring one wishes. See *infra* notes 152-53 and accompanying text.

for example, azoospermic males for whom intracytoplasmic insertion of sperm, a standard treatment for male infertility, is the only possible solution.¹⁴⁹

In such cases, rather than go childless, adopt, or use donor sperm from a stranger or brother (a 25% rather than 50% sharing of genes with offspring), they might want to have a child with whom they have a close kinship genetic connection, which they could achieve by cloning themselves. In this case, they are interested in a reproductive genetic connection of at least 50% and, if they cannot achieve that, are willing to settle for 99.9% through nuclear transfer cloning. They would not be seeking to “design” a child so much as have a child with a genetic connection to their family. If their spouse provided the oocyte and gestation necessary for reproductive cloning to occur, both partners would have a biologic connection with their child.¹⁵⁰

A plausible case exists in these circumstances for recognizing reproductive cloning for the gametically infertile as an exercise of procreative liberty. It serves the basic reproductive goal of getting the infertile patient’s genes into the next generation—indeed, it is their only way of doing so. The couple is committed to rearing the child and treating it as an individual. In evolutionary terms, cloning may not be a long-run successful reproductive strategy, but without this short-run remedy, their genes will die with him. This suggests that the infertile person seeking to clone is seeking the conventional reproductive goal of rearing genetically related children by the only means, given his medical condition, open to him. As such, it should be treated like attempts at coital reproduction and banned or restricted only if a strong showing of harm can be made.¹⁵¹

The greatest claim of harm is that the life of a child produced by cloning is likely to be so psychologically painful or confusing that its interests justify preventing cloning even in cases of true infertility.¹⁵² If parents are truly interested in having and rearing a genetically related child rather than an identical copy, there may be good reason to think that the cloned child will psychologically fare well. There may be a strong physical resemblance to the DNA source, but parents committed to the well-being of their child, as a person in his own right, can avoid treating the child as a mere copy of the DNA source. More experience will be necessary to determine how infertile couples can use cloning to have genetically related children while minimizing psychological or social problems in resulting children. It is plausible to think that a positive rearing experience for parents and child would occur even in these unique circumstances.

A *modern traditionalist*, however, would have more difficulty accepting reproductive cloning by persons who are sexually fertile. Their claim to be

¹⁴⁹ Gerald Schatten et al., *Cell and Molecular Biological Challenges of ISCI: Art Before Science?*, 26 J.L. MED. & ETHICS 29, 34 (1998).

¹⁵⁰ The husband would have a 99.9% genetic connection, while the wife would have a gestational and mtDNA connection. Even then, only a small number of that small group of gametically infertile persons is likely to opt for reproductive cloning.

¹⁵¹ The small number of persons seeking reproductive cloning when infertile does not lessen or change the ethical analysis. Rights matter even if only one person exercises them. As the Supreme Court reminds us in *Casey*, it is the degree of interference, not the number interfered with, that determines whether a fundamental right has been infringed. 505 U.S. at 894 (discussing whether a spousal notification requirement infringes a woman’s right to terminate pregnancy if it would result in only a few women being denied an abortion).

¹⁵² In a person-affecting system of harm, the cloned child who would not otherwise have been born would not be harmed by being brought into the world in that condition. See discussion *infra* Appendix.

exercising reproductive freedom has no basis if they are cloning a third party whom they think has a desirable genome, for in that case they would not be providing any genes and thus would not be reproducing.¹⁵³ If they cloned themselves, they would be passing on 99.9% of their genes. In choosing to clone themselves rather than sexually reproduce, they are claiming more than the ordinary interest in passing on a haploid set of chromosomes by sexual reproduction. The claim of a right to pass on more goes beyond what ordinarily occurs in reproduction, and thus would seem much less deserving of special protection on that score. It is not helpful to get into an essentialist argument about whether an interest in getting a diploid set of chromosomes into the next generation is truly “reproductive.” It is reproductive *plus*, but there is no reason why an individual’s desire to pass on diploid, rather than haploid, chromosomes should be respected when they are able to reproduce sexually.¹⁵⁴

The claim of the sexually fertile to clone is a claim either to choose whatever genome in children that one wishes or a claim to maximize the number of its genes, which gets into the next generation and presumably generations after. But there is no commonly accepted right to choose whatever genome one wishes for one’s offspring, even if there is a right, as this article argues, to select some aspects of the genome of offspring when that choice advances conventional understandings of reproductive interest without harming others.¹⁵⁵ A close analysis of the cases in which selection occurs is needed to show its legitimacy, as the previous discussion has shown. Unless one takes a *radical liberty* approach to these questions or adopts a more robust version of procreative liberty than has been argued for here, it will be difficult for the sexually fertile to sustain that claim. Cloning when fertile does replicate a larger portion of genes, but it does so in a way that changes ordinary understandings of offspring and of why reproducing is so valued by individuals.¹⁵⁶

Because of doubts that cloning when fertile is truly “reproductive,” one need not ask whether there is a strong case for thinking that permitting it would cause direct, substantial harm. If not protected as part of procreative liberty, a state that chose to limit reproductive cloning by the fertile would need show only a rational basis for thinking it posed harm. One ground of concern would be whether parents would be as interested in the well-being of offspring when cloning is chosen in lieu of sexual

¹⁵³ Persons who have obtained the nuclear DNA of another for somatic cell nuclear transfer cloning would not themselves be reproducing. The source of the DNA would be replicating 99.9% of their genes, but they are not claiming a right to do so nor in the scenario described here intending to rear resulting offspring.

¹⁵⁴ The claim of such a right would give those with wealth and power additional advantages over others, in much the same way that wealth-based access to non-therapeutic enhancement might. For a discussion of “genetic domination,” see BRUCE A. ACKERMAN, *SOCIAL JUSTICE IN THE LIBERAL STATE* 113-38 (1980). In the long-run, cloning by the sexually fertile is unlikely to be a successful reproductive strategy. Without the genetic diversity generated by meiotic recombination and sexual merging of different chromosomes, cloned individuals who clone in turn will eventually be weakened versus others. Consistent inbreeding would make it much less likely to survive in the long-run. See Mark Derr, *Florida Panther’s Great Leap Hits a Wall*, N.Y. TIMES, Oct. 15, 2002, at F3. Yet the individual faced with the short-run prospect of no genetic transfer to a new generation or transfer by cloning might rationally choose cloning despite the many long-run disadvantages.

¹⁵⁵ This position is a far cry from the perception of a general right to select offspring characteristics in all cases that Karen Lebacqz mistakenly ascribes to her earlier cited critique. See Lebacqz, *supra* note 46.

¹⁵⁶ This statement is contestable and may appear to contradict earlier statements. See *supra* note 46 and accompanying text. In any event, yielding to community conceptions of the importance of reproduction as intimately tied to sexual reproduction does not also entail yielding to its conceptions of acceptable means of achieving sexual reproduction. See Lebacqz, *supra* note 46.

reproduction. But even if some parents would respect such an offspring for its own identity, there is enough of a risk that others would not do so to satisfy the rational basis standard that would justify limitation when reproductive liberty is not at stake.

Finally, a judgment that cloning when fertile goes beyond most plausible accounts of procreative freedom may call into question whether cloning when infertile would not also be deemed non-reproductive. It is true that it is the only way to get genes into the next generation, but in doing so, one loses the advantages of meiotic recombination and interchange of chromosomes that constitutes sexual reproduction. In addition, the resulting child may also have to resort to cloning to transmit its genes, thus further limiting recombination.

These issues will have to be revisited once additional experience with mammalian cloning and cloning human embryos occurs. If the formidable scientific and medical obstacles to safe cloning are overcome, the key ethical inquiry will be whether an individual's choice of reproductive cloning serves important reproductive interests without causing harm to others (as understood at the time the science has improved). I have argued that cloning by an infertile person might plausibly be viewed as "reproductive," because it is the only way that he or she could have a genetically related child to rear. In gene transmission terms, the person cannot get any genes into the next generation unless they transmit a diploid genome containing their nuclear genome.¹⁵⁷ In contrast, preventing the sexually fertile person from cloning themselves does not prevent them from the core reproductive event of transmitting a haploid set of chromosomes.¹⁵⁸ Reproductive disadvantages in the long-run are not a sufficient basis for denying short-run use by persons who have no other way to pass a haploid genome to the next generation. The problem of how the cloned child will then reproduce, and if cloned, how his clones in turn would reproduce would also have to be faced.

D. REWRITING THE GENETIC CODE OF OFFSPRING

Frequently mentioned in ethical and policy debates of reproduction in the genomic era is the prospect of active engineering or altering of the genome of prospective offspring.¹⁵⁹ Such a prospect, however, is highly speculative, even more so than negative non-medical selection or nuclear transfer cloning. A major barrier is that the genes associated with desired traits are unknown and, because of their polygenic nature, will be difficult to identify. Once the genes are known, gametes or embryos could be screened for them and then used or not used in reproduction.

Positive alteration, however, requires further steps beyond identifying genes, screening gametes or embryos, and not using or transferring affected ones.¹⁶⁰ Knowing the relevant gene simply sets the stage for the further step of silencing genes or adding new segments of DNA.¹⁶¹ Few would expect those techniques to be soon available for pre-birth editing of a prospective child's genome.

¹⁵⁷ See NBAC REPORT, *supra* note 35, at 15.

¹⁵⁸ See *id.*

¹⁵⁹ See Robertson, *supra* note 39, at 436; John A. Robertson, *Oocyte Cytoplasm Transfers and the Ethics of Germ-Line Intervention*, 26 J.L. MED. & ETHICS 211, 211 (1998).

¹⁶⁰ See Kristie Sosnowski, *Genetic Research: Are More Limitations Needed in the Field?*, 15 J.L. & HEALTH 121, 127-30 (2001).

¹⁶¹ Genes may be silenced by adding interfering RNAs to stop DNA transcription. Or genes may be inserted through homologous recombination or in artificial chromosomes.

Yet the prospect is realistic enough to merit discussion now. Scientists are quite skilled at “knocking out” or silencing genes in mice or other organisms.¹⁶² The 2001 discovery of new classes of ribo-nucleic acids (“RNAs”) that selectively silence genes after transcription will greatly increase the ability to knock-out genes.¹⁶³ Presumably all the techniques done in mice could occur in human embryos, though genetic manipulation experiments in human embryos are now quite rare, if they occur at all. At some point, using gene-editing techniques with human gametes or embryos will seem reasonable, and issues of whether the moral acceptability of such uses justifies allowing research to proceed will have to be faced.¹⁶⁴

The *radical liberty* view easily accepts “editing” or “rewriting” the genomes of prospective offspring.¹⁶⁵ *Strict traditionalists*, on the other hand, would staunchly oppose any genetic alteration, with the possible exception of therapeutic ones, but they are unlikely to accept the research on embryos that would be necessary to establish the safety and efficacy of therapeutic germline interventions.¹⁶⁶ Even *modern traditionalists* are likely to be leery of non-therapeutic alterations at this time. Ever pragmatic, however, they are willing to examine the facts and see if plausible reproductive uses of gene alterations could be made in the future. Indeed, a *modern traditionalist* risks inconsistency if she dismisses gene alteration out of hand. She should be open to a right to “edit” or alter offspring genomes when necessary as a plausible reproductive strategy, just as she is with non-medical negative selection or reproductive cloning for gametic infertility.

A key issue is whether positive alteration does serve important reproductive goals. Parents demanding the right to alter genes before birth would have to show that alteration is not a mere preference, all other things being equal, but is essential to whether they will reproduce all.¹⁶⁷ But if they are otherwise fertile and likely to have a healthy child, it may be difficult to see why their “need” to alter genes is so key that it should be respected. Even if it would confer fitness advantages on offspring, the resulting distribution of desirable genes would raise serious justice issues and risk genetic domination by the few over the many.¹⁶⁸

Also important will be the impact on the child. Because alteration in most cases will generally aim at improving the life-prospects of a child, it will be hard to show

¹⁶² Scientists can transfer genetic material between organisms, for example, transfecting pigs with the silk-producing genes of spiders so that pigs produce silk in their milk. Lawrence Osborne, *Got Silk*, N.Y. TIMES MAG., June 16, 2002, at 49. At present, DNA is simply injected into the nucleus, counting on principles of homologous recombination for it to be taken up at the intended location. Those cells that have taken up the genes can be identified and then cloned to produce many copies. Improved vectors for inserting DNA into cells or artificial chromosomes may be a more efficient way to transfer genes between cells.

¹⁶³ *Science* magazine, the leading science publication in the world, named this discovery the most important scientific event of 2002. Jennifer Couzin, *Breakthrough of the Year*, 298 SCIENCE 2296, 2296 (2002).

¹⁶⁴ Henry E. Malter et al., *Gene Silencing in Mouse Embryos Using Short Interfering Oligoribonucleotide-Based Double-Stranded Constructs*, 78 FERTILITY & STERILITY S75 (Supp. 2002). Such research would raise issues of embryo and human subjects research, research funding policy, and patents, all of which are beyond the scope of this article.

¹⁶⁵ If DNA is the “code” for proteins and cellular functioning, then instructions in the code for disease-causing proteins could be edited out or rewritten to ensure a healthy child. *Strict traditionalists* are likely to be offended by this articulation for they would perceive it as assuming that the child is an object or product which the parents may legitimately design or fashion as they wish.

¹⁶⁶ See CLONING REPORT, *supra* note 13, at 96-110.

¹⁶⁷ For discussion of the importance of use of the technique being “essential” and not a “mere preference,” see Robertson, *supra* note 39.

¹⁶⁸ See ACKERMAN, *supra* note 154, at 113-38.

that the child is harmed as a result.¹⁶⁹ True, the parents might have hopes and expectations for the child based on the engineered trait, but parents could still be loving and respectful of a child whose genes they have altered. Assessing the impact on the child is doubly difficult because it may be difficult to show that the child has been harmed as a result of the alteration. But for the technique in question, the child claimed to be harmed might never have been born.¹⁷⁰

At the same time the *modern traditionalist* can sympathize with many of the concerns that animate the *strict traditionalist*. Many persons would find genetic manipulation of offspring to engineer traits as the epitome of “designing” or “manufacturing” a baby, of turning the “gift” of a child into a product acceptable only with those designed traits. The strongly negative connotation of the term “designer babies” reflects the fear that parents will use genetic technology to turn their children into objects or commodities that undermine their freedom and dignity.¹⁷¹ Although only a few parents will do so at first, others will join the race if early movers into non-medical enhancement gain an advantage. A “positional arms race” could ensue that leaves the competitors at roughly the same relative position as they were before expending many resources and changing the social tone by doing so.¹⁷² Those without the resources to compete may be left even further behind. Policies that discourage such inequities might well be desirable.¹⁷³

In the end, the acceptability of positive alteration of human genes before birth will depend heavily on the reasons motivating parents and the benefits and harms of the alterations sought. To assess the arguments and competing interests, I address three situations (therapeutic alteration, non-therapeutic enhancement, and intentional diminishment) in which “editing” or modification of a prospective child’s genome code might occur.

¹⁶⁹ The *strict traditionalist* might argue that any alteration harms the child by robbing it of its qualities and experiences it would have had if it had been “begotten” and not made.

¹⁷⁰ Indeed, some persons would argue that the very process of experimentation that would be necessary to perfect these techniques risks harming the children who are born as a result. They call for changes in human subject research regulations to prevent such work from occurring. See Rebecca Dresser, *Designing Babies: Research Ethics Issues* (2003) (unpublished manuscript, on file with American Journal of Law & Medicine). While this position at first blush is appealing, it has not considered the fact that the children in question would not have been born if the experimental technique in question had not been used. Even if those children, strictly speaking, have not been harmed, it does not follow that such research or other gene alteration activity is otherwise acceptable or part of a person’s reproductive liberty. See discussion *infra* Appendix.

¹⁷¹ Francis Fukuyama gives three arguments against such choices, but the ones he lists (violating the dignity of a human, the right of a human to be human, and the preservation of human nature) are too vague and undeveloped to perform serious work in determining which genetic technological innovations would be acceptable. FRANCIS FUKUYAMA, *OUR POSTHUMAN FUTURE: CONSEQUENCES OF THE BIOTECHNOLOGY REVOLUTION* (2002).

¹⁷² See ROBERT H. FRANK & PHILIP J. COOK, *THE WINNER-TAKE-ALL SOCIETY: WHY THE FEW AT THE TOP GET SO MUCH MORE THAN THE REST OF US* 167-87 (1995) [hereinafter *WINNER TAKE-ALL SOCIETY*]; ROBERT H. FRANK, *LUXURY FEVER: WHY MONEY FAILS TO SATISFY IN AN ERA OF EXCESS* (1999); BUCHANAN, *supra* note 92, at 222-56.

¹⁷³ Whether restrictions aimed at limiting positional arms races would be constitutional will depend upon whether non-medical enhancement falls within procreative liberty, and the importance of communal efforts to prevent genetic segmentation in society.

1. Therapeutic Alterations

A plausible case could be made for genetic alteration on therapeutic grounds in a few circumstances, but they are likely to be rare.¹⁷⁴ The most likely candidate for germline gene therapy would be couples who face the 1 in 4 risk of a child with serious genetic disease, such as sickle cell anemia, Tay Sachs disease, or cystic fibrosis.¹⁷⁵ They could screen embryos by PGD for that condition and have a child by transferring only those which lack the mutation. Given that option, there is little reason why a couple with healthy embryos to transfer (the 75% that are heterozygous) would have an interest in genetic alteration of the affected embryos.¹⁷⁶

The most plausible situation for a parent requesting therapeutic alteration of affected embryos would be if the only viable embryos they could produce had the disease-causing mutation. Unless they silenced certain genes or inserted new DNA, they would have no healthy offspring. Such cases are also likely to be rare. If all embryos in a given IVF cycle were positive for the disease, most couples could simply go through another IVF cycle to create embryos that were mutation free. While some couples may not ever be able to produce healthy embryos, for example, when one partner has two copies of a dominant gene or both partners have two copies of a gene for a recessive trait, that number is likely to be quite small.

But the importance to individuals, not their numbers, should determine whether a right exists.¹⁷⁷ Assuming that genetic modification of mammalian and human embryos has been shown to be safe and effective, a couple unable to produce healthy embryos would have a plausible claim to use germline gene therapy of affected embryos so that they might have healthy offspring. Unless the genetic alteration occurred, they would have no viable means of producing healthy offspring. In those circumstances, a ban on germline intervention would effectively limit their ability to have offspring.

A major ethical concern with germline alterations would be the risk of a deleterious impact on offspring.¹⁷⁸ The alteration here, however, is designed to benefit the child by permitting it to be born without a disease that would greatly limit its opportunities. Indeed, unless the alteration occurs, the parents might not reproduce at all, thus depriving the child, which opponents of germline interventions seek to protect, of the life that it would have had if the alteration had occurred.¹⁷⁹ The main risk to offspring then is not genetic engineering as such, but rather whether that process itself is safe and effective enough that the intended therapeutic benefits

¹⁷⁴ The distinction between “therapeutic” and “non-therapeutic” alterations is a rough cut of the issues. If pushed further, the distinction might collapse in many circumstances. See BUCHANAN, *supra* note 92, at 107-54.

¹⁷⁵ This analysis would apply also to dominant conditions (50% chance of the child being born with the mutation).

¹⁷⁶ A strict right-to-lifer might choose to do so to save embryos with the mutation, but it is unlikely that persons with those views would be requesting PGD to screen embryos in the first place. Perhaps a family that wanted siblings for a child born after IVF and PGD and was not able to undergo another IVF cycle might request to gene therapy on remaining embryos with the mutation. But such cases are likely to be infrequent.

¹⁷⁷ See *Casey*, 505 U.S. at 894 (holding that husband notification requirement that would likely bar very few women from abortions is unconstitutional despite the small number affected).

¹⁷⁸ The argument has also been made that such germline genetic engineering could remove desirable genes from the gene pool. Given the small number of cases in which such deletions would occur, this fear is not realistic. If important genes were lost, the missing genes could be inserted in later generations.

¹⁷⁹ For further discussion of this point, see *infra* Appendix.

will be achieved. If safety is established, it is hard to see how the child has been harmed and the parents and provider subject to moral condemnation for their efforts to remove disease genes from it.¹⁸⁰

Such certainty, however, is possible only if enough cases of human germline gene therapy have already occurred to establish its safety and efficacy. To achieve that level of clinical certainty, one would have to show that the first, experimental transfers to the uterus of altered embryos were themselves justified on the basis of facts concerning apparent risks, including for example, extensive experience with germline engineering of other mammals, including primates, and blastocyst-stage studies of the effects of genetically altering earlier human embryos. When there is a reasonable basis for thinking that actual harm will be minimal, and the parents are committed to rearing and loving the resulting child, proceeding with the first embryo transfers would be ethically justified. The child will not have been harmed if it has no other way to be born healthy.¹⁸¹

2. Non-therapeutic Alteration—Enhancement

Discussions of non-medical genetic enhancement are highly theoretical, because altering human embryos for non-medical purposes is even further off in the future than germline therapy. Most desirable traits are likely to be polygenic in origin and thus not subject to easy manipulation, even if the relevant family of genes were known.¹⁸² Without a close connection to treating or preventing disease, however, the resources for finding those genes may never be forthcoming.

Once the genes controlling or affecting those characteristics were known, techniques for inserting them into gametes or embryos would have to be perfected. Only after extensive experience with animal models and human embryos would transfer of genetically altered embryos to the uterus be reasonably considered. Further study would be needed to determine whether children born after alterations have the phenotypic traits sought. As noted, some persons would argue that any experimental embryo transfer is unethical, because the future child is not available to give consent to the research.¹⁸³ That child, however, does not exist at the time of the

¹⁸⁰ Even if unsafe, the child itself, strictly speaking, is not harmed in a person-affecting system of harm. However, the authenticity of the parents' reproductive project can then be questioned. See discussion *infra* Appendix.

¹⁸¹ The ethics of research here is quite complex. Strictly speaking, no child would have existed unless the experimental gene therapy had been done. Even if children are born with injuries or anomalies, they would have had no alternative way to have been born without them. If they suffer inordinately, they may have no interest in continued living, and maintaining their lives would arguably violate their right to be free of inordinate suffering. For discussion of this point, see *infra* Appendix.

¹⁸² See Michael J. Reiss, *What Sort of People Do We Want? The Ethics of Changing People Through Genetic Engineering*, 13 NOTRE DAME J.L. ETHICS & PUB. POL'Y 63, 75 (1999); Robertson, *supra* note 39, at 436.

¹⁸³ Leon Kass and the President's Bioethics Council make this move to oppose reproductive cloning. They argue that it would never be ethical to transfer a cloned embryo to the uterus because of the resulting child's lack of consent. Indeed, they suggest that the first IVF embryo transfers were unethical because of the child's lack of consent. As this paragraph shows, however, they are mistaken that the child is harmed by being born after research and thus that its advance consent is necessary. To make that claim, they have to adopt a person-affecting theory of harm. Since the person comes into existence only as a result of the embryo transfer, he or she cannot have been harmed by it (unless truly a wrongful life, in which case cessation of all life support would be morally required). See *infra* Appendix. To make their case, they must appeal to non-person-affecting principles of harm which they have failed to discuss. A general objection to children as "products" does not provide such a theory. See CLONING REPORT, *supra* note 13, at 109.

transfer and would only come into being if the transfer occurred. If parents requesting the procedure are committed to loving and rearing the child born after the experimental transfer, e.g., they are consenting to the experiment in order to have that child, then they are not harming the child nor violating social norms of parental commitment to the well-being of offspring.¹⁸⁴ If the subject of research is not able to consent, but its interests are protected or advanced, then the research may still ethically proceed.

Suppose, however, that animal research has demonstrated the safety and efficacy of non-therapeutic genetic enhancement and that genetically engineered children have been safely born and flourish. May a parent claim a right to use such techniques on their own prospective children as an exercise of procreative or familial liberty? The argument for procreative liberty would rest on the parents' claim that genetic enhancement was essential to their decision to reproduce—that they would not reproduce unless they could be assured through genetic enhancement that their child would be well-equipped for the competitions and vicissitudes of life. They would not be claiming a mere preference that the child be enhanced, but that it was a *sine qua non* of their decision to reproduce at all.¹⁸⁵

Even if such a claim satisfies a necessary condition for procreative liberty, it may not be sufficient. Because the couple is sexually fertile and the expected child is healthy, their reproduction—and their progeny's reproduction—could easily occur without resort to genetic enhancement. The parents might believe that only genetic enhancement will equip the child sufficiently for life's challenges, but they may not be rational in holding such beliefs. The situation might be different if other parents routinely practiced genetic enhancement, thus placing their child at a disadvantage. Until such wider use occurs, however, parents desiring to use genetic enhancement might not have a convincing case that non-medical enhancement is essential to their child's well-being. Although building on the understandable parental commitment to provide for the well-being of their child, they have gone far beyond what is reasonably necessary for why reproduction is valued.¹⁸⁶

The claim, however, that enhancement is not sufficiently "reproductive" or central to parental rearing concerns must contend with two counterfactuals. The first is that parents engage in many sorts of non-medical enhancement of their children's attributes after birth and, indeed, may even have a constitutional right of familial autonomy in rearing offspring to do so.¹⁸⁷ If so, it should not matter, if physical safety is ensured, that the enhancement efforts occur prior to birth. Yet others would argue that genetic changes are different in quality and kind, not merely degree.¹⁸⁸ They are likely to be more permanent, will affect the germline, and are potentially much more dangerous. A key problem for the *modern traditionalist* is to justify the moral difference or lack thereof between pre-birth and post-birth enhancement.

¹⁸⁴ For further elaboration of this point, see *infra* Appendix.

¹⁸⁵ See Robertson, *supra* note 39, at 429-32.

¹⁸⁶ For example, the claim of a right to alter the genes of prospective offspring to enhance its longevity would also fail. A long lifespan is not necessary for the successful reproduction of that progeny. Requests to extend the life of future children might then reasonably be viewed as not part of reproductive choice. Although a longer life might serve the interests of their children, not everything that serves offspring interests falls within reproductive liberty.

¹⁸⁷ Meyer v. Nebraska, 262 U.S. 390, 400 (1923); Pierce v. Soc'y of Sisters, 268 U.S. 510, 534-35 (1925); Wisconsin v. Yoder, 406 U.S. 205, 232 (1972).

¹⁸⁸ See Maxwell J. Mehlman, *The Law of Above Averages: Leveling the New Genetic Enhancement Playing Field*, 85 IOWA L. REV. 517, 537-39 (2000).

A second obstacle is the status of non-medical selection of traits other than gender. If negative selection of non-medical traits is not permitted, then *a fortiori* there is no case for positive alteration. But if non-medical selection is allowed, it will be difficult on grounds other than safety to argue against inserting genes for the same trait. If safety is established, then the same arguments against germline or inherited modifications as against pre-birth versus post-birth enhancement apply. Genetic changes are likely to be more permanent, affect future generations, and are potentially more dangerous. Again, the persuasiveness of the distinction between non-medical negative selection and non-medical positive alteration will be a key issue in the moral and social acceptance of these techniques.

If non-medical genetic enhancement is not a clear expression of procreative or familial liberty, then a rational case against it would suffice as grounds for restricting it and could easily be established. Government concerns that it might actually harm children, either in the actual engineering or in the expectations that parents then have of them, and the risk of creating classes of differentially endowed citizens provides a sufficient, rational basis for preventing such uses of genetic technology.¹⁸⁹

A more difficult question arises if genetic enhancement is found to be essential for parental reproduction and rearing.¹⁹⁰ A governmental ban on positive alteration would require stronger justification. One possible justification would be to prevent positional arms races for the genes of children that will be hard for parents, concerned about the well-being of their children, to resist. The danger is that parents will feel obligated to engage in pre-birth genetic engineering, because other parents are doing so, just as SAT prep courses have become routine and athletes feel obligated to use steroids if other athletes are gaining an advantage from them.¹⁹¹ Although some first movers may gain some advantages for their children, eventually other parents with resources will catch up. As a result, relative positions may not have changed, but everyone would have spent more money to stay where they are, some children may have been injured in the process, and the gap with “have-nots” will have greatly increased. Unless the government acted, there would be no incentives for parents to refuse such techniques.¹⁹²

¹⁸⁹ The fact that the child is not itself harmed would not mean that government could not rationally try to discourage the activity. See *infra* Appendix.

¹⁹⁰ For a discussion of the importance of the use of the technique being essential to reproduction and not a mere preference, see Robertson, *supra* note 39.

¹⁹¹ The phenomenon of wasteful and self-defeating positional arms races where each tries to improve his relative position versus others is now familiar. See WINNER-TAKE-ALL SOCIETY, *supra* note 172, at 167-87. If genetic enhancements become possible, agreements to discourage positional arms races will likely emerge through social norms, contracts, or governmental regulation. If so, the argument that restrictions on positional arms races in genetic enhancement of offspring would violate procreative liberty would be weak.

¹⁹² See *id.* at 186-87. The case for a ban on enhancement would be strongest if there were physical risks from the procedure, and the child would have been born regardless of the use of the harmful enhancement technique. Frank and Cook posit a situation in which a genetic enhancement technique has a 99% chance of a 15% improvement on SAT-type tests but a 1% risk of no improvement and severe emotional disability as a result. If there is such a high risk, a genetic enhancement could be banned on those grounds, e.g., as not safe and effective, for existing children. If the enhancement occurred prenatally, it might not be harmful to the child who would not otherwise have been born but for use of the technique. However, one might still reasonably question whether parents are exercising procreative liberty when they take a small risk of a great loss in order to make an otherwise healthy child somewhat better off.

3. Intentional Diminishment

The least persuasive case for parental freedom to use non-medical genetic alteration techniques is for intentional diminishment of prospective offspring—genetic alteration that aims to reduce or remove capabilities that would otherwise have made the child normal and healthy. A paradigm case of intentional diminishment occurs in the film *Bladerunner*.¹⁹³ An evil scientist genetically engineers human “replicants” with a limited life span to “off-planet” in menial positions.¹⁹⁴ Other frequently noted cases concern deaf or dwarf parents electing to have genes for hearing or height removed from prospective children so that they will have phenotypes similar to their parents.¹⁹⁵ The literature on this topic also occasionally discusses creating limited humans or human-animal chimeras to do menial tasks, to be “meat puppets,” or to provide organs for other humans.¹⁹⁶

The case for including intentional diminishment within the protective canopy of procreative liberty is even weaker than is the case for non-medical enhancement. Although human individuals would be born from the haploid chromosomes of two other individuals, the alteration is neither done for the well-being of the resulting child (except possibly in the case of the deaf), nor to increase its own prospects for successful reproduction. Rather, reproductive resources are being used to produce a human entity to serve parental preferences, not to benefit the child or accomplish transmission of genes to succeeding generations. Only the deaf or dwarf couple might have a plausible claim of reproductive interest. They are seeking a child to raise and love and want it to have size and hearing phenotypes closer to their own.¹⁹⁷

Given the difficulty of showing that intentional diminishment falls within procreative or family liberty, concerns about harm to the child, who could have been born healthy but the parents have chosen to diminish it, would easily provide a rational basis for action ending such prohibition. Strictly speaking, the child would not itself be harmed if the parents had not brought it into the world whole and undiminished. Yet the government is not obligated to allow all possible children to be born, just because enabling them to be born would not “harm” them.¹⁹⁸ If procreative liberty is not infringed, society might reasonably prefer a different set of children and stop uses of techniques for intentional diminishment when the parents could otherwise have normal, healthy children.¹⁹⁹ The right to diminish offspring is simply not coherent as an expression of procreative or familial liberty, for it does not seek to produce healthy offspring who themselves will be fit to reproduce.

¹⁹³ See Katheryn D. Katz, *The Clonal Child: Procreative Liberty and Asexual Reproduction*, 8 ALB. L.J. SCI. & TECH. 1, 17 (1997).

¹⁹⁴ The plot is driven by the attempts of some “replicants” who have escaped to earth to find the genetic key that can unlock a normal human lifespan, and thus enable them to live out the love they have for each other.

¹⁹⁵ Robertson, *supra* note 39, at 438-39.

¹⁹⁶ JAMES BOYLE, SHAMANS, SOFTWARE, AND SPLEENS: LAW AND THE CONSTRUCTION OF THE INFORMATION SOCIETY 150-53 (1996).

¹⁹⁷ But even that claim could be contested, even if ultimately accepted. In the end, one would expect to find very few legitimate reproductive cases of diminishment.

¹⁹⁸ See Robertson, *supra* note 39, at 440-41.

¹⁹⁹ See *infra* Appendix.

V. POLICY MAKING FOR REPROGENETICS

The prospect of expanded use of genetics in reproduction has produced demands for a more rational and focused set of public policies in this area. Many people assume that these techniques pose major individual and social risks, and need much closer monitoring than they have received until now. While some countries have central agencies that license and monitor assisted reproductive clinics, most notably the Human Fertilisation and Embryology Authority in the United Kingdom, there is no federal or state agency that examines, reviews, and licenses the provision of reproductive and genetic services;²⁰⁰ nor is there a well-developed body of state law that defines rights, duties, and resulting legal relations in use of these techniques.²⁰¹ As a result, questions of the acceptability of genomic information in reproduction are left largely to the market created by patients and providers of these services. Some decry market domination of technological reproduction, while others see the market as a useful device for accommodating the diverse demands of new technology.²⁰²

Debates over the need for regulation of reproductive and genetic techniques often conflate two kinds of issues that need to be carefully separated to arrive at defensible solutions. One set of issues concerns the safety and reliability of the reproductive and genetic services provided. In addition to their other complaints about genomics in reproduction, *strict traditionalists*, for example, view the lack of regulation as a serious gap that allows commercially driven operators to create demand for untested and often unsafe products, and eventually for a “Brave New World” of “designer children.”²⁰³

The call for regulation to protect safety and transparency, however, overlooks both the regulatory systems that affect provision of these services and the general hands-off approach that government has typically taken toward medical services. Physicians and hospitals must be licensed, meet tort law standards of good practice, and use only Food and Drug Administration-approved drugs and devices, regardless of the area of practice. They must also comply with institutionally imposed reviews of research with human subjects and, in some cases, may have to seek approval of the Recombinant DNA Advisory Committee before conducting human gene therapy research.²⁰⁴ Beyond those restrictions, most physicians are free to practice as they choose. Although some highly publicized cases of theft of embryos, use of own sperm, and misleading advertisements have occurred in infertility clinics, cases of

²⁰⁰ See Human Fertilisation and Embryology Act, c. 37 (1990) (Eng.); Maurice A.M. de Wachter, *The European Convention on Bioethics*, 27 HASTINGS CENTER REP. 13, 13 (1997); UNITED NATIONS EDUCATION, SCIENTIFIC AND CULTURAL ORGANIZATION, at <http://www.unesco.org> (last visited Nov. 13, 2003).

²⁰¹ See Erik Parens & Laurie P. Knowles, *Reprogenetics and Public Policy Reflections and Recommendations*, 33 HASTINGS CENTER REP. S3 (Supp. 2003).

²⁰² Compare Kely M. Plummer, Comment, *Ending Parents' Unlimited Power to Choose: Legislation is Necessary to Prohibit Parents' Selection of Their Children's Sex and Characteristics*, 47 ST. LOUIS U. L.J. 517, 518 (2003), with David Orentlicher, *Beyond Cloning: Expanding Reproductive Options for Same-Sex Couples*, 66 BROOK. L. REV. 651, 677 (2000/2001).

²⁰³ Legally trained commentators emphasize other issues. See, e.g., Judith F. Daar, *Regulating Reproductive Technologies: Panacea or Paper Tiger?*, 34 HOUS. L. REV. 609 (1997); Lori B. Andrews, *Regulating Reproductive Technologies*, 21 J. LEGAL MED. 35 (2000); LORI B. ANDREWS, *THE CLONE AGE: ADVENTURES IN THE NEW WORLD OF REPRODUCTIVE TECHNOLOGY* (1999).

²⁰⁴ NATIONAL INSTITUTES OF HEALTH, DEP'T OF HEALTH & HUMAN SERVICES, NIH GUIDELINES FOR RESEARCH INVOLVING RECOMBINANT DNA MOLECULES (Apr. 2002), available at http://www4.od.nih.gov/oba/rac/guidelines_02/NIH_Guidelines_Apr_02.htm.

dishonesty, fraud, slanted advertisements, and rampant commercialization are not unique to assisted reproduction.²⁰⁵

Although some providers have exploited consumers, it is by no means clear that there are any greater problems in this area than in various other areas of medical practice, nor any reason to think that the healthy competition that exists among infertility providers will not doom most of those providing poor quality or dishonest services to short, professional half-lives. Patients are increasingly knowledgeable about clinic and provider success rates, and physicians compete hard for patients.²⁰⁶ If abuses or egregious mistakes occur in genetic diagnosis or assisted reproduction, tort suits (of which there have been few²⁰⁷) and the consumer grapevine should provide adequate correction.

Given the differences between the British and U.S. legal systems, a central licensing or regulatory agency at the state or federal level in the United States may not be necessary. Indeed, creation of a new regulatory agency to govern reprogenetics is unlikely given the general reluctance to “throw” a new agency at social problems, particularly if doing so would reignite the bitter conflicts over embryo status and abortion that have accompanied most legislative forays into this area.²⁰⁸

The second motivation for regulation has been the ethical, legal, and social concerns raised by use of these techniques even when they are safe and effective, and consumers are fully informed of their risks, benefits, and proven or unproven status. To date, most regulation in this regard has occurred through state law defining the parental rights and duties arising from use of gamete donors and surrogates.²⁰⁹ There have also been recurring debates at the federal level about the use of federal funds for embryo research.²¹⁰ Indeed, it is the intransigence of those conflicts that make the emergence of a comprehensive regulatory structure for these techniques at the federal or even state level unlikely, as recurring controversies over embryo research and, most recently, over therapeutic and reproductive cloning have shown.

A brief review of recent federal activity will show the slim chances for a national consensus on how to handle the reproductive issues likely to arise in the era of genomics. Since 1980, administrative inaction spurred by right-to-life sentiments had blocked the use of federal funds for embryo research.²¹¹ The Clinton administration was prepared to remove the ban administratively and appointed the

²⁰⁵ E.g., John A. Robertson, *The Case of the Switched Embryos*, 25 HASTINGS CENTER REP. 13 (1995); Karen T. Rogers, *Embryo Theft: The Misappropriation of Human Eggs at an Irvine Fertility Clinic Has Raised a Host of New Legal Concerns for Infertile Couples Using New Reproductive Technologies*, 26 SW. U. L. REV. 1133 (1997).

²⁰⁶ The one exception is the 1992 Fertility Clinic Success Act, which fosters a voluntary reporting system through the Centers for Disease Control and the relevant professional groups.

²⁰⁷ Matthew Browne, Note, *Preconception Tort Law in an Era of Assisted Reproduction: Applying a Nexus Test for Duty*, 69 FORDHAM L. REV. 2555, 2559-60 (2001).

²⁰⁸ The creation of the new Department of Homeland Security to deal with terrorist threats may be an exception.

²⁰⁹ E.g., N.H. REV. STAT. ANN. § 168-B:4 (2002); VA. CODE ANN. § 20-158 (2000).

²¹⁰ Erin P. George, Comment, *The Stem Cell Debate: The Legal, Political and Ethical Issues Surrounding Federal Funding of Scientific Research on Human Embryos*, 12 ALB. L.J. SCI. & TECH. 747 (2002).

²¹¹ Shannon Brownlee, *Designer Babies: Human Cloning Is a Long Way Off, But Bioengineered Kids Are Already Here*, WASH. MONTHLY, Mar. 2002, at 25, 27.

Human Embryo Research Panel for guidance on the matter.²¹² That panel strongly supported federal funding of embryo research.²¹³ Before any research was funded, however, Congress passed a ban on any use of federal funds for “embryo research,” thus leaving the matter in the hands of the private sector.²¹⁴

The right-to-life versus scientific research fault-line surfaced again in debates over federal funding of embryonic stem cell research. That debate began in 1998 when researchers at Johns Hopkins University and the University of Wisconsin developed ways to culture human embryonic stem cells indefinitely in the laboratory, opening the door to directing them to produce replacement tissue to treat disease.²¹⁵ At the behest of President Clinton, the National Bioethics Advisory Commission examined the issue and recommended federal funding both of derivation of and research with embryonic stem cells.²¹⁶ The Bush administration, however, pulled back from this recommendation before the National Institutes of Health could make any awards.²¹⁷ On August 9, 2000, President Bush announced that he would permit federal funding of research with embryonic stem cells derived before that date.²¹⁸ Although this “compromise” gave federal support to some embryonic stem research, fewer cell lines than first imagined were available, thus relegating most research again to privately funded actors.

The latest reprise of the battle has occurred in the fight over a ban on therapeutic cloning. In 2001, the House of Representatives had overwhelmingly voted in favor of a criminal ban on therapeutic as well as reproductive cloning.²¹⁹ After intense lobbying by both right-to-life, patient, and biotech industry groups, the issue died in the Senate.²²⁰ With the Republican victory in the 2002 elections, however, it is now back on the public agenda. Once again, we see pro-life forces battling with scientists and patient groups for whether scientific research using embryos may occur. Given the sharp split, reproductive matters remain once again in the private sector with no direct regulatory oversight.

Given how abortion politics entangle every turn of the policy-making road, it is unlikely in the near term that, other than Food and Drug Administration oversight of safety, extensive federal or state oversight of the uses of genetics in reproduction will become part of the regulatory landscape in the United States. Most regulation will occur informally through the market interactions of willing consumers and providers of these services against a background of common law norms, some

²¹² R. Alta Charo, *Bush's Stem-Cell Decision May Have Unexpected—and Unintended—Consequences*, CHRON. HIGHER EDUC., Sept. 7, 2001, at B14.

²¹³ President Clinton, however, did reject the Panel's recommendations on federal support in some cases of creating embryos for research.

²¹⁴ H.R. 2127, 104th Cong. § 511 (1996).

²¹⁵ James A. Thomson et al., *Embryonic Stem Cell Lines Derived from Human Blastocysts*, 282 SCIENCE 1145, 1145-47 (1998); Michael J. Shamblo et al., *Derivation of Pluripotent Stem Cells from Cultured Human Primordial Germ Cells*, 95 PROC. NAT'L ACAD. SCI. 13726 (1998).

²¹⁶ General Counsel Harriet Raab had previously issued an opinion stating that since embryonic stem cells were not themselves embryos, federal funding of research with them did not violate the Congressional ban on federal funding of research with embryos.

²¹⁷ ZENIT, *Report Fueling Fears About Stem Cell Research: Embryos Created and Destroyed on Purpose*, at <http://users.colloquium.co.uk/~BARRETT/stems.htm> (last visited Nov. 13, 2003).

²¹⁸ Katherine Q. Seelye & Frank Bruni, *A Long Process that Led Bush to His Decision*, N.Y. TIMES, Aug. 11, 2001, at A1.

²¹⁹ See Human Cloning Prohibition Act of 2001, H.R. 2505, 107th Cong. (2001).

²²⁰ Nicholas Wade, *Scientists Make 2 Stem Cell Advances*, N.Y. TIMES, June 21, 2002, at A18.

professional self-regulation, and occasional state legislative intrusions.²²¹ Unless some major problems develop, some version of the current decentralized system of review, with many different centers of power and influence offsetting each other, is likely to continue to characterize the regulatory landscape of reproductive and genetic technologies. If this mixed system proves grossly incompetent for the task, more direct regulation will come into being.

VI. CONCLUSION

I have looked at the ethical, legal, and social conflicts that are likely to arise from increased use of genetics in reproduction and the approaches to resolving those conflicts that are now in play. A central focus has been to show how a *modern traditionalist*, rather than *strict traditionalist* or *radical libertarian*, perspective on these issues is the most fruitful approach to reconciling the competing interests that arise from the growing use of genomic knowledge in reproduction.

Modern traditionalism strongly supports a liberty claim-right to use genetic knowledge and techniques to have healthy offspring to nurture and rear. Genetic techniques that directly aim to serve those goals are usually ethically acceptable and should be legally available, for their use fits neatly into traditional understandings of why reproduction is valued. Access to them, however, could be limited if they imposed serious harms on the persons most directly affected by them. As genetic techniques grow in importance, providing access to persons without the means to obtain them will also be important.²²²

Applying this perspective to four areas of current or future controversy, this article has shown that the most likely use of these techniques serve standard reproductive goals without causing undue harm to values of respect for prenatal life, the welfare of offspring, the status of women, or social equality. Use of some techniques, however, such as reproductive cloning when fertile, intentional diminishment, and possibly non-medical enhancement do not clearly advance conventionally understood reproductive agendas and deserve less respect than other uses.

The analysis has also shown that many fears of abusive use of reproductive technologies are highly speculative and may not occur even when techniques are perfected. If genomic knowledge is increasingly used in reproduction, it is likely to be used primarily in those cases where it reasonably serves goals of having healthy children to nurture and rear. Techniques that inspire the worst fears—genetic enhancement, intentional diminishment, reproductive cloning when fertile—are least

²²¹ Such public bodies as the National Institutes of Health Human Embryo Research Panel (1996), the National Bioethics Advisory Commission (1998-2001), and the President's Council on Bioethics (2002-2004) have provided a useful service in analyzing issues and organizing discussion. So have bodies from the National Academy of Sciences, the Institute of Medicine, the American Association for the Advancement of Science, and interested professional bodies, such as the Ethics Committees of the American College of Gynecology and Obstetrics, and the American Society of Reproductive Medicine. Although only advisory, their reports and recommendations have helped clarify and shape the social and political debate by pointing out the major normative fault lines and the tradeoffs that different public policies could have, with recommendations for how best to balance them. They have also played a role in advising courts, legislatures, institutions, and providers about ethical practices.

²²² John Deigh has argued that if genetic enhancement becomes feasible, there will be an obligation to provide it to the poor as well (personal communication with author).

likely to be of interest to people interested in the age-old project having healthy offspring.²²³

As the genomic revolution continues to unfold, ethical, legal, and social controversy over how to use and regulate these techniques will continue. Rather than limit broad categories of use in order to stop the most unlikely and least defensible uses, policymakers should shift their attention to ensuring that genetic techniques are used in informed, safe, and productive ways. It is not inherently wrong to achieve traditional reproductive goals in novel, technological ways that use the insights of genomic approaches to human biology. A strong commitment to these principles should help ensure that the use of genetic technologies in reproduction will increase, rather than diminish, human flourishing.

²²³ This statement does not hold as strongly for genetic enhancement but there are other features of that practice that could limit its use. *See* discussion *supra* Part IV.D.2.

APPENDIX: HARM TO OFFSPRING WHO WOULD NOT OTHERWISE BE BORN

The question of harm to offspring born as a result of genetic and assisted reproductive technologies raises perplexing issues. The problem arises because most of our ethical reasoning assumes a person-regarding conception of harm. If an action or omission does not set-back the interests of a person, then it does not harm that person.

This question arises repeatedly in situations involving assisted reproduction and genetic technology, as many references in the text indicate. A common concern is that children born as a result of those techniques are “harmed” because of the physical, mental, social, or psychological conditions which attend their births. These techniques include cloning, genetic enhancement or diminishment, surrogacy, egg and embryo donation, and other manipulations of gametes and embryos.

The problem is that but for the use of (or failure to use) these technologies, the child whose welfare is at issue would never have existed and thus, under person-affecting theories of harm, has not herself been harmed. The technique or manipulation that causes the condition of concern is also the technique or manipulation that brings or causes the child to be brought into existence.²²⁴ Viewed from the perspective of the now-existing child, she is better off than the alternative of not existing at all.²²⁵

Yet many persons are troubled by decisions that knowingly bring a handicapped child into the world when actions to avoid its birth were within reach. Taking the risk that the child with a cloned or altered genome will be born handicapped or damaged, or in a novel parenting situation, seems insufficiently attentive to the welfare of the resulting child.²²⁶ Can we not condemn their actions as wrong and impose sanctions to prevent them from occurring?

Dan Brock and Derek Parfit have explored a non-person-affecting theory of harm to deal with those situations.²²⁷ They argue that the world is better off if a class of 100 persons is all “normal” rather than a world with a class of 100 persons, 99 of whom are “normal” and one who has a disability. If that is so, a person would have an obligation to use reasonably available means to substitute a “normal” for a

²²⁴ The case is different if the parents have done something affecting the child’s present condition which could have been avoided and yet the child be born, such as refraining from using drugs or alcohol in a pregnancy going to term.

²²⁵ I put aside the rare cases of truly wrongful life, in which every postpartum moment of life is full of excruciating pain. In such a case, one would have a moral obligation to cause the cessation of that child’s life. However, David Heyd would disagree. He thinks that, until there is a person in being, there is no being to whom moral duties are owed, and thus no rights holder until birth occurs. Therefore, there has been no wrong until after the child is born, and efforts are not made to cease its excruciating existence. DAVID HEYD, *GENETHICS: MORAL ISSUES IN THE CREATION OF PEOPLE* 59-62 (1992). See also MELINDA A. ROBERTS, *CHILD VERSUS CHILDMAKER: FUTURE PERSONS AND PRESENT DUTIES IN ETHICS AND THE LAW* (1998).

²²⁶ Derek Parfit’s example of the woman who could wait a month to conceive or take a pill and thereby avoid the birth of a child with a withered arm captures this sense perfectly. Derek Parfit, *On Doing the Best for Our Children*, in *ETHICS AND POPULATION* 100 (Michael D. Bayles ed., 1976).

²²⁷ DEREK PARFIT, *REASON AND PERSONS* 487-90 (1984); Dan Brock, *The Non-Identity Problem and Genetic Harms—The Case of Wrongful Handicaps*, 9 *BIOETHICS* 269 (1995). See also BUCHANAN, *supra* note 92, at 222-57. See ROBERTS, *supra* note 225; Melinda Roberts, *A New Way of Doing the Best That We Can: Person-Based Consequentialism and the Equality Problem*, 112 *ETHICS* 315, 315-50 (2002).

disabled child. In making this argument, Brock and Parfit recognize that it applies only if the number of children born is the same and excessive efforts are not required to substitute the “normal” child for the disabled one.

Let us assume that this analysis is correct. If so, their theory provides no basis for judging the vast majority of cases in which the numbers could not have been the same or there is no clear basis for determining that the efforts required to have the “normal” child are “excessive.” Due to infertility, medical uncertainty, or strongly held personal beliefs, a couple may not be able to substitute a healthy child for the disabled one. Also, substituting the “normal” for the disabled child could require invasive prenatal diagnostic procedures and destruction of embryos or fetuses, which Brock and colleagues recognize may be too much to ask. Because of these constraints, their approach would also appear to exempt a person who would reproduce only if they could use the genetic enhancement or diminishment technique in question.

Another way to approach this problem, suggested at a few points in the text, is to ask whether parents who are willing to use (or not use) genetic modification and reproductive techniques are acting in ways that serve reproductive needs as commonly valued and understood. A relevant question would be whether the contested use makes sense as a way to satisfy an individual’s goals of producing viable offspring in the next generation.

A relevant factor in answering that question is whether parents will rear and care for the resulting children just as other parents do. If so, it will be difficult to claim that they are not involved in achieving the usual goals of reproduction. While cases of extreme or bizarre views will challenge such an approach, a commitment or intent to rear makes the situation different from that of a person producing cloned or altered embryos, or children for others to rear with whom there is no genetic connection.²²⁸ As long as parents who use these techniques are committed to rearing their child, they should be considered to be exercising or engaging in legitimate procreative activity. Questions in implementing this approach, as well as the legitimacy of imposing resulting rearing costs and burdens on others, will also need to be addressed.

²²⁸ Although that person may not be harming the child in pursuing reproductive goals, she may be harming other interests, such as a collective or communal interest in a certain moral tone. But using such judgments to constrain reproduction in a liberal society where people are generally free to choose their own ends and vision of the good is questionable.