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Katharine Hall
Macalester College

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A plethora of medical possibilities await couples unable to conceive children on their own. Commonly known by their acronyms--IVF (In-Vitro Fertilization), GIFT (Gamete Intrafallopian Tube Transfer), ZIFT (Zygote Intrafallopian Tube Transfer)—these technologies offer ways to help. New technologies look to solve problems that the old technologies couldn't fix. The problem of sterility is currently being addressed by discovering ways to create gametes from somatic cells. Nayernia et al published a scientific article in *Laboratory Investigation* on the derivation of male germ cells from bone marrow stem (BMS) cells in May 2006.[1] Yet many of these technologies are risky and can cause disabilities or malformations in the children they look to create. For the purposes of this paper, I will focus on the moral issue of blameworthiness when the application of this technology goes awry in these ways.

I will argue that although the strongest version of the precautionary principle should not be applied to this research, some form of responsibility principle should apply. I will then

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[1] Karim Nayernia, Jae Ho Lee, Nadja Drusenheimer, Jessica Nolte, Gerald Wulf, Ralf Dressel, Jörg Gromell, and Wolfgang Engel, "Derivation of Male Germ Cells from Bone Marrow Stem Cells," *Laboratory Investigation* 86 no. 7 (May 2006), 654-663.

address the philosophical problem of attributing a wrongdoer to an act when the existence of the wronged is necessarily contingent on that act. This problem is apparent in the work of Derek Parfit, who refers to it as the "non-identity problem". He does not address reproductive technology specifically, but he does argue that *present* persons cannot be held accountable for actions that affect *future* persons because the subtleties inherent in an action taken by current persons would necessarily result in different individuals being created than would otherwise have existed. In this way, current people cannot be held accountable for actions that affect these necessarily different future persons. Finally, I will show that although both the parents and physician-researchers engaged in a procedure that carried possible risk to the created child, through Derek Parfit's non-identity problem, moral blameworthiness can only be attributed to the physician-researcher and not the parents.

First, it is important to note that specific forms of reproductive assistance are risky. For example, the procedure of creating gamete cells from somatic cells is complicated and involves many chemicals that could affect the child that the reproductive science looks to create. In addition, most aspects of the research have not been independently tested. For this reason, not all reproductive technologies should be available to all people. Only those with a reproductive problem should be able to use these technologies, and in that case they should use only the technology that fixes their specific problem (see appendix).

There are some instances when a person who employs reproductive technology to fix their specific problem might choose a technology that carries inherent risks. For example, when assessing the gametes derived from BMS cells, researchers can't say for sure how each specific chemical that is used affects the BMS cells and the resulting gametes and fetus. Some would say that this calls for the application of the precautionary principle. The precautionary principle generally states that we should avoid any actions which have a potential

to cause harm until the actions have been proven to cause no appreciable harm. In short, "better safe than sorry."

I am generally inclined to reject the precautionary principle and agree with O'Nora O'Neill that, due to the risk that most activities of life inherently create, this principle becomes incoherent and at most an illusion. O'Neill says that often times the precautionary principle cannot be applied. Different options carry different risks, and we would be forced to sort through the potential risk calculus before deciding on any action. In addition, exploring all of the unknowns of "potential risk" of any scientific advancement would be altogether too time-consuming. An article about the precautionary principle from *Science* correctly points out, "If interpreted literally, no new technology could meet this requirement."[2]

In some cases, the precautionary principle can more readily be applied. For instance, consider biological or nuclear warfare. The effects of these types of weapons could cause such dire consequences that they should certainly not be used. However, in other cases application of the principle could result in worse consequences. For instance, some people claim we should apply the precautionary principle to the ongoing debate on global warming. They claim that all countries should immediately stop greenhouse emissions since we don't know how these emissions affect the environment. However, some scientists postulate that cutting off greenhouse emissions immediately could have equally negative consequences, such as pushing us towards an ice age.[3] In this case, the precautionary principle would be nearly impossible to apply—it would even be difficult to sort out which party could appeal to the principle.

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[2] Kenneth R. Foster, Paolo Vecchia, and Micheal H. Repacholi. "Science and the Precautionary Principle," *Science,* 288 no. 5468 (2000), 979-981.
[3] Richard B. Alley, *The Two-Mile Time Machine : Ice Cores, Abrupt Climate Change, and Our Future,* (New Jersey: Princeton University Press, 2000).

In the context of some reproductive research (such as the research to create gametes from BMS cells) the precautionary principle has a stronger case for consideration. This is one example where much is unknown and great harm could be caused. It is the type of case that O'Neill says is the least unconvincing application of the precautionary principle, as "one possibility clearly brings some risk of catastrophe while others do not."[4] Here, the precautionary principle ought to be applied, since experimentation on humans has not yet begun. First, the most dangerous elements need to be considered, tested, and approved. However, I would not advocate applying the precautionary principle to the point at which all potential harms have been assessed. When there is no other choice that created the same results then it would be hard to tell a couple that they would need to wait until all possibilities for harm were taken into consideration.

Here there is a distinction between failures inherent in the technology that could not have been predicted, and avoidable human error. The technological failures become possible as a result of avoiding a strong formulation of the precautionary principle, which I have argued would result in disbarring the use of any new technology in the foreseeable future. In instances of failures of technology, no agent should be morally accountable. However, in the case of errors due to negligence, the responsibility principle should be applied. This principle simply states that "When A's actions impose costs on B, A should be made responsible, by paying for these costs."[5] As I mentioned previously, reproductive technology can have intrinsic failures, which the agent cannot be held morally blameworthy for, however, where there is risk there can still be some form of accountability. "Where

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[4] Onora O'Neill, *Autonomy and Trust in Bioethics*, (Cambridge: Cambridge University Press, 2002), 164.

[5] Talbot Page, "Responsibility, Liability, and Incentive Compatibility," *Ethics* 97 no. 1 (1986), 242.

there is uncertainty, the cost A imposes on B is often in the form of a risk, in other words, in the increased probability of harm."[6] In practice, this accountability is not one in which the agent is held morally responsible. We account for this risk through insurance, which will cover damages from unexpected harm our actions may inflict. Nonetheless, in these cases, we are expected to meet certain standards to decrease the probability of harm.

In the case of error due to negligence, the negligent person should be held morally blameworthy for any costs that their actions impose on others. Specifically regarding this type of research, for example, one can imagine a scenario in which the physician-researcher makes a mistake which results in unfortunate consequences for the unborn child. For instance, in the research of Nayernia et al, specific chemicals are used in very small amounts. One such chemical, retinoic acid, is known to cause malformations in mice when the mice are exposed to higher concentrations of this chemical during embryogenesis.[7] If a physician-researcher uses the wrong pipette, which results in increased levels of retinoic acid and this causes the resulting child to be born with some handicap or malformation, then it seems that the physician-researcher is at fault. Although I wish to discuss moral responsibility, it might be helpful to use an example of legal responsibility. In tort law the physician-researcher could be sued for damages due to negligence, "defined as a failure to exercise the required degree of care, skill and diligence ordinarily possessed by a reasonable and prudent physician in the same

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[6] Page, 245.

[7] F. J. Huang, Y. D. Hsuuw, K. C. Lan, H. Y. Kang, S. Y. Chang, Y. C. Hsu, and K. E. Huang, "Adverse effects of retinoic acid on embryo development and the selective expression of retinoic acid receptors in mouse blastocysts," *Human Reproduction* 21, (2006) 202-209.

medical specialty acting under the same or similar circumstances."[8]

This can be difficult when assessing research negligence, as James Childress points out: "malpractice suits depend on a standard of "due care" which may be unclear in research settings."[9] I will argue that in determining moral responsibility, this pre-determined standard of care should be developed and could be as simple as applying the technology only by following a carefully recorded procedure. Deviation from the procedure would result in the individual being held morally blameworthy.

Another problem lies in the assessment of relevant moral blameworthiness. This is due to the fact that the child's existence is necessarily contingent on the reproductive technology. If the technology had not been used, then this child never would have existed.

The philosophical justification of this idea can be found in the work of Derek Parfit: "We should ask, 'If particular people live lives that are worth living, is this worse for these people than if they had never existed?' Our answer must be No."[10] If the person's existence is contingent on the results of some mistake, then we cannot say that the mistake harmed the child, because we cannot say that this is worse than for the child than if she never existed. Parfit's example of depleting resources will be helpful:

> Suppose we are choosing between two social or economic policies. And suppose that, on one of the two policies, the standard of living would be slightly higher over the next century. This effect implies another. It is not true that, whichever policy we choose, the same particular people will exist in the further

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[8] "Notes and Comments: Researcher Liability for Negligence in Human Subject Research: Informed Consent and Researcher Malpractice Actions," *Washington Law Review* (2003), 229.

[9] James F. Childress, "Compensating Injured Research Subjects: I. the Moral Argument," *The Hastings Center report* 6 no. 6 (1976), 21.

[10] Parfit, Derek, *Reasons and Persons*, (Oxford: Clarendon Press, 1984), 363.

> future. Given the effects of two such policies on the details of our lives, it would increasingly over time be true that, on the different policies, people married different people. And, even in the same marriages, the children would increasingly over time be conceived more than a month earlier or later would in fact be different children. Since the choice between our two policies would affect the time of later conceptions, some of the people who are later born would owe their existence to our choice of one of the two policies. If we had chosen the other policy, these particular people would never have existed.[11]

Parfit concludes that "our choice cannot be worse for these future people."[12] In fact, Parfit argues that causing people to exist benefits them, which means that our choice of depletion probably benefited these people.[13] It is important to note that the benefit of existence is not relevant to my assessment of moral blameworthiness. In addition, Parfit claims his arguments apply only to future person's lives that are "worth living." However, for my arguments it does not matter if the life of the child could be considered "not worth living." The only relevant considerations for moral blameworthiness are whether or not the same child could have lived a better life *but for* the actions of an agent. Parfit's non-identity problem challenges the intuition, showing that an act we might generally think of as "wrong" can be "wrong for" no one. In summary, Parfit concludes that we have only wronged someone if our action results in causing that person to be worse off. If he is right, and we have not wronged someone in these cases, then we cannot be held morally blameworthy.

Parfit is not the only one to make this argument. Gregory Kavka agrees, but where in the resource depletion example, Parfit states: "[children] conceived more than a

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[11] Parfit, 361.

[12] Parfit, 363.

[13] See Appendix G: Whether Causing Someone to Exist Can Benefit This Person, in Parfit, 487-490.

month earlier or later would in fact be different children,"[14] Kavka thinks merely the act of pausing could change the resulting child. He gives the example of a "pleasure pill." Let us imagine:

> A pill that, when taken just before sexual relations, has two effects. It heightens the pill-taker's sexual pleasure a tiny bit and insures that any child conceived would be mildly handicapped. As pausing to take the pill would change who is conceived, and as existence with a mild handicap is not bad on the whole, no one would be rendered worse off if a prospective parent not using contraceptive devices were to take the pill before sex.[15]

Kavka's example is more interesting because it directly corresponds to my topic of discussion. In this case it seems obvious that the parent's actions resulted in the handicapped child. If Kavka is right, then it appears no agents can be held morally blameworthy.

Luckily, at least one philosopher, Melinda Roberts, has already addressed this example. She shows that the problem with Kavka's scenario is that he treats the case as though there were only two possible options: "(1) a flawed existence and (2) no existence at all."[16] She terms these "type 2-alt cases," to show that there are only two possible alternatives that could result from an action. Roberts suggests that at least some cases to which the non-identity problem applies are actually "type 3-alt cases." Here there might be a third alternative. Roberts writes:

> How plausible is it that no accessible world exists in which the "mildly handicapped" child is born healthy in part because the child's parents refrain from taking the pleasure pill? The parents,

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[14] Parfit, 361.

[15] Gregory S. Kavka, "The Paradox of Future Individuals," *Philosophy and Public Affairs* 11 no. 2 (1982), 100.

[16] Melinda A. Roberts, *Child Versus Childmaker: Future Persons and Present Duties in Ethics and the Law*, (Oxford: Rowman & Littlefield Publishers, 1998), 95.

> Kavka says, "pause" to take the pill and so produce a particular child. But, regardless of what they would have done, could they not have, equally well, instead "paused" to contemplate the mysteries of human sexuality and then proceeded to produce exactly the same child—sans handicap—they in fact produced?[17]

This would be the third alternative: creating the same child without a handicap.

The factor that Kavka claims resulted in the different child is the factor of time. He presumably, and I think correctly, supposes that in order for a specific child to be conceived, the precise sperm and egg cells must meet at a precise time. Colin McGinn describes this relationship as a biological continuity: "just as you must have come from the zygote you came from because you are diachronically and developmentally continuous with it, so you must have come from the gametes you came from because you are similarly continuous with them."[18] Kavka's argument seems to imply that if the gametes met at a different time, then one of the other multimillion sperm cells would have met the egg and resulted in conceiving an entirely different child. What Kavka does not take into consideration is that there are many ways that the child could be conceived with precisely the same gametes. McGinn solves this problem by making a distinction between spatiotemporal constraints and fundamental constraints, where spatiotemporal constraints are supervenient on fundamental constraints.[19] The precise parental gametes *are necessary* for the individuation of the entity, but spatiotemporal constraints *are not necessary.*

For example, we can imagine the same person being conceived in Maine or California. If the child was conceived in Maine, then the parents probably did different things

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[17] Roberts, 96.

[18] Colin McGinn, "On the Necessity of Origin," *The Journal of Philosophy* 73 no. 5 (1976), 133.

[19] McGinn, 131-35.

before the child was conceived than they would have in California. Similarly, any actions that the parent's took before conceiving the child, such as pausing to take Kavka's pleasure pill, do not *necessarily* result in a different child being produced. In this way, the child's existence is not necessarily contingent on an act we might have thought of as "wrong." If existence is not contingent on this act, then Kavka and Parfit's arguments cannot successfully show that no one has harmed anyone.

In addition, when examining Roberts and McGinn's examples it seems clear that Parfit and Kavka are wrong to assume that in all cases the resultant child was necessarily contingent on specific acts. It is important to note that Roberts recognizes that the authors' of the non-identity cases may have stipulated such cases to be specifically "type-2 alt cases." But if this is true, Roberts rightly claims that "these cases are highly artificial in a way their authors nowhere expressly recognize."[20] Kavka and Parfit both seem to both be arguing that if different choices were made, the future would necessarily be different in such a way that the existence of future people is necessarily contingent on the choices of past persons.

Although I mostly agree with this sentiment, it is obvious that this does not mean moral blameworthiness cannot be applied. In order for the nonidentity problem to be universally applied in the way Kavka and Parfit apply it, there would be no room for "type-3 alt cases." I say "universally applied" because they both claim that the nonidentity problem shows that there can be no relevant moral blameworthiness regarding actions we take now since they will result in different future people. But it is obvious that we can imagine the same child conceived at the same time and by the same parents if different decisions are made. So,

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[20] Roberts, 97.

blameworthiness can be considered in the case of actions that hurt future people.

I have shown that the nonidentity problem does not bar considerations of moral culpability because there are possibilities in which the same person could exist but without some type of handicap. According to T.M. Scanlon, this only solves half of the problem. He thinks that Parfit's non-identity problem raises "a substantive question about when we have wronged someone, not a question about who can be wronged."[21] Rahul Kumar, a philosophy professor at the University of Pennsylvania who focuses research on non-consequentialist moral theory and contractualism, applies Scanlon's contractualism to address the specific problem of wronging children through scientific advancements that affect that child. He argues that through an application of moral contract theory, children have some moral claim on their parents for lack of pre-conception testing. I will not discuss the validity of his conclusions, but I do think that his argument can be applied to wrongs that can happen to a child as the result of reproductive technology.

Kumar begins by examining contractualism. He claims, I believe rightly, that contractual moral theory is comprised of mutual respect among persons for value as persons. In an article by Kumer entitled, "Who Can Be Wronged," he claims that an appeal to contractual moral theory could help solve Parfit's problem of who can be wronged. I will first examine Scanlon's contractual moral theory to show how the child can be wronged by actions that were taken to produce the child, and then I will examine Kumar's thesis in more detail.

For Scanlon, "an act is wrong if its performance under the circumstances would be disallowed by any set of principles for the general regulation of behavior that no one

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[21] T.M. Scanlon, *What We Owe to Each Other Cambridge,* (Massachusetts: Harvard University press, 1998), 187.

could reasonably reject as a basis for informed, unforced general agreement."[22] He thinks that people should be treated on the basis of reasons they themselves could not reasonably reject if they are reasonable people. In this definition, reasonableness, "presupposes a certain body of information and a certain range of reasons which are taken to be relevant, and goes on to make a claim about what these reasons, properly understood, in fact support."[23]

Here, we can see how children can be hurt by the reproductive technology that is used to create them. If choices were made, or actions were taken that caused the hurting of the child, and these actions or choices resulted in violating principles that could not reasonably be rejected, then these choices or actions were wrong. Another way to consider this problem is by considering that the reproductive technology which was employed was dangerous. It carried some risk to the child it looked to create. According to Scanlon, the possibility of risk can also be considered in moral contract theory.

Scanlon says that, "since others could reasonably refuse to license us to decide what to do in a way that gave concrete factors [...] no weight, the aim of justifiability to others gives us reason to recognize these considerations as ones that are generally relevant, and are in some circumstances compelling reasons to act."[24] Conversely, these reasons can give us compelling justifications not to act. If we are reasonable people and we do act in some way that is disallowed by a set of principles that we could not reasonably reject, then we have done something wrong. An example of one of these principles will be helpful. Kumar gives the following example:

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[22] Scanlon, 353.
[23] Scanlon, 192.
[24] Scanlon, 156.

> Those individuals responsible for a child's, or other dependent person's, welfare are morally required not to let her suffer a serious harm or disability or a serious loss of happiness or good, that they could have prevented without imposing substantial burdens or costs or loss of benefits on themselves or others.[25]

This principle describes the relationship of the caretaker to the dependent, and it could not reasonably be rejected by a reasonable person. In this case if an action violates this principle, the action is morally blameworthy, and the child has grounds to make the claim that they were wronged.

It is important to note that Scanlon feels "contractualism provides no reason for saying that people who do not now exist but will exist in the future have no moral claims on us."[26] This means that possible children are still contained within the scope of this moral theory. In this way, the child can have been wronged at any point, and we need not wait for the child to become a reasonable person in order to know that the child has been wronged.

Rahul Kumar extends the Scanlon's theory by considering different relationships. He shows that we establish expectations concerning consideration and conduct between persons which can vary depending upon relationships between persons. Particular relationships contain expectations that are derived from that relationship. This can affect a person's conduct with regard to that particular relationship. [27]

From this, Kumar concludes:

> One person wronging another, then, requires that the wrongdoer has, without adequate excuse or justification, violated certain legitimate expectations with which the wronged party was

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[25] Rahul Kumar, "Who can be Wronged?" *Philosophy & Public Affairs*, 31 no. 2 (2003), 112.

[26] Scanlon, 187.

[27] For full argument see Kumar, 99-118.

> entitled, in virtue of her value as a person, to have expected her to comply.[28]

In addition,

> there is no special problem for contractualism, then, concerning how one can have wronged one's child [...]. To be so bound to one's child, as caretaker to dependent, it need only be true that (a) one intends to conceive a child, and (b) one has reason to take it to be the case that the intended, but yet to be conceived, child will be of the type required for her to owe it to the child to take appropriate measures to protect its welfare, regardless of what its particular token identity turns out to be.[29]

These criteria are both obviously met when parents decide to use reproductive technologies. If something does happen to the child as a result of the technology, someone must be to blame.

Now that I have established reproductive technologies can be wrong and that they can be wrong for the child they look to create, I will address the problem of attributing a wrongdoer. This is where I consider the nonidentity problem relevant. Kumar certainly disagrees. He says, "What [he] take[s] to be mistaken is the idea that the kinds of considerations identified by the non-identity problem, concerning the fixity of psycho-physical personal identity, are morally relevant for reasoning about whether or not one person has been wronged by another."[30] Although I can still see how a person can be wronged by actions that their existence was necessarily contingent upon, I don't see how a person can be held responsible for those actions if the child would otherwise not have been created. My argument does not apply to all forms of reproductive technology, but only a small area of new research.

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[28] Kumar, 107.
[29] Kumar, 114.
[30] Kumar, 100.

Due to their discovery of new possibilities for reproduction, Nayeria et al have demonstrated one case which is not subject to Robert's critique of being "highly artificial," but which is a "type-2 alt case." The parents who decide to conceive a child using gametes from bone marrow stem cells are in a unique position. Unlike IVF or other forms of assisted reproduction, there is no possible way that the same child could be conceived using an alternative method. The cells are derived from a different part of the body, and this is the only way that these cells could be used to create a child. When choosing between available forms of assisted reproduction, the same cells could be manipulated in different ways. In these cases we can imagine the possibility of the exact same child being produced in a number of different ways. If the child is born with some flawed existence using BMS cell technology that was due to an error by the physician-researcher, the parents could not be held responsible because the *only* alternative for this child would be nonexistence.

However, I see this as further evidence that the physician-researcher can be held responsible for acts that hurt the child. The researcher is still in a "type 3-alt case," because if the researcher had not made a mistake, the same child could theoretically be created. This means that there were three options that resulted from the researchers actions: (1) nonexistence, (2) flawed existence, and (3) a better existence. Since the existence of the child is not necessarily contingent on the error in and of itself then the physician-researcher has no appeal to the non-identity problem.

In conclusion, reproductive technologies are not immune to moral blameworthiness. Parfit and others might argue that they are since the child's existence is necessarily contingent on the use of this technology. However, I have shown: (1) a wrong does exist (2) a wronged person exists and (3) a wrongdoer exists. I still consider the nonidentity problem important, however, and it is important enough to shift moral blame from one party to another. I have shown

that in one modern example of research this distinction becomes obvious. Parents and physician-researchers alike should consider their actions carefully before selecting some form of assisted reproductive technology.

Appendix

Reproductive Autonomy is the idea that people should be allowed to reproduce in whatever way they wish, based on their autonomous choice. This position is supported by some scholars of bioethics including John Harris and John Robertson. Robertson writes, "A regime of private discretion in attempts to procreate, with minimal regulation, must prevail."[31] The arguments Robertson and Harris put forth are based on the principle of autonomous choice and the liberty to follow through with such choices.

The most convincing aspects of these arguments stem from the fairness principle: "it seems invidious to require [that infertile people]...meet tests to which those who need no assistance are not subjected."[32] On this point I agree, yet Robertson takes reproductive technology further by arguing that "procreative liberty be given presumptive priority in all conflicts, with the burden on opponents of any particular technique to show that harmful effects of it justify limiting procreative choice."[33]

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[31] John A. Robertson, *Children of Choice: Freedom and the New Reproductive Technologies*, (New Jersey: Princeton University Press, 1994), 16. In O'Neill, Onora, *Autonomy and Trust in Bioethics*, (Cambridge: Cambridge University Press, 2002), 60.

[32] John Harris, "Rights and Reproductive Choice," in John Harris and Søren Holm, eds., *The Future of Human Reproduction: Ethics, Choice and Regulation, Clarendon Press*, 1998, 5-6. In O'Neill, 58.

[33] John A. Robertson, "Embryos, Families and Procreative Liberty: The Legal Structures of the New Reproduction," *Southern California Law Review*, 59 (1986), 1030. In O'Neill, 60.

Harmful effects of reproductive treatments for infertility can be compared to other treatments in medicine to show how harmful effects can result from allowing anyone to choose any means of reproduction. The example of a patient who presents with a heart condition will be helpful. Imagine that the physician tells the patient that she can completely cure the patient by performing open-heart surgery. If the patient agrees to the surgery, then the physician will obviously cause harm to the patient, but this harm is not morally relevant, as "there is no objection to our harming someone when we know both that this person will have no regrets, and that our act will be clearly better for this person."[34] Even if the patient dies in the surgery due to a poor heart, the physician has done their best and should not be held morally accountable. Now, let's imagine that a drug exists which could non-invasively cure the heart condition. Here, the physician is at fault if she chooses to perform the heart surgery when an alternative route is available. In this case the physician's actions were not better for that person, as they caused much unnecessary pain.[35]

Similarly, we would not claim that the patient should be allowed to choose highly invasive heart surgery instead of taking a pill, which would alleviate the condition. Not only would such a decision be irrational, it would also cause tremendous problems for the allocation of resources. Here it becomes obvious that possibilities for treatment bar unnecessary and obviously harmful treatment if an alternative creates the same results. Here, we can see that not all options for reproductive assistance should be open to all people. The type of reproductive technology chosen should be selected on the basis of whether it is the best means to fix a specific reproductive problem.

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[34] Parfit, 374.

[35] Example from: Roberts, 87-89.

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