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Genetically Engineering Human-Animal Chimeras and Lives Worth Living

D.R. Cooley
Associate Director of the Northern Plains Ethics Institute
Associate Professor of Philosophy and Ethics
Department of History
402 Minard Hall
North Dakota State University
Fargo, ND 58105-5075
[701] 231-7038

Abstract

Genetic engineering often generates fear of out of control scientists creating Frankenstein creatures that will terrorize the general populace, especially in the cases of human-animal chimeras. While sometimes an accurate characterization of some researchers, this belief is often the result of repugnance for new technology rather than being rationally justified. To facilitate thoughtful discussion the moral issues raised by human-animal chimeras, ethicists and other stakeholders must develop a rational ethical framework before raw emotion has a chance of becoming the dominating justification for public opinion and policy.

Derek Parfit's work on lives worth living for human beings can provide valuable insight into the morality of creating chimeras. As long as their lives are overall good, then bringing them into existence does not harm them even if they are used for medical research or procedures, or they are created to carry on the homo sapiens' "family" line.

Introduction

As the genetic engineering of human-animal chimeras forges new boundaries, more questions about its moral permissibility will arise. Transgenic animals, including chimeras, are created by three different methods: DNA microinjection, retrovirus-mediated gene transfer, and embryonic stem cell-mediated gene transfer. (Margawati 2003) The first method involves the injection of genetic material (a transgene) from one organism into the fertilized ovum of another. (Buy 1997) The resulting organism has the transgene in every one of its cells, thereby making all its cells genetically dissimilar from the two genetic sources. With retrovirus-mediated gene transfer, a retrovirus is used as a vector to transfer genetic material into the host cell. For embryonic stem cell-mediated gene transfer, embryonic stem (ES) cells are introduced into an embryo at the blastocyst development stage. (Buy 1997) These two methods create transgenic animals that are also chimeras, i.e. entities that have cells that are unique to at least two different organisms. The geep, for example, has two cell types, one from a sheep and one from a goat. (Fehilly, et al. 1984, pp. 634-6) Whichever method is used, it is clear that each resultant entity's personal identity is inseparably bound to the time, genetic material, and environment in which it is formed and grows. Therefore, they seem ideal candidates for Parfit's life worth living argument.

In this paper, an argument for why it is morally permissible to create human-animal chimeras to be used for organ transplants, medical procedures, such as pre-clinical testing, research into understanding why transplanted cells localize and differentiate in a host, and for other benefits to human beings will be developed. (National Academies 2005, p. 49) Next, the same conclusion can be drawn even when researchers intentionally create chimeras capable of holding the status of actual or potential human persons. As long as they have lives worth living or good lives, one cannot say legitimately neither that their creation and existence injured them in some way nor that their existence are inherently bad. In fact, there is a good argument that

researchers are obligated to create those chimeras that serve human needs or continue the “family” line when homo sapiens cannot.

Section 1: Human lives worth living

In *Reasons and Persons*, Parfit posits a powerful argument that bringing someone into existence can be a benefit to the individual as long as he has a life worth living. Parfit believes that:

An act benefits someone if its consequence is that someone is benefited more. An act harms someone if its consequence is that someone is harmed more. The act that benefits people most is the act whose consequence is that people are benefited most. (Parfit 1992, p. 69).

Parfit’s notion of benefit is not the one most used in ordinary discourse. First, remote effects are included in an action’s utility calculus as long as the action is necessary to the benefit being received (Parfit 1992, p. 69). Second, Parfit’s benefit notion provides a better way to measure positive gains. For example, the benefit of one action should be compared to the benefits accrued through alternative acts to determine if an agent is actually benefitted by the original action. Suppose that an agent, A, has to select between two actions; one will benefit person B, while the second will benefit person C. Furthermore, suppose that if person B is not benefitted by A, another individual will intervene to give B the same benefit A would have given him. If A does not give C a benefit, then C will not receive a benefit from anyone. For Parfit, A can benefit C, but he cannot benefit B. B’s outcome would have been the same regardless of what A does, but A can positively affect C in a way that C would not have otherwise have been rewarded.

Human-animal chimeras, even if their lives end relatively quickly in comparison to either species from which they come, can have lives worth living.

Causing someone to exist is a special case because the alternative would not have been worse for this person...for this reason, causing someone to exist cannot be better for this person. But it may be good for this person. (Parfit 1992, p. 489)

If we merely consider the alternatives of existence and non-existence, then existence itself cannot be a benefit for anything that exists. The alternative to existence is not to exist, which cannot harm any being for there is no being to injure. Thus, mere existence is not a benefit because there is no alternative in which the person would not have received the benefit. On the other hand, if a person has a good life in which his overall life is more valuable than it is disvaluable, then the person is benefitted; if it is bad, then he is harmed. For those with good lives, it is morally better for him to exist than not to exist. (Parfit 1992, p. 391)

Besides being capable of a life worth living, a person's existence as a whole can be compared to other people's lives or an ideal life for him. Some people have lives that are barely worth living, while others have existences far exceeding the minimal level. (Parfit 1992, p. 489) If a person has a life barely worth living, then he has been benefitted, but a person with a life well worth living is benefitted much more than the former. In Parfit's Risky Policy case, for example, because of a decision we make about immediate social policy, future people will die at the age of 40 from radiation poisoning. (Parfit 1992, p. 372) If we had followed a Safe Policy instead, then the lives of those who would have resulted would have been much longer and of much higher quality than the Risky Policy people. However, even though the Risky Policy individuals have shorter lives than they and others would desire, their lives are still overall worth living. Given that no one is harmed by either choice--if they do not exist, then they cannot be injured and if they do, then they have lives worth living--it follows that no harm is done to those who would result merely by picking the risky policy over the safe one. (Ibid.) There might be other reasons for the action to be unethical, but referring to the future generations' life values will not help establish that case.

Parfit is also an essentialist in regards to personal identity.¹ “If any particular person had not been conceived within a month of the time when he was in fact conceived, he would in fact never have existed.” (Parfit 1992, p. 352) In order to be X and Y’s biological son, for example, he must have a combination of their DNA at a particular time. Thus each person’s identity is in part the result of a specific ovum from his mother and a specific spermatozoon from his father meeting in a particular way at a particular time. (Parfit 1992, p. 352)

Although each person’s complete identity is not wholly dependent on when she was conceived, that event does have great bearing on who the person becomes. In addition to life experiences, the individual’s genetic make-up has significant impact on who the person will be. A person blind from birth due to a genetic condition will turn out to be a much different individual from one born with visual capabilities. That is, if the two are virtually identical in every way except for the fact that one has blindness as a genetic trait while the other does not, they will be essentially different. The former’s conception of life, communication, experiences, etc., allow him to lead an equally good but significantly altered existence from someone who will have incomparable visual life events.

Within the narrow scope of lives worth living, if a moral agent brings into existence a person with a life worth living, *ceteris paribus*, then the agent has done something morally right. Alternatively, if the life is not worth living, then the agent has acted unethically. Moreover, according to how good the life is, the agent can benefit the resulting individual more or less in direct relation to the value of the life. For those with lives barely worth living, then benefit is much less than for those with lives that have great good with small evils.

Section 2: Medical human-animal chimeras

The morality of chimeras and other biotech animals’ engineered existence can be evaluated in the same way as that of human persons. Identity for chimeras must satisfy the same

conditions Parfit's personal identity principle developed for human people has in order for Parfit's argument to work as well as it does for people. Not that biotech animals need to fulfill the criteria for being persons. That would be too high a standard for many of them. However, no one would disagree that chimeras are alive and would not have existed except for researchers' genetic engineering and other related actions.

The most contentious types of transgenics or chimeras are those incorporating human cells or genetic material in some manner. In order to have useful results for humans, the chimeras have to be "biologically humanized" so that they are similar enough to human beings to achieve useful results yet not be human beings that will render them useless for the intended research or other medical purpose. (Robert 2006, pp. 841-2) For example, embryonic stem cell-mediate gene transfer is employed by Zanjani to create his part human/part sheep developed to increase the number of organs available to humans needing transplants. However, rather than injecting human ES cells into a blastocyst, Zanjani waited until a sheep fetus developed adequately before beginning the process. (Westphal 2003) The reason for the delay was to avoid the ethical problems caused by creating an entity that is too closely human. Most researchers, government officials, granting bodies, the public and so on do not want an animal engineered that has human physical features, higher order thinking, or other characteristics that are commonly thought of as being unique to homo sapiens because it raises issues which many are not prepared to evaluate rationally.

This is one reason that many want to prevent chimeras from reproducing. It is not an unjustified fear in the research world given what has already transpired. In some cases, a mouse with human cells, which already exists, can produce human gametes. If two chimerical mice with the requisite gametes breed, then they would create a human fertilized ovum. (Rifkin 2005) Of course, the fertilized egg cannot be carried to term in a mouse uterus, but it would develop as far as it could before the mouse's body rejected it or the mouse died from congenital complications. More troubling is if someone stepped in prior to this time to remove and implant the ovum in a

woman, where it might be able to gestate. It also would be possible to use such techniques as IVF to avoid using the mouse uterus at all for gestation. The result would be a child who would raise moral questions and discomfort about genetic engineering and human dignity.

Of much greater concern is the possibility that chimeras' brains will develop to a point in which they have equivalent moral status to that of a new born human infant. Primates, although their genetic material is highly similar to human beings'--which often makes them the best nonhuman organ donor and useful for other research purposes--are prohibited in many cases from being turned into human-animal chimeras due to this potentiality. In other words, because of the probably transhuman result, primates are too genetically similar to humans to permit researchers to do very much genetic engineering on them. (Greene, et al. 2005; National Academies 2005, 3.b-c)

Even if regulatory agencies and others permitted human-chimera engineering at will, it is a difficult claim to establish that these chimera types can have lives worth living if one focuses on the researchers' primary intentions and motives. After all, the animals are being designed in order to be used for organ transplantation or medical experimentation for the sole benefit of individuals outside of their dominant species. Generally, being created for intentional slaughter tends to make many conclude that the animals should not have been brought into existence for their own sake since their existence is merely a means to a human end. Making matters worse is if the end is for something that could have been avoided, such as the need for transplants for people who lived physically deleterious lifestyles due to their own knowingly imprudent actions. If a person has taken no exercise, has a very bad diet, smokes, and does a variety of other unhealthy activities, while understanding that acting in this manner is likely to injure him, and he has the ability to act in healthy ways, then the morality of creating a sacrificial animal to save such a selfish person could be called into doubt. The innocent creature is being used as an extrinsic good to preserve someone who might not deserve being rescued at the blameless life's loss.

One possible response to the exploitation argument is to link these creatures' existence to that of animals bred and raised for commodities. Granted that some animals are treated in inhumane ways during their growth, sale, and transportation to and slaughter in the abattoir, it does not follow that their overall lives are always full of enough misery and suffering to make their lives not worth living.² All that would have to occur to give them a meaningful existence is for their lives to be more pleasant than not on the whole. Moreover, the higher the ratio of excess pleasure to pain, then the better the life will be.³ Since the standard for a life worth living is so low, many food and other commodity animals would be benefitted from being brought into existence merely with the intention to slaughter them at a later date.⁴

If it is permissible to use animals for food when we--at least in most of the developed world-- do not need this protein source, then it follows that using them for organ transplants and other medical processes or medical experimentation to benefit human persons must also be morally permissible. First, if people have alternative protein and other products normally provided from animal sources and it is still ethical to exploit them in this manner, then medically employing animals to save the imprudent and selfish is also morally right. Second, if the food production argument is sufficient for the imprudent and selfish, then the morality of engineering animals to fulfill the innocent humans' needs must be entailed. If it is ethically justified to act in this way for weaker moral reasons, then trying to achieve a nobler aim would have to be morally justified as well.

Of course, there are very powerful arguments against raising commodity animals when doing so is unnecessary for human persons' flourishing.(Zamir 2004) If the animal as commodities argument fails, however, the notion of more intrinsically valuable entities being permitted to exploit less intrinsically valuable individuals to fulfill the former's vital needs can still provide sufficient support for creating chimeras for medical and other purposes. Although it is controversial to claim that human persons are more important than animals, it is hard to see that many actually reject this position, especially when for instance, there is an insufficient organ

supply to transplant into those human people who need them. (Robert 2006, p. 842) If it is a choice between saving a human child or adult baboon's life, then the baboon's death is less a price to pay. In addition, we deal with animals in ways positively prohibited when it comes to humans in similar circumstances. People do not hesitate to kill a mouse that is eating the food the former need or desire. They have their houses sprayed to eliminate termites, ants, or other insects they consider to be pests. Hitting a bird with the vehicle in which one is traveling does not often generate in anyone the same remorse or regret that hitting an actual or potential person would occasion. The conclusion to be drawn from these and other examples like them is that it is plausible to believe that animals permissibly can be used for human needs. If it is done for human flourishing-which would require they eliminate as much unnecessary animal injury as possible⁵-then the case for the permissibility of this chimera type's engineering becomes stronger. As long as the chimera has a life worth living and the life sacrificed is for real human needs, such as preserving a human person who deserves to have her life saved or researching medical treatments that would benefit innocents, then creating these chimeras with the intention of ending their lives is morally right. This argument becomes even more powerful if the chimeras also have lives worth living, regardless of how short these lives might be. In fact, it seems to be a moral duty to sacrifice these creatures to save the lives of innocent humans. However, if there is nothing in it for animals except an overall bad life, it is a more contentious claim to prove that genetic engineering them is permissible.

Some might return to the genetic engineers' mental states to argue along Kantian lines that creating animals with the primary intention of killing them or otherwise employing them for human needs is sufficient to prove that human-animal chimeras should not be brought into existence. Exploiting the innocent--in this case, chimerical animals--is an essential component of the action that makes the entire action unethical, regardless of the action's outcome. In fact, it would have been better for the chimeras if they had never existed rather than being the result of tainted behavior, and to create them in this inherent degradation environment is to harm them.

The problem with such an argument is clear from Parfit's work: it is impossible to injure something that never exists. At the time when researchers are deciding to design a chimera, there were not three alternatives. They are not deciding between creating a chimera, creating a non-chimera, or doing nothing. A non-chimera is not going to help further the research or medical processes, otherwise this option would have already been taken at a greatly reduced expenditure of time and resources. Researchers, rather, were choosing between creating a chimera and performing an action that has nothing at all to do with chimeras. This reality means that the non-chimera cannot be harmed or benefited because it will never exist in any actual world, and existence is necessary for harm and benefit. Moreover, no harm is done to the chimera as long as its life is at least neutral when considered as a whole. In fact, the chimera can be benefited by being created just so long as its life is worth living, as above explained. Given proper raising, handling, and other care techniques, there is good reason to believe that the animals will have such an existence, albeit shorter than some might want. There are those who might even label the human-animal chimera lives as flourishing up to the moment of death; thus, chimeras created for death are not injured inherently by their mere existence or why they came into being. Finally, even if it was an option between engineering a chimera and non-chimera, creating one would necessarily entail that it is not the other. Recall that genetic material's essential nature and other factors in creating an entity guarantee that chimeras are never the same thing as a non-chimera. Hence, the chimera cannot exist as anything other than a chimera.

Section 3: The Hubris Argument

Although it might seem to delve too far in the realm of science fiction, there might come a time in which researchers begin to think about designing human-animal chimeras to keep some trace of homo sapiens viable. It is clear that the overuse of resources, effects of pollution, and other deleterious environmental factors will eventually make it impossible for homo sapiens

members to live the lifestyles many currently enjoy or even to continue as a species. Since research of this type takes such a long time to yield useful results and public opinion would have to be altered significantly, starting to think about the ethical ramifications of creating human-animal chimeras that will have the moral status of persons is appropriate.⁶

Although some philosophers have argued lucidly in favor of human-animal chimeras⁷, there are many, such as Kass, Fukuyama, and Streiffer, who vehemently oppose the creation of human-animal chimeras that are too much like humans.⁸ Karpowicz, et al., claim that human dignity is degraded “when the family of valuable capabilities at its core are deliberately and wrongfully diminished or eliminated.” (Karpowicz, et al., 2005, p. 120) The intention and other internal states of those creating chimeras, hence, are thought to play a role in the morality of engineering them. As long as researchers do not intend to diminish or eliminate any psychological characteristics associated uniquely with the human brain, and the chimeras do not take on any of these mental features, then it is permissible to engineer them. (Karpowicz, et al., 2004 p. 334)⁹ For Robert and Baylis, the purpose for which the animal came into being helps determine the chimera’s moral status, unlike what occurs in the creation of a human being. (Robert and Baylis 2003, p. 9) Putting aside the fact that no evidence is provided to support the conclusion that there is such a difference,¹⁰ what is thought to make engineering chimeras that are too similar to human persons morally wrong is hubris on researchers’ part. Human chimeras’ moral status relies “primarily on the will and intention of powerful ‘others’ who claim and exercise the right to confer moral status on themselves and other creatures.” (Robert and Baylis 2003, p. 9) The ultimate result of this hubris is an alleged moral confusion about our existing relationships with each other and animals and future relationships with human-animal chimeras, which in turn is a threat to the social fabric and order. (Robert and Baylis 2003, pp. 9-10)

To more fully explicate the hubris argument, it is helpful to turn to work on the ethics of augmenting or enhancing children. If it is morally permissible to enhance them with their generally acknowledged greater moral status, then it would follow that engineering human-animal

chimeras that too closely resemble human persons or have traits that make them too biologically human will have an identical ethical classification.

Bostrom argues that technology can “increase human health-span, extend our intellectual and physical capacities, and give us control over our own mental states.” (Bostrom 2005) Eventually as a result of a sufficient number of incremental changes in the human condition, post-humans that are sufficiently dissimilar to homo sapiens will arise. One fear is that post-humans will eventually view un-augmented humans as inferiors who are only “fit for slavery or slaughter.” (Bostrom 2005) Another concern that has been raised is that such superior creatures would not be interested in mating with the gene poor homo sapiens. (Silver 1998, p. 36)

Sandel provides perhaps the most interesting line of reasoning in this area when he claims that genetic engineering and enhancements are threats to human dignity. (Sandel 2007, p. 24) His justification for the assertion is that the more enhancement that occurs, then the less achievement the person actually has for his features and actions, and the less regard we have for him and his accomplishments. (Sandel 2007, p. 25) Everyone is obligated “To appreciate children as gifts...to accept them as they come, not as objects of our design, or products of our will, or instruments of our ambition.” (Sandel 2007, p. 45) In fact, by believing that we can design the world to fit our needs and desires regardless of what they may be, we lose our humility and place in the world. (Sandel 2007, p. 27)

The results are disastrous according to Sandel. Everyone undergoes an “explosion of responsibility” because each person is obligated to choose how to change reality all the time instead of merely accepting it as something outside our control. In addition, humility decreases while hubris increases. Parents cannot teach their children to be humble in the face of the unbidden when they did not have this virtue themselves when it mattered the most. Hubris in many increases more and more due to our ability to alter reality as we see fit. Eventually, we begin to believe that nothing can stop us from forcing our will on all nature. Finally, there is a solidarity loss in society. Those with greater gifts will not feel noblesse oblige toward the

undergifted as they should, given that they now believe that those without the same augmented features are at fault for not improving their lots in lives through genetic engineering and other enhancement techniques. (Sandel 2007, pp. 86-91) The ungifted, as a result, begin to resent those who are their superiors. In the end, it becomes a class struggle between the naturally and artificially gifted and the ungifted.

Although Sandel considers and rejects a religious and a consequentialist criticism, he never addresses the most plausible and obvious objections to his position. (Sandel 2007, p. 92) No one would disagree that parents who design their children for evil reasons, such as improving the morally irrelevant characteristics the child will have, act unethically. Genetic engineering is not unique in this matter. Any parent who creates a child primarily to feed his own self-esteem or for some other selfish reason is a reprehensible person. These people do not deserve to have the gift of children because they harm them and contribute to society's degradation by treating reproduction as some form of materialistic endeavor.

However, there is nothing inherently wrong with modifying children. If the intention and other mental states are benign on the whole and the life is worth living, then the engineering is permissible.¹¹ As Sandel does acknowledge, we admire parents who seek the best for their children. (Sandel 2007, p. 50) If we have parents who are aware that their child would be far better off with a genetic characteristic they cannot provide her through non-artificial means and they enhance her, they are acting in the child's best interests as parents should. Although Sandel explicitly rejects liberal eugenics, if a genetic enhancement will not interfere in the product's autonomy/life plans and it improves humankind or promotes the entire society's collective welfare, then it is permissible to perform the genetic engineering. (Sandel 2007, pp. 75-8) Humility can also be a central component of the action. If parents enhance because they cannot change the world to accept their child or give her equal opportunity for success for what she would be without the genetic change, then they humbly accept the unalterable unbidden. Provided that humility really does require acceptance of the given, it does not follow that humility

requires acceptance of all the givens. Otherwise we would merely allow nature to do with us as it will instead of controlling any aspect of our lives. If we are striving to improve future generations' lives, then alteration of the given is permissible—if not obligatory in some cases.

The standards applied to enhancing human children are equally applicable to genetically engineering chimeras that will be persons. If the action is performed out of hubris, lack of humility, or for other evil mental states on the whole, then the action is unethical, although there is no reason to claim that the entity's existence is morally bad. The latter is determined by whether the chimera has a life worth living. On the other hand, if the mental states are good on the whole, then creating chimeras is morally right provide that they have lives worth living. As long as there is a good reason to alter radically the genome in this way, then doing so is merely an expression of our humanity as persons. (Savulescu 2003, p. 24)

Conclusion

The alteration of genomes make many people begin thinking about the evils caused by eugenic programs that demeaned and destroyed many human persons. The aura of Nazi Frankensteinism becomes greater when it is creating animals that have human characteristics. However, discomfort is insufficient evidence to decide any moral issues, although it might be useful as a sign that something has gone wrong. If it can be shown that there is a great need for the technology, then it becomes much more likely that those who now question it will be more willing to re-evaluate their concerns and, perhaps, decide that such creatures are morally permissible to create. (Franklin 2003, pp. W25-6) If the chimeras are for the clear, obvious benefit of those who need them in order to survive, then many will start rethinking their initial emotive reactions.

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¹ Jones and Kripke have made similar claims about identity and necessity. See Jones 1981, p. 249 and Kripke 1980, p. 114 footnote. A table's identity, for example, is bound up essentially with the exact wood that is used to make it.

² Leahy would argue that raising animals for meat eating is actually a benefit to their species because it keeps the species viable. (Leahy 1991, p. 210)

³ This would be part of an argument for more human processes for animal use in the food supply.

⁴ Chickens, swine, cattle, and other animals raised in barbaric conditions would most likely not have lives worth living.

⁵ One cannot flourish while simultaneously exploiting other sentient creatures as mere means.

⁶ Proving a duty to produce creatures that will be persons will be a difficult task. However, if people wish to have offspring and want the best for them, then in a world of limited resources and an environment inhospitable to human beings, chimeras might be the best solution.

⁷ See Eric Sotnak's "Nonhuman Chimeras with Human Brain Cells."

⁸ See Kass' *The Ethics of Human Cloning*; Fukuyama's *Our Posthuman Future: Consequences of the Biotechnology Revolution*; and Streiffer's "In Defense of the Moral Relevance of Species Boundaries" and "At the Edge of Humanity: Human Stem Cells, Chimeras, and Moral Status."

⁹ Johnson and Eliot, on the other hand, argue against creating chimeras that are compromised human beings. Intentionally creating such creatures would reflect badly on both the creators and those who allow it to happen, e.g., relevant groups and societies who know about it. (Johnson and Eliot 2003, p. 7)

¹⁰ Bok notes that it is unclear why membership in a species entails radically different moral status. (Bok 2003, p. 26)

¹¹ I will assume no requirement that all the mental states have to be pure or primarily good in order for the action to be morally right.