

## Title: Genetic Engineering: (How Far) Should we Shape Nature for Human Ends?

<b>Time:</b> 70-140 minutes (1 or 2 class periods)	<b>Unit:</b> Ethics/Philosophy of Science	<b>Topic:</b> Thinking about the ethical implications of Eurocentric Science
<b>DESCRIPTION</b>		
<p>This is a one or two-part lesson plan in bioethics to make connections among various topics in philosophy and advances in medical and biological sciences.</p> <p>In the first class, students will be asked to articulate their initial assumptions and beliefs about genetically engineered animals. The class will then explore how different moral theories might approach the question of the permissibility of modifying nature for human ends. The class ends with a discussion and reflection on the initial assumptions and whether these have changed.</p> <p>In the second class, students will prepare a presentation representing various positions on a proposal to prohibit the creation of genetically modified organisms. Then, taking the various positions into account, the students will try to come up with some policy recommendations that compromise among the positions.</p> <p><i>Acknowledgement:</i> I would like to acknowledge Deborah Stevens and Lynne Bowyer who introduced me to Patricia Piccinini's art.</p>		
<b>Learning Goals</b> By the end of this lessons, students will be able to: <ol style="list-style-type: none"> <li>1. Articulate their initial reaction to imagined genetically modified animals</li> <li>2. Articulate the main approach of a few moral theories</li> <li>3. Assess how these moral theories would analyze the permissibility of designing animals for human ends</li> <li>4. Consider how to negotiate among opposing moral perspectives</li> </ol>	<b>Agenda</b> <i>Class 1</i> <ol style="list-style-type: none"> <li>1. What is it? Reactions to images of imagined genetically modified animals</li> <li>2. Introductory comments</li> <li>3. Case Discussion 1</li> <li>4. Reflection, explanation, and consideration of initial reactions</li> </ol> <i>Class 2</i> <ol style="list-style-type: none"> <li>5. Case Discussion 2</li> <li>6. Four Corners Activity</li> <li>7. Stakeholder decision-making</li> <li>8. Group presentation and summative activity</li> </ol>	<b>Materials and Resources</b> <ul style="list-style-type: none"> <li>• Internet enabled computer and projector</li> <li>• Post-it-notes or some other way to record initial impressions of images.</li> <li>• Bristol board</li> <li>• Glue</li> <li>• Flip chart to record class discussion</li> <li>• Markers</li> <li>• Class copies of appendices 2, 3, 4, and 5</li> </ul>
<b>CURRICULUM EXPECTATIONS</b>		
<p><b>Ethics:</b></p> <p><b>Overall Expectation:</b></p> <ul style="list-style-type: none"> <li>• demonstrate an understanding of the main questions, concepts, and theories of ethics</li> <li>• illustrate the relevance of philosophical theories to concrete moral problems in everyday life</li> </ul> <p><b>Specific Expectation:</b></p> <ul style="list-style-type: none"> <li>• demonstrate how the moral problems and dilemmas that occur in everyday contexts can be effectively analyzed using a variety of different philosophical theories</li> </ul> <p><b>Philosophy of Science</b></p> <ul style="list-style-type: none"> <li>• demonstrate an understanding of how philosophical questions apply to disciplines such as, physics, mathematics, and psychology;</li> <li>• evaluate the strengths and weaknesses of the responses to some questions of natural and social sciences defended by some of the major philosophers and schools of philosophy, and defend their</li> </ul>		

<p>own responses.</p> <p><b>Research and Inquiry Skills</b></p> <p><b>Overall Expectation:</b></p> <ul style="list-style-type: none"> <li>• Correctly use the terminology of philosophy</li> </ul> <p><b>Specific Expectations</b></p> <ul style="list-style-type: none"> <li>• <i>Using Reasoning Skills:</i> apply logical and critical thinking skills to problems that arise in jobs and occupation</li> <li>• <i>Using Communication Skills:</i> clearly explain their own views in philosophical discussions in class and in other types of exchanges</li> </ul>		
<b>PLANNING NOTES</b>		
<p>This lesson can be taught as one class period or two. The second class is optional.</p> <p><b>Prior Reading For Teachers</b></p> <ul style="list-style-type: none"> <li>• The Belmont Report (USA Research Ethics) <a href="http://www.hhs.gov/ohrp/humansubjects/guidance/belmont.html">http://www.hhs.gov/ohrp/humansubjects/guidance/belmont.html</a> <i>This resource is useful as a quick description of the principlist approach</i></li> <li>• Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (Canadian Research Ethics) <a href="http://www.pre.ethics.gc.ca/pdf/eng/tcps2/TCPS_2_FINAL_Web.pdf">http://www.pre.ethics.gc.ca/pdf/eng/tcps2/TCPS_2_FINAL_Web.pdf</a> (Chapter 1 “Ethics Framework” and Chapter 13 “Human Genetic Research”) <i>This document is useful for thinking about the ethics of genetic engineering in a Canadian context</i></li> <li>• Assisted Human Reproduction Act <a href="http://laws-lois.justice.gc.ca/eng/acts/A-13.4/page-2.html#h-4">http://laws-lois.justice.gc.ca/eng/acts/A-13.4/page-2.html#h-4</a> (“Prohibited Activities” esp. 5(1) i-g) <i>It is worth noticing that the creation of human-animal hybrids such as “The Carrier” or “Big Mother” would currently be illegal in Canada. The law could change in the future, however.</i></li> </ul>		
<b>ASSESSMENT</b>	<b>TIME</b>	<b>LESSON 1 DESCRIPTION</b>
<p>Assessment FOR Learning (AfL)</p> <p>Assessment AS Learning (AaL)</p> <p>Assessment OF Learning (AoL)</p>	10-15 minutes	<p><b>MINDS ON</b></p> <ul style="list-style-type: none"> <li>• Establishing a positive learning environment</li> <li>• Connecting to prior learning and/or experiences</li> <li>• Setting the context for learning</li> </ul>
		<p><b>What is it?</b></p> <p>Show one of the Images from <a href="http://www.patriciapiccinini.net/">http://www.patriciapiccinini.net/</a> (all images are licenced for educational use although it is always good to let the artist know if you are going to use her work <a href="http://www.patriciapiccinini.net/contact/65/83">http://www.patriciapiccinini.net/contact/65/83</a>)</p> <p><i>Recommended image: “Undivided”</i></p> <p><a href="http://www.patriciapiccinini.net/156/73">http://www.patriciapiccinini.net/156/73</a></p> <ul style="list-style-type: none"> <li>• Have students look at the image(s) for several minutes (say 10-15 minutes). This might seem like a long time, but part of the purpose of the image exercise is to reflect slowly on what they are seeing and to have time for several initial reactions.</li> <li>• Give them some way to record their initial impressions of the image (e.g. post-it notes, index cards, construction paper, etc.) Have the students record one reaction per means (e.g. one reaction per post-it-note); these reactions can be contradictory.</li> <li>• Have students post their reactions somewhere visible in the room or on a poster board. If the class is large you might consider making several poster boards, perhaps divided into different kinds of reactions (e.g. positive, negative, etc.)</li> </ul>

	20-30 minutes	<p><b>ACTION</b></p> <ul style="list-style-type: none"> <li>Introducing new learning or extending/reinforcing prior learning</li> <li>Providing opportunities for practice and application of learning (guided &gt; independent)</li> </ul> <p><b>Case Discussion 1: “The Carriers and Big Mothers”</b></p> <ul style="list-style-type: none"> <li><b>TRANSITION:</b> teacher instructs the class to return to their seats and distributes the Appendix 2, the case discussion handout.</li> <li>Choose some of the ethical theories previously discussed in class (e.g. the principlist approach to bioethics, Confucianism, stoicism, hedonism, utilitarianism, existentialism, nihilism, ethical relativism, moral particularism, moral pluralism, virtue ethics, casuistry, care ethics, feminist ethics, rights theories, etc.). The theories chosen should be ones that are likely to lead to different answers when analyzing the case discussion.</li> <li>If students have already completed the “Eurocentric science and Indigenous Ways of Knowing” lesson created by Jamie M.A. Smith, and/or the “Aboriginal Ethics and the Environment” lesson created by Anne Pringle the class could consider indigenous ways of knowing as part of the ethical theories mentioned above.</li> <li>The teacher should remind the students of the main approaches of these theories, especially those aspects that are relevant to the case discussion.</li> </ul> <p><b>Note:</b> the discussion of the theories can take place during the case discussion, introducing one at a time and considering how that approach would look at this issue. This way student’s don’t have to remember the main approaches of multiple theories at a time.</p> <p>Show one or two of the Images from <a href="http://www.patriciapiccinini.net/">http://www.patriciapiccinini.net/</a> (all images are licenced for educational use although it is always good to let the artist know if you are going to use her work <a href="http://www.patriciapiccinini.net/contact/65/83">http://www.patriciapiccinini.net/contact/65/83</a> )</p> <p><i>Recommended image:</i>      “The Carrier” <a href="http://www.patriciapiccinini.net/44/93">http://www.patriciapiccinini.net/44/93</a> and/or      “Big Mother” <a href="http://www.patriciapiccinini.net/167/83">http://www.patriciapiccinini.net/167/83</a></p> <ul style="list-style-type: none"> <li>Together as a class, discuss the case. Record the discussion on the flip chart.</li> <li>The case discussion questions or the number of theories considered can be modified as needed to fit the time allotted for the class.</li> </ul>
	15-20 minutes	<p><b>CONSOLIDATION</b></p> <ul style="list-style-type: none"> <li>Providing opportunities for consolidation and reflection</li> <li>Helping students demonstrate what they learned</li> </ul> <ul style="list-style-type: none"> <li>Students return to their own initial reactions recorded on the post-it notes from the “What is it?” exercise and read the ones that were posted by others</li> <li>Students have an opportunity to ask about some of the reactions and explain their own reactions</li> <li>As a class discuss whether these initial reactions have shifted at all as the result of the case</li> </ul>

ASSESSMENT	TIME	LESSON 2 DESCRIPTION
Assessment FOR Learning (AFL) Assessment AS Learning (AaL) Assessment OF Learning (AoL)	25 minutes	<b>MINDS ON</b> <ul style="list-style-type: none"> <li>Establishing a positive learning environment</li> <li>Connecting to prior learning and/or experiences</li> <li>Setting the context for learning</li> </ul>
		<b>Case Discussion 2</b> <ul style="list-style-type: none"> <li>Remind the class of the discussion from last day referring to the flip chart. Distribute appendix 3.</li> <li>Read the new case, perhaps while showing another picture of the Big Mother.</li> </ul> <b>Four Corners Activity</b> In each corner of the room have a sign for each of the groups identified in Case Discussion 2: Animal Rights Activists, Skeptics, Designer Pet Owners, Scientists <ul style="list-style-type: none"> <li>Students should join the group they most agree with. Ideally, there would be approximately the same number of students in each group. If there is one group that is not represented, then students might have to be randomly allocated to a group.</li> <li>I think there are both advantages and disadvantages of having students choose their own group vs. being assigned a group. The advantage of choosing a group is that the reasons students identify to support their view are likely to be stronger reasons. The disadvantage is that students will not be asked to move beyond their own individual perspectives. The advantage of taking a different perspective than the one the student agrees with is that many philosophy-related jobs require skills of making implicit values explicit. For example, if one is engaged in clinical ethics the job is not to present the “right” values, but instead to be able to describe a differing value set (for e.g. to the MD) in a way that makes sense (to the MD given the MD’s values). So the job is mainly one of values interpretation, and making implicit values explicit, rather than one of “winning” the argument.</li> <li>Ask students to talk with the other students in their corner about why they chose the group they did.</li> <li>Students should try to think about how they would present their position to convince a government policy maker to adopt their view.</li> <li>Have volunteers from each group present the position to the whole class.</li> </ul>
		<b>ACTION</b> <ul style="list-style-type: none"> <li>Introducing new learning or extending/reinforcing prior learning</li> <li>Providing opportunities for practice and application of learning (guided &gt; independent)</li> </ul>
		<b>Stakeholder decision-making</b> <ul style="list-style-type: none"> <li><b>TRANSITION:</b> after each group has presented their positions have them form new groups. This time there should be at least one representative from each corner in each of the new groups to advocate for that position. There can be any number of new groups as appropriate for the class size. Distribute appendix 4 to each group.</li> <li>The new groups are now going to take on the role of a government policy-maker who is trying to find a solution that can be morally</li> </ul>
	20 minutes	

	20 minutes	<p>justified and will represent a negotiated compromise among the perspectives of the four previous groups (animal rights, skeptics, designer pet owners and scientists).</p> <ul style="list-style-type: none"> <li>• The groups should complete appendix 4 and they should be encouraged to think of creative solutions.</li> <li>• The groups should also think about how they will present their solutions and justifications to the class.</li> </ul>
		<p><b>CONSOLIDATION</b></p> <ul style="list-style-type: none"> <li>• Providing opportunities for consolidation and reflection</li> <li>• Helping students demonstrate what they learned</li> </ul>
		<p><b>Group Presentations and Summative Activity</b></p> <ul style="list-style-type: none"> <li>• Have each group present their solutions and justifications to the class.</li> <li>• As the groups present have students complete appendix 5 the summative activity</li> </ul>
<p><b>Accommodations</b></p> <ul style="list-style-type: none"> <li>• Cases could be described with visual details of images</li> <li>• Rather than writing reactions, students could draw their reactions</li> </ul>	<p><b>Reflection</b></p>	
<p><b>Appendices</b></p> <ol style="list-style-type: none"> <li>1. Teacher comments</li> <li>2. Case Discussion 1</li> <li>3. Case Discussion 2</li> <li>4. The Stakeholder Approach</li> <li>5. Summative Activity</li> </ol>		

## Appendix 1: Teacher Comments

# Case Discussion 1 “The Carriers and Big Mothers”

The goal for this case discussion is to consider how some moral theorists might approach the question of whether it is morally permissible to engineer animals for human ends. The teacher should lead the discussion by pointing out the main approaches of some of the moral theories that have already been discussed in class and asking leading questions about them. For example:

- Kantians believe that only rational beings are members of the moral community to whom we owe direct duties. Are the designer animals rational? Would Kantians include them in the moral community?
- Utilitarians think that we should treat all sentient beings as moral equals. Are the designer animals sentient? Utilitarians also think that we should do whatever has the consequences that maximize good outcomes for all sentient beings affected. How would we assess the harms and the benefits in this case?
- Feminist ethics is concerned to identify and work to remove oppression and social injustices. Are there any factors in this case that contribute to or ameliorate oppression or social injustice?
- Indigenous ways of knowing are monistic, wholistic, relational and spiritual. Relational ways of knowing show respect for all creation and think that understanding the world requires living in harmony with it, whereas dominating the world disturbs the balance and equality among relationships (from Jamie Smith’s lesson). What are some of the ways that indigenous perspectives might approach this case?

### Sample answers for the discussion of case 1 (from above)

- Since the designer animals are not rational, Kantians would say that we do not have direct moral duties to them. Kantians would say that we should still treat the designer animals well, for example we should not hit them or abuse them, because treating the animals poorly would degrade our own rational nature.
- The designer animals are sentient because they can be caring, attentive and depressed. Utilitarians would consider the depression of the designer animals to be significant because it indicates that there might be something harmful about the arrangement. However, in many cases the humans are more numerous than the designer animal (e.g. one Big Mother cares for several infants and assists any parents involved). Whether the needs of the many will outweigh the harms to a few depends on how significant the harm and how great the benefit.
- Feminist ethicists are concerned with all forms of oppression (racism, sexism, classism, etc.) and the interactions among the kinds of oppressions, but they consider women’s oppression to be particularly salient. Feminist ethicists might think that the development of the designer animals is positive since they would significantly ease women’s obligations to care for young, weak, vulnerable, frail, or ill members of society. Some feminists might be concerned about the oppression of The Carriers and Big Mothers. These feminists would not think it is permissible to alleviate the oppression of one group (women) at the expense of another (designer animals). But it is not clear if the designer animals are oppressed. Most feminist ethicists are fine with the idea of having pets. Does the mere fact that designer animals look humanoid change that?
- It seems like some indigenous perspectives might resist the genetic design of animals to suit human ends. This project does not recognize that “Parts of nature have meaning only in terms of their interrelationships with the whole of nature” (from Jamie Smith’s lesson). Instead, it selects those parts of nature favoured by humans. Trying to bend nature to human desires to the extent present in the case seems to ignore the requirement to “participate fully and responsibly in [harmonious] relationships” (from Jamie Smith’s lesson) with nature. Instead it seems to dominate nature and disrupt balance and equality.

## Appendix 1: Teacher Comments

# Case Discussion 2

The goal of this case discussion is twofold: first, to think about one's own values with respect to the positions mentioned in the case, and second, to think about how one might negotiate among different perspectives that encode differing values. The case was written with the hope that different values are implicit in the differing positions, but these values are not made explicit. One of the things that students might do is to try to make the implicit values more explicit.

In addition, many of the arguments from the different groups were drawn from arguments offered in a different, real-world, context. For example, the animal rights activist says she can communicate with her Big Mother, but no one else can communicate with the Big Mother. This is an issue that has arisen with "facilitated communication" which is used to assist people with communications difficulties. Some people do not think that it actually allows communication and instead they believe that it involves the facilitator imposing their views and pretending they come from the person with a disability. There was a case involving Anna Stubblefield who was charged with sexual assault because it is not clear that the person she was working with actually gave consent.

To give a second example, the arguments offered by the families who think they are helping the designer animals are very similar to the arguments that were offered by pro-slavery groups around the time of the US civil war.

For the scientists, they have concerns that seem altruistic and focused on the designer pets, but some of these concerns might be motivated by self-interest because of the possibility of further research funding.

**Appendix 2: Case Discussion 1**

## “The Carriers and Big Mothers”

**The Case**

Imagine genetic science has advanced to the point where we can design animals to precisely meet human needs and desires. Scientists are careful to ensure that although these designer animals can be trained, like a dog, they are not fully rational like a human being. These new animals provide wonderful benefits to human beings.

For example, “The Carrier” can help the elderly live independent lives; he can help ensure mobility for those who cannot walk; he provides companionship for those who are lonely. Although Carriers were originally designed to provide assistance to the elderly and those who have disabilities, they are beginning to become popular among single people and families. Carriers are expensive, but they are useful and can assist with household chores and carry heavy items around the house or on camping trips.

Another example, “Big Mother,” has been designed to help care for human infants; she can lactate human milk throughout her whole life. She is gentle and attentive. Although Big Mothers are expensive, they can care for several children at once and they are cheaper than enrolling several children in early childhood learning centres. Newer versions of the Big Mother can act as artificial wombs and early embryos can be implanted in a Big Mother who gestates the fetus and gives birth. Big Mothers have become very popular and they free parents from some of the demands of caring for young children. Women, in particular, love Big Mothers as they allow women to focus on their careers while they are young and still raise a family. In cities where there are a lot of Big Mothers, the wage gap between men and women has begun to disappear. Being a single parent is now much easier.

People who have purchased these new designer animals treat them well, much like they treat family pets. However, the designer animals have begun to exhibit signs of depression. Scientists are not sure how to explain the depression or what is causing it, and so far there has been no way to treat it.

**Questions**

1. Why do you think the designer animals are depressed?
2. Do you think it is morally permissible to create new forms of life for the sole purpose of benefiting humans?
3. How would the moral theories approach an answer to question 2?
4. Which moral theory do you think gives the best answer? Why?
5. Which moral theory do you think gives the weakest answer? Why?
6. Is genetically modifying animals to suit human ends morally different from breeding animals to suit human ends? Why or why not?

**Appendix 3: Case Discussion 2 and Four Corners activity**

## “Big Mother Speaks”

**The Case**

An animal rights activists claims she has been able to develop a means of communicating with the Big Mother who raised her. They use a form of sign language, although they do not use a standard form such as ASL. The activist claims that Big Mother is depressed because she doesn't like being kept in captivity. Big Mother appreciates that her owners feed her and treat her well, but Big Mother wishes she could have a family of her own. The animal rights activist thinks that the Canadian government should pass a law to prohibit the creation of any more designer animals and all existing designer animals should be set free.

No one else has been able to learn to communicate with a Big Mother or a Carrier. Some people are skeptical and think the animal rights activist is lying about her communication with Big Mother. The skeptics hired some experts in the linguistics of sign language who say that they have observed the interactions between the activist and Big Mother and they do not believe that there is any actual communication going on. The skeptics think that designer animals are useful and we should continue to create them and keep them as pets.

Many families that own designer animals are incensed by the activist's suggestions. They say they love their Big Mothers and their Carriers. The families say they would be heartbroken if they had to give up their designer animals. In addition, many designer pet owners say that the Carriers and the Big Mothers wouldn't be able to survive on their own. They are not intelligent enough to get jobs, and they would be vulnerable to predators if they tried to live in a forest. These families think that the designer animals should be grateful to live with humans who love them and take care of them. These designer pet owners oppose the idea of freeing existing designer animals, but they would be willing to compromise and agree to a ban on creating any new designer animals.

Some of the scientists who created the Big Mothers and Carriers are concerned by the activist's suggestions. They had already noticed that some of the designer pets were depressed. These scientists are worried that they had not gotten the genetic engineering quite right and the animals might be more intelligent than they anticipated. The scientists think that perhaps we should free the existing designer pets, but they say with a little more research funding they should be able to figure out how to create a new strain of designer pets who would be happy to live in captivity with humans. These scientists support freeing existing designer pets, but they are opposed to a ban on the creation of new designer animals.

**Activity**

Choose to be a representative of one of these groups that you most agree with. Meet with others to discuss how you would present your position to the Canadian government in 2 minutes.

**Appendix 4: The Stakeholder approach**

Names of Group Members:

What is the ethical issue?	
1. Relevant Facts (known)	2. Questions that remain (unknown, need to know)
3. People or entities affected by the decision	4. Values, concerns, and ethical perspectives of those affected by the decision
5. Possible solutions	
6. Decision and justification (refer to the values, concerns, and ethical perspectives listed in box 4)	

**Appendix 5: Summative Activity****Summative Activity and Assessment**

1. What solutions were offered by the groups?
2. Which group do you think presented the solution that offered the most satisfying compromise among the positions? Why?
3. Do you think your initial reaction from last class affected the group you wanted to represent in the four corners discussion? If so, how?
4. What were some of the strengths of the solution offered by your group?
5. What were some of the weaknesses of the solution offered by your group?
6. In the solution proposed by your group were any of the views discounted or left out all together? If so, why?