

*The Paradigm of Animal Experimentation*

This past summer, neighbors of mine fostered a one-year-old beagle puppy. I naturally walked over with my dog to visit the puppy as soon as I found out about his arrival. However I noticed that this beagle was not behaving normally: he did not get excited to see people that wanted to pet him, he had no bark, and he would not really interact with my dog in ways that other dogs would. Sure, when I walked over he seemed happy — he wagged his tail, strutted over to me, and kept close for a few seconds — however he did not try to make eye contact with me or jump for joy like a small beagle puppy normally would. When I tried to look in his deep brown eyes, they would not look back at me or even attempt to. All movements and actions, from footsteps to sniffing, were passive, almost sullen. I soon learned that this beagle was raised in a for-profit company research lab, and just a few days before my visit was the first time he had ever been outdoors and set foot (or paw, rather) on grass. Learning this clarified for me the behaviors of this dog. I could tell that each small sniff of the outdoor air seemed overwhelming to him, since his heightened sense of smell had been limited to the indoor scents of concrete and drywall. While in the lab he was forcibly given a parasite to test a prototypical medicinal cure which luckily succeeded to make him physically healthy again. Unfortunately, the psychological effects of such a life impacted the beagle's ability to function normally. Seeing this as he was as a result of just living in a lab was personally alarming and my mind raced with seemingly rhetorical questions. Why was this dog's life not as valuable as the lives of other dogs he would

help? Why are some animals, including humans, more worthy of treatment than others? Is it truly more ethical to test on some animals? Is any of this testing even necessary? Are there better alternatives to imprisoning animals for the benefit of scientific, cosmetic, or educational advancement? With that in mind, I questioned the reasons why people justify the use of animal experimentation, and why it continues today. Throughout this paper, I will focus on how the paradigm of animal testing was created by its own history, how we are operating within normal science today and the moral trade-offs animal testing faces, and how the current paradigm of animal testing is eventually going to shift.

I will begin by introducing the origins of animal experimentation and how the method is intertwined with scientific advancement throughout history. Animals have been used for testing since Ancient Greece, where scholars such as Aristotle and Erasistratus used them for experiments (Hajar). Aristotle, in particular, was curious about the parts of animals and the real or imaginary uses of different structures. This proved to be challenging for him, since science was still so underdeveloped in all of its fields at the time. He had no previous knowledge, yet still took on studying animals to advance the scientific knowledge base. Aristotle spent many long hours dedicating his studies to his observations of animals, yet he failed to create any true advancement (his findings reduced animals to two different groups: animals with vertebra and bloodless animals [Ogle]). However, this caused him to become known as one of the first well-known philosophers to deeply consider animals in relation to academia. It was not until much later in history that scientists used specific animals in a laboratory setting to test specific measures.

In seventeenth century France, Descartes philosophized dualism, which is the theory that there is a separate body and immaterial mind, and through his own method of reasoning, he argued that animals had no awareness or feeling of any kind; including the idea that animals could feel no pain (Cottingham). His ideology is likely what contributed to the extent of animal testing later on, and led to what reshaped the paradigm of consciousness. Animals were seen as biologically similar to humans, however they were perceived to be totally without feeling. This ties closely with the Judeo-Christian ideology of humans being far more superior than animals, which allowed people to treat animals as poorly as they so pleased, since doing so would not break any moral obligations. Later in the seventeenth century, the earliest animal testing began to be discussed and literature began to be published on the topic. The idea of animal rights emerged contemporaneously and spread exponentially. Later in the eighteenth century, Charles Darwin studied animals and provided normal science with great insights regarding many soon-to-be relevant features. Darwinism deeply shifted how the scientific community viewed animals and the connectivity between the different species. It subsequently altered the way in which scientists view certain animals compared to humans and opened the door to more in-depth exploration of physiology and the similarity between species. In the 19th century, Claude Bernard -- who became known as the father of physiology -- wholly believed that performing experiments on animals was an accurate and sufficient way to determine what the effects of substances would be on humans.

Today, many advancements in science are in part due to animal experimentation. For example, many advancements in the field of psychology are due to experimenting with primates.

Harry Harlow was a psychologist who studies child development, and his use of primates took advantage of the striking similarities between humans and rhesus monkeys (Suomi, Horst, van der Veer). In the 1950's, he studied the dependency of infant monkeys by isolating these animals. In one experiment, he took them away from their mother and placed them in a small, contained environment with a doll made of cloth that was shaped like their mother, and a doll made of wire from which the monkey could nurse. Once the monkey became relaxed, Harlow presented it with what it perceived to be a threat in the corner of the cage: a loud, clanging frightening humanoid robot with blinking lights for eyes and sharp metal teeth. The baby monkey could not escape the cage and run away from this except to one of the mothers. He was able to make advancements in the development of attachment theory due to the testing, but at an ethical and psychological cost to the animal test subjects.

The history of animal experimentation is blanketed by a term philosophers refer to as normal science. This term, normal science, was made popular by the philosopher of science Kuhn, who believed that science constantly works under a paradigm. In order to understand what normal science is, one must first know what a paradigm is. Kuhn understood a paradigm as being comprised "... of the general theoretical assumptions and laws and the techniques for their application that the members of a particular scientific community adopt (Chalmers, 108)." In other words, he believed that science is guided by an intuition of shared beliefs that are not part of science education and that science consistently applies those shared beliefs (Kuhn). Normal science, then, is the articulation and development of a paradigm in the scientists' "attempt to account for and accommodate the behavior of some relevant aspects of the real world as revealed

through the results of experimentation” (Chalmers, 108). So, normal science is the scientific practices within a paradigm. Animal experimentation is normal science because it is normal for scientists to utilize this method when trying to reach relevant scientific conclusions. We operate within it by testing animals as we please as long as it eventually comes out to benefit either a company or the scientific community in general. Scientists today conduct research on animals for a variety of purposes, from education to cosmetics, simply because they can and it works.

However, there is a moral tradeoff to animal experimentation. In some fields, such as cosmetics, animal experimentation is completely unnecessary and work done on animals in this field is solely taking advantage of the paradigm. In these fields, there are other cost-effective methods for completing research. (I will not get into the specifics in this paper, but many large make-up brands have become cruelty-free). For other fields such as medicine and treatment-testing, animal experimentation can contribute to findings that save thousands of human lives. Animal testing is cost-effective, scientifically expedient, and is less harmful than testing on humans. But when do we draw the line? How many little mouse bodies must pile up in a laboratory’s trash bin before a researcher ponders a new way to approach achieving scientific solutions?

To revisit the moral debate between humans and animals, it is necessary that we question the morals behind animal testing, and therefore the moral debate regarding animals and humans. We operate in a paradigm where normal science consists of both testing on animals and questioning those motives. Are animals moral beings that deserve rights just as much as humans,

or is there an animal hierarchy where humans stand above all other species? Probably neither. However, if humans are not superior to non-humans, where do we draw the line? If we cut it too close, we find ourselves doing what we do today such as keeping animals in small cages and only letting them out to whip them on the stage of a circus. If we extend the line too far, we find ourselves condemning others for exterminating a rat in their basement or killing a spider on their leg. With regard to animal experimentation, how do we know how far is too far in terms of harm caused by experimentation? Animals already die, but I believe the line should be drawn when any animal dies in vain. This leads into my next argument: scientists do not truly know if animals are moral beings.

People tend to attempt to either support or oppose animal experimentation through a small self-made philosophical window containing only one moral philosophy (Foëx). A person might oppose animal testing by taking on virtue ethics and saying that scientists continue with animal testing because they don't have the good virtues that allow them to see the scale of the harm being done. A different person might justify their claim in support for animal testing by taking on utilitarianism and saying that the benefits outweigh the harm done by animal testing. Animal testing is not universally right nor wrong; each person interprets the paradigm differently in accordance with their own moral theory that they have developed throughout their lives due to personal experiences.

Working directly with animals, however, has given scientists perspectives of their own. To step back into history again, scientists such as Pequet and Harvey in the mid seventeenth

century would perform vivisections on animals in order to study the heart (Meli). With the limited tools and technology scientists had then compared to today, the experiments were not very humane and the animals used were not protected under any rights. “Some of these vivisection experiments appeared exceedingly cruel and many spectators expressed their unease and discomfort at witnessing or performing them (Meli).” This discomfort would have philosophical significance to researchers and the community. I believe it is this discomfort that drove scientists to accept the pleas for animal rights and the discontinuation of animal experimentation in some settings. In the eighteenth century, the natural philosopher Hales continued with these vivisections but made it known that he did his practice on deceased animals because of the “disagreeableness of anatomical dissections’ (Meli).” He compared his measurements of a horse’s heart rate when in pain and terrified versus not in pain or terrified under vivisection (Meli). So, even as early as the mid eighteenth century, people started noticing problems with performing experiments on live animals.

Fortunately, in the last fifty years, there has been significant moral progress -- if one takes the stance of a moral universalist -- with regards to the way animals are treated in countries belonging to the European Union. During this time, the “3Rs” were developed and refined, and they stand for replacement, reduction, and refinement. Replacement meaning to accelerate the “development and use of models and tools, based on the latest science and technologies, to address important scientific questions without the use of animals (The 3Rs)”; reduction meaning “appropriately designed and analyzed animal experiments that are robust and reproducible, and truly add to the knowledge base (The 3Rs)”; and refinement meaning to advance “research into

animal welfare by exploiting the latest in vivo technologies and by improving understanding of the impact of welfare on scientific outcomes (The 3Rs).” Even prior to the 3R’s, the US Federal Food, Drug, and Cosmetics Act of 1938 required that drugs would have to be tested on animals before they could be marketed in response to mass poisonings caused by companies selling products that contained a solvent that turned out to be poisonous to humans (Hajar). The cruelty of science seems to have not been solved with this act, but transferred from one species to many others.

Many institutions currently have animal rights protocols being used in practice, and I was informed by a researcher that there are many steps that they must take in the research process to ensure the well-being of the small animals they use; at least what we identify as “well-being.” There are also many articles published on how animals should be treated and utilized properly in a lab environment in order to minimize harm. It is recognized that in some areas of study, such as cancer research, that testing on animals is an extremely informative method of research. In 2010, the British journal of cancer published *Guidelines for the Welfare and Use of Animals in Cancer Research* that outlines concepts from general recommendations to specific practices, like working with tumors and cell lines.

But still, in America as well as other parts of the world, animal testing does not have such legal imperative, so scientist are “free to use animals even where non-animal approaches are available (Humane Society International). For instance, many animals are bred and slaughtered to be used for classroom dissections to teach high-schoolers about biology. These students, who



often do not pursue biology, are required by the school system to cut open animal carcasses and make scientific observations based on what they see and feel. They take notes on their observations, turn them in for a grade, go home, and don't think about the once-alive being they were forced to maul anymore. For example, when I was only in the sixth grade, my teacher brought out a platter of small grey dead squids for us students to examine. Our only instructions were to hold at least one, and nothing else. Luckily we each had a pair of latex gloves to create a barrier between the slimy carcass and our skin. The dead squids weren't squirming, but the students were. I didn't see the purpose of the squids, and I remember wondering why they had to kill the squids before we saw them. The teacher said that she brought in the squids so that we could learn what it was like to work with animals, however I surely was not learning much at all and neither were the students playing dolls with the squid carcasses. Biology had previously been a track I wanted to pursue, however upon seeing the disregard for the respect of animals, I decided that I didn't want to work in that paradigm. It is not necessary to teach life sciences or biology using dead animals in the classroom; there are reusable and electronically simulated dissection alternatives that both produce less waste and prevent the killing of the six to twelve million animals used in classrooms per year (National Anti-Vivisection Society). What is the purpose behind this, and why hasn't this method of teaching been changed? It is mainly because it is convenient and it's practical to work and teach within the current paradigm so that students can learn to work within normal science.

Animal testing is frowned upon significantly today at least partly through the help of an increasing popularity of animal rights groups and methods. The paradigm of animal testing will

likely break even more with the growing emergence and popularity of animal rights groups and laws in support for ethical treatment. Also many cosmetic companies, such as *Lush*, advertise that they are cruelty-free as a part of their marketing strategy. As morals and technology progress, the paradigm continues to break until animal testing becomes a research method of the past.

Subsequently, it is likely that the paradigm will eventually shift due to advancements in technology and the moral standards of scientists. Biological research is advancing and people are creating non-animal techniques for lab testing. Animal testing is proving not to be helpful in many areas of disease research, so in order to further progress in medical science people will need to begin to rely on innovations from computational biology and cell-based screening systems (About Animal Testing). Continuing in this area of research is vital to escaping the paradigm of animal testing and saving the lives of hundreds of thousands of animals every year. However, scientists currently do not have widespread access to that level of technology yet so they work with what they can to get the results they need, which means experimenting with animals.

An example of a possible paradigm break is the development of a synthetic replacement for horseshoe crab blood. Within the last four decades, the blood from horseshoe crabs has been used in the creation of medicines and vaccines. This leaves about 130,000 dead each year and those that don't die show effects of injury and disorientation (Maloney, Phelan, Simmons). I would like to note that this practice does not experiment on the horseshoe crabs themselves but

rather utilizes them in the process of creating medicine. I still count it as animal experimentation in that the practice of utilizing these horseshoe crabs is purposely for the benefit of science and medicine. Researchers at the National University in Singapore realized this problem and cloned the recombinant Factor C that scientists were using from the horseshoe crab blood using synthetic alternatives (Maloney, Phelan, Simmons). Unfortunately, in the case of the university, they found that the laboratory-synthesized clone was not as viable as the blood itself, therefore patching up the break in the paradigm that almost came into existence. This study, however, provides hope that science might break out of using horseshoe crabs for its advancement and that new discoveries might actually lead to a solution great enough to break the paradigm even further.

A true break in the paradigm could be through Harvard's Wyss Institute's "organs-on-chips", which their website describes as "microfluidic devices lined with living human cells for drug development, disease modeling, and personalized medicine." These devices can simulate hearts and lungs, and are much more cost-effective than clinical trials. However, they are still costly compared to animal testing. Animals can be bred and raised for very little money. Chip organs are more accurate than animals, but they would need to be able to be replicated at a low cost and be able to be easily distributed in order to eventually replace the area of animal testing it would relate to.

Also, it would take even longer for chip organs to be applied to animals. Much of veterinary medicine testing is first tested on animals in the laboratory. This is what happened

with the beagle I mentioned in the introduction, and it is what's currently happening with tens of thousands of other dogs and animals that people keep as pets. For example, my own dog, Max, is required to take steroids every few years because he has a rare skin condition that can make him extremely uncomfortable. I was grateful my local pet store had such medicine for him until I realized how many animals that this drug had to be tested on until Max was given access to it. Veterinary medicine will be the most difficult field to escape from in the animal experimentation paradigm. However, if technology continues to advance in the way it is now, and more products like chip organs are produced, I believe that all animal testing can be replaced if scientific access is easy enough and if we are patient to wait decades to see any major change.

Animal testing is a tragedy that has continued for centuries, from Aristotle to today. There are millions of cases of science taking advantage of animals that I chose to include only a specific few that functioned to support my arguments. I also chose not to include photos because the most significant examples can be the most disturbing to view. Signs of animal experimentation practices are luckily slowing largely because of evolving morals and the increasing presence of animal rights groups who are influencing the government to make incremental legal changes. These changes unfortunately aren't enough to stop the experimentation and testing on millions of animals every year. As long as people test on animals, moral debates on its ethics will continue and the level of necessity of such experimentation will decrease as the level of technology increases. It's true that in order to make scientific progress, scientists have needed to cause harm to animals in some situations. However, it is not necessary for the violence to continue if there are safer and more humane alternatives. Even though it

might take decades, I am confident that there will be a paradigm shift away from this abuse of life and that experimentation on animals will one day come to a halt.

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