

Util-izing Animals

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ABSTRACT: *Biomedical experimentation on animals is justified, researchers say, because of its enormous benefits to human being. Sure animals die and suffer, but that is morally insignificant since the benefits of research incalculably outweigh the evils. Although this utilitarian claim appears straightforward and uncontroversial, it is neither straightforward nor uncontroversial. This defense of animal experimentation is likely to succeed only by rejecting three widely held moral presumptions. We identify those presumptions and explain their relevance to the justification of animal experimentation. We argue that even if non-human animals have considerable less moral worth than humans, experimentation is justified only if its benefits are overwhelming. By building on arguments offered in earlier papers, we show that researchers cannot substantiate their claims of behalf of animal research. We conclude that there is currently no acceptable utilitarian defense of animal experimentation. Moreover, it is unlikely that they could be one. Since most apologists of animal experimentation rely on utilitarian justifications of their practice, it appears that biomedical experimentation on animals is not morally justified.*

Biomedical experimentation on animals is justified, researchers say, because of its enormous benefits to human beings. Sure animals die and suffer, but that is morally insignificant when compared to experimentation's spectacular payoffs. As Carl Cohen, a leading philosophical apologist for vivisection, writes:

When balancing the pleasures and pains resulting from the use of animals in research, we must not fail to place on the scales the terrible pains that would have resulted, would be suffered now, and would long continue had animals not been used. Every disease eliminated, every vaccine developed,... indeed, virtually every modern medical therapy is due, in part or in whole, to experimentation using animals.¹

The Moral Worth of Animals

Researchers would need to demonstrate the success of animal experimentation even if animals had no moral worth. For if animal experimentation were invaluable (or just marginally valuable), it would be a waste of scarce public resources. However, this proffered justification of research openly acknowledges the moral worth of animals. Unless animals had moral worth, it would make no sense to say that we must include their deaths and suffering "on the scales." If they are devoid of value -- or their value were morally negligible -- the impact of experimentation on them would never enter the moral equation. In short, even defenders of research acknowledge that the interests of non-human animals can

outweigh the interests of humans if, in some particular case, the animals' interests are sufficiently greater than the interests of humans.

Not that this is much of an acknowledgement. Some philosophers have argued that non-humans animals have considerable moral worth -- even if not as much as do humans.² However, many utilitarians assume humans have a far greater moral worth than animals. That is, they adopt speciesism; they believe humans have more moral worth than any animals simply because they are members of our species. Such an assumption should ultimately be challenged -- but not here. For present purposes, we shall assume that non-human animals have non-negligible moral worth, albeit considerably less worth than humans. As it turns out, the recognition of even this minimal claim sets the stage for potent moral objections to animal experimentation.³ And, if arguments against research are plausible on this minimalistic assumption, then defenders of research will be wholly vulnerable to any view which holds that the moral worth of animals is similar to, or at least not substantially less than, the worth of humans.

Exactly what it means for a utilitarian to say that animals have less moral worth than humans is debatable. Historically utilitarian arguments have been used to evaluate actions involving creatures of the same moral worth. How do we extend these arguments to cases involving creatures of different worth? Consider, for instance, "cruelty to animal" statutes on the books in most developed countries. Although what counts as "cruelty to animals" varies from government to government, at least this much is true of all such laws: it is wrong to inflict excruciating pain on an animal merely to bring a human some tinge of pleasure. For instance, most people think it wrong to kill a gorilla to make an ashtray from its hand or to kill an elephant to use its tusks for a paperweight.

To state this generally, even if creatures_A have less moral worth than creatures_H, as long as creatures_A have non-negligible worth -- of the sort specified by "cruelty to animal" statutes -- then there must be circumstances under which morality demands that we favor creatures_A over creatures_H. For instance, even if creatures_H are more valuable, if the harm to creatures_A is considerably greater than the harm to creatures_H -- or if there are considerably greater numbers of creatures_A who must suffer that harm -- then morality demands that we favor creatures_A over creatures_H in those circumstances. Were that not so, it would make no sense to say that creatures_A had any moral worth.

Thus, a utilitarian would hold that the moral worth of an action would be the product of a) the moral worth of the creature which suffers (benefits), b) the seriousness of the wrong it suffers (the significance of its benefit), and c) the number of such creatures which suffer (benefit). This would give us a fairly straightforward way of making utilitarian judgements involving creatures of different moral worth.

But not entirely straightforward. For instance, the Cohenesque defense of animal experimentation frequently gets cast, at least in the public debate, as if the choice to pursue or forbid animal experimentation is the choice between "your baby or your dog." But this way of framing the question is misleading. Doubtless there are choices to be made. Perhaps experimentation is justified. But the choice has not been nor will it ever be between "your baby and your dog." It couldn't be.

Single experiments (and certainly not single experiments on single animals) will never lead to any medical discovery. Only coordinated sequences of experiments can lead to discovery. Animal experiments are part of a pattern of activity -- an institutional practice -- and that practice or institution may significantly benefit humans. But no isolated experiment can. Thus, we must reformulate the moral question: should we continue the practice of

animal experimentation? Apologists of research will say yes: they claim the practice will save innumerable human lives.

Three moral asymmetries

According to Cohen the benefits of research "incalculably outweigh the evils."⁴ (emphasis ours) Other defenders of research obviously agree. Although this utilitarian claim appears straightforward and relatively uncontroversial, it is neither straightforward nor uncontroversial. As the previous comments showed, apologists must demonstrate that the practice of animal experimentation yields greater benefits than any alternative practices. Likely they can demonstrate this only by rejecting three widely held moral presumptions.

a) Acts vs. omissions

The researchers' calculation will be implausible unless we reject the widely held belief that there is a significant moral distinction between evil we do and evil we do not prevent. Most people assume that we are more responsible for what we do than for what we do not prevent. For instance, most people assume it is morally worse to kill someone than to let them die; it is morally worse to steal than to fail to prevent someone else from stealing; and that it is morally worse to tell a lie than to fail to correct someone else's lie. Those who hold this view do not necessarily claim the failure to prevent evil is morally innocent (although some theorists say just that). They do hold, however, that it is not as wrong to permit an evil as to perpetrate one.⁵

Moreover, most theorists and lay people think it is not merely worse to perpetrate an evil than to permit it; they think it is much worse. For instance, most people would be aghast if Ralph failed to save a drowning child, particularly if he could have done so with little effort. But aghast as they might be, they would not think Ralph as bad as his neighbor Bob who held a child's head under water until she drowned. So, although we need not specify what "much worse" means, it means minimally this: the person who drowns the child should be imprisoned for a long time (if not executed) while the person who allowed the child to drown should not be punished at all -- although perhaps he should be morally censured for his callousness.⁶ Even in European cultures which have "Good Samaritan" laws, someone who violates such laws (say, by not saving a drowning child) may be punished, but far less severely than someone who killed a child. And that most assuredly indicates a profound moral difference.

How is this applicable to the experimenters' position? Like this: the experimenter wants to knowingly kill -- and often inflict pain and suffering on -- creatures with non-negligible moral worth to prevent future harm to humans. That is, they are doing an evil act as a means of preventing other evil acts. Experimenters, would likely contend that this asymmetry is applicable only if the wrong perpetrated is morally equal to the wrong not prevented. And, since animals are not as valuable as humans, then the wrong not prevented is morally much more weighty than the wrong perpetrated.

For the purposes of argument we agreed that humans are more valuable than animals. Even so, this does not free the experimenter from the force of the asymmetry. This asymmetry has moral bite even if the evil not prevented is worse than the evil perpetrated. For instance, it is worse for a child to die than for a child to be spanked for inappropriate

reasons (say, because the parent had a bad day at the office). But this difference in moral weight can be outweighed by the moral asymmetry between what we do and what we do not prevent. For instance, most people will think an adult worse for spanking his child (or worse still, a strange child in a nearby ghetto) for inappropriate reasons than for not feeding that ghetto child.

A defender of research might further respond that this example is irrelevant since both cases involve children -- creatures of the same moral worth. However, for reasons given earlier in the paper, this objection fails. That one creature has less moral worth than another certainly enters the moral equation, but it is not the only factor. We must also include the seriousness of the harm (significance of the benefit) and the number of creatures subjected to that harm (recipients of the benefit). We now offer a particular case to illustrate this asymmetry at work despite the putative difference in moral worth.

Ralph fails to go to a nearby ghetto to feed a starving child. His next door neighbor, Bob, drives to the same ghetto, picks up a stray puppy, takes it home and kills it slowly, causing it great pain -- although no more pain than the starving child feels. The law would do nothing whatsoever to Ralph; Bob could be arrested and charged with cruelty to animals. Moreover, the community would not condemn Ralph -- after all, few of their number would feed the starving child. But most people in the community would roundly condemn Bob for his cruelty and callousness. They would not want to live next door to Bob, nor have him as their son-in-law.⁷

Consequently, if this asymmetry is morally relevant, it is relevant even given the presumed difference in moral worth. The benefits to humans must be substantially greater than the costs to animals, else the moral benefits will not outweigh the immorality of perpetrating an evil as compared to preventing one. How much greater we cannot specify numerically. However, unless the defenders of animal research are disingenuous when they assert that animals have some non-negligible moral worth -- or lower that worth in an *ad hoc* manner so that vivisection is always justified come what may -- experiments which kill numerous animals and yield only slight benefits to humans will not cut the moral mustard.

Some theorists do not accept this moral distinction; they think there is no moral difference between what we do and what we permit. For them, this asymmetry provides no objection to animal experimentation. But, as we argue later, rejecting this asymmetry -- even if we should reject it -- has consequences unacceptable to most researchers. Moreover, although this first asymmetry is rejected by a few theorists, the next two are almost held universally.

b) Definite harms vrs. possible benefits

The utilitarian defense of experimentation becomes still more problematic once we note that the real trade off is not merely between what we do and what we permit, but what we do -- inflicting suffering on animals in the name of biomedicine -- is definite, while preventing the suffering of humans is possible -- and the probability of success is likely unknown. For the moment, however, let us assume that we know the probability that a coordinated sequences of animal experiments will benefit humans. We can illustrate the animal experimenter's quandary using game theoretical reasoning for decisions under risk. It is sometimes legitimate to give up some definite benefit B in the hope of obtaining a greater benefit B_i -- if B_i is sufficiently great. For instance, you might give up \$10 to obtain a 10% chance of gaining \$200. Generally speaking, game theoretic reasoning indicates it is

legitimate to give up a definite benefit B for some other benefit B_i, if the product of the utility and probability of B_i occurring is much greater than the utility of B (being definite, its probability is 1). Thus, even if researchers could ignore the first asymmetry, they would still have to show -- and not merely assume -- that the product of the probability and utility of benefits to humans is greater than the product of the certain suffering of laboratory animals (adjusted for the diminished value of the animals) and the number of animals who suffer. That is easier said than done.

In the actual experimental situation, the probability of any sequence of coordinated animal experiments being successful is usually unknown at the time of experimentation. Thus, the experimenter's predicament seems closer to game-theoretic scenarios of decisions under uncertainty, where the various outcomes of actions are (roughly) known, but the probabilities of those outcomes are not. In this case, while the harm to animals is definite, the probability that humans will benefit from experiments is unknown.⁸

Consequently unless researchers can quantify the success of the institution, they will be hard put to justify that institution given the definite evil to animals. Moreover, it will be argued below that assessing the utility of the institution of animal experimentation may likewise be difficult, if not practically impossible. Since both the utility and the probability of the benefits of animal experimentation are unknown, and the harm to animals substantial and definite, it is difficult to know how researchers will morally defend their practice.

c) The creatures which suffer vrs. the creatures which benefit

The creatures who pay the costs of experimentation are not the one's reaping the benefits.⁹ This clashes with the moral presumption against inflicting suffering on one creature with moral value in order to benefit some other creature. Although it is noble for someone to undergo a painful bone marrow transplant to save the life of a stranger, we think it would be wrong to require them to undergo that procedure. We assume people should not be required to sacrifice for others. Or, even if we think people should be required to make some sacrifices, most people would think it inappropriate to require the ultimate sacrifice. Yet each year in the United States nearly 70 million mammals -- creatures of acknowledged moral worth -- are expected to make the ultimate sacrifice to benefit other creatures, namely humans.¹⁰

As before, a defender of research might respond that this case is irrelevant since both examples involve humans, creatures of the same moral worth. Again, as we argued earlier, for utilitarians the overall moral worth of an action is a product of the moral worth of the creature which suffers (benefits), the seriousness of the wrong it suffers (the importance of the benefit), and the number of creatures which must suffer (benefit). Thus, the third asymmetry is relevant to an assessment of the utilitarian calculation, even though we have admitted, for purposes of argument, that animals have less moral worth than humans.

For instance, even if we assume that non-human animals have less moral worth than do humans, most people think there are some sacrifices animals should not have to make to benefit us. Most people think it wrong for people to kill a gorilla so they can make an ashtray out of its hand or to kill an elephant so they can use its tusks for a paperweight. That is, although most people think neither the gorilla nor the elephant has the same moral worth as a person, they assume these animals cannot be asked to give up their lives so humans can obtain some relatively insignificant benefits. The defenders of research

agree. That is why they claim that the benefits of research are direct and substantial. They want to show that its benefits outweigh the costs to the lab animals.

This cluster of asymmetries drives home the fact that researchers must identify overwhelming gains if they are to have any hope of morally justifying their practice. Of course they could just reject these widely held moral views. It seems Cohen rejects them. And other respectable ethical theorists have rejected at least one of them (usually the first one). But the rejection comes at considerable cost. Not only would rejecting these asymmetries clash with widely held moral beliefs, each rejection has consequences which many researchers would find most morally unpalatable.

Consequences of rejecting these asymmetries

Consider what follows from a rejection of the first asymmetry. If acts and omissions were of equal moral weight, then animal experimenters could not categorically rule out non-consensual experiments on humans -- even though they claim they are so opposed. Here's why. If defenders of animal experimentation deny the act / omission distinction, then they are committed to the claim that we should pursue any activity which yields greater goods than the goods sacrificed by the activity. Consequently, they can never say that any activity is, in principle, morally impermissible: there might always be some greater moral good which is achievable only through that activity.

Hence, if certain biomedical benefits could only be achieved through non-consensual experiments on humans, then, if the benefits are greater than the costs, such experiments would be morally justified. This is a most unwelcomed consequence for animal experimenters. For two reasons. First, most experimenters want to categorically deny the permissibility of non-consensual biomedical experiments on humans.¹¹ That they cannot do. At most they can say that such experimentation could be justified only if the benefits were substantial -- it is just that such conditions are rarely satisfied, and thus, experimentation on humans is rarely justified.

Second, this line of defense will be difficult to hold. It is implausible to think that experiments on non-consenting humans would never yield substantial biomedical benefits to a far larger number of humans. Certainly some commentators on Nazi war crimes claim that some German experimentation yielded biomedical benefits for other humans. Experiments on prisoners -- although presumably consensual -- have also yielded significant results, especially clinical trials of new drugs. Finally, all new compounds are tested (consensually) on small numbers of humans before being widely used in the human population. Humans make good test subjects. Consequently, if non-consensual experiments on humans are justified if the benefits are great enough, it seems likely that experiments will sometimes be justified.

On the other hand, if researchers want to rule out such experiments in principle, then it must be that they believe that it is categorically worse to commit an evil than to fail to prevent one. But, as we have already argued, researchers adopting that position will have a difficult time defending animal experimentation. Perhaps, this defense would work if the benefits of experimentation are demonstrably overwhelming. Perhaps.

Rejecting the second asymmetry likewise comes at considerable cost. The second asymmetry seems incontestable. It would be the height of foolishness to give up any good G_1 for the mere chance of obtaining some other good G_2 if G_2 were not greater than G_1 .¹²

Abandoning this asymmetry would be to abandon rationality itself: it would be to license sacrificing any good in the mere hope that some other good will possibly be achieved.

Abandoning the third asymmetry would require abandoning the idea of the moral separateness of creatures, a view central to all Western conceptions of morality. Some theorists interpret this asymmetry absolutely -- that we can never, under any circumstances require one creature of moral worth to suffer to benefit another one. This strong interpretation of this asymmetry is at the core of libertarianism.¹³ Were this interpretation applied to the issue of animal experimentation, animal experiments could never be justified, no matter how great the benefit.

Most theorists, though, interpret this asymmetry more weakly to indicate that one creature of moral worth can never be required to suffer for the benefit of another creature unless the sacrifice is small and benefits substantial. Even on this weaker version, the benefits of experimentation would have to be overwhelming to justify the practice. For instance, most laypeople assume it would be inappropriate to require people to undergo a bone marrow transplant to save someone else's life, even though the benefit relative to the pain is considerable. Moreover, virtually everyone would be opposed to requiring people to give up one of their good kidneys to save someone else's life. Thus, even if we assume animals have less value than humans, this asymmetry -- like the two before -- implies that researchers must show staggering benefits of experimentation to morally justify the practice.

WHAT REALLY GOES ON THE SCALES?

Cohen's accounting of what goes on the moral scales is incomplete. For instance, when determining the gains relative to the cost of animal experimentation we must include not only the costs to animals (which are direct and substantial), but also the costs to humans (and animals) of misleading experiments. For instance, the pre-occupation with misleading animal models likely delayed for twenty years the development of effective preventative measures for polio.¹⁴ How many lives were lost or ruined because of this delay? Such losses must be placed on the scales.

Moreover, since we should include possible benefits (since no benefits are certain) on the scales, we must also include possible costs. For instance, some people have speculated that AIDS was transferred to the human population through an inadequately screened oral polio vaccine given to 250,000 Africans in the late 1950s. Such a claim has not been established; it may well be false.¹⁵ But even if it is not true, something like it might well be true. We know, for instance, that one simian virus (SV₄₀) entered the human population through inadequately screened vaccine.¹⁶ Moreover, we know that animal experiments have misled us on more than one occasion (e.g., determining the dangers of smoking). Therefore it is difficult to know how researchers could plausibly claim that there would be no substantial ill-effects of future animal experimentation. These possible ill-effects must be counted.

Finally -- and perhaps most importantly -- what is crucial for the moral calculation is not the benefits animal experimentation has produced and will produce, but the benefits which only animal research could produce. To determine this utility we must ascertain a) the role that medical intervention played in lengthening life and improving health, b) the contribution of animal experimentation to medical intervention, and c) the benefits of

animal experimentation relative to those of non-animal research programmes.¹⁷ Since even the AMA recognizes the value of non-animal research programmes, then what goes on the moral scales are not all the purported benefits of animal experimentation, but only the *increase* in benefits relative to alternative programmes.¹⁸ Since we do not know what these other programmes would have yielded, determining the increase in benefits would be exceedingly difficult to establish, even if we could easily determine the contributions of animal experimentation. But, as it turns out, determining even these benefits is difficult -- if not impossible.

DIFFICULTIES OF CALCULATION

What our argument shows is that if a utilitarian defense of animal experimentation is to be plausible, apologists must demonstrate that the *increase* in benefits of animal experimentation relative to non-animal research programmes clearly outweighs its costs -- including the moral costs identified earlier. And that, of course, is exactly what experimenters claim.

"In fact, virtually every advance in medical science in the 20th century, from antibiotics and vaccines to antidepressant drugs and organ transplants, has been achieved either directly or indirectly through the use of animals in laboratory experiments."¹⁹

The result of these advances is significant. "A longer life span has been achieved, decreased infant mortality has occurred, effective treatments have been developed for many diseases, and the quality of life has been enhanced for mankind in general." All these benefits are attributable, we are told, to experiments on animals. As the White Paper asserts:

...[H]ad scientific research been restrained ... as antivivisectionists and activists were ... urging, many millions of Americans alive and healthy today would never have been born or would have suffered a premature death.²⁰

This is a gross exaggeration. There is considerable evidence that interventionist medicine has played only a relatively small role in lengthening life and improving human health. As an editorial in *Lancet* summarizes the evidence: "public health legislation and related measures have probably done more than all the advances of scientific medicine to promote the well-being of the community in Britain and in most other countries."²¹

Or, as medical historians McKim and McKim explain it:

In general medical measures (both chemotherapeutic and prophylactic) appear to have contributed little to the overall decline in mortality in the United States since 1900 -- having in many instances been introduced several decades after a marked decline has already set in and having no detectable influence in most instances. More specifically, with reference to these five conditions (influenza, pneumonia, diphtheria, whooping cough and poliomyelitis) for which the decline in mortality appears substantially after the point of intervention -- and on the unlikely assumption that all this decline is attributable to intervention -- it is estimated that at most 3.5 per cent of the total decline in mortality since 1900 could be ascribed to medical measures introduced for the diseases mentioned here.²²

The related point is vividly shown by a close examination of U.S. health statistics. The life expectancy in the U.S. increased 43% from 1900 to 1950 -- before the advent of many medical treatments and vaccines. Since 1950 life span has increased only 7.4%. Since the rate of mortality from motor vehicle accidents has decreased by more than 20% since 1950, that decline in mortality accounts for most of the increase in life expectancy.²³ Hence, medical intervention has not single-handedly conquered disease and illness. Thus, medical intervention prompted by animal experimentation has not been the panacea described by the AMA.

There are theoretical reasons which explain the limitations of animal experimentation. Biomedical researchers claim that by observing the effects of various stimuli in non-human animals, they can form legitimate expectations about the likely reactions of humans subjected to similar stimuli. In earlier papers we argued that inferences from animal models to humans are highly questionable, both from standpoint of the logic of analogical reasoning and from evolutionary biology.²⁴

There is also ample empirical evidence of the limitations of animal experimentation. Even when species are phylogenetically close we cannot assume they will react similarly to similar stimuli. Tests for cancer in rats and mice yield the same results only 70% of the time.²⁵ Moreover, the concordance between rats and mice drops to 50% for cancers which are site-specific.²⁶ Some regulatory agencies, e.g., the FDA, require by fiat that the human-rat concordance be equal to the rat-mouse concordance. But as Lave *et. al.*, and Gold *at. al.*, point out, this is an implausible assumption.

Similar disanalogies were evident in the study of teratogens. Our "closest" biological relatives -- the primates -- show biological effects which are significantly disanalogous from those in humans.

Nonhuman primates offer the closest approximation to human teratological conditions because of phylogenetic similarities...However, a review of the literature indicates that except for a few teratogens (sex hormones, thalidomide, radiation, etc) the results in non-human primates are not comparable to those in humans.²⁷

Other researchers reach the same conclusion.

It is the actual results of teratogenicity testing in primates which have been most disappointing in consideration of these animals' possible use as a predictive model. While some nine subhuman primates (all but the bushbaby) have demonstrated the characteristic limb defects observed in humans when administered thalidomide, the results with 83 other agents with which primates have been tested are less than perfect. Of the 15 listed putative human teratogens tested in nonhuman primates, only eight were also teratogenic in one or more of the various species...The data with respect to the "suspect" or "likely" teratogens in humans under certain circumstances were equally divergent. Three of the eight suspect teratogens were also not suspect in monkeys or did not induce some developmental toxicity.²⁸

Researchers themselves acknowledge the differences between non-human animals and humans. That is why they choose test subjects based on non-causal (economic) criteria.

In practice, such selection seems to be dominated by factors based on practicality. Animal models are selected on the basis of how many criteria they possess, such as: ready availability, low cost, ease of handling, high fertility, ease of breeding, large litters, short gestation length, ease of mating time determination, low rates of spontaneous deaths and developmental abnormalities, ease with which their fetuses can be examined, and the amount of information available on their reproduction, development, and response to developmental toxicants... The rationale for using such criteria is that none of the animal models tested is an obvious counterpart of humans in response to developmental toxicants. This leaves the issue of practicality foremost in the selection process.²⁹

This point has also been made by other prominent researchers:

A great deal of time and effort has been expended discussing the most suitable species for teratology studies, and it is time that a few fallacies were laid to rest. First, there is no such thing as an ideal test species, particularly if the intent is to extrapolate the results to man. The ideal is approximated only when testing veterinary products or new food materials in the domestic species for which they are intended...³⁰

Selecting animal models on the basis of non-causal criteria is part and parcel of the instrumentalist's strategy which pervades the institution of biomedical research. Researchers claim that the practice of animal experimentation is valuable, notwithstanding demonstrative causal disanalogy between test species and humans.³¹ They think the contribution of animal research to biomedical advancement can still be ascertained from surveys of primary research literature and histories of medicine.

Not so. Both sources of information underreport manifest dissimilarities between animals and humans.³² If a researcher is trying to discover the nature of human AIDS and conducts a series of experiments on rats only to find that they cannot develop AIDS, these findings may well not be reported. And, even if negative findings are reported, they are less likely to be read and discussed by professionals -- especially if the negative results are not thought to have uncovered an explanation for the failure. Consequently, we cannot assess the value of the institution of animal experimentation simply by tallying successes -- or even ratios of successes to failures -- in the extant research literature. Some animal researchers recognize just this problem:

One of the reasons that many contributors have missed the point is that they have drawn conclusions from published data, which represent only a small sample of the many screening tests performed. Moreover, these represent a biased sample because of the generally greater interest in positive results and the tendency of editors, whether of a sensational newspaper or an erudite journal, to cater to the tastes of their readers. Consequently, lessons gained from the high proportion of negative results and borderline cases that occur in practice are lost, as are also the occasional positive responses which regrettably never see the light of day, for commercial or political reasons.³³

Many standard "histories" of biomedical research amplify the distorted picture of the success of animal research found in the primary literature. When historians of medicine discuss some biomedical advance, they likely omit failed experiments -- even when

those experiments appear in the primary research literature. "In science, as in everyday life, one tends to remember the winners. The losers are usually forgotten."³⁴ Historians typically report events thought to be crucial to understanding the current state of the science. Failures do not typically play a role in that understanding. Finally many biomedical historians are members of the disciplines about which they are reporting. They understandably write histories which articulate their understanding of the discipline. Since vivisection is integral to these disciplines, we should not be surprised that these histories often emphasize its "successes." In summary, There is no simple or straightforward way to find the evidence required to substantiate the contribution of animal experimentation. More is required than counting "successes" reported in the literature.

Finally, since we have never systematically tried non-animal experimentation, it is difficult to know how anyone could be confident that the benefits of animal experimentation are sufficiently greater than those of non-animal research programmes. In the past researchers have used the "intact systems argument" to give reason why, *in principle*, only animal experimentation could yield significant biomedical phenomena about humans. But, in our 1993b, we showed that defense is flawed.

Conclusion

None of this shows that animal experimentation has been worthless. None of this shows that abandoning animal experimentation will not hinder some biomedical advances. What it does show is that animal experimentation has been less valuable than researchers have led us to believe. In addition, it has shown that researchers will be hard pressed to give a precise accounting of its value. Thus it seems doubtful that researchers can plausibly claim that the benefits of animal experimentation are overwhelming. Yet given the arguments earlier in the paper, that is exactly what they need to show to morally justify the practice.

Perhaps researchers might respond that it is we who must demonstrate that research is not valuable, that it is we who must show that the evils of experimentation outweigh its benefits. Not so. For the moral onus always rests on anyone who wishes to perpetrate what is, all things being equal, a moral wrong. Since people on both sides of this debate -- researchers included -- acknowledge the moral status of non-human animals, then they must provide clear and demonstrable evidence that the value of the institution of research exceeds its moral costs. That they had not done. Given the arguments in this paper, it is difficult to know how they could.

NOTES

1. Cohen, C. (1986): "The Case for the Use of Animals in Biomedical Research", New England Journal of Medicine, vol. 315, pp. 868.

2. Clark, S.R.L. (1977) *The Moral Status of Animals*. Oxford: University Press; Regan, T. (1983) *The Case for Animal Rights*. Berkeley: University of California; Rachels, J. (1990) *Created From Animals*. Oxford: University Press; and Singer, P. (1990) *Animal Liberation*, 2nd edition. New York: Avon Books.

3. Most defenders of research acknowledge the moral value of animals. Cohen, for instance, states that we are not "morally free to do anything we please to animals." (p. 866) But even those who do not explicitly recognize the value of animals are committed to their having a value by engaging in such utilitarian calculations.

4. Cohen, C. (1990) "Animal Experimentation Defended," in *The Importance of Animal Experimentation for Safety and Biomedical Research*, ed. S. Garattini Amsterdam: Kluwer Academic Publishers, p. 8.

5. Several points in our paper were anticipated by Stephen R.L. Clark in "How to Calculate the Greater Good," 1977) *Animals' Rights: A Symposium*, ed. Patterson, D. and Ryder, R. (Centaur Press: London) pp. 96 - 105.

6. Obviously if the person had some special duties to the child, for instance, if she were a lifeguard at the pond, then she could be held liable for the child's death. But in this case, her obligation would be explained by her special status: she has assumed the responsibility for people swimming in her pond. In the cases in question, however, we are asking about the role this asymmetry plays when the people in question have not assumed any special responsibility for the children.

7. Some researcher might argue that they have special obligations to people -- obligations that override the force of this asymmetry. But it is not entirely clear why a researcher would say this or what it would mean. Lifeguards are hired to save people from drowning. Researchers are not hired to save people from kidney disease. Moreover, special obligations are just that -- special. They are owed to specific people. But to which specific people do researchers owe these obligations? You, me, Aunt Joan? Finally, if sense could be made of the claim that researchers have special obligations to humans who might benefit from their research, even greater sense could be made of the claim that they have special obligations to their lab animals. After all, the law requires them to care for their lab animals; it does not require them to benefit specific humans beings.

8. Even this may be too generous -- for properly speaking, the various outcomes of a coordinated series of experiments will be unknown prior to experimentation, while the harm to animals is nevertheless definite.

9. Of course researchers are prone to say that animal experimentation benefits animals too. We find this claim questionable and more than a little disingenuous. The experiments are not done to benefit animals. If animals benefit it is frequently an accidental consequence of experimentation, not its goal. Moreover, even if true, the creatures which suffer will not be the ones who benefit from that suffering. Some dog may benefit, but not the dog who was "sacrificed."

10. Rowan, A. (1984) *Mice, Models, and Men*. (New York: State University of New York Press), p. 70.

11. See, Cohen (1986) p. 866. See also *AMA White Paper* (1986), pp. 1, 7.

12. As before, the value of G will be a product of the value of the creature suffering (benefitting), the nature of the suffering (benefit), the number of creatures suffering (benefitting) -- and now, the probability that the suffering (benefit) will occur.

13. Nozick, R. (1974) *Anarchy, State, and Utopia* (New York: Basic Books).

14. Paul, J.R. (1971) *A History of Poliomyelitis*, New Haven: Yale University Press, pp. 384-385.

15. Some physicians thought the claim was plausible. See, for example, the letter to the editor by B.F. Elswood and R.B. Striker (1993) in *Research in Virology* vol. 144, pp. 175-6.

16. Hayflick, L. (1972) "Human Virus Vaccines: Why Monkey Cells?", *Science*, May 19, pp. 813-814. Several hundred thousand people have been exposed to SV40 through vaccines. In vitro the virus mutates normal human cells into cancerous cells.

17. Strictly speaking we should also determine the benefits of "mixed research programs," i.e., those which rely on reduced levels of animal experimentation in conjunction with some non-animal-based experiments and research methodologies.

18. The AMA specifically recognizes the benefits of cell culture studies, computer simulations, and clinical studies and epidemiological investigation. *AMA White Paper*, p. 27.

19. *Ibid.* p. 16.

20. Ibid. p. 17.
21. *Lancet* (1978) August, pp. 354-5.
22. McKinlay, J.B. and McKinlay, S. [1977]: "The Questionable Contribution of Medical Measures to the Decline of Mortality in the United States in the Twentieth Century," *Health and Society*, 55: 405-28.
23. *Health United States* (1988) Publication of the Department of Health and Human Services, pp. 53, 72.
24. LaFollette, H. and Shanks, N. 1995: "Two Models of Models in Biomedical Research," *Philosophical Quarterly*; 1994a: "Chaos Theory: Analogical Reasoning in Biomedical Research". *Idealistic Studies*; 1994b: "Animal Experimentation: The Legacy of Claude Bernard," *International Studies in the Philosophy of Science*; 1993a "Animal Modelling in Psycho-pharmacological Contexts" *Behavioral and Brain Sciences*, (commentary), pp. 653-4; 1993b: "The Intact Systems Argument: Problems with the Standard Defense of Animal Experimentation," *Southern Journal of Philosophy*, pp. 323 - 33; 1993c: "Animal Models in Biomedical Research: Some Epistemological Worries" *Public Affairs Quarterly*, pp. 113 - 30.
25. Lave, L.B. et. al. (1988) "Information Value of the Rodent Bioassay", *Nature*, vol. 336, pp. 631-633.
26. Gold, L., Slone, T., Manley, N. and Bernstein, L. (1991) "Target Organs in Chronic Bioassays of 533 Chemical Carcinogens," *Experimental Health Perspectives* 93, p. 243, 245.
27. Mitruka, B.M. et. al. (1976) *Animals for Medical Research: Models for the Study of Human Disease*, New York: Wiley, p. 467.
28. Schardein, J.L. (1985) *Chemically Induced Birth Defects*, New York: Marcel Dekker, pp. 20, 23.
29. Hood, R.D. (1990) "Animal Models of Effects of Prenatal Insult" in *Developmental Toxicology: Risk Assessment and the Future* (ed) R.D. Hood, New York: van Nostrand, pp. 184-185.
30. Palmer, A.K. (1978) "Design of Subprimate Animal studies", in *The Handbook of Teratology*, (eds) J.G. Wilson and F.C. Fraser, vol. 4, New York: Plenum Press, p. 219.
31. In all candor, however, the value of much animal experimentation may be economic rather than biomedical. Animal research is a multi-billion dollar industry. With such fiscal momentum, it is not hard to see how an institution could become insensitive to the real limitations of animal research.
32. Of course, both the primary research literature and histories of biomedical research will report some failures of research. The issue here is whether biomedically significant dissimilarities between humans and non-human animals will be given "equal reporting" by researchers working under the umbrella of a fundamentally vivisectionist paradigm.
33. Palmer, *op.cit.* p. 216.
34. R.N. Giere (1991) *Understanding Scientific Reasoning*, 3rd edition (Ft. Worth: Harcourt, Brace, Jovanovich), p. 74.