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Should we enhance animals?

Sarah Chan

Abstract

Much bioethical discussion has been devoted to the subject of human enhancement through various technological means such as genetic modification. Although many of the same technologies could be, indeed in many cases already have been, applied to non-human animals, there has been very little consideration of the concept of “animal enhancement”, at least not in those specific terms. This paper addresses the notion of animal enhancement and the ethical issues surrounding it. A definition of animal enhancement is proposed that provides a framework within which to consider these issues; and it is argued that if human enhancement can be considered to be a moral obligation, so too can animal enhancement.

Human enhancement has been the subject of considerable bioethical debate. Emerging technologies such as genetic modification and other forms of bioengineering offer the potential to increase human abilities well beyond our current limitations and even create entirely new modes of human functioning. These possibilities simultaneously inspire excitement and, for some perhaps, dread at the prospect of an enhanced future for the human race; and thereby raise ethical and philosophical questions about the use of enhancements and the very nature of humanity itself.

Philosophical discussion of human enhancement has concentrated on such issues as how to define enhancement; whether enhancement can be distinguished from therapy in a morally meaningful manner; whether there can be said to be anything morally wrong either with the technologies aimed at achieving enhancement or with the idea of enhancement itself and the desire to enhance; and how the use of enhancement technologies relates to problems of fairness, equity and justice, on an individual and global level.

Although the discourse over human enhancement remains live, with many questions yet to be resolved, a substantial body of philosophical thought has developed in support of enhancement. Those supporting human enhancement have argued that attempts to determine the moral acceptability of enhancement by reference to what is normal, natural, species typical or therapeutic are misguided: at the individual level at least, enhancements are, by definition, beneficial, and therefore not only are they morally permissible, they are obligatory [1-5].

Such discourse has thus far emerged purely in the context of human enhancement, and our obligations towards our offspring in particular as well as other human beings. Yet although many human-enhancing technologies could be, indeed in many cases already have been, applied to non-human animals, the arguments relating to human enhancement have seldom been considered in relation either to the use of such technologies on these creatures or the

moral obligations we might hold towards them. This paper examines the applicability of such arguments to animals and attempts to answer the question: should we enhance animals?

By way of introduction to a discussion of animal enhancement, consider the following hypothetical scenario:

Imagine a situation in which you knew your child was going to be born with a congenital brain condition such that his cognitive abilities would be restricted to a level equivalent to that of a higher primate, such as a chimpanzee. If under these circumstances you had the option of treatment to restore your child's intelligence to a level approaching normal, it would be extremely remiss of you (to say the least) to decline it! Indeed, if there is the opportunity to improve your child's intelligence in a safe and reasonable manner, whether in response to detrimental brain injury or as an added benefit, it may be argued that there are good moral reasons to do so [4,6].

Now consider an alternative situation. A baby is going to be born with a congenital condition limiting his native cognitive abilities to that of a chimpanzee. The condition is that the baby is, genetically and biologically, a chimpanzee! Why do we feel that in this case there is no obligation to provide treatment or enhancement to increase his intelligence to a level approaching humans, if such interventions were possible and safe?

There are numerous possible answers to this, but the question is whether any of these objections provide valid moral grounds to distinguish between the purported obligation to enhance humans and the existence of a similar obligation to enhance animals under the same circumstances. In this paper, I propose a framework for an ethical analysis of animal enhancement and identify wider issues associated with enhancing animals. Some of these issues mirror the ethical discourse regarding human enhancement; of specific relevance to animal enhancement are issues relating to animal welfare and concerns over making animals more human. I argue that a consideration of animals' interests is central to the ethics of animal enhancement, and that we can have obligations to other beings, both humans and other animals, based on their interests. If this is the case, then when enhancements are of overall benefit to animals, animal enhancement can, as well as human enhancement, be a moral obligation.

Why consider animal enhancement?

As the above scenario illustrates, the question of whether we should enhance animals may present an interesting ethical problem in itself. There are, however, other reasons why animal enhancement is a worthy subject of bioethical consideration. First, it is of practical relevance in that animal enhancement is directly pertinent to the possibility of human enhancement. The types of technologies that might be used to enhance humans will in all likelihood first be tested on animals; and indeed many such technologies are already in use on animals, such as genetic manipulation and drug testing.

In addition, a consideration of animal enhancement might cast new light on the discourse over human enhancement, in that what we learn about the reasons to enhance or not to

enhance animals could extend to our understanding of why we should or should not enhance humans.

Finally, it is plausible that an analysis of the ethics of animal enhancement may indicate that there are in fact some positive moral reasons to enhance animals, as (it is suggested) there are to enhance humans, and this may have implications for the types of technologies and interventions that we choose to pursue in respect of animals. Equally, if such an investigation revealed compelling arguments to abjure the enhancement of animals, these might have implications for the ethics of human enhancement. In the discussion that follows, I shall explore what some of these reasons may be.

What is animal enhancement?

A discussion of the ethics of “animal enhancement” first requires us to consider what is meant by the term.

In one sense, humans have already been “enhancing” animals for many centuries. Generations of selective breeding to intensify certain traits in domesticated species have resulted in strains of animals that have been enhanced in the sense that some aspect of their function has been increased or some aspect of their function or appearance altered in ways that humans consider enhancing. This “enhancement” has resulted in dairy cows that produce more milk, horses that are larger and stronger, and hundreds of dog breeds of different shapes and sizes: hounds and terriers to hunt or fight, sheep dogs to herd and protect, guard dogs to guard and lap-dogs to keep laps warm and pose for portraits.

Moreover, genetic manipulation technologies now allow us to effect genetic changes more quickly, effectively and directly than by traditional breeding methods; and as well as making use of existing genetic variation, introduce new genes in our quest to transform existing species. Transgenic mice bearing introduced genes [7] from humans or other species are commonly used in biomedical research—for example, genes for the various proteins implicated in Alzheimer’s disease to create a mouse model to study disease pathology [8] or human immunological genes to create a mouse with a “humanised” immune system [9]. Another, perhaps more frivolous, example is ornamental fish that have been genetically modified to display fluorescent colouration [10].

In addition, technologies for human enhancement could also be applied to non-human animals—indeed, as mentioned, it is probable that many human enhancement technologies, if they have not already been developed and tested on animals, will be so before they are first applied to humans. For example, increased longevity or life extension is a prominent goal of human enhancement [4, 11, 12]. The technology to achieve this in humans is yet to be realised, but startlingly effective advances in increasing longevity have already been made in animals. Selective breeding, targeted genetic modification and pharmacological agents have all been used to extend lifespan well beyond normal in animals, including *Drosophila* [13], *Caenorhabditis elegans* [14] and the mouse [15]. Some of these enhanced animals can live almost twice as long as their unenhanced counterparts [16, 17].

Another class of proposed human enhancement is increased physical capabilities, for example to improve athletic performance. Genes controlling muscle development in both mice and humans have been identified, and genetically engineered mice displaying significantly increased muscle growth have already been produced [18, 19], suggesting that similar modifications would be feasible in humans.

A potentially “animal-enhancing” technology that has provoked some debate is the creation of human–animal chimeras. Concerns over the mixing of human and animal biomaterials have come to prominence recently in light of the creation of so-called cytoplasmic hybrid embryos for stem cell research. Whereas these sorts of entities should pose few concerns (being merely clumps of cells that are neither sentient nor self-aware), issues have been raised in respect of more fully developed “humanimal” chimeras, in particular those with human brain or neural tissue.

To date, experiments of this nature have included the creation of adult mice with human neural stem cells engrafted in the brain [20, 21] (the “human neuron mouse” [22]) as well as primate embryos with human cells inserted into the developing forebrain [23]. The main concern in this regard stems from the possibility that these animals might have the potential for increased, even approaching human, levels of cognition, as a result of the human contribution to brain structure and function. Although no “animals with human brains” have yet been produced, the prospect has stirred considerable ethical debate.

Objections to these kinds of interventions that might be termed “animal enhancement” have largely focused on the application of the various technologies rather than the concept of animal enhancement itself. Such objections tend to be of the following types: risk-based concerns [24]; dislike of the unnatural [25]; concerns about animal welfare [25-28]; and concern over making animals more human [22-30]. The first two of these have been comprehensively dealt with in relation to many biomedical technologies and in the context of human enhancement; it is the latter two that, I suggest, are of more interest as ethical objections to animal enhancement.

Defining animal enhancement

Ethical discourse over human enhancement has moved beyond arguing about the technology to a more general consideration of the principles of enhancing humans. Similarly, a proper ethical discussion of animal enhancement requires us to develop a definition of the term.

The obvious question when it comes to classifying animal enhancements is: enhancements from whose point of view? Considering the range of technological interventions that might be termed “animal enhancement”, it is possible to identify at least three definitions. An enhancement of an animal may be something that: (1) Produces an increase in some natural function or confers a novel function; (2) Improves some aspect of the animal for human purposes; (3) Enables greater fulfilment of the animal’s own interests.

These categories will obviously overlap in some cases, although not all. An increase in some natural ability may be in an animal’s interests as well as serving human purposes. Conversely, many “enhancements” that increase the animal’s fitness for human purposes

might be considered to be against the animal's interests—force-feeding to produce geese with grossly enlarged livers for foie gras, for example.

In relation to the first definition, it has been argued extensively in relation to other technologies (including human enhancement) that there is no special moral quality associated with the natural, nor any moral proscription against the unnatural [1,3,4]. It is therefore implausible that either increasing a natural function or introducing a novel function should be morally right or wrong in itself; and such a definition of “animal enhancement” tells us nothing about enhancement as a moral object.

Yet it is easy to imagine potential consequences of these modifications that might be good or bad from the perspectives of the various beings concerned. A cow whose resistance to disease is enhanced, whether by increasing its “natural” resistance or introducing novel genes, will probably live a better, disease-free life. On the other hand, genetically engineering pigs to serve as immunocompatible organ donors for humans is obviously good for the human recipients, but might be bad for the pig if the premature ending of its life as an organ donor could be said to harm it.

If animal enhancement is not right or wrong in itself, therefore, it must be right or wrong consequentially, in relation to its effects on those sorts of entities who matter morally.

Humans (it is generally agreed) matter morally; therefore an animal enhancement that produces a benefit to humans is a good thing, at least for those humans who benefit. We have all benefited from agricultural enhancements and probably also from research involving “enhanced” animals. This view of the utility of animal enhancement is not to be ignored; indeed it may form a substantial part of human–animal interaction in the nearer-than-expected future [32].

What of the enhanced animals themselves? Might they also benefit from enhancements? It has been suggested that human enhancement is something that is beneficial, in the individual's interests—“If it wasn't good for you, it wouldn't be enhancement.” (see Harris, p 9) [4]. If we are to use similar principles to classify animal enhancement, it is the third of the above categories that most closely maps to this definition: an enhancement in the animal's interests, which can be said to benefit the animal.

I suggest that this is an important ethical consideration for animal enhancement: if there are moral reasons for or against animal enhancement they must derive at least in part from the moral status of animals themselves and our relationship to them.

Enhancements and animal interests

If we are to accept the idea of animal enhancement being an intervention that fulfils animals' interests as an appropriate framework for considering the ethics of animal enhancement, we must establish a number of things. The first is whether animals are proper subjects of moral consideration, whether they matter morally; for if not, their interests will have no bearing on an ethical analysis. The second is what animals' interests consist of, because if we are to say

whether or not an enhancement is in an animal's interest and thus ethical, we will need an adequate account of what these interests are.

There have been extensive previous attempts to define a moral theory covering animals. Most of these involve exhaustive accounts of all possible criteria upon which moral status might be based, followed by an evaluation of each possibility against already acknowledged moral truths. Of course, the content of these "truths" is itself far from universal: for example, some commentators use the moral lemma that permanently mentally incapacitated humans and babies have full moral value as a yardstick to reject higher thresholds of moral status [33], whereas others are prepared to regard this assertion itself as open to debate [34,35].

Whereas a full and detailed discussion of animals' moral status could occupy volumes, only certain theoretical and evidentiary premises are required in order to facilitate a consideration of animal enhancement.

Animals can have interests

Animals have varying capacities ranging from merely being alive to being sentient (in terms of being capable of sensing pain—and pleasure), having the capacity to hold desires and formulate intentions, and in the case of some animals, self-awareness.

As a product of these capacities, animals can therefore have interests; and the content of these interests will depend on the extent of the animals' capacities. For example, animals who are sentient, possessing the ability to sense pain, presumably have an interest in not feeling pain [36-39]. If they are able to feel pleasure as well as pain (for an extensive discussion of this see Balcombe) [40], they have an interest in experiencing the former and not the latter.

Animal interests, though, may extend considerably beyond merely avoiding suffering. It is becoming increasingly clear that many non-human animals can do much more than just feel pain: they may be capable of evincing desire, intention and deliberate action; they may be conscious and some even self-conscious.

Some animals have proved themselves self-aware through gaining the ability to use language—perhaps the best-known examples in this regard are those of chimpanzees who have been taught to communicate using sign language and who have proved able to use language in a manner equivalent to basic human abilities [41, 42]. The capacity of some individuals of their species to use language to express their self-awareness gives us good grounds to suppose that, even for those who have not directly evinced such abilities, there is a high chance they may be self-aware. Even in non-language-capable species, various cognitive behavioural tests have shown evidence of self-awareness: the mirror recognition test, for example, demonstrates that elephants [43] and dolphins [44] (among others) are able to perceive themselves as individual beings.

These interests matter morally

The properties of animals as outlined above are often used as thresholds for determining whether they are worthy of moral consideration. Moral theories concerning the relationship of humans to animals tend to fall somewhere along a spectrum of possibilities. At one end is the hypothesis that all life is of equal moral value—a theoretical position that few if any attempt to defend seriously, because it would imply that the life of plants, protozoans and bacteria was of equal worth to human life and that therefore we should, morally speaking, allow ourselves to succumb to starvation, parasitic infestation or bacterial infection rather than kill other beings of moral importance to ensure our survival. At the other is the position that humans and only humans are of moral value, purely in virtue of their humanness—an argument that, it might be argued, is equally indefensible and moreover has no utility in this context, because it would imply that considerations of animal enhancement are themselves of no moral relevance, and thus fail to provide any input of value to such considerations. Most theories, though, attribute varying degrees of importance to the characteristics discussed above (sentience, self-awareness and so forth).

Philosophical accounts of moral value often invoke the concept of “personhood” and “persons” as an indicator for the sort of entities that matter morally. On John Harris’ account of personhood: “a person will be any being capable of valuing its own existence” (Harris, p 18) [34]. This assumes the possession of certain characteristics that are necessary to be able to value one’s own existence: not just awareness but self-awareness, and more than that, the ability to contemplate and reason about one’s future.

Beings capable of using language to express the value they place on their own lives will be, self-evidently, persons; this includes most humans as well as some animals. For non-language-capable beings the case is less clear, although as I have indicated there may be good reasons to think that some such creatures, higher primates in particular, could be persons. The arguments I wish to propose regarding animal enhancement do not, however, rest on recognition of these animals as persons, and I will henceforth accept that they may not be persons for the sake of proving that the obligations I wish to assert in respect of animals and animal enhancement nonetheless hold.

Persons are certainly proper subjects of moral concern; but they are not the only sorts of entities for whom we should have moral concern. Non-person animals may not be capable of valuing their own lives and may thus lack an interest in continued life, but they are still able to possess multifarious interests in virtue of the capacities they do have. As Bernard Rollin argues, these interests of non-persons may still be sufficient to warrant moral concern and to ground moral action: “[E]ntrance into the moral arena is determined by something’s being alive and having interests in virtue of that life, interests and needs that can be helped or harmed by a being who can act morally” (Rollin, p 47) [45].

We can have obligations based on these interests

It seems sensible that to say “X has interests” is to imply that something can either be good or bad from X’s perspective and therefore that we can do good or bad to X through

facilitating or frustrating X's interests. In relation to our treatment of animals it is possible, therefore, to cause harm to an animal by frustrating its interests or, conversely, benefit that animal by fulfilling its interests.

As beings who can act morally ourselves, we have a moral choice between helping and harming, doing good or bad. This, then, defines both the foundation and the content of our obligations towards other beings: we have a *prima facie* moral obligation towards beings with interests, to act in those interests and not against them.

Animals and the obligation to enhance

What are the implications of this conclusion in terms of animal enhancement? If we have obligations to act in animals' interests, to benefit them and not to harm them, then we have an obligation to use enhancement technologies on animals when it is in those animals' interests, and to refrain from doing so when it is against their interests. The greater the interest, the stronger the obligation in each case. We may also have obligations to animals (including humans) to enhance other animals when it benefits the first group of animals to do so; but these obligations will have to be considered in conjunction with whether the enhancement is in the interests of the enhanced animals themselves and the strength of our obligations in this regard.

When is enhancement in animals' (or humans') interests?

How we determine in practice whether a given intervention is in an individual animal's interests—that is, whether or not it constitutes an enhancement in the beneficial—may sometimes pose difficulty: how does one know what is best for others?

This problem also arises, although to a lesser degree, in assessing the benefits of some forms of human “enhancement”. Although we might concur in general that a life free from the fears of cancer or the infirmities of age is (all other things being equal) probably better than one burdened by them, we might not agree so universally that having, for example, synaesthetic capabilities or the ability to sense electromagnetic fields would necessarily be good for us. If we accept the interest-relative definition of enhancement, whether human or animal, then it follows that whether or not something constitutes enhancement must ultimately be a subjective question: one man's meat (or one mouse's cheese) may be another's poison! We must remember, however, that unless there is a good reason not to have a modification, even if the individual does not view it as enhancing, then it is at worst neutral rather than negative.

Humans can often decide for themselves whether something benefits them or not; but when this is not the case (for example when making decisions for children regarding potential enhancement) [5] we must judge what is most likely to be in the individual's interests. When it comes to making decisions for others regarding enhancement, then, it is a matter of assessing likely rational preferences as to whether something is likely to be of benefit to the individual concerned.

We are often able to make reasonable assumptions about what is good for human individuals and for humans in general because, as humans ourselves, we are inside the community of judgement: we share many experiences, have many features of our lives in common, and evidence suggests to us (even if it can never be conclusively demonstrated) that we may have similar subjective experiences and inner lives. Even this is not foolproof, as the vast body of debate in medical jurisprudence over “best interests” demonstrates. With respect to non-human animals, though, we are at a further disadvantage when it comes to making substituted judgement decisions, because of the many aspects of our lives and experience we do not share with them.

Perhaps this is a matter of degree rather than substance: it is easier for us to determine what will be good for a human whose lifestyle, age, cultural background, abilities, education, life experiences and so forth are similar to our own, than to determine what will be good for someone in circumstances greatly different to ours. Likewise, the differences between human and animal lives create a greater but not (or not always) insurmountable barrier; benefits that are relevant to a specific interest may be generalisable across all individuals of whatever species that share that interest—for example, any creature that has an interest in continued life will presumably benefit from an increase in the length of that life. It is less clear how to deal with interests that may be species specific, although we may often be able to hazard a guess: humans as a species lack supersonic hearing, but we might suppose that a dolphin without sonar abilities would probably have a worse life than one with.

We can say in general, however, that technological interventions affecting animals will be morally permissible if they do not cause harm to any creature’s interests, and may be morally obligatory when they also serve the interests of the enhanced animal or other animals, including humans. Our obligations to enhancement are likely to be greatest when we are considering enhancements that will probably cause harm to none, will be in the overall interest of either the enhanced creatures or other moral subjects, and will be in the interests of creatures with higher psychological capacities such as self-aware entities or persons.

Balancing the scales: obligations to humans and animals

The existence of such obligations towards non-human animals does not negate the existence of other obligations we may have, not least towards humans. Like all obligations, our obligations towards non-human animals in respect of their interests do not bind absolutely but must be viewed in the context of the complete network of obligations to which we are subject in respect of all creatures within our moral sphere. As our obligation to refrain from harming others may yield to our need to protect ourselves in the case of self-defence, the obligations we hold towards animals must be weighed against other, potentially conflicting obligations to determine the optimal moral course of action.

Therefore, if I say that we have an obligation to enhance animals in their interests, I do not mean that this holds even at the cost of detriment to other creatures such as humans and neglecting our obligations in this regard; just that the obligation exists to be weighed against these other possible obligations.

How we balance the scales to determine which, out of all the competing obligations we might have towards other creatures (human and non-human alike), are the most pressing and thus dictate our optimally moral course of action, is another question worthy of consideration but beyond the scope of this paper. It may well be that for almost all possible animal enhancements, there may be a more pressing obligation to do something that satisfies a competing human interest.

It bears noting, however, that even within the realm of obligations to other humans alone, we have multiple and often competing obligations that must be balanced. Recognising that it is not feasible to fulfil all the obligations that might be incumbent upon us does not absolve us from the need to fulfil any of them; the mere presence of competing obligations does not render all obligations void.

The relevant point for this paper is not to establish that our obligations to enhance animals outweigh all other obligations such as those towards humans, but merely that such obligations exist and ought to be taken into consideration.

Cognitive enhancement of animals

Returning to our hypothetical mentally retarded human child and chimpanzee baby: it is quite plausible to argue that we have an obligation to enhance the human baby's inherently limited mental capacities to a level approaching normal human intelligence, because it would sensibly be in the baby's interests to do so. I have argued in this paper that we can also have obligations to non-human animals based on their interests: do we likewise have an obligation to enhance the chimpanzee— and if not, why not?

The assertion that we do have an obligation to the chimpanzee baby to enhance his or her intelligence, according to the theory outlined above of obligations arising in virtue of interests, turns on the assumption that an increase in intelligence is in fact in the chimpanzee's interests—in other words, that enhancing the animal's intelligence is a benefit. One possible objection to animal cognitive enhancement is that we cannot necessarily say that increased intelligence is a benefit to non-human animals. An argument might be made that a chimpanzee whose intellectual capacities were sufficient to enable him to have regard for himself and his situation, as humans do, might somehow suffer from such knowledge; that being a (relatively) super-intelligent ape among ordinary apes would be worse than being an ordinary ape among equals.

To analyse the first objection, that a “simple” quantitative increase in intelligence may not be a benefit, let us reconsider the analogous human situation. Are we better off with increased intelligence, or is it the case that a human with intelligence substantially greater than her peers would be likely to suffer because of it? Arguments such as these have been used to cast doubt on the benefit of human cognitive enhancement.

In fact, studies have shown that human intelligence, at least as measured by conventional methods, is positively correlated with socioeconomic success, health and longevity [46-48], all of which are normative goods. It is fair to say that increased intelligence is a benefit to humans under most circumstances. As a further illustration, consider whether it would be

thought detrimental to have decreased intelligence: because it would almost certainly be considered a harm to be deprived of intelligence, it can be considered a benefit to have intelligence conferred [49]. One can imagine similar ways in which increased intelligence would benefit an animal by enabling it to attain greater fulfilment of at least some of its interests.

Of course, such an increase might result in harm to other animals as the enhanced animal became more competitive for resources such as food, mating partners and so forth. However, we do not usually regard the positional harms suffered by others as a compelling reason to refrain from enhancing humans [4]; indeed, we are encouraged to “level up” [6] to ameliorate any disadvantage caused. The “Red Queen” or “arms race” scenario of enhancement in which we might thus become embroiled as we are obliged to enhance one and then another, each to the other’s relative detriment, presents something of a conundrum, not only for animal enhancements but, perhaps instructively, for human enhancement as well.

It being the case, though, that increased intelligence is a benefit to (some) animals as it is to humans, then the reasons we may have to enhance a human child’s intelligence can also apply to create similar obligations to enhance these animals. In other words, we do have a prima facie obligation to enhance the chimpanzee as well as the human. Of course, a great deal of work is required to demonstrate that cognitive enhancement is as much of a benefit to a chimpanzee as it is to a human; but that does not negate the existence of some obligation, even if it is not as great.

One might argue that as humans cannot (as yet) be biological parents to chimpanzees, the burden of parental care that creates the obligation to enhancement is not present in the second case. Perhaps we have obligations to our descendants that do not exist to others? If this is the case, however, they cannot be based merely on genetic relatedness. After all, we are genetically related to chimpanzees (albeit more distantly; current estimates place the genetic similarity between humans and chimpanzees at approximately 99%, depending on the measurements used) [50-52] as well as to our children! Nor, I think, can we say that the parent’s obligation would be any less pressing towards an adopted child. Indeed, the obligation of beneficence ought to extend more generally to all of humankind, not just one’s own children. But if to all of humankind, why not beyond the boundaries of our species?

The idea of the species boundary as a moral boundary, of *Homo sapiens* as somehow morally distinct from all other species on this planet, is pervasive and at first glance, perhaps, persuasive. Our philosophical language is suffused with references to “humans” and “humanness” as a morally exalted property: we are concerned with human rights, human dignity, human nature and with humanity as a morally significant quantity. This focus on humanness as an indicator of moral status draws an implicit line: entities that are human are different, morally speaking, to entities that are not.

The prevalence of this idea, however, does not necessarily reflect its moral truth. The principle of speciesism has been criticised by several commentators writing on animal interests and animal rights [33, 53-55]]. Nevertheless, the notion of humanness as something

qualitatively distinct in moral terms, the existence of the human “Factor X” (see Fukuyama, pp 149–60) [56], continues to retain philosophical credibility in many discussions.

If the sole reason for excluding non-human animals from the sphere of our moral obligations to enhance is that they are a different species, then I think an onus of philosophical proof remains, to demonstrate that species boundaries are valid moral boundaries rather than arbitrary distinctions. As David DeGrazia argues, “[u]nless and until unequal consideration for animals is successfully defended, we should regard equal consideration as more reasonable” (DeGrazia, p 53) [53]. In the absence of such defence, the primary obligation to enhance animals (both human and non-human) should hold.

In other words, if the basis for moral consideration is creatures’ interests and capacities, then we owe them equal consideration on the basis of those interests, irrespective of whether they are human or non-human animals. We may owe some non-human animals less if their interests are less and some human animals more if their interests are greater; but if creatures, human or non-human, can be shown to have equal interests and capacities, then we have equal obligations to those creatures.

It should not matter what species a creature belongs to: if enhancements are a benefit to human and non-human animals alike, then animal enhancement, as well as human enhancement, is also a moral obligation.

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