Introduction

Technologies that enhance core human capacities are nothing new. For example, writing instruments, caffeine, and computers enhance capacities such as memory, alertness, communication, and access to information. However, recent and predicted advances in neuroscience, nano-, bio-, and information technology, and computer science (NBIC) appear to enable enhancements of a different magnitude and significance. Such robust human enhancement technologies (R-HETs) promise substantial amplification of existing physical and cognitive capacities, as well as novel forms of perception, significantly extended life, and even new forms of existence and flourishing (e.g., partially digital existence) (Roco and Bainbridge 2002a).

The infrastructure for realizing these technologies is already being developed, with substantial funding from the federal government. The Defense Advanced Research Project Agency (DARPA) and the Armed Forces Institute of Regenerative Medicine conduct R-HET research on physical capabilities (such as lifting, stamina, strength, bodily regeneration and resistance to diseases and toxins) as well as cognitive capabilities (such as memory, processing, and responsiveness) (DARPA 2008b; DARPA 2008a; Department of Defense 2008). In addition to its ongoing research, DARPA maintains a list of "Future Areas of Interest" which includes "Applications of Biology to Defense" and "Novel Technologies to Improve the Human Consequences of Transformation." Many of the technologies needed to realize the goals of these research projects already exist in early forms--e.g. brain-computer interfaces that allow fully paralyzed individuals and Rhesus Macaques to interact with a computer (Taylor, Tillery, and Schwartz 2002; Wickelgren 2003). The NSF and NIH also have programs designed to explore R-HET, for example the National Institute of Biomedical Imaging and Bioengineering's Medical

Devices and Implant Science Program Area (NIBIB 2009) and NSF sponsored reports and research on the convergence of NBIC technology (see (Roco and Bainbridge 2002b; Roco and Bainbridge 2003)).

The ethics of robust enhancement is receiving considerable attention (McMahan 1996; Sandler 2007; Garcia and Sandler 2008; Buchanan 2008). However, there has been little discussion of which ethical issues concerning R-HETs are legitimate bases for policy decisions. It might seem that if, for example, implementing some R-HET is unethical, then this fact would provide a justification for policies that restrict this R-HET in some way. However, for reasons discussed below, legitimate ethical concerns are not always legitimate grounds for state action. The mere fact that it would be morally wrong to develop a given technology does not entail that policies should be put in place to regulate or completely restrict the development of that technology.

Given that ethical concerns do not directly dictate policy, the policy-relevant question is not simply what ethical issues arise from the development and implementation of R-HETs, but whether these ethical concerns serve as legitimate grounds for the state to restrict (or promote) the development and/or implementation of R-HETs. The answer to the question of whether or not an ethical concern is a legitimate basis for state action depends on the constraints on legitimate state action. The core assumption of this paper is that political policy decisions should be made against the backdrop of *justificatory neutrality*; the view that

legitimate policies have justifications that are not based in any particular conception of what in life is good, valuable, or right.[1]

The aim of this paper is to explicate and motivate *neutrality of justification* and apply it to ethical concerns that arise in the context of R-HET policy. After an explanation of neutrality of justification and how it serves to constrain state action, several arguments for and against public funding and stricter regulation of R-HETs will be considered. These include that such testing offers potential human benefits, that it poses potential human risks, that such testing constitutes playing God, that it involves crossing species boundaries, and that such testing raises the possibility of enhancing the moral status of the research subjects.

The issues discussed in what follows are not exhaustive of the ethical dimensions of developing and implementing R-HETs. Evaluating particular policies governing R-HET research will require that an evaluation of the reasons presented for the given policies on a case by case basis. However, evaluating these issues and determining whether they serve as legitimate bases of policy decisions will demonstrate the application of neutrality of justification to particular ethical issues that arise in the context R-HETs, and thereby provide a framework for evaluating ethical concerns regarding R-HETs in other policy contexts.

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[1] It is worth elaborating, briefly, on three points related to justificatory neutrality as discussed in this paper. Firstly, throughout this paper, "neutrality" will be used in a technical sense rather than the colloquial sense meaning something like "not taking sides." The technical meaning will be developed throughout the paper, but the reader might be helped by being made aware of the different usage of the term at an early stage. Secondly, in assuming justificatory neutrality, the paper is already taking a stand on a set of conception of good and will not remain neutral between this conception of the good and others. This paper assumes a foundation of liberalism and appeals to neutrality within that framework. By making this assumption the paper avoids a foundational debate about which kind of state is most just. Thirdly, in advocating for justificatory neutrality a prescriptive view is being advanced. Rather than describing legitimacy constraints as understood by a particular society, this paper attempts to apply a normative concept from political philosophy. As such, certain justifications might be ruled out as illegitimate despite the fact that, for example, the United States legal system recognizes such justifications as legitimate.

Neutrality of Justification

The foundations of contemporary neutrality can be traced to Rawls's *Political Liberalism*. Rawls argues that in light of the fact that there is a pluralism of conceptions of the good over which there is reasonable disagreement, the state may not legitimately enact policies that are non-neutral--i.e. that fail to respect the pluralism of reasonable conceptions of the good of the citizenry. Doing otherwise is to ignore the "fact of reasonable pluralism" and threatens destabilization of the state (Rawls 1996). *Neutralism* is the view that governments govern legitimately only when they govern neutrally.

But what justifies the Neutralism? Rawls argued that a neutral state was most likely to offer political stability. In addition to offering political stability, Rawls thought that neutralism was justified by the fact that the government should govern with the consent of the governed, and that governing neutrally is a means to this end or is constitutive of this end (Rawls 1996). Other proponents of neutralism have offered a variety of justifications for neutralism, including that neutrality best promotes the autonomy of the citizenry by allowing them to pursue, within some constraints, the good life in the way they see fit (Ackerman 1980), that neutrality is the political component of treating individuals as ends in themselves (Larmore 1999), and that skepticism about our ability to come to know what the good is requires that we avoid politically endorsing some conceptions of the good over others.[2]

[2] Note that this does not entail that no policy may ever be put in place. A policy can be endorsed without the state endorsing a particular conception of the good that justifies that policy. In policy debates, some policy may win out over another without the justification for the prevailing policy being grounded in any particular conception of the good. For example, the state may choose not to enact a policy whereby the Ten Commandments are displayed on all public buildings. This does not mean they must also endorse a conception of the good by which no religious symbols are displayed on state buildings. Instead, the justification for the policy adoption might be economic in

While debates about neutralism and its content are still standard fare amongst political philosophers (see, for example, (Sher 1997; Klosko and Wall 2003; Arneson 2003; Arneson 2008)) there is a general agreement among neutralists that the doctrine includes a constraint on which justifications for public policy are legitimate (see, for example, (Brighouse 1995; Klosko and Wall 2003; Streiffer and Rubel 2004; Streiffer and Hedemann 2005; Marneffe 2008; Macedo 2008)). This commitment to neutrality of justification takes many forms:

> Kymlicka: The state does not take a stand on which ways of life are most worth living, and the desire to help one way of life over another is precluded as a justification of government action (1989, 884).
>
> de Marneffe: the government is neutral in the relevant sense when it adopts only policies that can be justified by neutral reasons (2008, 1).
>
> Arneson: Neutrality of justification requires that any policies pursued by the state should be justified independently of any appeal to the supposed superiority of one way of life or conception of the good over another (2008, 1).
>
> Macedo: It [neutrality] means that the justification of the law abjures reliance on particularistic or sectarian truth claims (2008, 2).

At the heart of each of these formulations is the idea that the state may not justify a policy decision by appeal to reasons that only some constituent groups of a society would endorse as justification for that policy.

This constraint on justifications requires some caveats. Firstly, neutrality of justification is a constraint *within* liberal states. Neutrality is meant to extend from, and embody, core liberal values such as equality and freedom. Therefore, promotion of these values is always a

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nature. Thus a policy wins out over an alternative, but not because the state endorses one conception of the good over another.

legitimate basis for policy decisions in the liberal state. In addition, there will be a set of resources that are means to promoting reasonable conceptions of the good within the liberal state. These primary goods--i.e. goods that all citizens may put to use to achieve those things they reasonably take to be good -- include things like economic resources, health services, and education (for a discussion of primary goods, see (Rawls 1996)). Due to their instrumentality in achieving and promoting any reasonable conceptions of the good of the citizenry, appeal to the generation or degradation of primary goods is legitimate in making policy decisions.

Secondly, although some conceptions of the good held by the citizenry restrict state action, not all conceptions of the good do so (Rawls 1996). The state is limited to being neutral with respect to *reasonable* conceptions of the good. For example, a conception of the good is held to be unreasonable when it includes values that are inconsistent with the core values of liberalism, when it is inconsistent with well founded empirical results, or when distinctions with normative implications are arbitrary or unfounded. For example, conceptions of the good that are racist do not serve to constrain which state actions are legitimate, nor do the conceptions of the good that require that we teach that the earth is 4,000 years old.

It is also worth noting that the neutrality constraint does not require unanimity in the citizenry's conceptions of the good; neutrality of justification does not require that all citizens are able to endorse a given state action for the same reason. If a state action can be justified for a plurality of reasons given the plurality of goods reasonably endorsed by the citizenry, then that state action is legitimate with respect to the principle of neutrality. Agreement on a policy despite disagreement over the reasons that justify the policy is what Rawls identified as an "overlapping consensus of reasonable comprehensive doctrines (1996)."

For example, imagine that a liberal state is considering a significant tax increase on companies that emit X amount of carbon into the atmosphere. Suppose that under one conception of the good, this is justified on the basis that it will improve international relations and set a good example for other countries. Under another conception of the good, international relationships are not of value and neither is setting a good example. However, the tax increase can be justified under this conception of the good because it will increase research into new technologies and increase the store of human knowledge (a value under this second conception of the good). Despite the fact that people holding these conceptions of the good disagree over the justification for the tax increase, they can, consistently with their conceptions of the good, justify the tax increase. Thus, neutrality of justification will be satisfied and a tax increase is neutral. Of course, there might be disagreement over how much of a tax increase is consistent with the different conceptions of the good. If so, the tax increase that will be neutrally justified is that increase over which there is agreement.

Given these clarifications, the principle of neutrality of justification can be formulated as follows:

> **Principle of Neutrality of Justification (PNJ)**: A policy is neutral with respect to justification just in case that policy is consistent with all reasonable conceptions of the good embedded in a liberal society.

This formulation captures the idea that the liberal state (i) is constrained only by reasonable comprehensive doctrines and (ii) that state action can be justified as a result of an overlapping consensus.

PNJ is a necessary condition for legitimate state action but not a sufficient one. There may be times where there are neutral justifications for inconsistent policies. In these cases, the

question will be which of the justifications has more merit, which PNJ will not resolve. Determining whether a policy satisfies the PNJ is an important step in determining the legitimacy of a given policy, but it is not the only consideration. However, if a policy cannot be justified in a way that satisfies PNJ, it will be illegitimate independently of the policy's other merits.

Applying PNJ to R-HET Policy and Default Policy Positions

In the remainder of this paper, PNJ will be applied in policy contexts involving R-HETs. The focus will be on the application of R-HETs to non-human animals and ethical arguments appealed to in order to justify funding or regulating these applications. Three kinds of ethical arguments regarding funding and/or regulation of testing R-HETs on non-human animals are evaluated with respect to PNJ: arguments from benefits and risks; arguments from the possibility of moral status enhancement; and arguments from the intrinsic nature of R-HETs. The potential policy implications of these types of arguments range from easing current restrictions on animal testing for the purposes of developing R-HETs to a complete ban on testing of R-HETs on non-human animals.

The goal in the remaining discussion is not to endorse any particular policies, but rather to see how the PNJ can usefully be applied to determine the legitimacy of a series of ethical concerns that might be appealed to in justifying a range of R-HET policies. The discussion will serve as a model for applying neutrality considerations to public discussion of R-HET policy and provide a useful mechanism of criticism without also being a condemnation of particular ethical views.

Before engaging with the ethical arguments, it is important to make clear one assumption about default policy positions made in the remainder of the paper. Default

positions are those positions that the state should take in the absence of neutral reasons that would serve as a basis for justifying any policy options under consideration. Following Brighouse (1995) I will assume that that non-funding and non-regulation of R-HET research do not require justification, whereas funding and regulating such research does; that is, non-funding and non-regulation are the default policy positions. Non-funding is the default position with respect to public funding because such funding is ultimately a cost paid by the taxpayer and is coercively taken from them. Thus, it must be justified neutrally (Brighouse 1995). Non-regulation is the default position with respect to regulation of research because regulations directly restrict the autonomy of researchers. Since the default positions are non-funding and non-regulation, the onus is on proponents of R-HET research to justify publicly funding it, and on opponents to justify regulation, in ways that satisfy PNJ.

This assumption is not universally shared (see (Dworkin 1986)) but the reasons offered in favor of these default positions are compelling. If, however, they are the wrong default positions, a different set of default positions will have to be defended by those who wish to apply the PNJ. However, since the goal is to provide a model for applying PNJ to R-HETs, the assumption should not be an impediment so long as we are aware that a change in default positions could radically alter the particular policies that are legitimate for reasons other than congruence or conflict with PNJ.

Arguments from Benefit and Risk

The benefits appealed to by those in favor of funding for R-HET research and limiting cumbersome regulation, e.g., (Bostrom and Sandberg 2006; Bostrom 2008), generally fall into two kinds: economic benefits and welfare benefits (both individually and collectively). They

include increasing our lifespan, broadening social interactions, increasing our accessibility to epistemic resources, and decreasing the incidence of disease and biological deterioration. These benefits are taken to justify R-HET policies that will promote their development.

From the perspective of neutralism, arguments that appeal to these kinds of benefits in advocating for a pro-research policy are legitimate so long as the benefits generated are primary goods – i.e. so long as the benefits are valuable independently of which reasonable conception of the good an individual in a society endorses. Many of the goods mentioned above appear to be of this kind. All else equal, people with diverse conceptions of the good recognize extensions of their life, increased social interactions, and increases in epistemic resources as goods. Since PNJ allows that a particular policy will be legitimate even if it is endorsed by different parties for very different reasons--i.e. so long as there is an overlapping consensus--the benefits on offer from R-HETs are legitimate grounds for policy decisions regarding research on non-human animals.

This does not imply that any means of achieving those ends is permissible. To say that these ends are legitimately appealed to in justifying funding is to say that, to the extent that they will be realized, these ends provide a prima facie reason for funding a given research program. This does not entail that there are no countervailing reasons that would serve to undermine research funding. If, for example, achieving the neutral ends would require mass violations of human rights, the funding would be unjustified despite the fact that appeal to the specified ends is legitimate.

Opponents of funding R-HET research may reply that we should be skeptical of the benefits on offer and instead note certain risks associated with R-HET research, development,

and implementation. The risks associated with R-HETs can be divided into those that accompany the development of R-HETs and those that accompany the implementation of R-HETs. Developmental risks largely supervene on the risks associated with research on the kinds of materials and technologies that will be used to produce R-HETs. Most notably these risks include those associated with biotechnology and nanotechnology (see (Reiss and Straughan 1996) for an overview of some of these worries), but there are also potential risks associated with the computer science aspects of developing R-HETs. Developmental risks associated with biotechnology and nanotechnology include worst-case scenarios such as the creation of a bio-engineered organism with the potential to wipe out huge populations of humans either directly or indirectly by killing off significant sources of sustenance , or the creation of self-replicating nanobots that transform all matter into a homogeneous grey-goo (Drexler and Whitaker 1986). Similar worst-case scenarios might arise in the context of developing computer programs with artificial intelligence.

Of course not all the risks are as bad as these worst-case scenarios depict; they are after all "worst-case scenarios." There are risks of bio-engineered organisms that cause health problems, and of toxicity associated with nano-particles, and of computer viruses that will generate economic costs. There are also issues related to social justice. Garcia and Sandler (2008) argue that widespread adoption of R-HETs might have serious, negative impact on social equality, especially if they are most easily accessible to the wealthy. If these negative impacts are likely to be realized, and can only be addressed by excessively restrictive regulation of R-HET research (a position not endorsed by Garcia and Sandler), perhaps there is a reason to regulate R-HET research.

In light of these risks, opponents of R-HETs may seek to justify restrictive policies that limit the development and application of these technologies. If R-HETs are a means to social injustice, health problems, and possibly total destruction, we should heavily regulate or do away with the R-HET research in order to mitigate these risks.

So, who is right? Should we expect the best or the worst from R-HET technologies? Should we thereby make restrict R-HET research or should we publicly fund such research? These are important questions, but neutralism won't, and isn't intended to, provide an answer to them. What neutralism does tell us is that the benefits and harms appealed to in these discussions are appealed to *legitimately*. Whatever the answer to our empirical question about the benefits and harms of R-HETs, the answer may play a legitimate role in policy decisions.

Arguments from the Possibility of Moral Status Enhancement

Another ethical issue (besides risks and benefits) that arises in the context of the testing of R-HETs is the effects of such testing on non-human research subjects. Enhancing the cognitive capacities of non-human test subjects raises novel issues, including the possibility of enhancing the moral status of non-human research subjects. On many plausible views of moral status, a beings moral status is intimately connected to its cognitive capacities. The capacity for a being to suffer or enjoy its life depends, at least in part, on having a set of cognitive faculties.[3] Furthermore, different or more developed cognitive capacities further enhance the capacity for suffering and enjoyment. Insofar as R-HETs may enhance a being's core cognitive capacities, such as the capacity for reasoning or memory, it may alter our obligations to these beings. In

[3] "Suffering" and "enjoyment" are being used broadly to include not only sensory feelings of pleasure and pain but also to include a beings evaluative attitudes towards individuals or states of affairs.

what follows I will set aside traditional worries about the ethical treatment of animals in research contexts(see, for example, (Singer 1977; Regan 1983)) and focus on the issues that are specific to cognitive enhancement.

Streiffer (2005) raises the worry about moral status enhancement in the context of research that results in human-animal neural chimeras, individuals that are composed of both non-human cells and human neural cells. Streiffer argues that some enhancements to non-human animals might result in their having the underlying basis that gives rise to human-level moral status.[4] This might result in individuals towards which humans have strong moral obligations. But, given the context in which such individuals would be created, their moral status might go unappreciated and therefore severe wrongdoings might be committed against these individuals.

Similarly worries arise in the context of testing R-HETs on non-human animals since one way of underwriting human-level moral status is by appeal to our distinctive cognitive capacities or the level of those cognitive capacities. On such views of the moral status of non-humans, there is a possibility that R-HETs will enhance that moral status of research subjects by augmenting or giving them these cognitive capacities.

The possibility of moral status enhancement raises several worries. Some may view moral status enhancement as intrinsically wrong, while others may believe there is nothing

[4] By "human-level moral status" I mean the moral status typically accorded to human beings. Sometimes this is understood in terms of having a certain set of rights or being due a certain minimum level of consideration in moral deliberations. It has of course been argued that many non-humans already have "human-level" moral status. I am sympathetic to these views and if they are correct they may already indict the treatment of animals in research contexts. In setting aside the traditional animal ethics issues, I am assuming that there is a difference in moral status between humans and non-human animals. Despite personal reservations about this assumption, it is useful in highlighting the novel issues that arise from the use of R-HETs on non-human animals and how the PNJ bears on these issues.

intrinsically wrong with moral status enhancement so long as the new moral status of the individual is appropriately recognized (for a discussion of ethical evaluations of moral status enhancement see (Streiffer 2005)). However, the requirement that the new moral status of the individual is respected is unlikely to be met in many cases due to the fact that the cognitive enhancements that give rise to moral status enhancement need not also enhance the ability for the enhanced individual to make their new moral status known. As such, these individuals may be treated in ways that would be appropriate for individuals with their previous moral status, but that are absolutely impermissible given their enhanced moral status.[5]

To illustrate this, imagine that a group of rabbits has been chosen to test the safety of a drug that is intended to significantly augment core cognitive capacities such as reasoning and memory. These rabbits are to be kept in normal animal housing, monitored over a period of time after taking the drug, and then euthanized. Assume that upon administration of the drug, the test subjects develop whatever cognitive capacity serves as the basis for human-level moral status. Given the moral status enhancement that has occurred, the research plan described above, ending in the death of the research subjects, would be absolutely impermissible. Even worse, because the rabbit's morphology makes them ill-suited to communicate their new level of moral status, it is possible that it would go entirely unnoticed and the research would be carried out.

[5] One objection to this might be that, since the aim of testing on non-human animals will be to determine effectiveness, that there is little worry that the new moral status of the individual go unnoticed. After all, there will be tests in place to see if the R-HET was effective when applied to the non-human test subjects. However, it may be possible to detect an increase in cognitive capacities without detecting an increase to the degree that the individual has undergone an enhancement to human-level moral status. Additionally, the enhancement of cognitive capacities relevant to moral status may be a side effect of enhancement of other cognitive capacities. In some research contexts, enhancements to the latter capacities might be detectable while enhancements in the former are not.

Does the possibility of moral status enhancement provide legitimate grounds for regulation? Whether or not an individual thinks it is possible for cognitively enhanced individual to come to have the same moral status as a human being will depend on their view about the basis of moral status. On some views, human-level moral status is grounded in certain cognitive capacities (or the genetic basis for certain capacities, see (Liao forthcoming)), on other views human-level moral status is grounded in species-membership or membership in a particular moral community. These disagreements are a function of disagreements over conceptions of the good as much as anything else. Given the debates over the grounding of moral status and the fact that whether moral status enhancement is even possible will be in part determined by a commitment to some conception of the good, the seeming answer to the question of whether issues of status enhancement provide legitimate grounds for policy decisions is 'no.'

However, there are multiple senses of moral status and so multiple senses of moral status enhancement. One sense of moral status means human-level moral status, and there is the potential for reasonable disagreement over whether any non-humans can ever attain this level of moral status. But, insofar as we recognize that we cannot do whatever we please to some non-human animals--for example, it is impermissible to play football using a live puppy--there is another sense of moral status that certainly applies to these non-humans. This sense of moral status, at a minimum, obligates us not to cause significant pain to non-human animals for trivial reasons. An individual's having moral status in this sense is to be due a certain kind of *treatment*; call this sense of moral status the 'treatment sense of moral status,' or 'T moral status.'

Consider a scientist performing an experimental operation on two chimpanzees that differ only in that one is incapable of feeling pain. The surgery requires the removal of large amounts of skin tissue. For the sake of the example, assume that the cost of anesthesia is not cheap, but not prohibitively expensive, and easily administered. In such a circumstance, it is morally required to anesthetize the normally functioning chimpanzee, whereas there is no such requirement with respect to the other chimpanzee.

This thought experiment shows that different non-human animals may have different moral status in the treatment sense. It also points to the connection between moral status in this sense and cognitive capacities. The difference in the moral status of the chimpanzees supervenes on a difference in their cognitive capacities, specifically their respective capacities to suffer.

T moral status, unlike the full, or human-level, moral status, is not binary, but incremental and suffering may or may not be sufficient for having moral status in this sense, but the capacity to suffer does partly determine the kind of treatment an individual is due. Consider again the surgery on the chimpanzees, but imagine a third chimpanzee that is cognitively limited such that all its sensations are dulled. Assume there are two different anesthetics, STRONG and WEAK, which differ in their strength, STRONG is stronger than WEAK, but costs the same. If STRONG is used on the normal chimpanzee, it will feel little discomfort; if WEAK is used it will be in terrible pain. STRONG and WEAK will have identical effects on the cognitively limited chimpanzee; it will feel little discomfort either way.

While there is no moral requirement to administer STRONG to the cognitively limited chimpanzee, there is such a requirement to administer STRONG to the normal chimpanzee. This

difference in treatment is precisely a difference in moral status in the treatment sense of moral status. Furthermore, this difference in T moral status is a function of the respective chimp's cognitive capacities. Given the ways and amounts that the chimpanzees might suffer, they are due different treatment.

Just as there is a sense in which non-human animals have moral status and different non-human animals may have different moral status, there is an accompanying sense in which this moral status may be enhanced. This follows from the fact that T moral status supervenes, at least in part, on cognitive capacities relevant to suffering and the fact that these capacities can be enhanced. Were the cognitively impaired chimp described above cognitively enhanced so that it was mentally similar to the normal chimp, a status enhancement would simultaneously occur such that it would no longer be permissible to treat this chimp as he was treated before.

Does the possibility of incremental T moral status enhancement like that just described provide neutral reasons for regulating R-HET research? Insofar as the U.S. has legitimate legislation regarding the treatment of non-human animals on the basis of their capacity to suffer, it does. The Animal Welfare Act requires that "with respect to animals in research facilities, include requirements--(A) for animal care, treatment, and practices in experimental procedures to ensure that animal pain and distress are minimized, including adequate veterinary care with the appropriate use of anesthetic, analgesic, tranquilizing drugs, or euthanasia;..." (Congress 1966, sec. 2143). Given that R-HETs may alter the kinds and amount of pain and distress that test subjects can experience, R-HETs may also incrementally alter the T moral status of non-humans test subjects; that is R-HETs may alter the kind of treatment that is

due to certain cognitively enhanced, non-human animals. And, for reasons mentioned above, researchers might be in a poor position to judge whether or not moral status enhancement has occurred in test subjects. This might result in violations of the Animal Welfare Act in virtue of a failure to appropriately minimize pain and distress.

This consideration is a legitimate basis for regulation of R-HET research so long as the Animal Welfare Act satisfies PNJ. No justification of the Animal Welfare Act has been provided here, but parties to the policy debates concerning R-HET regulation will almost certainly not challenge the legitimacy of the act. Therefore, for the purposes of discussing the policy implications of moral status enhancement, it is safe to assume the legitimacy of the AWA. Therefore, the possibility of incremental moral status enhancement is a legitimate consideration in favor of regulating R-HET research when such research will be done on non-human subjects. What regulations are justified on these grounds are a separate matter and will not be discussed here.

Arguments from the Intrinsic Nature of R-HETs

Other concerns implicated in debates about R-HETs in the context of research on non-human animals are what I'll call intrinsic concerns. Many such concerns about R-HETs are similar to concerns raised in discussions about genetically modified organisms and the development and use of nanotechnologies (see, for example, (Reiss and Straughan 1996)). It is unsurprising that these objections would also apply to R-HETs, since R-HETs are largely based on nanotechnology and biotechnology.

In the context of bioengineering, in particular genetically modifying organisms, a popular criticism is that such acts constitute playing God. One way to understand the playing

God objections to bioengineering is that such engineering requires that we cross species boundaries that were set forth by God (Robert and Baylis 2003). In creating all species, God set forth species boundaries (i.e. distinct forms of life) and crossing them is sacrilege. Those who endorse species-boundary, or intrinsic nature, based objections to bioengineering, will also likely object to R-HETs that offer a similar opportunity for boundary-crossing or nature changing via radical cognitive alteration.

Another version of the playing God objection to R-HETs might give up the essentialist view of species boundaries inherent in the original criticism and maintain that it is God's place, not ours, to determine the course of species evolution. The core of this version of the playing God objection is still that by trying to enhance our core capacities we act against God's wishes, or exercise powers not appropriate to us given our God-given limitations.

However we understand the playing God objection, it will be clear that any version of these arguments, plausible or not, does not provide legitimate grounds for state action according to PNJ. Given that religious commitments vary widely, a requirement of secularism is justified quite naturally by a requirement of neutrality. In a society with reasonable atheists, secular reasons will be necessary if there is to be any overlapping consensus on policy decisions. But, we need not consider only atheists to see why reasons are restricted to secular reasons. Religious commitments vary greatly even between those that are committed to the existence of God. We can imagine some citizens committed to a deity that encourages humans to make the most of their core capacities. On such a view, developing enhancement technologies would be in keeping with the will of God. But, again we have a tension between different conceptions of the good and so neutrality requires that secular reasons, or reasons

independent of any particular religious commitments, are appealed to in justifying legitimate policy.

Not all intrinsic concerns regarding R-HETs are religious in nature. Objections to bioengineering and nanotechnology include that the use of such technologies and the products of such use is repugnant (Kass 1997), that they are unnatural, that they violate human dignity (Karpowicz, Cohen, and van der Kooy 2005), and that the development and use of such technologies always or in particular contexts embody arrogance or hubris (Sandler 2008). While each of these objections deserves considerable attention in ethical discussions, these objections are unlikely to serve as legitimate grounds for restricting funding (when otherwise justified) to and requiring regulation of research on R-HETs. Each of these objections invoke reasons which are of the kind that neutrality of justification is meant to rule out. Views about what constitutes human dignity, what is repugnant, what character traits are virtues and which are vices, and whether what is natural should play any role in our ethical deliberations are exactly the kinds of views over which there is disagreement among reasonable people with varying conceptions of the good. As such, any particular view is illegitimate as a basis for policy decisions.

Conclusion

What follows from the above discussion of PNJ and the legitimacy of certain justifications for the regulation and funding of R-HET research? Do the potential benefits of R-HETs justify deregulation of research practices? Do worries about moral status enhancement justify heavy restrictions on the use of non-human animals in R-HET research? Neutrality provides a framework by which we can evaluate the legitimacy of a given reason for overriding the default positions with respect to federal regulation and public funding of R-HETs. The fact that research

on a particular R-HET might result in future health, welfare, or social benefits (or risks) provides a legitimate reason for regulating such research, as does the fact that such a technology has implications for the T moral status of research subjects . The fact, if it is a fact, that R-HET research on non-human animals is against God's will or that it is repugnant, does not serve as a legitimate reason for regulating R-HET research.

Assessing particular enhancement technologies and particular policies proposed for funding and regulating them requires evaluating the reasons for and against these policies with the particular technologies in mind. The distinctive challenge with respect to these technologies is that they have the potential to dramatically alter the core capacities of those beings that use them. That they do so raises the possibility of new benefits, new risks, and new ethical challenges that we must face on a case by case basis. But, in each case we must ask if the reasons available to justify the policies we wish to put in place are neutral.

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