

COMPARATIVE ETHICAL CALCULUS

Exploring a mathematical model that refines and unifies
discussion of human ethics and between comparative species

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Inspired and informed by conversations over several years with

Rob Bass

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WHAT TO EAT

I set out on my quest to define ethical behavior that concerns members from more than one species as a result of my diet. My parents, being Seventh Day Adventist and poor, raised me vegetarian. I remained so until I was fifteen, at which point, in the biology classroom, I declared to my fellow Students for the Ethical Treatment of Animals: Life must die to sustain one's life. I decided that a carrot's concerns were important, so why was I privileging a chicken over a carrot? I felt as Tool's lyrics on track 69 of the Undertow album would say a few years later: "Life feeds on life." From then on I ate whatever made me happy (which includes being satisfactorily healthy).

Later, I met a vegan who induced me to read John Robbins' book, Diet for a New America, which gratuitously depicted and described the torture suffered by chickens, pigs, and cows in a factory farm, which are common in the United States. In part because of our relationship, I became vegan. That lasted no more than a few months in that small town where healthy alternatives were hard to come by, and beyond my Army salary. I grew weary of eating yeast for protein. And our relationship ended.

So I ate freely again. Not long afterward, a friend and mentor in philosophy, Rob Bass, became vegan (and then so did his wife). I respected his position, yet was led to wonder what Jessica, a friend of a friend (relayed via T.D. Houfek) had said on the virtues of veganism for animal quality of life: Free range omnivores may promote quality of life more for animals than vegans do, because free range omnivores are willing to financially support higher quality of life for livestock, whereas vegans will not. Vegans boycott animal products of any origin. So only the free range diet can financially induce a committed livestock farmer to treat their animals better.

On occasion I played Devil's advocate with Rob Bass, asking what set apart vegetables from animals in the consideration. He responded: their ability to suffer. At that time, which was a few years ago, his concerns were echoed by Jeff Riegenbach who lambasted libertarians who disregarded animal suffering as inconsiderable.

Then on Christmas Eve in Tennessee, where family was eating ham and brisket, the topic of comparative ethics again arose. T.D. Houfek brought up the point that animal testing can save human life, therefore its prohibition costs human life. When I relayed that to Rob Bass, he responded with Robert Wright's problem of animal torture. Suppose an average mouse's nonconsensual suffering for 10,000 units of time is equivalent

to an average human's nonconsensual suffering for 1 unit of time. Causing an average mouse to suffer, without the mouse's consent, for 24 continuous hours is hypothetically equivalent to causing an average human to suffer, without the human's consent, for 9 continuous seconds. Without equivalent redeeming benefit, causing a human to suffer for 9 seconds seems immoral. Accordingly, it seems categorically immoral to torture a mouse for a day.

Even before Rob had mentioned this proportion, I proposed that functions beyond proportional functions ought to be considered for the ethical calculus of the suffering of comparative species. My mind has since been aflame with related thoughts assailing my consciousness that share a common core ethical model. As I have explored and edited the model, I realized that there are three parts, not just one, that are worth independent consideration and critique. Therefore, this article is divided into those three parts, respectively. In Part 1, there are partial requirements to a model of comparative ethics. Part 2 describes a model that meets these requirements. Finally, Part 3 provides example applications of the ethical model.

PART 1: SENTIENCE AND QUALITY OF LIFE

Before journeying far into the forest of ethics, let us identify that forest. Ethics is the branch of philosophy that focuses on beneficial and detrimental behavior, where the benefits and detriments of all those concerned is considered. A system of ethics does not provide guidance toward an agent's short-term benefits or necessarily toward an agent's benefits at all. If it did, then economics, being a science of agent choice, would be a sufficient superset of ethics. Yet a system of ethics ought to have some benefit for those considered in the long-term. If the system never benefits its agents, then that system of ethics is self-defeating, and ought to be discarded in favor of a system that eventually does benefit those concerned. Some various properties have been considered for this benefit. Let us use the one that Aristotle championed: eudaemonia. Briefly put, eudaemonia is a long-term benefit to an agent and posterity (Robert Bass, Toward a Constructivist Eudaemonism <http://personal.bgsu.edu/~roberth/disser.html>). Something like this concept will be used later on, broadly referred to as quality of life.

The underlying assumption of a quantifiable model of ethics places this approach into the tradition of utilitarianism (<http://en.wikipedia.org/wiki/Utilitarianism>). Utilitarian ethicists attempt to judge intentional behavior based on its

benefits and detriments to all beings worthy of ethical consideration. Rather than posit absolute rules from the top-down, in the form precepts, commandments, or laws, utilitarians attempt to measure the effect of a behavior within a situation and derive from the bottom-up principles or guidelines that promote a net benefit. Some precepts might be "avoidance of killing ... to prevent their slaughter" (<http://web.singnet.com.sg/~alankhoo/DharmaRealm.htm>), whereas a utilitarian might attempt to assess the damage of killing or unprevented slaughter.

SENTIENCE IS NECESSARY FOR ETHICAL CONSIDERATION

Buddhists have been concerned with comparative ethics for millennia. In Theravedan Buddhism sentience is the primary qualification for ethical concern. One line from a Buddhist prayer (Quoted from Diamond-Sapphire 6.0 by Gregory Peters, which quotes from Diamond Sutra) goes:

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May all sentient beings have perfect happiness.

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In this line, we see a preference for the quality of life for beings that can feel and sense. Perfect happiness is not dissimilar from eudaemonia or general well-being. There is a disregard for nonsentient beings. Who weeps for the cars and

desktop computers when they are old and useless? To the extent that these machines have no feelings or senses, no one should.

Suppose a person was cloned for torturous scientific experimentation. Does the clone have rights? The clone would not have existed except for experimentation. Cloning an organ for torturous experimentation is not significantly unethical, but cloning a whole human for torturous experimentation is as ethically regrettable as raising a human for torturous experimentation. The distinguishing trait between meat and member is sentience.

Religious figures have argued on the sanctity of human life, because a human possesses a soul. Without tackling the vague and inadequate definition of a soul, let us consider to partially replace the soul with sentience in general as a kind of spiritual basis of an ethically important being.

Why? There is a utilitarian and intrinsic answer. The sentient being has other desires about the best use of its time and resources. The preferences of the sentient agent are taken into account, foremost by that agent. But even suffering is regarded when the agent is not intelligent enough to articulate preferences. We care for the well-being of the retarded or infantile, both of which are capable of communicating suffering.

SENTIENCE IS INSUFFICIENT FOR ETHICAL CONSIDERATION

Sentience alone, in its minimal definition as the ability to sense and feel, should be an insufficient requirement for ethical consideration. Suppose a robot were constructed that had senses and feelings. Already robots with senses exist. And even consumer-grade virtual pets, such as Digimon (<http://en.wikipedia.org/wiki/Digimon>) or The Sims (http://en.wikipedia.org/wiki/The_Sims_2), are capable of simulating crude forms of feelings. These simulations of sentience, albeit crudely insufficient, are an approach toward the level of sentience possessed by mammals.

Senses alone are insufficient for ethical consideration, as cameras and microphones possess senses. At least they possess raw physical recording power. One might posit that a true sense requires information processing ability beyond the code created by physical light on a photoreceptive cell, or the code created by vibrations of air on an electrically charged membrane. The interactive artist Simon Penny has gone a step further to state that the 19th Century model of senses as organs of reception is outdated, and that senses in a sentient being are part of an interactive system, in which not only do the senses receive information but are tuned by the animals' behavior, therefore are to a lesser degree active participants in interaction with a physical environment.

Feelings alone are also insufficient for ethical consideration. Emotional response as humans know it is bound to a system of information processing, which includes the output and input to a control system. A feeling often serves a mammal by inciting it to act in a coordinated and goal-directed manner.

Below the surface of both of these explorations of the components of sentience (sensation and feeling) are requirements of information processing and goal-directed behavior. Leaping from the biological sciences to the computational sciences, these terms have come up before, under the umbrella of artificial intelligence. Computer scientists, in an effort to automate more complex behavior require an intelligent machine, not only to record data and produce output, but also to perform intricate transformations on the data for the purpose of evaluating the accomplishment of a set of goals and executing behavior that must itself be later evaluated for efficacy. Computer scientists call this field artificial intelligence. I think their principles are as good as any for natural intelligence, too. Intelligence, regardless of medium, is a requirement for ethical consideration. So far that means that an object must possess sentience and intelligence in order to be considered an entity worthy of ethical consideration.

What is the ethical consideration for animals with subhuman intelligence? The minimal bound for animal's comparative

ethical weight seems to be above a THETA(zero)-function's asymptote. By that, I mean to say that a subhuman animal merits some consideration. The maximal bound seems to be below an OMEGA(x)-function's asymptote. By that, I mean to say that a subhuman animal merits less consideration than a human.

The comparative value cannot be wages, because not all humans earn wages. It cannot be market value of the animal, because nonsentient gold has a high market value but is no more sentient than nonsentient lead. The comparative value could consider the intelligence of the nervous system, based on observable ability. Psychologists typically measure intelligence based on observable ability.

INTELLIGENCE IS A DUBIOUS REQUIREMENT

There is a problem with comparing ratings, because for example, how many average adult chimpanzee lives are worth an average single adult human life? There is the economic answer, based on market price, which fluctuates due to supply and demand and is not intrinsic to sentience. But what is the ethical answer?

A headcount is an insufficient model of comparative intelligence. No simple addition of lesser intelligence equates to greater intelligence. There must be some method of

organization to arrive at greater intelligence. No number of chimpanzees can be said to equate to Shakespeare.

There are computers with lesser and greater degrees of processing power, but processing power, which can be simulated by using more computers or a longer duration, does not sufficiently simulate higher intelligence. For instance, no number of computers performing an exhaustive, brute force search on the decision tree can arrive at a solution to the game of chess within the estimated lifespan of the universe. But a well-engineered database of important positions and heuristic estimates of these positions has solved the game better than top human players, whom we regard as intelligent.

For this reason, comparing species of varying degrees of intelligence with a goal toward finding ratios or equivalent sums is dubious.

In terms of engineering, intelligence posits fundamental difference in algorithms and architectures. Some algorithms and architectures can be compared for their relative efficiency at equivalent tasks or tasks that may be transformed into equivalent tasks. For example, B.F. Skinner showed that pigeons could be trained to be spotters, by transforming their keen sight and image recognition plus their ability to peck a button into a target detection system. In doing so, the pigeon's task performance could be compared to a machine, human, or another

able animal. Even blind humans can perform the task provided that some other eye can relay information to the human (such as a seeing-eye dog or an electronic eye that impresses a tactile image on the skin).

Finally, besides the difficulty of comparing intelligence between species, even if it is practical to adopt intelligence as the major ethical discriminant between species, one should remember what Emo Philips once said:

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I used to think that the brain was the most important organ in the body, but then I realized which organ was telling me that.

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Intelligence as the prime requisite for ethical consideration should be criticized. If for no other reason, this requisite might benefit those that score high on intelligence quotient tests, inflating self-importance of administratively identified geniuses, and potentially justifying malicious atrocities in so much as they benefit the more clever symbol manipulators and punish the less apt.

Why is the capacity to suffer insufficient? The capacity to suffer is hard to compare between mammals. What should be registered? The suffering that humans recognize? The cuteness of the specimen? Why should any species be considered above another in capacity to suffer, supposing each possesses the

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ability to experience pain and pleasure? Also suffering is harder to distinguish objectively than intelligence is. Weighting ethical consideration for suffering also promotes the illusion of suffering, which is easier to fake than intelligence is. Suffering also suggests that circumventing the mechanisms of suffering (through anesthesia) is ethically equivalent to removing suffering.

Real suffering, and the situations that cause suffering, should not be ignored. One convenient approach to suffering is to consider it as a relatively worse quality of life. One at a low quality of life can be said to be suffering more than one at a high quality of life.

QUALITY OF LIFE MEASURES ETHICAL IMPACT

When considering well-being, the concept quality of life is useful. It connotes a positive, rather than negative such as suffering. Those who are living do not necessarily see life as suffering. If they did, they could always find a way out of the suffering, permanently.

Buddhists would claim that many forms of sensorial and emotive gratification, such as television, visceral movies, and amusement parks encourage or even implant delusion, and such delusion is a cause of suffering, therefore diminishes quality of life.

I take a less ascetic view. The question is: What is the ethical opportunity cost of the entertainment? What could the person be otherwise doing that would improve their quality of life, which necessarily includes their enjoyment, thus some sort of gratification?

The ascetic path is only ethically preferable inasmuch as it enhances quality life to its practitioner or the practitioner's environment. For Buddha, it was ethically preferable as it enlightened him and he enlightened the scribes who have by succession enlightened generations, with precepts that apparently still benefit millions.

Quality of life seems to be subjectively defined, as it is based on the preferences of those who have to do the living. It is not based on a master definition, there is no condition that can be said to have identical quality of life for all. To the extent that the preferences of beings are unique, their criteria for quality of life are unique. It is not like the Economist's quality-of-life index

(http://www.economist.com/media/pdf/QUALITY_OF_LIFE.pdf), which presupposes universal preferences for political freedom, family life, climate, gender equality, and community life. A person might not share the same weights on factors or may have other criteria not on the list. This problem becomes even more obvious when the population consists of heterogeneous species.

Without external consideration, this could lead to disturbing internal conclusions. Quality of life for a psychopath, in a permissive environment, increases. A psychopath when violently abusing someone experiences a lowered blood pressure, serenity, exactly the opposite of what a healthy person experiences when beating. Although this is a gain in subjective experience for the psychopath, it is a loss for the victim.

Ironically, as one member of the evolutionary psychology mailing list commented, sadism and masochism, when coupled, could be considered a net gain in quality of life, presuming the sadist is enriched by inflicting pain and the masochist by receiving pain.

INTELLIGENCE IS NECESSARY FOR ETHICAL BEHAVIOR

Not only is intelligence required for an agent to be worthy of ethical consideration, but with intelligence comes the responsibility to employ the intelligence for ethically desirable results. Contrariwise, an unintelligent process, although it may have beneficial or harmful results to ethically important beings, cannot behave in manner that is intrinsically ethical or unethical. A tidal wave or hurricane is not evil, because it is not sentient. A lucky harvest is not good, also because it is not sentient.

With great intelligence comes great ethical responsibility. That the less sentient understand their actions less and so are less culpable. Whereas the more sentient better understand and are more culpable. Therefore, the wolf that preys on a rabbit is less culpable than the human that preys on a rabbit. The adult wolf that kills a human child is less culpable than the adult human who kills a human child.

This does not make the wolf's actions negligible, but does diminish their ethical concern. It also diminishes the ethical merit of actions that increase quality of life. That seems a little troubling.

INTELLIGENCE AND COMPETENCE ENABLE FREEDOM AS A COMPONENT
OF QUALITY OF LIFE

What is the criteria for sovereignty? Is it consciousness? Language ability? Self-sufficiency? It seems that non-parasitic self-sufficiency is a major component. If so, a self-sufficient, a non-parasitic being ought to be considered to own itself. But even a plant can meet these requirements, which we trade, destroy, without regard. The ability to make a choice, to act, to communicate seems to be another requirement. The degree to which an animal can communicate confers rights upon the animal.

A retarded or autistic human is treated as a child, for inability to be self-sufficient and also for inability to communicate. In general, intelligence is a requirement for sovereignty.

Sovereignty confers the benefit of authorizing behavior in one's personal space; that is to say, consent. Consent is only necessary for matters that the sentient creature is capable of making sane and intelligent judgment on. A child need not give consent to be vaccinated, nor a dog to be de-liced, nor the cells in the body for a human's needs to move, nor (hypothetically) for a human to be driven by superhuman intelligence toward an improved quality of life for sentience at a cosmic scale.

Robert Wright brought up the ethical paradox of inflicting suffering without the consent of the sufferer. Yet real-life is not so dichotomous to consider all nonconsensual suffering to be unethical.

There are many instances in which a human is forced to temporarily suffer: vaccination, compulsory education, toilet training, diet restriction, compulsory hygiene, violence pruning, vocal suppression of a screaming child. Some of these are for the domestication of a human child, and others are for the long-term benefit of the child.

My son, Jade is home-schooled. He complains about school and refuses to discuss it. He'd rather be outside playing. Yet his grandparents, who raise him, school him. As well they should. Regardless of the United States legal compulsion to educate a child, an education is valuable preparation for a higher quality of life during adulthood in an information economy. A studious education is an investment in the child's future well-being.

Likewise, diet regulation and compulsory hygiene are investments for a child's future, without the consent of the child. Jade is induced by authority alone to shower and brush his teeth daily. He'd rather not.

If a child, which has the capability to learn and has a great deal of intelligence is not worthy of sovereignty, then is an animal with subhuman intelligence? In matters of comparative ethics, it should be recognized that what is appropriate for one species may be inappropriate for another. As long as a creature is capable of self-sufficient, non-parasitic behavior, then it ought to be at least considered for sovereignty. A mouse need not be competent in the skills expected from an adult human, it need only survive on its own in its expected environment.

Violating valid sovereignty is usually unethical for two reasons. First, the sovereign creature, by possessing intelligence and competence, probably has a good idea of what it

should be doing in order to survive and potentially thrive. As market economists have pointed out when contrasting the free market with command economy: the free market usually better employs the intelligence possessed by each agent in the economy to arrive at an aggregate optimal distribution of resources. A similar analogy holds true for sovereign behavior in general.

Human rights have been supported because humans enjoy the rights, but also because, I believe, they have a long-term benefit to the economy. Market choice enables market satisfaction.

However, sovereignty should not be treated as an absolute laissez faire principle. Although tenuous to maintain and dubious to instigate, there can situations under which the violation of sovereignty of a few does create a substantial benefit to the many. On rare occasions, genuine sacrifices may be ethical. As a matter of general policy totalitarianism is unwise, but a robust system of ethics ought to both acknowledge exceptions and deter abuse of mechanisms for exception.

There may be a psychological mechanism within intelligent species that has evolutionary pressure. An intelligent agent that feels a need to be free might be able to learn through exploration that freedom allows. Almost every human experiences enslavement or imprisonment as suffering. It is doubtful that each enslaved or imprisoned person has cognitively considered

their loss productivity; rather they simply feel mistreated and confined, and would rather play the game fairly.

It is not that establishing sovereignty is noble in its own right, but that it enhances external utility and internal quality of life. Stated negatively, violating sovereignty diminishes quality of life, for the environment and the victim.

MATERIAL COMPONENTS SHOULD NOT BIAS INTERPRETATION

A sentient being may be human, but need not be so. It may be a nonhuman animal on earth. In theory it could be an alien being. It could even arise in an electronic rather than biological environment.

Suppose computers continue to evolve intelligence. When should a computer be given rights equivalent to a human? A computer system might control a vast network. Would destroying part of the network be considered destroying part of that entity? Moreover, aren't property rights more an economic function than an ethical function? That property ownership improves the use and maintenance of property to satisfy the members of the society, and improves quality of life to ethically considerable beings signifies ethical importance.

However the computer network example elucidates a related problem, being and organization. Humans recognize each other as humans and consider the ethics of their interaction on that

scale, not on the scale of the component organs, organelles, tissues, or cells that comprise the human. The human's cells are not independent of the human. They cannot easily survive independent of the system from which they originated. Therefore, the cells are not considered independent entities for ethical consideration. They are inextricable from their organization within the tissues, and the tissues from their organelles, and the organelles from their organs, and the organs from their organism.

Attempts have been made to treat human organizations as entities. Supposing they were sentient and intelligent, they would be candidates for ethical consideration. But they fail to qualify as entities because their component parts are not dependent. Many humans born in one city can leave the city and survive in another nation, another industry, another company, another family. The humans that comprise an organization are independently viable apart from the organization. And the humans are sentient and intelligent. Therefore, it is the independent, sentient, and intelligent components that ought to be given ethical consideration, not the cooperative endeavors that the ethical entities establish.

Applying this requirement of ethical consideration to the case of the intelligent computer system, the property in question would have to be identified as inextricable to the

computer system itself. If it were capable of independent operation, then it could qualify as property external to the computer system and the ownership of such property, although having been used by the computer system would not necessarily be said to have comprised the sovereign domain of the computer system.

Although not all of the requirements of a model of utilitarian ethics were touched upon, the salient features of intelligence, quality of life were discussed. Furthermore, the notion that a blanket behavioral prohibition can sufficiently provide guidance on ethical behavior was weakened. One case of this was sovereignty, which ought to be respected, not due to a precept but, for extrinsic and intrinsic utilitarian reasons. Having discussed the requirements of a model, let us consider the efficacy of a mathematical model.

MATHEMATICS MAY ADVANCE THE DISCUSSION OF ETHICS

In the humanities, mathematics is a foreign language. By many in the softer studies mathematics is reviled, perhaps because of the educational bureaucracy places verbal skills on one end of the academic spectrum and mathematical reasoning on the other. And perhaps because tokenization of interaction dehumanizes personal relationships. Yet, in so much as insight might be derived and the science of ethical behavior may be

advanced, any tools from any origin that prove efficacious would be foolish to go unused, regardless of their foreign or taboo origin.

Ethics often considers the balance of well-being between sentient beings. This has a root in the intuitive notion of fairness, which many species predating humans possess. The notion of fairness also underlies some exchange in economics, which has been propelled forward by numerical analysis.

However any mathematical model of a system is limited by its flexibility and scope. If a mathematical model of ethics were limited to scalar factors, then the model's scope is limited to situations that can be reduced to scalar factors.

Rob Bass duly relayed that any form of utilitarianism which reduces numbers to a sum over a finite period of time suffers a contradiction. If the span of consideration is infinite (as the span of ethical action in the universe is hoped to be), then any sum of positive units of utility yields an infinite utility. Therefore an alternative course of action that has a finite result has a relatively inconsequential meaning over the course of an infinite timeframe. Since finite actions are considered meaningful, there is a contradiction in the model. At the time, the best I was able to come with is an analogy to models in physics. Newtonian physics does not accurately model behavior at speeds near that of light. Yet it is adequate for modeling

many activities at a scale and speed that humans routinely encounter. Newtonian physics, if subjected to the same stringent criticism, is a false model. But it works within requirements of scope and tolerance of error. I ask for leeway to have a human scope (say within a few humans' lifespans) and tolerance of gross errors.

A mathematical model is also limited by the precision of instruments of measurement. Yet even gross orders of magnitude would be an improvement over the stalemates of discussion that pass among many ethical and comparative ethical debates on topics such as animal treatment, medical care, abortion, drug enforcement, and euthanasia.

Given the usual usage of numbers, some requirements for the numerical model that compares species requires ethical preference, comparable attributes, and results for heterogeneous population. Since the species are being compared, each species must have some comparable attributes, which can be numerically or logically interpreted. For a simple numerical system of ethics, a scalar result should either indicate a preference or indifference for ethically affected proposals. This ethical preference does not necessarily coincide with a responsible agent's self-selected preferences (as the agent involved may disregard the ethical model or have preferences that conflict with the ethical model). Since ethics often deals with the

thorny issue of both harming and benefiting distinct portions of a population, results that affect a population in a heterogeneous manner should yield an interpretable result.

Given what mathematics has done for economics, physics, and biology, lifting a tradition riddled with rank speculation and false premises into one with methods to refine speculation and methods for testing premises, a few basics from that symbol transformation toolkit are worth a try, if not several.

PART 2: ARITHMETIC OF INTELLIGENCE AND QUALITY OF LIFE TO CALCULATE ETHICS

Having defined some salient principles of ethical consideration between members of different species, let us take a stab at the work of modeling a system with numbers. Given the complexity inherent in the subject matter and the admitted humble degree of skill at numerical analysis, allow me to employ an arithmetic model, at least as an example of what kinds of results a mathematical model of comparative ethics ought to yield.

Complications to an arithmetic of intelligence arise. There may be qualitative distinctions that defy additive comparison, such as language use and symbolic thought. No amount of bacteria (or rats) can speak a human sentence. But some gorillas have been trained to sign a human sentence.

Having decided, in part one, that intelligence is the primary factor for comparing the ethical importance of species, let us first model intelligence. Let us begin with a scalar approximation of intelligence; that is, a real number. This scalar correlates to the ethical weight of the species.

A scalar measurement (such as Celsius, Fahrenheit, kilogram, etc.) needs benchmarks in order compare results. For this purpose and for mnemonic and computational convenience, let the value 1.0 correspond to average human intelligence during the year 2000. To denote a measurement on this scale, let us refer to the number as a sapien, so the value 1.0 sapien corresponds to average human intelligence.

By average, all members of the human population are considered, including the extremely dumb and smart. Averaging prevents discrimination against less capable members. There may be exceptional members (such as Cocoa the gorilla) who warrant having their intelligence measured apart from the average of the species, but as a gross order of magnitude estimate and given the propensity to abuse estimates of intelligence and correlated ethical importance, let the average of the species be used by default and in all cases not explicitly excepted by extreme properties.

By using the year 2000 as a benchmark year, human intelligence at different times in history or the future can be

compared. The value 1.0 is convenient measurement, basically making humanity the basis for comparing other species. For another axiomatic benchmark, let completely nonsentient matter in the year 2000 have an average intelligence of 0.0.

As discussed in part one, not only does intelligence correlate to ethical importance, but it also correlates to ethical responsibility, or culpability. Therefore, the same attribute, intelligence, correlates to ethical responsibility, too. Should any unintelligent device be used, the ethical responsibility is shouldered on the ethically important agent. For example, the wielder of a pistol is responsible for the pistol's behavior, and the wielder's behavior is not discounted for having used an unintelligent implement.

The axioms of the intelligence scale were the easy part. The hard part is comparing between species. As previously discussed, intelligence is not additive.

Ethical importance of an entity ought to be equal to or greater than the ethical importance of the sum of its parts; otherwise, one ought to weigh the sum of its parts rather than the lesser important aggregate entity. Therefore, the basis of assigning intelligence to species ought to be constrained by ordering various species according to the capacity to learn complex behavior by the average member of a species, and

constrained by the component intelligence that comprises the organism.

For lack of instruments and methodology, estimates are rounded to the nearest magnitude. These order of magnitude estimates should only be used to open a discussion and hold the place until more accurate estimates are supplied.

Again an average human was postulated at 1.0, and nonsentient matter was set to 0.0. For example, a piece of granite has an intelligence of 0.0. This is equal to the ethical importance and responsibility of the granite, too. The ethical importance is not related to the economic value. A diamond of equal physical weight might be worth much more than granite in most markets, but its intelligence, ethical importance, and responsibility are also 0.0, for it is no more intelligent than granite.

Between these two values, estimates are grossly interpolated:

Object	Sapient
Average nonliving matter	0
Average virus	1E-12
Average prokaryote	1E-10
Average eukaryote	1E-09
Average plant	1E-07
Average insect	1E-07
Average invertebrate	0.00001
Average fish	0.0001
Average reptile	0.0001
Average avian	0.0001
Average amphibian	0.0001
Average mammal	0.001

Average nonhuman primate	0.1
Average human	1

Intelligence correlates to the ability to adapt to an environment. The ability to learn. By the above scale, average intelligence of a species correlates to ethical weight. Intelligence correlates to the highest displayed complexity of behavior given an equivalent environment and training methods. What is the interpretation of 0.5 intelligence? Half as intelligent as a human, meaning the average member is able to perform an equivalent task half as intricate as average member of homo sapiens, given an equivalent environment and training methods.

The training environment need not be identical, as, for example, a person learning mathematics in China or Germany, or England is not learning through the same language, but may be exposed to the same concepts and equivalent educational methods. Some gorillas, lacking human vocal range, can perform modest sign language and some chimpanzees can construct primitive tools. But not with as much skill or craft as a median member of homo sapiens.

Having noted the factor of ethical importance and responsibility, it is useful to also mention some alternative attributes that were decided against. The mass of the being is an unsuitable factor, except to estimate expected minimal or

maximal ethical importance where other measurements are unavailable. All other factors being equal, a giant spider is no more ethically important than a tiny spider. Rather than the mass of organism, it is the mass of its organs directly contributing to intelligence that are of interest. A cloned kidney is not intrinsically an ethically important object, but a cloned brain might be. Yet the mass of the control system (such as the nervous system in a mammal) is also an unsuitable factor, because it punishes species with mass-efficient intelligence. As a gross analogy, the 0.2 kg PDA (portable data assistant) that I use to write notes for this article on has more computing power and more efficient algorithms than a 10 kg PC twenty five years ago.¹

We now have enough data to consider a few implications. The behavior of a virus has relatively negligible culpability (0.000000000001 sapiens), which coincides with the modern belief on virus behavior, that it is relatively mechanical and not within the scope of ethical assessment. We can also estimate that a rodent's behavior (0.001 sapiens) would be about 1000 times less culpable than the same behavior by an average human, because the human is capable of advanced teleological assessment unavailable to a mouse. The mouse can also said to be behaving in a more mechanical fashion, ruled by instinct alone, rather

than on advanced, learned behavior from which we derive a basis of free will.

ASSESSING QUALITY OF LIFE

In part one, quality of life was conceived as the relative enjoyment or suffering an intelligent being experiences. To enable numerical analysis, a scalar value of 1.0 hedon is assigned the average well-being of a given species in the year 2000. For lack of an all-inclusive term that spans the diverse preferences for good living, this unit of well-being is referred to as a hedon, from the Greek for pleasure.² This does not necessarily include the argument that hedonism is the ultimate objective. In fact this author believes that optimal pleasure for all is achieved through strategy that attempts to optimize the harder to define concept of eudaemonia.

The scale is based on the relative quality of life for a given species within a duration. So the average human during the year 2000 experienced 1.0 hedon for that year. This attempts to account for all members of the population, those suffering, disabled, healthy, diseased, poor, rich, bright, or fulfilled. A hedon is relative to the species, so cannot be directly compared between species. 1.0 hedon for a mouse is not necessarily equivalent to 1.0 hedon for human. If necessary,

the species name can be used when denoting the relative variety of quality of life, such as 1.0 human hedon, or 1.0 mouse hedon.

By benchmarking the year 2000, relative improvements or degradations in quality of life can be measured.

Another postulated value, 0.0 hedon, is assigned to two ethically equivalent events: the first is oblivion, a state without sensation, emotion, cognition, or activity of any kind. The second state is death. One obvious consequential difference between these states is that currently there is no reliable process for reviving the dead. Once death is initiated, it is presumed to continue forever. Speculations on after-life are not accounted for, or at any rate, are accounted for as having a net effect of 0.0 hedon, equal to oblivion.

No claims are made on how to measure relative quality of life, except as a thought-experimental exchange. There is a proportional property of quality of life. A fully informed member of the species is said to be indifferent to an exchange of duration of quality of life at one value for a lower quality of life with a longer duration. For example, a person living at 1.0 hedon-year would be indifferent toward two years at 1.0 hedon or four years at 0.5 hedon. And the person would also be equally indifferent to one year at 2.0 hedon.

As it turns out, this proportional indifference is also a property of the concept, quality-adjusted life years (QALY)

(http://en.wikipedia.org/wiki/Quality-adjusted_life_years). A patient in perfect health for one year is said to be at 1.0 QALY, and would be indifferent to living for two years at 0.5 QALY, where the reduction of quality is due strictly to medical disability, disease, or discomfort. However, a hedon, unlike a QA (quality-adjustment coefficient of the QALY), refers to all factors of quality of life, not just medical. Because both QALY and hedon-time have similar methods of exchange, one could expect a transformation of medical quality-adjustment (QA) to yield a corresponding (but not equal) transformation of quality of life (hedon).

Although quality of life has been compared to quality-adjusted life years (QALY), it has not been compared to standard of living, wealth or income. While one would expect that, all other things being equal, voluntary access to more resources in general provides at least as high a quality of life as no access, the ratio would not be expected to be one-for-one. In general, doubling income or wealth does not double happiness. It is the utility that the resources afford, which in most any economy ramps up with prosperity, such that there is a diminishing margin of return on quality of life for additional wealth.

Because of the simplistic arithmetic, extreme values of quality of life are not valid. In general, quality of life

calculations should be performed on a span that does not increase by an order of magnitude (such as 0.0 to 10.0).

Beyond proportion, another method of comparison is postulated: negation. A negative quality of life is defined such that a person experiencing that negative amount and an equal duration of a positive amount (such as one year at 1.0 hedon and one year at -1.0 hedon) would be indifferent to this experience than the sum of the durations at oblivion (0.0 hedon). By definition, then, someone at less than 0.0 hedon (such as -0.1 hedon) without hope for future improvement in quality of life, would prefer death, for the resultant improved quality of life (to 0.0 hedon).

Exceptions exist. Suppose the average of a population was suffering so much that the average member of the population preferred death. Rather than retaining the arbitrary definition of 1.0 hedon for the average, the average of -1.0 hedon is sensible. If the average member of a species happened to be perfectly poised on an indifference to oblivion, then 0.0 hedon would be applied to the species and 1.0 hedon would be calibrated to most similar species with a defined average hedon value. If the species were insentient, and therefore indifferent, then there is no meaningful measurement of experience beyond stating that insentient species always has 0.0 hedon, regardless of circumstance or status.

The quality of life is meaningless without a valid duration. Because proportions of durations were permitted to be exchanged, and simple arithmetic was used, absurd results can be used when comparing extreme proportions. For this reason, the valid range is speculated to be about within an order of magnitude, such as comparisons within the range of 1.0 years to 10.0 years. Obviously extremely short or long durations yield absurd results.

Furthermore, a shortcoming of the model is that the quality of life itself is not statically measurable. Having half of a year of some vacation (2.0 hedon) and half a year of work (1.0 hedon) is not the same quality of life as a quarter year of vacation, and four quarters of a year of work, because any vacation time at all might have a higher hedon rating than the prolonged vacation, due to a diminishing margin of return on each additional day of vacation. Therefore, the quality of life should account for the aggregate experience, in the same order as the experience.

Suppose two options exist in a decision tree. To assess their difference in years of quality of life, one must calculate the quality of life for both future states independently, taking into consideration the complex interactions of components of each whole state.

Since details of quality of life are tailored to the individual the individual can gauge his or her own quality of

life and make guesses as to what might lead to this, but it is harder to infer what it means for others, especially with nonhuman psyches.

Although quality of life has been stated as a matter of preference on the part of the agent, the quality of life is implicated as a critical factor for determining the ethical merit of an action. This implies that quality of life, all other things being equal, is not only personally preferable, but is also ethically preferable. From a utilitarian foundation, that seems like a reasonable assumption. Even if one adheres to a virtue ethics foundation, one could correlate expected quality of life to terms of the exercise of virtue.

For attempting to deal with uncertainty in quality of life, one can approximate by applying the expected quality of life. Use the usual probability function of weighting each possible quality of life by the probability of that eventuality. For instance, surgery that has an 80% survival ratio with full recovery, for whom the patient values at 1.0 hedon, and 20% death rate (0.0 hedon) the expected quality of life is:

#

$$\begin{aligned} &0.8 \text{ probability} * 1.0 \text{ hedon} \\ &+ 0.2 \text{ probability} * 0.0 \text{ hedon} \\ &= 0.8 \text{ probability-hedon} \end{aligned}$$

#

ASSESSING ETHICAL IMPACT

Having postulated a scale of ethical importance, responsibility, intelligence, quality of life, and duration, the ethical value may be assessed. This model simply multiplies the factors together.

#

$$\begin{aligned} \text{ethical value} = & \text{ethical importance} \\ & * \text{quality of life} \\ & * \text{duration} \end{aligned}$$

#

As stated earlier, ethical importance equals the average intelligence of the species. For lack of refinement, let the sum of the population be a scalar weight to ethical importance, as well.

#

$$\text{ethical importance} = \text{population} * \text{intelligence}$$

#

The default units used in the equation are:

#

$$\text{ethical value} = B \text{ being} * S \text{ sapien} * H \text{ hedon} * Y \text{ year}$$

#

For convenient reference let us denote a unit of ethos as:

#

$$1 \text{ ethos} = 1 \text{ being} * 1 \text{ sapien} * 1 \text{ hedon} * 1 \text{ year}$$

#

There is no absolute value to 1 ethos. To make sense out of the equation, variant alternative situations must be compared. Let us do so by working through an example. A vivid example.

Consider murdering a single human as a baseline for grossly unethical behavior. Suppose in this simplistic example, that only the potential victim exists in the universe along with the negligible means to murder. The two options in this simplistic example are murder and no action. Murder terminates the life. Suppose the individual were 30 years of age, and the life expectancy (for that individual) were about 70. If no action is taken, the individual is expected to live 40 more years, followed by oblivion forever.³ Whereas, if murder is chosen, then the individual immediately and forever experiences oblivion (0.0 hedon), without intermittent sensation. Suppose the individual's quality of life were 1.0 hedon, and there is no reason not to use the average intelligence for the human species, 1.0 sapien.

#

murder = 1 being * 1.0 sapien * 0.0 hedon * 40 years +
eternal oblivion

null = 1 being * 1.0 sapien * 1.0 hedon * 40 years +
eternal oblivion

#

What is of concern is the difference, and the oblivion is negligible by definition. Removing this and computing the arithmetic, and then converting to the unit of ethos (sapien-being-hedon-year), yields a difference between the events of 40 ethos. Using no action (or null) as the baseline, in this thought experiment, murder is relatively valued at -40 ethos.

#

murder = 0 ethos

null = 40 ethos

#

Let us model the discussion of quality of life from part one. Asceticism is not necessarily a higher or lower quality of life. It would depend on the psychological profile of the potential ascetic and the quality of life conferred by other options available.

A psychopath, although possibly elevating quality of life for the duration of some violent act, would have a net loss on quality of life, as there would be an exchange. Suppose the psychopath feels serene for one hour of beating and the victim feels terror for one hour of beating. Even without considering future effects and societal intervention on quality of life for either party, a model indicates a net loss. Canceling like factors, the difference is:

#

$$\begin{aligned}\text{beating} &= 2.0 \text{ hedon}[\text{psycho}] + -1.0 \text{ hedon}[\text{victim}] \\ &= 1.0 \text{ hedon}\end{aligned}$$

$$\begin{aligned}\text{no beating} &= 1.0 \text{ hedon}[\text{psycho}] + 1.0 \text{ hedon}[\text{victim}] \\ &= 2.0 \text{ hedon}\end{aligned}$$

#

The ethical opportunity cost of beating is -1.0 being-sapient-hedon-hour. The future consequences within a psyche and a society exacerbate the ethical fault.

Simulation of an ethically undesirable result is not ethically undesirable, insofar as the simulation does not detract actual quality of life. In fact, insofar as the simulation enhances quality of life, the simulation is desirable. So while gladiatorial combat has an ethical cost of the combatants, a videogame about gladiatorial combat or a movie about gladiatorial combat has no ethical cost insofar as no one was harmed.

For an example, consider the below figures:

#

$$\text{entertainment} = 1 \text{ being} * 1.0 \text{ sapient} * 2.0 \text{ hedon} * 1 \text{ hour}$$

$$\begin{aligned}\text{no entertainment} &= 1 \text{ being} * 1.0 \text{ sapient} * 1.0 \text{ hedon} * 1 \\ &\text{hour}\end{aligned}$$

#

If all other things could be held equal, and no other options existed, then in this example the opportunity cost of foregoing entertainment would be 1.0 sapien-hedon-hour.

In fact, the entertainment value, as a component of quality of life, contributes to ethical value of the event. Although the entertainment value also enhances the quality of life of those watching real gladiatorial combat, this is further offset by the propensity to subjugate others through reduced regret for actual ethical loss. One could say that desensitization to really ethically regrettable experience creates a subjective discount on the ethical importance of the event, such as through devaluing the lives affected.

Similar to the example of murder, but in a different direction, is euthanasia. In 1999, Jack Kevorkian was imprisoned for assisting Thomas Youk in his suicide, who was suffering the final stages of amyotrophic lateral sclerosis, the same disease that Stephen Hawking is surviving (http://en.wikipedia.org/wiki/Jack_Kevorkian). Thomas Youk preferred oblivion to continued suffering. Let us model the ethical impact of Kevorkian's role in enabling the suicide. Suppose, for the simplistic example, that there are no other participants of ethical consideration, that the universe only contains Youk's quality of life and Kevorkian's agency to affect that quality of life. Suppose Youk was expected to live for 3

years more, and that he would have been indifferent to death to a duration at half the quality of life of the average human in 2000 and an equal duration under final stages of ALS. The suicide would end this. The figures supposed are:

#

ALS = 1 being * 1.0 sapien * -0.5 hedon * 3 years

suicide = 1 being * 1.0 sapien * 0.0 hedon * 3 years

suicide - ALS = 1.5 ethos

#

Assuming no other consequences, the relative ethical value of suicide is 1.5 ethos, presumably equivalent to adding 1.5 years of life at the human average level of quality in the year 2000, or at least of preventing a continuous year and a half of torment.

Given that Kevorkian was imprisoned, made himself to suffer, clearly repaying the relief of suffering with suffering is not ethically justified. Supposing prison life at 0.5 hedon and Kevorkian's freedom at 2.0 hedon, the ten years of imprisonment might be modeled as:

#

imprisonment = 1 being * 1.0 sapien * 0.5 hedon * 10 years

freedom = 1 being * 1.0 sapien * 2.0 hedon * 10 years

#

With this hypothetical data, imprisonment had an ethical cost of 15 ethos to Kevorkian alone. That doesn't even take into account the patients that Kevorkian was prevented from alleviating pain and the ethical cost of prosecution, incarceration, and resultant scare-tactics on other compassionate caregivers. Incidentally, Kevorkian is due for parole in June 2007.

So far events have only considered human beings. Let us model Robert Wright's example of a mouse's suffering. Hypothetically suppose the mouse to have an intelligence equivalent to 0.001 sapien, and the extreme torment for one day plus average quality of life for one day to be indifferent to oblivion for two days, or -1.0 hedon. The ethical cost of the torment of the mouse is modeled as:

#

mouse torment = 1 being * 0.001 sapien * -1.0 hedon * 1 day

mouse torment = -1.5 being-sapien-hedon-minutes

human torment = 1 being * 1.0 sapien * -1.0 hedon * 1.5

minutes

#

The mouse's suffering for a day is as ethically regrettable as the human's suffering for a minute and a half. The conditions that confer quality of life for one species are not exchangeable for the conditions that confer quality of life for

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another species. A mouse enjoys a running wheel and a wood shaving floor; a human does not necessarily enjoy such conditions.

All that has been considered so far, is a single individual's quality of life. This does not, though take into account transfer payments, or a distribution to beings in a population. Let us consider that.

DISTRIBUTION OF QUALITY

There is an issue of distribution of quality. Using my own preferences, suppose a four member population of Ethans, two poor immigrants working a field (1.0 hedon), one serving in the Army (2.0 hedon), and one as a director of a niche videogame (4.0 hedon). Compare this to a four-member population of Ethans, each of which is serving in the Army (2.0 hedon). Their averages are equal (2.0 hedon/being). But one population has more members suffering more for fewer with higher quality.

The indifference above may be assessed in three manners: as accurate, favoring too much of the former, favoring too much of the latter. Although at first glance, it seems that the distribution $\{1, 1, 2, 4\}$ is less fair than $\{2, 2, 2, 2\}$, the definition of quality of life does not anticipate efficient transfers or concentrations of quality of life. Someone at 1.0 hedon would expend less energy achieving 2.0 hedon than someone

at 2.0 hedon achieving 3.0 hedon. The growth of resources expended to sustain a higher quality of life outpaces the measurement of quality of life. Therefore, the scale of quality of life might represent a root, logarithm, or other family of functions whose asymptote grows more slowly than a linear proportion of its dependent variable, resources. Therefore, although is correct in noting disparity of the distribution $\{1, 1, 2, 4\}$ from that of $\{2, 2, 2, 2\}$, the overall resources to maintain $\{1, 1, 2, 4\}$ may be higher than that of $\{2, 2, 2, 2\}$. That would inherently bias the two examples. It might be like trying to compare what distribution could be had for \$300 and what distribution for \$200. In the former distribution, there is inherently more resources fueling the quality, whereas in the latter the same average quality of life is maintained with less resources consumed. With identical resources, the actual distributions of quality might be $\{1, 1, 1, 3\}$ compared to $\{2, 2, 2, 2\}$. In this comparison, the former has a lower average (1.5 hedon/being) than the latter (2 hedon/being).

LINEAR INTERPOLATED RISK AVERSION

Yet if an absurd result occurs for a heterogeneous distribution of quality of life, then there is a technique to bias against the unfairness. The problem is mathematically similar to a probability distribution and risk. A guaranteed

payoff of \$3.50 is less risky than the payoff equal to the roll of one six-sided die. Both have the same average (or mean). A median would do no better and would ignore the low and high values of a distribution. A non-uniform weighting of the values within the average may be worth considering.

Suppose an unassigned intelligence were to be randomly assigned to the life of one of the individuals. You would feel safer in the balanced society, having no chance for lower quality, yet would not have the chance for higher quality, either. A distribution of risk could be layered on top of the distribution of quality.

Clearly, the aggregate quality of life should be within the bounds of the minimum and maximum members' quality of life.

Suppose the weights were used to add to the average quality, as well.

quality	weight	total weight
15 at 1 ea.	2	31
1 at 2	1	32 / 31 \approx 1.03

A little better. And seemingly more fair than:

quality	weight	total weight
15 at 1 ea.	1	16
1 at 2	1	17 / 16 \approx 1.06

Let us apply the weighted average:

quality	weight	total weight
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1	1	2	$2+2+1.67+1 = 6.67$
---	---	---	---------------------

2		1.67	
---	--	------	--

4		1	$(2 + 2 + 5.33 + 4) / 6.67 = 2$
---	--	---	---------------------------------

It's nearly the same as an average:

quality		weight	total weight
2	2	2	2
2	2	2	2
2	2	2	2
1		1	
			$2+2+2+2 / 4 = 2$

Suppose the more extreme example:

quality		weight	total weight
15 at 1 ea.		2	31
1 at 16		1	46
			$46 / 31 = 1.5$

Compared to a non-weighted average:

quality		weight	total weight
15 at 1 ea.		1	16
1 at 16		1	31
			$31 / 16 = 1.9$

The bottom-biased linear average seems more fair. The proportion of the end points could be refined. Suppose a factor of 4:1, for the original example:

quality		weight	total weight
1	1	4	$4+4+2+1 = 11$
2		2	
4		1	$(4 + 4 + 4 + 4) / 11 = 1.5$

This is less preferable then. Until it can be refined further, I'll use this bottom-biased linear average with the factor 4:1, where warranted.

Disparity has not been eliminated, only discounted. The original example is ethically equivalent to the uniform distributed average when the well-to-do are experiencing even more exceptional quality of life:

quality	weight	total weight
1 1	4	$4+4+2+1 = 11$
2	2	
9	1	$(4 + 4 + 4 + 9) / 11 = 2$

However, notice that the upper-quality in this example comprises one-fourth of the population, which a large portion indeed, compared to the disparity of wealth, and then calculating that quality of life grows less quickly than the proportion of wealth.

Still, let it be said again: quality is not efficiently concentrated; it probably has an asymptotic order of comparable to a root or logarithm of resources. Therefore, it is likely that an average of quality of life would account for unfairness, as unfair concentrations end up wasting overall quality of life per person.

BIRTH'S EFFECT ON QUALITY OF LIFE

A community that has a higher birth rate and higher population is not necessarily more ethical than another. It is the quality of each individual's life, and the ethical effects

of the actions of the community on the ethically significant environment; that is not to say necessarily on the ecological environment. The destruction of rocks on a lifeless planet is of no ethical consideration. What concern is that aside from transformation into another form which is scarcely less intelligent than the former? But the destruction of a forest inhabited by sentient beings and the resultant suffering of the sentient beings should be considered.

Each sentient being that is born has a consideration in the quality of life, whose merit is proportional to their intelligence.

By this line of reasoning, one may consider that birth control is an ethical choice. By limiting birth rate, all other factors being equal, the resources available will be spread among fewer beings, so ought to be more likely to sustain a higher quality of life for each being. Yet a new being also has a capacity to elevate quality of life, through the production of goods and performance of services. In addition, there are emotional mechanisms by which companionship and other loving relationships suggest the presence of a new member to the population may increase the quality of life for at least some of its members, provided that all other factors could remain equal or not be impinged upon any more than the benefit conferred by the behavior of the additional member.

This has been accounted for by a function analogous to per capita, or average quality of life to be considered, as opposed to a summation of quality of lives of the members. One person with life of quality (and no one else at all) is ethically preferable to two persons with half the quality of life. The average quality of life for the two halves is a half; whereas, the average quality of life for a single whole, is a whole. In an averaging function, the number of persons makes no difference.

DEATH'S EFFECT ON QUALITY OF LIFE

Because this model of utilitarianism is an average, Derek Parfit's repugnant conclusion of a life barely worth living has been avoided, which is that a larger population of miserable people is ethically preferable to a smaller population of happier people (<http://plato.stanford.edu/entries/repugnant-conclusion>). Rob Bass, though, relayed Derek Parfit's follow-up, which was the repugnant conclusion that killing off the unhappy members would raise the average. This is troublesome to an average of that only accounts for the quality of life of the living members. If a model also accounts for the recently deceased and their expected quality of life given a precondition, then this repugnant conclusion can be satisfactorily solved. Let us enumerate nontrivial and controversial data to illustrate the model. Suppose a population with hedon distribution {1, 2,

3}. The average is 2 hedons. Derek Parfit's repugnant conclusion is that killing the lowest member yields hedon distribution {2, 3} whose average is 2.5 hedons, which is higher and therefore concluded ethically preferable. That is repugnant since the killed member (at 1 hedon) preferred living! Suppose, instead though that the projected alternatives looked at the expected life span. Imagine each person expects to live for exactly 1 more year. Then, not killing yields the distribution for the following year as {1, 2, 3}, average 2. Whereas, killing yields the distribution for the following year as {0, 2, 3}, average 1.7.

How long does the deceased person stay on the books as part of the average? I proposed that it be for the expected lifespan of the person given their present condition, with no especial support or intervention. For example, suppose an average person in a population generally has a life-expectancy of 70 years. A particular member is 80 years old. That does not mean that their life is worthless, for having exceeded the average. The expected lifespan of this particular member is 80 years old or more, obviously, because the person is already 80 years old. Suppose in this population and given this person's medical status, their life expectancy is until 90 years. I propose that the person be counted in calculations of quality of life for the additional ten years. As situations change the estimates of

life expectancy may change. Some of these changes in estimate are due to refined estimation techniques, and some of these changes are due to influences from new information, and some are due to new events. Of these, the new events have an ethical impact. If someone, for example, is exposed to air pollution that damages their lungs and shortens their life and lowers their quality of life, then the effect of the air pollution is the difference of the expected quality of life in the case that air pollution is avoided, to which it is suffered.

Another delicate case is abortion. The life expectancy and quality of a fetus depends on many factors that the fetus cannot control. Early in pregnancy the fetus cannot survive outside of a womb, or a replication of the womb's environment. That fetus' life critically depends on the mother. At an early stage in a pregnancy under a projected harsh environment, such as a single mother living in poverty in a dangerous neighborhood, it might be a wise decision to consider the suffering of the child in terms of getting the mother into a better situation before having a baby, rather than continuing an early pregnancy and suffering. Aborting pregnancy when the forecast is miserable in order to have a child later when the forecast for the mother and child is happy, allows one to consider a crude mathematical model. The model does not do justice to the emotion and bond of childbearing, but I hope this is a step toward humane

consideration for the family. Suppose the alternatives are only:

Destitute: have a child in a slum while single, unemployable, and destitute, or

Comfortable: have an abortion and then have a child a year later while married and financially able to support a happy child.

Suppose that once a child is born, no further children will be supported by this mother. Suppose the mother cares for the child for 20 years. Suppose the child is expected to live for 70 years either way, and only the first 20 years will be effected by the mother's status. For both the mother and child, in destitution, expects a quality of life at 1 hedon on average, and for both in the financially stable state a quality of life at 2 hedon on average. Suppose abortion would inflict grief for a year (0.5 hedon).

This is overly simplistic, not taking into account many factors, but let it suffice for this thought-experiment that other factors on quality and duration of life are held constant between these alternatives.

Destitute: mother (19 years at 1 hedon) + child (20 years at 1 hedon) + mother without abortion (1 year at 1 hedon)

Comfortable: mother (19 years at 2 hedon) + child (20 years at 2 hedon) + mother with abortion (1 year 0.5 hedon)

Destitute: 40 hedon

Comfortable: 79.5 hedon

In this case, notice that the aborted child is not double-counted, just as the child who would never have been born a year later in a comfortable situation was not double-counted.

By continuing to count the recently deceased as members up and to the point of their expected future lifespan (given the currently available data on their lifespan and condition), Derek Parfit's repugnant conclusion on the average population has been solved.

COMPARATIVE ETHICAL IMPORTANCE

In a heterogeneous sample of differing species, the ethical importance of each species should be considered. A tuna fish living at a high quality and a dolphin living at half that quality is less ethically preferable to a dolphin living at the equivalent high quality and the tuna fish living at the equivalent low quality.

Each sentient being that is born has a consideration in the quality of life, whose merit is proportional to the average intelligence of their species. This can be treated as a weighted average.

In a hypothetical thought-experiment, suppose, for example, 10,000 mice and 100 humans. Suppose the intelligence (and

therefore ethical importance) of mice is 0.001 sapien. Two options exist in the universe. Perform medical experiments on the mice or not. Performing medical experiments on the mice has a 10% to yield new medical technology capable of extending the life of the 10 of the humans at a diminished quality of life (0.5 hedon) for 1 year. The medical experiment on the mice lasts 1 year and is quite painful, enough to reduce the mouse quality of life to 0.25. If the mice are not experimented on, then they will be miraculously set free to the wild. What is the ethical impact in this model?

#

Do not perform experiment

human = 10 human * 1.0 sapien * 1.0 hedon * 0 year

mouse = 10000 mouse * 0.001 sapien * 1.0 hedon * 1 year

human + mouse = 0.001 ethos * 10000 mouse = 10 ethos

#

Perform experiment

human = 0.1 probability * 10 human * 1.0 sapien * 0.5 hedon
* 1 year

+ 0.9 probability * 0 ethos

mouse = 10000 mouse * 0.001 sapien * 0.5 hedon * 1 year

human + mouse = 0.5 ethos + 5 ethos = 5.5 ethos

#

The result is a net loss of -4.5 ethos for performing the experiment. If the experiment were guaranteed to have extended life for humans for a year, then experimentation would be ethically indifferent.⁴

Suppose a slightly more complicated version of the same experiment, in which if the medical experiment is not performed, then no additional mice will be born at all. If no mice were born, then there would be none to compare them to. To avoid this absurd result, consider instead that the mice were born but were set free in a wilderness so that they may survive as self-sufficient non-parasites. Then the above arithmetic data holds true. However, note also that the quality of life available in the wild can be diminished by a lower quality wilderness. In such cases, it sucks to be a mouse, and as a mouse the quality of life in a lab might not look as bad anymore.

The problem of variant population size, especially from a higher birth rate, is worth further exploration.

PART 3: SOME SCENARIOS, PARTIALLY MODELED

Following are examples, where the model is applied to some interesting ethical issues. The data is primarily ad hoc, yet at least some conclusions can be made, if valid data were available.

CASE STUDY: LIVESTOCK

The model of comparative ethical calculus may be shaped by exploring the example of livestock. A farm may raise and slaughter livestock. What is the ethical implication of this? One might consider that the absolute basis for comparison is no farm at all. There is a delicate matter of the farmer's well-being to be considered, too. If the farm is not raising livestock, how much does this impinge upon the farm's employees? What is the ethical opportunity cost for foregoing the raising of livestock? Let us set this question aside and answer the consideration for the animal's consideration.

If there is no farm, and there are no livestock, it is of no ethical consideration. It is not equal to oblivion; rather it is null. There is no effect. The question comes, then, what is the ethical impact of raising an animal at all? If the raising of the animal is benefiting other animals (including humans), then there is at least some ethical merit. But if the raising of the animal is afflicting some animals (including the animal being raised), then there is at least some ethical cost. It is tricky to consider what the balance state would be, for equivalence to no animal born at all. Let us divide the problem into its external effects (on other animals) and its internal effects (on the affected population of the species).

On effects internal to the affected population, a relevant question is the relative quality of life for the raised members and their counterparts in other conditions, and the average as a whole. It is not easy to query the animals directly and elicit a response that can be meaningfully quantified. For the purpose of consideration, let a thought experiment suffice. Let a human stretch his or her imagination to the limits in imagining the experience of the animal, directly. The experience not only has different sensory apparatus, which may have relative differences in range, sensitivity, and precision, but also differing information processing, which would limit and define the experience.

How well does the average chicken live? Whatever the lifespan, it should be noted that health and disease, hunger and satiety, ability and injury, leisure and tedium, safety and terror, affect the quality of that existence. Suppose the existence of a chicken that was born in the wild and remained so, as compared to a free range chicken. If the free range chicken has better than wild health, satiety, ability, leisure, and safety than its wild counterpart, all other factors being equal, it may be said to experience a higher quality of living. To the extent that these improvements exist, free range raises the standard quality of living for chickens. If it has ethical merit, then to the extent that the quality of living is raised,

then the free range has made an ethical improvement. However, the free range farm exists to slaughter its residents. Assuming this was a painless affair, then the ethical impact would be the foreshortened lifespan. Given that the quality of life arithmetic allows for the trading of a higher quality but shorter duration life, an ethical balance equals the ratio of quality to the inverse of the ratio of the duration of a wild chicken to the raised chicken.

Certainly a chicken that had its beak seared off, toes cut off, abnormally fed, encaged with hardly room to move, would have a lower quality of life than a wild counterpart. If the existence were preferable to death, then the foreshortening of it by slaughter would have its own ethical demerit. If the existence were less preferable than death, then foreshortening the existence, while ethical under the immediate circumstances, would not provide an ethical nullification for the torturous life hitherto applied.

Suppose several humans are benefited, not just the consumers paying a lower cost for tasty, complete protein, but the farm owners and various workers, who would suffer some if foregoing the trade in favor of the next best option. Also suppose the animals are not slaughtered, but are raised for goods (eggs, milk, cheese, butter, etc.). Let us model this:

#

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factory farm (without slaughter)

human = 100 being * 1.1 sapien * 1.0 hedon * 2 year

chicken = 1000 being * 0.0001 sapien * 0.25 hedon * 2 year

cow = 1000 being * 0.001 sapien * 0.25 hedon * 2 year

human + chicken + cow = 220 ethos + 0.05 ethos + 0.5 ethos

~= 221 ethos

#

no factory farm

human = 100 being * 1.0 sapien * 1.0 hedon * 2 year

chicken = 1000 being * 0.0001 sapien * 1.0 hedon * 2 year

cow = 1000 being * 0.001 sapien * 1.0 hedon * 2 year

human + chicken + cow = 200 ethos + 0.2 ethos + 2 ethos ~=

202 ethos

#

In this particular, admittedly contrived example, there is a cost of about 20 ethos for not having a factory farm, primarily because the ethical importance of the chickens and cows were discounted. Notice that the chickens were especially discounted, based the author's (admittedly ignorant) guess at their species' average intelligence. The same facts and model could be construed with a different set of interpretations on quality of life:

#

factory farm (without slaughter)

human = 100 being * 1.01 sapien * 1.0 hedon * 2 year
 chicken = 1000 being * 0.0001 sapien * 0.1 hedon * 2 year
 cow = 1000 being * 0.001 sapien * 0.1 hedon * 2 year
 human + chicken + cow = 202 ethos + 0.02 ethos + 0.2 ethos
 ~= 202 ethos

#

no factory farm
 human = 100 being * 1.0 sapien * 1.0 hedon * 2 year
 chicken = 1000 being * 0.0001 sapien * 1.0 hedon * 2 year
 cow = 1000 being * 0.001 sapien * 1.0 hedon * 2 year
 human + chicken + cow = 200 ethos + 0.2 ethos + 2 ethos ~=
 202 ethos

#

In this case, in which meat-eating confers only about 1% improvement in quality of life for a ratio of 1 human to 10 chickens and 10 cows per year that stand to suffer at quality of life 1/10th of the species average, there is ethical indifference for or against factory farming, minus the consideration of slaughtered animals.

How should a being living below average quality of life be accounted for when killed? In the above case, where the quality of life is imposed (by imprisonment and mutilation), compare against a natural death rate for a given period compared to the slaughter rate for a given period. For example, suppose half

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the stock were slaughtered in two years. Also suppose that on average (unimprisoned and unmutilated) the death rate was already accounted for in the average quality of life for a two year period. Suppose also that the additional preference among humans was sufficient to raise quality of life by 1.01 to 1.02. The data works out as:

#

factory farm (with slaughter)

human = 100 being * 1.02 sapien * 1.0 hedon * 2 year

chicken = 500 being * 0.0001 sapien * 0.1 hedon * 2 year

+ 500 being * 0.0001 sapien * 0.0 hedon * 2 year

cow = 500 being * 0.001 sapien * 0.1 hedon * 2 year

+ 500 being * 0.001 sapien * 0.0 hedon * 2 year

human + chicken + cow = 204 ethos + 0.01 ethos + 0.1 ethos

~= 204 ethos

#

Because of the ethical importance is so low and the living condition already so close to death, if humans were so additionally satisfied by the meat then it would be marginally, though insignificantly, ethically preferable to slaughter.

Let's take an example, however, based on a few facts, restricting ourselves to beef, for simplicity and source data (<http://www.ers.usda.gov/news/BSECoverage.htm>). In the year 2002, U.S. beef consumption nearly matched U.S. beef production

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(27.9 billion pounds consumed, 27.09 billion pounds produced).

Let us approximate the U.S. beef consumed to equal that of the commercial slaughter 35.735 million head. Suppose a population of about 285 million in 2002, and a vegetarian rate of about 4 percent (<http://answers.google.com/answers/threadview?id=706957>).

So 36 million cows (28 billion pounds) consumed by 274 million humans. That is roughly 0.13 cows per year per cow-eater.

Suppose a natural mortality rate of 4%, such that of the 36 million slaughtered, 34.5 million would have survived. Also suppose the average condition of cattle to be below average.

Suppose U.S. human quality of life of the cow-eaters to be above species average (2.00 hedon). And suppose a cessation of cow-eating would impact the consumer fiscally and psychologically to equate to reduction to 1.99 hedon.

#

eat factory cow

human = 1 being * 1.0 sapien * 2.00 hedon * 1 year

cow = 0.0675 being * 0.001 sapien * 0.0 hedon * 0.5 year

+ 0.0675 being * 0.001 sapien * 0.1 hedon * 0.5 year

human + cow = 2 ethos + 0.00003375 ethos ~= 2.00003375

ethos

#

do not eat factory cow

human = 1 being * 1.0 sapien * 1.99 hedon * 1 year

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cow = 0.13 being * 0.001 sapien * 1.0 hedon * 1 year
 human + cow = 1.99 ethos + 0.00013 ethos ~= 1.99013 ethos

#

There is a slight difference, ethically preferable to satisfy the intelligent human's need for cow meat. If the difference in quality of life for the cow-eater were much smaller, then the cow's tiny ethical importance would swing the balance. There are non-animal rights arguments against eating cow, such as health of the human, financial costs to the human, and hidden costs of eating cows that have been subsidized but not removed (such as environmental concerns). Yet of these, only the health effects and financial costs can be trusted at face value. Such discussion as subsidized environmental costs are complicated and therefore potentially misleading. If the potential health problems of eating cow were defensible, then one could make the argument that this health detriment balances out the upfront financial and psychological costs to quality of life. If the overall quality of life of the cow-consumer were diminished by consuming cow, then one might consider the consumer to be ignorant, misinformed, or addicted. Suppose for example, that continuing to eat the current number of cows (0.13 per year) incurred a 10% probability of shortening expected life span by 1 year. Whereas, eating a tenth of the amount (0.013 cows per year) would effectively nullify this incursion.

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Suppose all chances of death from other causes and the discount placed on future expectations were already factored into the probabilities.

#

eat 0.13 factory cow per year

human now = 1 being * 1.0 sapien * 2.00 hedon * 1 year

human later = 0.9 probability * 1 being * 1.0 sapien * 2.00
hedon * 1 year

human now + human later = 2 ethos + 1.8 ethos = 3.8 ethos

#

eat 0.013 factory cow per year

human now = 1 being * 1.0 sapien * 1.99 hedon * 1 year

human later = 1 being * 1.0 sapien * 2.00 hedon * 1 year

human now + human later = 1.99 ethos + 2 ethos = 3.99 ethos

#

In this case, a preference of 0.19 ethos was obtained by restricting cow consumption, and the benefit would be directly experienced by the health-conscientious consumer. This illustrates an interesting conclusion of the model: It is ethical not only to consider quality of life for others, but also to consider quality of life for oneself. This argument rarely need be made loudly, as ethical analysis as an independent inquiry would be obsolete if self-interest coincided perfectly with ethics.

What would be the effect on the ethical impact toward cows by eating 1/10th the cow consumption? By the simplistic model, assuming that one's dietary restriction were not offset by increased cow consumption by others or inflexible cow slaughtering rate (as a Congress-tainted enterprise could be suspected of), then the maximal benefit would be 9/10th of the ethical difference of eating no cows at all, a bit less than 0.00001 ethos. Under this (admittedly ignorant) 0.0001 sapien value for a cow, where a cow's life (and quality thereof) has the ethical weight of only 1/1000th that of a human, it sucks to happen to be born as a cow.⁵

CASE STUDY: FOOD FOR THOUGHT

I can use this crude arithmetic model to assess my concerns for an ethical diet. For consideration, I am concerned with the following average United States human diets: omnivore, vegetarian, vegan, free range, and vegetarian plus fish. For simplicity let us restrict ourselves to cows. We have already evaluated the omnivore, no cow meat, and less cow meat diet. But what about the free range cow diet⁶. The free range cow is raised at a higher quality of life than the factory cow. It might be so high as to be above the average for the self-sufficient cow species, especially if limited to cohabitation near humans. Free range is not free to the humans, though.

Factory treatment of cows is motivated to cut financial costs (perhaps trading them for ethical costs). Here is a hypothetical model:

#

eat free range cow

human = 1 being * 1.0 sapien * 1.99 hedon * 1 year

cow = 0.0675 being * 0.001 sapien * 0.0 hedon * 0.5 year

+ 0.0675 being * 0.001 sapien * 1.5 hedon * 0.5 year

human + cow = 1.99 ethos + 0.00003375 ethos ~= 1.990050625

ethos

#

A problem again arises because of the reduced quality of life for the human. However, if the free range cows were tastier, and the human richer, then one would expect less quality of life loss. This, to some extent, corresponds to political opinion. Those with above average wealth and health consciousness (in California) are stereotypical free range, vegetarian, or vegan advocates.

The numerical ethical analysis result of limiting meat consumption coincides with the advice given by Peter Singer (http://www.motherjones.com/interview/2006/04/peter_singer.html), which basically states that eating more ethically most of the time is better than eating less ethically most of the time. Singer also pointed out that it is not useful to chastise

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oneself (and presumably another) for a small infraction in a diet. Within this numerical model, this chastisement can be seen as some psychological impact on quality of life (although much smaller than, say, a physical pain). And by looking on the positive side, there would be as much reason to reward the vast majority occasions on which the desirable diet was upheld as to chastise a rare fall from grace.

Should a tax be applied on meats to raise their costs to their true ethical costs? Absolutely not. The tax would go to a political system that itself has a net negative balance on ethical impact. While it is ethical to improve quality of life, it is unwise to assume that taxes improve quality of life.

INVOLUNTARY AND VOLUNTARY CHARITY

One could consider taxation and welfare. In the 1990s I heard (from Mike McMoil) that 20 percent of tax funds earmarked for welfare reach recipients. The 80 percent is the overhead cost of the governmental operation. By contrast 50 percent of funds to charitable volunteer organizations reached recipients. Assuming a simpler world where the cost fund represented a similar reduction of quality of life and the portion received by the recipient was an increase, one could see one of the organizations was producing less ethical benefit, and might, on the whole, be causing a net ethical detriment for its high cost.

The ethical proposition would be to shift all funds directly to charitable volunteer organizations. Suppose some ad hoc quality of life figures, with all other factors being cancelled out. Yet recall that quality of life is not a linear proportion of income or wealth.

#

tax-funded charity

total payer difference = -1000000 hedon

total recipient difference = +900000 hedon

payer + recipient = -100000 hedon

#

volunteer funded charity

total payer difference = -1000000 hedon

total recipient difference = +1100000 hedon

payer + recipient = +100000 hedon

#

The ethically responsible members of government would be producing ethically less desirable results in the above scenario, and would improve their ethical record by allowing direct transfer of the welfare budget by the taxpayer to a voluntary charity organization.

FELINE BIRTH CONTROL

As another animal example: One might perform a similar analysis for livestock mutilation on a pet cat. Spaying, neutering, or de-clawing diminish quality of life, insomuch as pain is endured during or after procedure, ability is interfered with, and psychological discomfort persists. An operation such as de-clawing would have the ethical consideration of the mutilated animal's quality of life and those of its housekeepers. Birth control, insomuch as it prevents lowering quality of life for the family, would be ethical, and is to some extent pursued on these grounds. Some ad hoc values can be concocted for illustration:

#

birth = average(1 being * 0.001 sapien * 1.0 hedon * 5
year,

1 being * 0.001 sapien * 0.5 hedon * 5
year)

birth = (0.005 ethos + 0.0025 ethos) / 2 = 0.00375 ethos

spayed = 1 being * 0.001 sapien * 0.99 hedon * 5 years

spayed = 0.00495 ethos

spayed - birth = 0.0012 ethos

#

Even with a minor loss of quality of life for the potential parent from the operation (0.99 hedon), there is a net gain, and

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this has not considered the external ethical effects on the owners and neighbors' quality of life, which may very well prefer spaying.

While birth control has such an argument, abortion might have such an argument, too. However, in the case of abortion at later stages, there is sentience and intelligence to consider. The formulation might follow lines as above with the additional cost of the intelligence that is forced to suffer.

One comedian extended the logic to state: I believe in abortion, post-birth abortion up to the age of 35. While infanticide has been practiced in some cultures, it should warrant ethical consideration above and beyond abortion. There is a child with a life expectancy. There is an ethical responsibility on the caregivers. At some point around birth, the new being is considered part of the population and the quality of life for that being can increased or diminished according to the care given. Of course the quality of life for the ones giving care should also be assessed. This is yet another ethical impulse for birth control when average quality of life for parties involved would drop, even after accounting for the joy of having a little one.

Just killing a member of the population is ethically regrettable, killing the members at the lowest positive quality of life is also regrettable, to the degree that their lives had

expected quality and duration. One might believe that it would raise the average ethical index for the population, and it might, but the event inflicted ethical damage. That mean does not justify that end. Whereas, had the poor quality of life member's life had been prevented through birth control, then there would be some ethical merit for maintaining a higher quality of life, as shown in the example of the cat's birth control.

UNITED STATES DRUG ENFORCEMENT POLICY

Another political issue that has been popular in recent decades, with ethical ramifications is U.S. drug enforcement policy. One might, for example, recognize a drug addiction, and note that there is an ethical preference to end the drug use. All this model needs is for the drug use to reduce quality of life. Suppose the drug temporarily boosted pleasure (1%) but for the rest of the time (99%) cost resources and addiction caused discomfort.

#

$$\begin{aligned} \text{drug use} &= 1 \text{ being} * 1 \text{ sapien} * 8.0 \text{ hedon} * 0.01 \text{ year} \\ &+ 1 \text{ being} * 1 \text{ sapien} * 1.5 \text{ hedon} * 0.99 \text{ year} \end{aligned}$$

$$\text{no drug use} = 1 \text{ being} * 1 \text{ sapien} * 2.0 \text{ hedon} * 1 \text{ year}$$

$$\text{drug use} - \text{no drug use} = 1.565 \text{ ethos} - 2.0 \text{ ethos} = -0.435$$

ethos

#

There is net loss of -0.435 ethos for this example of one year of drug use. A misguided moralist might support a War on Drugs under the guise that it would be ethically preferable. Yet suppose the result were to incarcerate the drug user for one year. What is the ethical bottom-line now?

#

incarceration = 1 being * 1 sapien * 0.5 hedon * 1 year
incarceration = 0.5 ethos

#

A net loss of about -1.0 ethos even when compared to the drug use, and this does not even take into account the ethical cost of quality of life to pay for the incarceration or enforcement of policy.

Incidentally, the same drug addiction for a being with less than 1 sapien (such as a lab rat or police dog) would be less ethically regrettable due to its ethical discount.

THE NAZI HOLOCAUST

One of the tragedies of the 20th Century is the Holocaust, with usual estimates of 9 to 11 million killed (http://en.wikipedia.org/wiki/The_Holocaust). Consider the ethical cost, both from murder and cruel treatment. It would not be safe to say that cruel treatment of those choosing to

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survive meant the quality of life was preferable to oblivion. It may have been due to an expectation that quality of life would increase afterward, and so make sub-oblivion levels of quality of life tolerable. Suppose, for numerical illustration, that on the whole the quality was similar to that faced by animals in a factory farm, around 0.1 hedon, but negative, such that one would prefer a slightly early death to avoid the cruelty (which an estimated 200,000 did commit suicide to avoid). Suppose the average killing time were 3 years, and the average life expectancy of the victims 20 more years. Other factors will not be considered in this brief and entirely lacking example:

#

$$\text{null} = 10 \text{ million beings} * 1 \text{ sapien} * 1 \text{ hedon} * 20 \text{ years}$$

$$\text{holocaust} = 10 \text{ million beings} * 1 \text{ sapien} * -0.1 \text{ hedon} * 3$$

$$\text{years}$$

$$+ 10 \text{ million beings} * 1 \text{ sapien} * 0.0 \text{ hedon} * 17 \text{ years}$$

$$\text{holocaust} - \text{null} = -203,000,000 \text{ ethos} = -203 \text{ mega-ethos}$$

#

No marks on paper can gauge that degree of human suffering. Medical experiments were performed on some victims, and all were treated as less than human. It may be said that their captors had applied an ethical discount to the human victims of the holocaust. According to Nazi doctrine, ethical importance

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correlated to mythical measure of genetic purity. Let us consider this ethical calculus with extreme caution, for the sake of all sentient beings.

From the example of torturous medical experiments, it is possible to imagine beings with negative ethical importance, whose torment is ethically preferable. It is, though, rather the kind of behavior one expects from the evil, as depicted of devils in Dante's Inferno or the villain in Dean Koontz' Dragon Tears. Interestingly, propaganda against opponents might present them as such torture-loving goblins. Yet again though, behavior is not indicator ethical preference.

AN EXCEPTIONAL LIE

Given that truthfulness is a common precept in ethical codes, one might consider the ethical cost of a lie. To display the value of this utilitarian model, let the example (from Mike McMoil) be one that stumped my teenage ethical code: The Nazis come to the door and ask if there are any Poles inside. There are. But if you say No, they go away. If you say Yes, the Pole goes to the concentration camp for 5 years (although not killed), and the next fifteen years lives with psychological and physical discomfort.

#

lie = 1 being * 1 sapien * 1 hedon * 20 years

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$$\begin{aligned} \text{truth} &= 1 \text{ being} * 1 \text{ sapien} * -0.1 \text{ hedon} * 5 \text{ years} \\ &\quad + 1 \text{ being} * 1 \text{ sapien} * 0.95 \text{ hedon} * 15 \text{ years} \\ \text{truth} - \text{lie} &= 13.75 \text{ ethos} - 20 \text{ ethos} = -6.25 \text{ ethos} \\ &\# \end{aligned}$$

The net effect of the telling the truth in this contrived example cost -6.25 ethos, equivalent to about 6 years of human life. The principle it shows, though is that an ethical system based on an algorithm of numerical analysis can yield results that better interpret events than a simpler, easier to follow code of precepts.

INVASION OF IRAQ

Usually a lie is unethical, because it covers up a regrettable event or deceives the audience into accepting a false justification for an event, which if the lie is false, is regrettable. An example of this would be, for instance, if there were no weapons of mass destruction in Iraq before the United States invaded and occupied that nation.

The story goes that there were weapons of mass destruction. If there were, that implies the ability to do great harm. Suppose a nuclear bomb, like one of the tens of thousands the United States owns, or equally mass-destructive weapon were detonated near Iraq and that detonation killed, on average,

10,000 humans and an equal number of mammals and ten times as many plants.

#

mass destruction = 10000 being * 1 sapien * 0.0 hedon * 30 years

+ 10000 being * 0.001 sapien * 0.0 hedon * 10 years

+ 100000 being * 0.0000001 sapien * 0.0 hedon * 10

years

null = 10000 being * 1 sapien * 1.0 hedon * 30 years

+ 10000 being * 0.001 sapien * 1.0 hedon * 10 years

+ 100000 being * 0.0000001 sapien * 1.0 hedon * 10

years

mass destruction - null = -300,010.01 ethos ~= -300,000

ethos

#

-300,000 ethos is quite an impact. But this impact only occurs if a weapon of mass destruction is used successfully. The existence of a weapon does not guarantee its use. The United States has over 20,000 such weapons of mass destruction, yet most of them have never been used. Most nations with such weapons, in various conflicts, have never used theirs either. So what is the probability of this event, given they existed? From United States usage of nuclear bombs or other mass weapons, the rate would be under 1 in 1000. Since United States has more

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such weapons than all other nations combined, it would be hard to estimate their probable usage. But even if it were 1 in 100, this estimates the ethical impact at:

#

usage < 0.01 probability

usage * (mass destruction - null) < -3000 probability-ethos

#

Then there is the question of how certain those weapons exist. The United Nations was uncertain. But the United States executive branch, if it can apply its domestic justice policy of conviction only beyond a reasonable doubt, said it believed they existed, certain enough to inflict a regrettable toll of its own.

#

0.0 < exist < 0.9

exist * usage * (mass destruction - null) < (0 ... -270
ethos)

#

How much was the toll? According to
<http://www.antiwar.com/casualties/> it was:

US dead ~= 3000

US wounded ~= 22500

Body count of Iraqi civilians from
<http://www.iraqbodycount.net/> and
<http://icasualties.org/oif/IraqiDeaths.aspx> is about:

Iraqi civilians dead \approx 50000

Iraqi military/police dead \approx 6000

Iraq invasion death \approx Iraqi civilians dead + Iraqi
military/police dead + US dead

Iraq invasion death \approx 50000 + 6000 + 3000 = 59000

Suppose each of those killed had a low life expectancy (say
20 years instead of 30 or 40) due to warfare or political
persecution in Iraq, even if the invasion hadn't occurred.
Without considering the wounded, or nonhuman animals, this
brings the ethical status to:

#

Iraq invasion death \approx 59000 being * 1 sapien * 0.0 hedon *
20 years

null death \approx 59000 being * 1 sapien * 1.0 hedon * 20 years

Iraq invasion death - null death \approx -1,180,000 ethos

#

This does not include the cost to those still living.
Disregarding Iraq's cost, the United States citizens' cost is

[http://nationalpriorities.org/index.php?option=com_wrapper&
Itemid=182](http://nationalpriorities.org/index.php?option=com_wrapper&Itemid=182)

United States citizen \approx \$350,000,000 USD.

That averages to about \$1200 per citizen. If you could
have used \$1200 in purchasing power through reduced inflation or
lower prices (such as gas) or a better job market, then this

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would have helped. That is about the same cost as a complete personal computer. Suppose, averaged over 3 years, \$400 represents a small impact on quality of life, about 0.0001 for 3 years.

#

United States buy war \sim 300,000,000 being * 1 sapien * 0.99999 hedon * 3 year

null \sim 300,000,000 being * 1 sapien * 1 hedon * 3 year

United States buy war - null \sim -9000 ethos

#

Together these values come to:

#

Iraq invasion death + United States cost \sim -1,189,000 ethos

#

These values have not considered other nations' death or injuries by United States or Iraqis. That is about the equivalent of 3 weapons of mass destruction, or about 8 catastrophes of the magnitude of the world trade center on September 11, 2001. The United States federal government paid a high ethical price.

There are arguments that the war boosts the economy, but these are holdover misinterpretations of the result of the Great Depression's continuation and cessation. Spending \$350,000,000

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on any productive project would boost short-term economic activity. And letting consumers select what is being spent would boost economic activity in the long run.

Estimating an aggregate sum from 1979 onward of Saddam Hussein's murder from <http://usinfo.state.gov/products/pubs/silenced/murder.htm> there are 30000 to 90000 dead, killed not by Saddam Hussein of course, but by the government of Iraq, no doubt with his will. A high figure of 90000 in the course 24 years has an average of less than 4000 killed each year. By comparison, averaging years 2005 and 2006, there have been 11000 killed by United States occupation. This has the chilling comparison:

#

Hussein occupation year \approx 4000 being * 1 sapien * 1.0
hedon * -30 year

United States occupation year \approx 11000 being * 1 sapien *
1.0 hedon * -30 year

United States occupation year - Hussein occupation year \approx
-210,000 ethos

#

Allowing for 1500 other murders per year not authorized by Iraq officials (5.5 per 100,000, about the same as the United States), there would still be twice as many violent deaths during United States occupation per year than Hussein's

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occupation. Even without financial costs considered, with only death tolls, calculation comparison may lead to the conclusion occupation is almost less ethically desirable than had Iraq a weapon of mass destruction.

DEPORTATION FROM CHINA

Another example occurred in June 2002, when a North Korean escaped the country and fled to the South Korean embassy in China. China invaded the embassy (embassies are considered sovereign soil) and extracted the refugee. China did not send him back to North Korea nor allow him to directly return to South Korea, but deported him to Canada, from where he went to South Korea. Putting some numbers on the story, consider the cases for China: laissez-faire, return to North Korea, return to South Korea, and deport to Canada. Suppose that political relations with North Korea would have some ethical cost of its own if failing to appear to be respecting North Korea's imprisonment policy for its citizens.

#

North Korea = 1 being * 1 sapien * 0.5 hedon * 20 years

South Korea = 1 being * 1 sapien * 2.0 hedon * 30 years

North Korea - South Korea = 10 ethos - 60 ethos = -50 ethos

#

Besides the low quality of life, the life expectancy of the refugee in North Korea would be shorter. This makes the net ethical effect more dramatic.

DEMOCRACY

One pithy illustration of democracy is the saying:
Democracy is two wolves and a sheep deciding what to eat. Let us model an abstract example. Suppose a democracy, in which the majority (50% plus 1) can institute or remove policies which affect quality of life for all members of a group. There can be cases where the democracy causes a net loss in quality of life.

#

$$\begin{aligned} \text{enforce} &= 51 \text{ being} * 1 \text{ sapien} * 1.01 \text{ hedon} * 1 \text{ year} \\ &+ 49 \text{ being} * 1 \text{ sapien} * 0.5 \text{ hedon} * 1 \text{ year} \\ \text{null} &= 100 \text{ being} * 1 \text{ sapien} * 1.00 \text{ hedon} * 1 \text{ year} \\ \text{enforce} - \text{null} &= 76.01 \text{ ethos} - 100 \text{ ethos} = -23.99 \text{ ethos} \end{aligned}$$

#

There is a large net ethical loss to enforcing majority rule. Before presuming that the majority would not be so callous as to afflict the large majority, notice that the quality of life, by definition, accounts for any personal guilt, meaning that the slim majority, even with guilt, have enough other benefits to quality of life to more than compensate their feelings.

Can there be systems of politics that can do better? One method is to subdivide any and all concerns that need not be decided on the aggregate level, such that individuals can employ their intelligence to choose options that maximize their quality of life. Suppose such choices were available and had half the benefit for the majority.

#

free choice = 51 being * 1 sapien * 1.005 hedon * 1 year
 + 49 being * 1 sapien * 1.0 hedon * 1 year
 null = 100 being * 1 sapien * 1.00 hedon * 1 year
 free choice - null = 100.225 ethos - 100 ethos = 0.225
 ethos

free choice - enforce = 100.225 ethos - 76.01 ethos =
 24.215 ethos

#

Not only does this contrived example of free choice outperform the default case in terms of ethical merit, but it is dramatically ethically preferable to the enforcement of majority rule.

TECHNOPHILIA

Considering differences in quantity as well as quality of life: many modern people trade it daily, through life-shortening yet enhancing devices such as cell phones, and

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locales such as cities. Cell phone use exposes the brain to local radiation, which can sometimes lead to brain disease. Yet the use of a cell phone also enhances current quality of life, so there is a tradeoff. A similar analogy applies to living a city with its pollution, stress, and crime. It provides factors such as employment, community, information, and convenience.

Along this line, one can consider the quality of life throughout history. Some people have argued that quality of life has gone down over the centuries and not up. Setting aside issues of duration of life, the quality of life could be assessed by speculating on the circumstances of the average life centuries ago and comparing those to high-tech alternative today.

There can be some further speculations afforded by this model of ethics. Sowell has mentioned that lowering cost translates to saving lives (Basic Economics?). This model can illustrate this, as well as refine discussion on improvements to quality of life.

ROBIN HOOD

One can ask the Robin Hood question: Is it ethical for the poor to rob the rich? By this model, there are some situations in which it is. Despite the protests for property rights (which is another precept) by libertarians (and I am a libertarian!), I believe this model elucidates some extreme exceptions in which

it is ethical for the poor to rob the rich. One case supposes a rich hoarder or extremely misguided spender, who was misusing wealth for unethical ends, overall lowering quality of life. The rub to the robbers, though, is that the transfer of wealth and the transgression of property rights is itself an injury to quality of life, both immediately and potentially interminably as once stealing is legitimized it is hard to predict how the stolen goods would be properly assigned for ethical ends. Just look at any government. Yet, for numerical demonstration, here is a contrived example in which some suffer for robbery and most benefit through better use of funds than the scrooge had applied them to:

#

```
rob = 1 being * 1 sapien * 2.0 hedon * 1 year
      + 90 being * 1 sapien * 2.0 hedon * 0.75 year
      + 10 being * 1 sapien * 0.5 hedon * 0.25 year
free = 1 being * 1 sapien * 10.0 hedon * 1 year
      + 100 being * 1 sapien * 1.0 hedon * 1 year
rob - free = 138.25 ethos - 110 ethos = 28.25 ethos
```

#

In this fairy tale, a net ethical balance of 28.25 ethos is derived from the robbery. This is a fanciful example, only suitable to a Robin Hood tale itself. A more realistic data set might be:

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#

rob = 1 being * 1 sapien * 2.0 hedon * 1 year
 + 10 being * 1 sapien * 2.0 hedon * 0.75 year
 + 90 being * 1 sapien * 0.5 hedon * 0.25 year
 free = 1 being * 1 sapien * 10.0 hedon * 1 year
 + 100 being * 1 sapien * 1.0 hedon * 1 year
 rob - free = 28.25 ethos - 110 ethos = -81.75 ethos

#

Yet while considering a more realistic data set, a similar model could be contrived to represent taxation. The game in which each person is forced to give a penny and half the pennies are destroyed, half are pocketed by a couple of pork-barrelers illustrates this same principle.

IS NATURE ETHICAL?

One can speculate on nature, asking if the net effects of wild creatures are ethical or not. Does the leopard that kills the baboon behave ethically? In a sense, no, it slaughters, and its ethically preferable feeding does not fully offset the ethical cost of slain baboon. Yet the ethical responsibility of the leopard is less than that of a human, so the comparative culpability is lower. Let us contrive a few numbers:

#

feed = 1 being * 0.1 sapien * 0.0 hedon * 5 year

+ 1 being * 0.01 sapien * 1.0 hedon * 0.01 year
starve = 1 being * 0.1 sapien * 1.0 hedon * 5 year
+ 1 being * 0.01 sapien * 0.25 hedon * 0.01 year
feed - starve = 0.0001 ethos - 0.500025 ethos ~= -0.5 ethos
#

So the behavior of the leopard is ethically regrettable.
It is destroying intelligent life.

Yet the question of ethics that matters more is not the raw number of an imagined world, but the comparison to a plausible alternative, taking factors into account. To attempt to stop leopards from killing would be to incarcerate all leopards. Continuing this strategy throughout the species would be ridiculous regulation of nature and thoroughly impossible. In nature, life feeds on life. The alternative, attempting to prevent this death would disrupt entire ecologies and bankrupt those trying. Therefore, letting nature continue ... naturally, is the more ethically preferable alternative to imprisoning natural creatures.

ENGINEERING LIFE

What of engineering stupidity to avoid intelligent life?
This is pretty much what stem-cell research aims to do.
Considering the ethical weight of stem-cells to be around that of eukaryote (10^{-9} sapien), a lot of stem-cell research is

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ethically preferable if it produces or probably produces a little quality of life for humans.

Yet, take the eugenics argument down a darker path. What of engineering stupid cows? If it were done to make them insentient meat producers, analogous to stem cell research, this would be ethically preferable, and would rank such eating about as ethically repugnant as eating yeast. But suppose it were not, and only made them as stupid as insects? That would still be a reasonable improvement over the current situation, provided all other factors could be maintained equal. Insects are less intelligent and less sentient than mammals, so less ethical damage is being done. However, like the argument for birth control and against murder, altering the intelligence level of the being once it is already born would not be ethically preferable. It would in essence diminish quality of life, similar to how disease diminishes the quality-adjustment coefficient of a QALY.

SUPERHUMAN INTELLIGENCE

Finally, there is another reason for considering comparative ethics. There may come a day when humans are not the most intelligent species (or form of being) in their environment. Decades down the road, some computer may surpass human intelligence. It would do well to consider how humans, if

displaced from the top of the intellectual chain ought to be treated. Hedging bets early with a treatment on comparative ethics couldn't hurt.

ROOM FOR IMPROVEMENT

The given model partially refines discussion of ethics. The model refines a discussion of ethics between members of the same species and other species. The model refines discussion of euthanasia, genocide, factory farming, medical experimentation, drug enforcement. The model does not justify events or suggest reparations.

The model is not complete or precise. The numbers outlined for ethical importance, intelligence, ethical responsibility are in much need of replacing. Hopefully this model will inspire consideration of a superior model, which will further the stated goals and requirements of the model: to improve ethical behavior through better identification of ethical behavior. Absurd results generated by the model elucidate limits or failures of the model, and should not be used to condone ethically absurd behavior. The first mathematical models of physics were less than precise.

¹ In cases where the intelligence of a species cannot be measured, it could be approximated and square root of neurogram measurements. This could roughly be denoted as the factor of sentience. A human has a sentience of 1 sapien-neurogram. A mouse of about 0.003 sapien-neurogram.

The square root of the neurograms assumes that additional mass for neural system incurs overhead, which grows faster than the proportion of the mass. So the most efficient densities of intelligence, are the smallest brains, although the larger brains also confer additional consideration, just not at a linear rate of growth.

² Various terms were considered, including eudaemon, felice, hedon, and euphore. Eudaemon from Aristotle's eudaimonia, yet does not necessarily coincide with Aristotle's (or subsequent philosophers') advice on how good living is achieved (such as through exercise of virtues). Various terms for happiness (felice, hedon, euphore) were not used, because freedom, is also included, and there is unsettled debate on whether a happy life through simulation would be equivalent quality of living as a happy life.

³ This math is loathsome, given that murdering a 80 year old has the same legal implication as murdering a 30 year old. What

is usually considered is a function of the probability of death, with an asymptotic order growing more rapidly than linear.

⁴ The square root of the population is not only complicated to calculate, but seems to favor elitism. By the square root of population, it is ethically equivalent that the many may suffer if it alleviates the suffering of the few. For example, 4 people quadrupling their quality of life is not ethically equivalent to 16 people doubling their quality of life. The result would be closer to equitable for 4 people quadrupling their quality of life being ethically equivalent to 8 people doubling their quality of life. Square-rooting of the population was considered to prevent absurd comparison between, say, parasitic viruses or bacteria, and an animal host. The extermination of countless viruses should be ethically superior for alleviating the suffering of an animal host. But perhaps this can be accounted for without square rooting the population. Removing the square root simplifies calculations immensely. Calculation of an average of a population, aggregate population, and marginal addition to a population are simplified when the population count is reduced to a proportion of the members counted.

⁵ I hope I'm not reincarnated as a cow.

<http://web.singnet.com.sg/~alankhoo/DharmaRealm.htm>

⁶ By "free range cow," I mean a cow that was humanely raised with ability to roam, although free range has no such distinction for any species except chickens.