# 1NC

## OFF

### 1

#### Negate –

#### 1] member[[1]](#footnote-1) is “a part or organ of the body, especially a limb” but an organ can’t have obligations

#### 2] of[[2]](#footnote-2) is to “expressing an age” but the rez doesn’t delineate a length of time

#### 3] the[[3]](#footnote-3) is “denoting a disease or affliction” but the WTO isn’t a disease

#### 4] to[[4]](#footnote-4) is to “expressing motion in the direction of (a particular location)” but the rez doesn’t have a location

#### 5] reduce[[5]](#footnote-5) is to “(of a person) lose weight, typically by dieting” but IP doesn’t have a body to lose weight.

#### 6] for[[6]](#footnote-6) is “in place of” but medicines aren’t replacing IP.

#### 7] medicine[[7]](#footnote-7) is “(especially among some North American Indian peoples) a spell, charm, or fetish believed to have healing, protective, or other power” but you can’t have IP for a spell.

### 2

#### The role of the ballot is to determine whether the resolution is a true or false statement – anything else moots 7 minutes of the nc and exacerbates the fact that they speak first and last since I should be able to compensate by choosing – it’s the most logical since you don’t say vote for the player who shoots the most 3 points, the better player wins.

#### Reject their framing on inclusion – they exclude all offense except what follows from their specific fwk which shuts out those without the resources to prepare.

#### The ballot says vote aff or neg based on a topic and five dictionaries[[8]](#footnote-8) define to negate as to deny the truth of and affirm[[9]](#footnote-9) as to prove true which means it’s constitutive and jurisdictional.

#### Their framing justifies permissibility since it only tells you what to do in face of one problem which means everything outside that instance isn’t condemned.

### 3

#### Presumption and permissibility negates – a) statements are more often false than true since I can prove something false in infinite ways b) real world policies require positive justification before being adopted c) the aff has to prove an obligation which means lack of that obligation negates d) resolved in the resolution indicates they proactively did something, to negate that means that they aren’t resolved.

#### Skep is true and negates –

#### Every reason is equally as violent in its creation.

**Derrida,** Jacques Derrida, “Force of Law: The Mystical Foundation of Authority” //Massa But **justice,** however unpresentable it may be, doesn't wait.· It **is that which must not wait.** To be direct, simple and brief, let us say this: **a just decision is always required immediately, "right away." It cannot furnish itself with** infinite information and the **unlimited knowledge of conditions,** rules or hypothetical imperatives **that could justify it.** And **even if it did** have all that at its disposal, even if it did give itself the time, all the time and all the necessary facts about the matter, **the moment of decision,** as such, **always remains a finite moment of urgency** and precipitation, since it must not be the consequence or the effectof this theoretical or historical knowledge, of this reflection or this deliberation, **since it always marks the interruption of the** juridico- or ethico- or politico-**cognitive deliberation that precedes it,** that must precede it. The instant of decision is a madness, says Kierkegaard. This is particularly true of the instant of the just decision that must rend time and defy dialectics. It is a madness. **Even if time** and prudence,the patience of knowledge and the mastery of conditions **were** hypothetically **unlimited, the decision would be structurally finite,** however late it came, decision of urgency and precipitation, **acting in** the night of **non-knowledge and non-rule**

#### Affirming negates.

**Paraphrasing Mcnamara ‘06**, Paul, 2-7-2006, "Deontic Logic (Stanford Encyclopedia of Philosophy)," No Publication, <https://plato.stanford.edu/entries/logic-deontic/index.html#4.3> //Massa

#### Premise 1—If the aff is true, it ought to be the case that members of the WTO should reduce IP protections.

#### Premise 2—It ought to be the case that the WTO reduce IP protections if and only if the members have IP protections. This is because standard logic would necessitate transferring the obligation predicate onto its necessary condition.

#### Thus, premise 3—if the aff is true, it ought to be the case that the members of the WTO has IP protections. This logically follows from “if P is Q and P is Q only if N, then N.”

#### External world skep is true.

**Neta**, Ram. “External World Skepticism.” The Problem of The External World, **2014**, philosophy.unc.edu/files/2014/06/The-Problem-of-the-External-World.pdf. //Massa

You take yourself to know that you have hands. But notice that, **if you do have hands, then you are not merely a brain floating in a vat of nutrient fluid and being electrochemically stimulated to have the sensory experiences** that you have now: such a brain does not have hands, but you do. So if you know that you do have hands, then you must also be in a position to know that you are not such a brain. **But how could you know that you are not such a brain? If you were such a brain, everything would seem exactly as it does now**; **you would** (by hypothesis) **have all the same sensory experiences that you’re having right now.** Since your **empirical knowledge of the world** around you **must somehow be based upon your sensory experiences, how could these experiences**—the very same experiences that you would have if you were a brain in a vat—**furnish you with knowledge that you’re not such a brain? And if you don’t know that you’re not such a brain, then you cannot know that you have hands.**

#### And, any account of morality is regressive since it predicates one universal rule on the existence of another moral rule. Since every human chain of reasoning must be finite according to our finite nature, such a reasoning process must terminate in a rule for which no reason can be given.

## Case

#### Space col and other techs are inevitable absent extinction – that causes incalculable amounts of animal and digital suffering, also known as s-risks, and outweighs extinction

Baumann 17 – Tobias Baumann, PhD Student in Computer Science at University College London, Master’s Degree in Mathematics and Bachelor’s Degree in Computer Science and Physics from Ulm University, Former Quantitative Trader at Jane Street Capital, “S-Risks: An Introduction”, 8-15, <http://s-risks.org/intro/>

Crucially, factory farming is the result of economic incentives and technological feasibility, not of human malice or bad intentions. Most humans don’t approve of animal suffering per se – getting tasty food incidentally happens to involve animal suffering. In other words, technological capacity plus indifference is already enough to cause unimaginable amounts of suffering. This should make us mindful of the possibility that future technologies might lead to a similar moral catastrophe. New technologies and astronomical stakes Barring extinction or civilizational collapse, technological progress will likely be inexorable. This means that new technologies will endow humanity with unprecedented power. Similar to technologies of the past, they will give rise to both tremendous opportunities and severe risks. If such advances allow us to colonize other planets, the stakes will become truly astronomical – the observable universe contains more star systems than all the grains of sand on Earth. This makes it even more important that we will use this newfound power responsibly. As we have seen, technological capacity combined with moral indifference can lead to a moral catastrophe. A future development akin to factory farming might cause suffering on an astronomical scale, vastly exceeding anything we’ve done so far. Such events are called s-risks (an abbreviation of “suffering risks” or “risks of astronomical suffering”). It is always hard to imagine what future developments might look like. Knights in the Middle Ages could not have conceived of the atomic bomb. Accordingly, the following examples are merely informed speculation. Many s-risks involve the possibility that advanced artificial systems may develop sentience if they are sufficiently complex and programmed in a certain way.4 If such artificial beings come into existence, they also matter morally5, but it’s quite possible that people will not care (to a sufficient extent) about their wellbeing. Artificial minds will likely be very alien to us, making it difficult to empathize with them. What’s more, humanity might fail to recognize digital sentience, just as many philosophers and scientists failed to recognize animal sentience for thousands of years. We don’t yet have a reliable way to “detect” sentience, especially in systems that are very different from human brains.6 Comparable to how large numbers of nonhuman animals were created because it was economically expedient, it is conceivable that large numbers of artificial minds will be created in the future. They will likely enjoy various advantages over biological minds, which will make them economically useful. This combination of large numbers of sentient minds and foreseeable lack of moral consideration presents a severe s-risk. In fact, these conditions look strikingly similar to those of factory farming. Several thinkers have also explored more concrete scenarios. Nick Bostrom coined the term mindcrime for the idea that the thought processes of a superintelligent AI might contain and potentially harm sentient simulations. Another possibility is suffering subroutines: computations may involve instrumentally useful algorithms sufficiently similar to the parts of our own brains that lead to pain. These are all examples of incidental s-risks, where an efficient solution to a problem happens to involve a lot of suffering. A different class of s-risks – agential s-risks – arises when an agent actively wants to cause harm, either because of sadism or as part of a conflict. For example, warfare and terrorism with advanced technology could easily amount to an s-risk, or a malicious agent might extort someone by threatening to torture simulated copies of that person.

#### The best estimate is there are 420 billion possible alien civilizations in the universe

Lichfield 16 – Gideon Lichfield, Editor-in-Chief of MIT Technology Review, Senior Editor at Quartz, Fellow at the Data & Society Research Institute, MSc in the Philosophy of Science from the London School of Economics and Political Science, BSc in Physics and Philosophy from the University of Bristol, Former Adjunct Professor in the Global Journalism Program at New York University, “There Have Probably Been Trillions Of Alien Civilizations, And Yet We May Still Never See One”, Quartz, 6-11, <https://qz.com/704687/there-have-probably-been-trillions-of-alien-civilizations-and-yet-we-may-still-never-see-one/>

[Paper internally quoted is by Adam Frank, Professor of Physics and Astronomy at the University of Rochester and Woodruff Sullivan, Professor of Astronomy and Astrobiology at the University of Washington]

Sorry, everybody. We’re just not that special.

In more than five decades of scanning the heavens, the search for extraterrestrial intelligence (SETI) has found no sign of alien life. Yet now two American astronomers, in the scientific equivalent of a back-of-the-envelope calculation, are estimating that over the course of its history the universe has seen at least half a trillion technologically advanced species.

The paper in Astrobiology by Adam Frank and Woodruff Sullivan notes that, in just the last few years, we’ve gained a much clearer sense of how hospitable the universe is to life. NASA’s Kepler space telescope has identified thousands of planets in our neighborhood of the galaxy, along with their sizes and distances from their stars. From there it’s fairly easy to guess how many may hold liquid water, which is probably essential for complex life. In our Milky Way galaxy alone there are, by this estimate, some 60 billion such “habitable” planets, write Frank and Sullivan.

The big remaining unknown is how many of these planets give rise to the kinds of lifeforms that build advanced technology (if nuclear weapons and Oculus Rifts can be called “advanced”). Since Earth is the only one we know of, the guesses vary wildly, but one such civilization per 10 billion habitable planets is generally considered “highly pessimistic,” wrote Frank in the New York Times yesterday (paywall). In astronomy-speak, this means the figure could be 10, 100 or even 1,000 times too low.

Using that “pessimistic” proportion, and other numbers from Frank and Sullivan’s paper, I calculated how many alien civilizations should have emerged within various subregions of the universe during its history:

Table

Description automatically generated with medium confidence

Remember, 420 billion intelligent civilizations is the “pessimistic” estimate. But sadly—or happily, depending on your view of aliens—it doesn’t make us any less alone.

Though Frank and Sullivan wisely avoid putting a number on how many alien species are knocking around right now, we can do our own back-of-the-envelope reckoning. A crucial unknown factor is how long a technologically advanced civilization lasts before either going extinct or blasting itself back to the stone age. Judging by the past century of human history, even a thousand years might be optimistic. But let’s be really optimistic and call it a million years. That’s the average lifespan of a mammalian species that doesn’t invent the means of its own destruction.

I’m also going to assume that, though the universe is 13.8 billion years old, advanced species didn’t begin to appear until a couple of billion years ago. It took most of the universe’s history to form the kinds of planets, rich in heavier elements, on which creatures like us could evolve.

So if there have been 420 billion civilizations in the past 2 billion years, each one lasting a million years, then on average, about 210 million of them have existed simultaneously at any given moment.

Update: Seth Shostak, senior astronomer at the SETI Institute, has responded to this article saying that “many have guessed” that one in a million habitable worlds would produce advanced intelligence, rather than one in 10 billion. If so, and sticking to the other assumptions, there’d a good chance of at least one other civilization in our own galaxy existing at the same time as ours, meaning it would much closer, and thus more plausibly detectable.

#### Universe destruction outweighs human extinction on scope

Hughes 18 [Dr. Nick Hughes, Postdoctoral Research Fellow at University College Dublin, PhD in Philosophy from University of St Andrews & University of Olso, and Dr. Guy Kahane, Professor of Philosophy at the University of Oxford, D. Phil. in Philosophy from Oxford University, “Our Cosmic Insignificance”, 7-6, http://www.unariunwisdom.com/our-cosmic-insignificance/]

Humanity occupies a very small place in an unfathomably vast Universe. Travelling at the speed of light – 671 million miles per you are herehour – it would take us 100,000 years to cross the Milky Way. But we still wouldn’t have gone very far. Our modest Milky Way galaxy contains 100–400 billion stars. This isn’t very much: according to the latest calculations, the observable universe contains around 300 sextillion stars. By recent estimates, our Milky Way galaxy is just one of 2 trillion galaxies in the observable Universe, and the region of space that they occupy spans at least 90 billion light-years. If you imagine Earth shrunk down to the size of a single grain of sand, and you imagine the size of that grain of sand relative to the entirety of the Sahara Desert, you are still nowhere near to comprehending how infinitesimally small a position we occupy in space. The American astronomer Carl Sagan put the point vividly in 1994 when discussing the famous ‘Pale Blue Dot’ photograph taken by Voyager 1. Our planet, he said, is nothing more than ‘a mote of dust suspended in a sunbeam’. Stephen Hawking delivers the news more bluntly. We are, he says, “just a chemical scum on a moderate-sized planet, orbiting round a very average star in the outer suburb of one among a hundred billion galaxies.”

And that’s just the spatial dimension. The observable Universe has existed for around 13.8 billion years. If we shrink that span of time down to a single year, with the Big Bang occurring at midnight on 1 January, the first Homo sapiens made an appearance at 22:24 on 31 December. It’s now 23:59:59, as it has been for the past 438 years, and at the rate we’re going it’s entirely possible that we’ll be gone before midnight strikes again. The Universe, on the other hand, might well continue existing forever, for all we know. Sagan could have added, then, that our time on this mote of dust will amount to nothing more than a blip. In the grand scheme of things we are very, very small.

For Sagan, the Pale Blue Dot underscores our responsibility to treat one another with kindness and compassion. But reflection on the vastness of the Universe and our physical and temporal smallness within it often takes on an altogether darker hue. If the Universe is so large, and we are so small and so fleeting, doesn’t it follow that we are utterly insignificant and inconsequential? This thought can be a spur to nihilism. If we are so insignificant, if our existence is so trivial, how could anything we do or are – our successes and failures, our anxiety and sadness and joy, all our busy ambition and toil and endeavour, all that makes up the material of our lives – how could any of that possibly matter? To think of one’s place in the cosmos, as the American philosopher Susan Wolf puts it in ‘The Meanings of Lives’ (2007), is ‘to recognise the possibility of a perspective … from which one’s life is merely gratuitous’.

The sense that we are somehow insignificant seems to be widely felt. The American author John Updike expressed it in 1985 when he wrote of modern science that:

We shrink from what it has to tell us of our perilous and insignificant place in the cosmos … our century’s revelations of unthinkable largeness and unimaginable smallness, of abysmal stretches of geological time when we were nothing, of supernumerary galaxies … of a kind of mad mathematical violence at the heart of the matter have scorched us deeper than we know.

In a similar vein, the French philosopher Blaise Pascal wrote in Pensées (1669):

When I consider the short duration of my life, swallowed up in an eternity before and after, the little space I fill engulfed in the infinite immensity of spaces whereof I know nothing, and which know nothing of me, I am terrified. The eternal silence of these infinite spaces frightens me.

Commenting on this passage in Between Man and Man (1947), the Austrian-Israeli philosopher Martin Buber said that Pascal had experienced the ‘uncanniness of the heavens’, and thereby came to know ‘man’s limitation, his inadequacy, the casualness of his existence’. In the film Monty Python’s The Meaning of Life (1983), John Cleese and Eric Idle conspire to persuade a character, played by Terry Gilliam, to give up her liver for donation. Understandably reluctant, she is eventually won over by a song that sharply details just how comically inconsequential she is in the cosmic frame.

Even the relatively upbeat Sagan wasn’t, in fact, immune to the pessimistic point of view. As well as viewing it as a lesson in the need for collective goodwill, he also argued that the Pale Blue Dot challenges ‘our posturings, our imagined self-importance, and the delusion that we have some privileged position in the Universe’.

When we reflect on the vastness of the universe, our humdrum cosmic location, and the inevitable future demise of humanity, our lives can seem utterly insignificant. As we complacently go about our little Earthly affairs, we barely notice the black backdrop of the night sky. Even when we do, we usually see the starry skies as no more than a pleasant twinkling decoration.

This sense of cosmic insignificance is not uncommon; one of Joseph Conrad’s characters describes

one of those dewy, clear, starry nights, oppressing our spirit, crushing our pride, by the brilliant evidence of the awful loneliness, of the hopeless obscure insignificance of our globe lost in the splendid revelation of a glittering, soulless universe. I hate such skies.

The young Bertrand Russell, a close friend of Conrad, bitterly referred to the Earth as “the petty planet on which our bodies impotently craw.” Russell wrote that:

Brief and powerless is Man’s life; on him and all his race the slow, sure doom falls pitiless and dark. Blind to good and evil, reckless of destruction, omnipotent matter rolls on its relentless way…

This is why Russell thought that, in the absence of God, we must build our lives on “a foundation of unyielding despair.”

When we consider ourselves as a mere dot in a vast universe, when we consider ourselves in light of everything there is, nothing human seems to matter. Even the worst human tragedy may seem to deserve no cosmic concern. After all, we are fighting for attention with an incredibly vast totality. How could this tiny speck of dust deserve even a fraction of attention, from that universal point of view?

This is the image that is evoked when, for example, Simon Blackburn writes that “to a witness with the whole of space and time in its view, nothing on the human scale will have meaning”.

Such quotations could be easily multiplied—we find similar remarks, for example, in John Donne, Voltaire, Schopenhauer, Byron, Tolstoy, Chesterton, Camus, and, in recent philosophy, in Thomas Nagel, Harry Frankfurt, and Ronald Dworkin.

The bigger the picture we survey, the smaller the part of any point within it, and the less attention it can get… When we try to imagine a viewpoint encompassing the entire universe, humanity and its concerns seem to get completely swallowed up in the void.

Over the centuries, many have thought it absurd to think that we are the only ones. For example, Anaxagoras, Epicurus, Lucretius, and, later, Giordano Bruno, Huygens and Kepler were all confident that the universe is teeming with life. Kant was willing to bet everything he had on the existence of intelligent life on other planets. And we now know that there is a vast multitude of Earth-like planets even in our own little galaxy.

#### Humanity will cause the inevitable destruction of the universe – Particle accelerators, Nanotech and other techs make it inevitable- Humanity must acknowledge the equality of alien life – anything less justifies genocide

Packer, Master in communication Wake Forest, 2007 <Joe, Alien Life in Search of Acknowledgment, pg 62-63> recut Valiaveedu

Once we hold alien interests as equal to our own we can begin to revaluate areas previously believed to hold no relevance to life beyond this planet. A diverse group of scholars including Richard Posner, Senior Lecturer in Law at the University of Chicago, Nick Bostrom, philosophy professor at Oxford University, John Leslie philosophy professor at Guelph University and Martin Rees, Britain’s Astronomer Royal, have written on the emerging technologies that threaten life beyond the planet Earth. Particle accelerators labs are colliding matter together, reaching energies that have not been seen since the Big Bang. These experiments threaten a phase transition that would create a bubble of altered space that would expand at the speed of light killing all life in its path. Nanotechnology and other machines may soon reach the ability to self replicate. A mistake in design or programming could unleash an endless quantity of machines converting all matter in the universe into copies of themselves. Despite detailing the potential of these technologies to destroy the entire universe, Posner, Bostrom, Leslie, and Ree’s only mention of alien life in their works is in reference to the threat aliens post to humanity. The rhetorical construction of otherness only in terms of the threats it poses, but never in terms of the threat one poses to it, has been at the center of humanity’s history of genocide, colonization, and environmental destruction. Although humanity certainly has its own interests in reducing the threat of these technologies evaluating them without taking into account the danger they pose to alien life is neither appropriate nor just. It is not appropriate because framing the issue only in terms of human interests will result in priorities designed to minimize the risks and maximize the benefits to humanity, not all life. Even if humanity dealt with the threats effectively without referencing their obligation to aliens, Posner, Bostrom, Leslie, and Ree’s rhetoric would not be “just,” because it arbitrarily declares other life forms unworthy of consideration. A framework of acknowledgement would allow humanity to address the risks of these new technologies, while being cognizant of humanity’s obligations to other life within the universe. Applying the lens of acknowledgment to the issue of existential threats moves the problem from one of self destruction to universal genocide. This may be the most dramatic example of how refusing to extend acknowledgment to potential alien life can mask humanity’s obligations to life beyond this planet.

#### The military is building isomer bombs that destroy the quantum vacuum- even testing destroys it

Bekkum 4 (Gary S., Founder – Spacetime Threat Assessment Report Research, “American Military is Pursuing New Types of Exotic Weapons”, Pravda, 8-30, <http://www.starstreamresearch.com/dark_matters.htm>) recut Valiaveedu

Recently the British science news journal "New Scientist" revealed that the American military is pursuing new types of exotic bombs - including a new class of isomeric gamma ray weapons. Unlike conventional atomic and hydrogen bombs, the new weapons would trigger the release of energy by absorbing radiation, and respond by re-emitting a far more powerful radiation. In this new category of gamma-ray weapons, a nuclear isomer absorbs x-rays and re-emits higher frequency gamma rays. The emitted gamma radiation has been reported to release 60 times the energy of the x-rays that trigger the effect. The discovery of this isomer triggering is fairly recent, and was first reported in a 1999 paper by an international group of scientists. Although this controversial development has remained fairly obscure, it has not been hidden from the public. Beyond the visible part of defense research is an immense underground of secret projects considered so sensitive that their very existence is denied. These so-called "black budget programs" are deliberately kept from the public eye and from most political leaders. CNN recently reported that in the United States the black budget projects for 2004 are being funded at a level of more than 20 billion dollars per year. In the summer of 2000 I contacted Nick Cook, the former aviation editor and aerospace consultant to Jane's Defence Weekly, the international military affairs journal. Cook had been investigating black budget super-secret research into exotic physics for advanced propulsion technologies. I had been monitoring electronic discussions between various American and Russian scientists theorizing about rectifying the quantum vacuum for advanced space drive. Several groups of scientists, partitioned into various research organizations, were exploring what NASA calls "Breakthrough Propulsion Physics" - exotic technologies for advanced space travel to traverse the vast distances between stars. Partly inspired by the pulp science fiction stories of their youth, and partly by recent reports of multiple radar tracking tapes of unidentified objects performing impossible maneuvers in the sky, these scientists were on a quest to uncover the most likely new physics for star travel. The NASA program was run by Marc Millis, financed under the Advanced Space Transportation Program Office (ASTP). Joe Firmage, then the 28-year-old Silicon Valley CEO of the three billion dollar Internet firm US Web, began to fund research in parallel with NASA. Firmage hired a NASA Ames nano-technology scientist, Creon Levit, to run the[International Space Sciences Organization](http://www.starstreamresearch.com/isso.htm), a move which apparently alarmed the management at NASA. The San Francisco based Hearst Examiner reported that NASA's Office of Inspector General assigned Special Agent Keith Tate to investigate whether any proprietary NASA technology might have been leaking into the private sector. Cook was intrigued when I pointed out the apparent connections between various private investors, defense contractors, NASA, INSCOM (American military intelligence), and the CIA. While researching exotic propulsion technologies Cook had heard rumors of a new kind of weapon, a "sub-quantum atomic bomb", being whispered about in what he called the "dark halls" of defense research. Sub-quantum physics is a controversial re-interpretation of quantum theory, based on so-called pilot wave theories, where an information field controls quantum particles. The late Professor David Bohm showed that the predictions of ordinary quantum mechanics could be recast into a pilot wave information theory. Recently Anthony Valentini of the Perimeter Institute has suggested that ordinary quantum theory may be a special case of pilot wave theories, leaving open the possibility of new and exotic non-quantum technologies. Some French, Serbian and Ukrainian physicists have been working on new theories of extended electrons and solitons, so perhaps a sub-quantum bomb is not entirely out of the question. Even if the rumors of a sub-quantum bomb are pure fantasy, there is no question that mainstream physicists seriously contemplate a phase transition in the quantum vacuum as a real possibility. The quantum vacuum defies common sense, because empty space in quantum field theory is actually filled with virtual particles. These virtual particles appear and disappear far too quickly to be detected directly, but their existence has been confirmed by experiments that demonstrate their influence on ordinary matter. "Such research should be forbidden!" In the early 1970's Soviet physicists were concerned that the vacuum of our universe was only one possible state of empty space. The fundamental state of empty space is called the "true vacuum". Our universe was thought to reside in a "false vacuum", protected from the true vacuum by "the wall of our world". A change from one vacuum state to another is known as a phase transition. This is analogous to the transition between frozen and liquid water. Lev Okun, a Russian physicist and historian recalls Andrei Sakharov, the father of the Soviet hydrogen bomb, expressing his concern about research into the phase transitions of the vacuum. If the wall between vacuum states was to be breached, calculations showed that an unstoppable expanding bubble would continue to grow until it destroyed our entire universe! Sakharov declared that "Such research should be forbidden!" According to Okun, Sakharov feared that an experiment might accidentally trigger a vacuum phase transition.

#### Quantum vacuum mining destroys the universe- it’s feasible and inevitable

Folger 8 – Tim Folger, Contributing Editor at Discover Magazine, Writer for National Geographic, MA in Journalism from New York University, BA in Physics from UC Santa Cruz, “Nothingness of Space Could Illuminate the Theory of Everything”, Discover Magazine, 7-18, http://discovermagazine.com/2008/aug/18-nothingness-of-space-theory-of-everything

When the next revolution rocks physics, chances are it will be about nothing—the vacuum, that endless infinite void. In a discipline where the stretching of time and the warping of space are routine working assumptions, the vacuum remains a sort of cosmic koan. And as in the rest of physics, its nature has turned out to be mind-bendingly weird: Empty space is not really empty because nothing contains something, seething with energy and particles that flit into and out of existence. Physicists have known that much for decades, ever since the birth of quantum mechanics. But only in the last 10 years has the vacuum taken center stage as a font of confounding mysteries like the nature of dark energy and matter; only recently has the void turned into a tantalizing beacon for cranks. As one blond celebrity heiress and embodiment of emptiness might say, nothing is hot.

To investigate the mysteries of the void, some physicists are using the biggest scientific instrument ever built—the just-completed Large Hadron Collider, a huge particle accelerator straddling the French-Swiss border. Others are designing tabletop experiments to see if they can plumb the vacuum for ways to power strange new nanotech devices. “The vacuum is one of the places where our knowledge fizzles out and we’re left with all sorts of crazy-sounding ideas,” says John Baez, a mathematical physicist at the University of California at Riverside. Whether in the visionary search for the engine of cosmic expansion or the near-fruitless quest for perpetual free energy, the vacuum is where it’s happening. By mining the vacuum’s riches, a true theory of everything may yet emerge.

Empty space wasn’t always so mystifying. Until the 1920s physicists viewed the vacuum much as the rest of us still do: as a featureless nothingness, a true void. That all changed with the birth of quantum mechanics. According to that theory, the space around a particle is filled with countless “virtual” particles rapidly bursting into and out of existence like an invisible fireworks display.

Those virtual quantum particles are more than a theoretical abstraction. Sixty years ago a Dutch physicist named Hendrik Casimir suggested a simple experiment to show that virtual particles can move objects in the real world. What would happen, he asked, to two metal plates placed very close together in a complete vacuum? In the days before quantum mechanics, physicists would have said that the plates would just sit there. But Casimir realized that the net pressure of all the virtual particles—the stuff of empty space—outside the plates should exert a minuscule force, a nudge from nothing that would push the plates together.

Physicists tried for decades to measure the Casimir force with great precision, but it wasn’t until 1997 that technology caught up with theory. In that year, physicist Steve Lamoreaux, now at Yale, managed to detect the feeble Casimir force on two small surfaces separated by a few thousandths of a millimeter. Its strength was about equal to the force that would be exerted against the palm of one’s hand by the weight of a single red blood cell.

At first most physicists regarded the Casimir force as a quantum oddity, something of no practical value. Now that has changed: Forward thinkers see it as an important energizer for the tiniest of machines, devices on the nano scale, and a few labs are working on ways to use the force to defy the conventional limitations of mechanical design. Federico Capasso, a physicist at Harvard, leads a small team that is trying to create a repulsive Casimir force by tinkering with the shapes of plates or with the coatings used to cover them. His entire set of experiments fits on a desktop, and the objects he works with are so small that most of them cannot be seen without a microscope.

“Once you have a repulsive force between two plates, you should be able to eliminate static friction,” Capasso says. That could lead to a host of useful applications, including tiny frictionless bearings or nanogears that spin without touching. “But the experiments are enormously difficult, so I cannot tell you when and how.”

For all its strangeness, the Casimir force may be the one property of empty space that does not baffle today’s physicists. It is garden-variety quantum mechanics, weird but not unexpected. The same can’t be said about dark energy, a truly astonishing discovery made by astronomers a decade ago while observing distant exploding stars. The explosions revealed a universe expanding at an ever-faster rate, a finding at odds with previous expectations that the expansion of the cosmos should be slowing down, braked by the collective gravitational pull of all the matter out there. Some unknown form of energy—physicists call it dark energy simply for lack of a more descriptive term—appears to be built into the very fabric of space, countering the gravitational pull of matter and pushing everything in the universe apart. Some theorists speculate that dark energy might cause a runaway expansion of the universe, resulting in a so-called Big Rip some 50 billion years from now that would tear the cosmos to pieces, shredding even atoms.

The observations have allowed physicists to estimate the quantity of dark energy by deducing the force needed to produce the accelerating effect. The result is a minuscule amount of energy for every cubic meter of vacuum. Since most of the cosmos consists of empty space, though, that little bit adds up, and the total amount of dark energy completely dominates the dynamics of the universe.

With the discovery of dark energy came difficult questions: What is this energy, and where does it come from? Physicists simply do not know. According to quantum mechanics, the energy of empty space comes from the virtual particles that dwell there. But when physicists use the equations of quantum theory to calculate the amount of that virtual energy, they get a ridiculously huge number—about 120 orders of magnitude too large. That much energy would literally blow the universe apart: Objects a few inches from us would be carried away to astronomical distances; the universe would literally double in size every 10-43 second, and it would keep doubling at that rate until all the vacuum energy was gone. This may be the most colossal gap between observation and theory in the history of science. And it means that physicists are missing something fundamental about the way the universe works.

“We’ve made a prediction on the basis of our best theories, and it is wrong, wildly wrong,” says Sean Carroll, a theoretical physicist at the California Institute of Technology. “That means we don’t just tweak a parameter here and there; we really have to think deeply about what our theories are.”

Even if no one knows where the energy of empty space comes from or why it has the value it does, there is now no doubt that it exists. And if there is energy to be had, there is inevitably somebody out there thinking of how to exploit it. The notion of limitless energy from empty space has inspired legions of wannabe physicists who dream of developing the ultimate perpetual-motion device, a machine that would solve the world’s energy problems forever. A quick Internet search for the words free energy and vacuum turns up pages and pages of schemes for tapping the vacuum’s energy. I ask John Baez if such efforts are as hopeless as previous perpetual-motion machines. Are they equally crazy and doomed to failure?

“Perhaps not as doomed as trying to prove the world is flat,” Baez says. “One thing I can say is that I sure hope it doesn’t work, because if you could extract energy from the vacuum, it would mean that the vacuum is not stable. For normal physicists,” he adds with a laugh, “the definition of the vacuum is that it’s the lowest-energy situation possible—it has less energy than anything else.” In short, Baez says, while we may be able to get energy from the vacuum, success “would mean the universe is far more unstable than we ever dreamed.”

The reasoning goes like this: If the vacuum is not at the lowest energy state possible, then at some point in the future, the vacuum could fall to a lower state, pulsing out energy that would threaten the very structure of the cosmos. If some clever engineer were ever to extract energy from the vacuum, it could set off a chain reaction that would spread at the speed of light and destroy the universe. Free energy, yes, but not what the inventors had in mind.

#### An avalanche of dark energy and matter research is coming quickly

Bertone 18 – Dr. Gianfranco Bertone, Professor in the GRAPPA Institute & Institute of Physics at the University of Amsterdam, PhD in Astrophysics from the University of Oxford, and Dr. Tim M.P. Tait, Professor in the Department of Physics and Astronomy at the University of California, Irvine, PhD in Physics from Michigan State University, BSc in Physics from UC San Diego, Former Research Associate at the Fermi National Accelerator Laboratory and Argonne National Laboratory, “A New Era in the Quest for Dark Matter”, Nature, 10-4, https://arxiv.org/pdf/1810.01668.pdf

The Future In the quest for dark matter, naturalness has been the guiding principle since the dark matter problem was established in the early 1980s. Although the absence of evidence for new physics at the LHC does not rule out completely natural theories, we have argued that a new era in the search for dark matter has begun, the new guiding principle being “no stone left unturned”: from fuzzy dark matter (10−22 eV) to primordial black holes (10 M ), we should look for dark matter wherever we can. It is important to exploit to their fullest extent existing experimental facilities, most notably the LHC, whose data might still contain some surprises. And it is important to complete the search for WIMPs with direct detection experiments, until their sensitivity reaches the so-called neutrino floor94 . At the same time we believe it is essential to diversify the experimental effort, and to test the properties of dark matter with gravitational waves interferometers and upcoming astronomical surveys, as they can provide complementary information about the nature of dark matter. New opportunities in extracting such information from data arise from the booming field of machine learning, which is currently transforming many aspects of science and society. Machine learning methods have been already applied to a variety of dark matter-related problems, ranging from the identification of WIMPs from particle and astroparticle data95, 96 to the detection of gravitational lenses97, and from radiation patterns inside jets of quarks and gluons at the LHC98 to real-time gravitational waves detection99. In view of this shift of the field of dark matter searches towards a more data-driven approach, we believe it is urgent to fully embrace, and whenever possible to further develop, big data tools that allow to organize in a coherent and systematic way the avalanche of data that will become available in particle physics and astronomy in the next decade.

#### That triggers quantum effects that violently collapse the vacuum---destroying the Universe

Arkell 14 – Esther Inglis-Arkell, Contributor to the Genetic Literacy Project, Contributing Editor and Senior Reporter at io9, Freelance Writer for Ars Technica, BS in Physics from Dartmouth College, “We Might Be Destroying The Universe Just By Looking At It”, io9 – Gizmodo, 2-3, https://io9.gizmodo.com/we-might-be-destroying-the-universe-just-by-looking-at-1514652112

It's not often that astronomy goes well with the book of Genesis. But this is a theory that evokes the line, "But of the tree of the knowledge, thou shalt not eat of it: for in the day that thou eatest thereof thou shalt surely die." In this theory, knowledge doesn't just kill you — it kills the entire universe. Indeed, one physicist speculates that continuous observation of the universe might put it into a state that will destroy us all. The Curse of the Big Bang Our universe's eventual demise, in this case, springs from the fact that it wasn't properly created. The big question has always been, how does something come from nothing? If, in the beginning, there was nothing but a vacuum, devoid of energy or matter, where did the universe come from? As it turns out, not all vacuums are alike - some of them are what's called "false vacuums." They are "bubbles" of space that look like vacuums, but aren't actually at their bottom energy state. They can collapse at nearly any time, and go into their ground energy state. The collapse of such a false vacuum releases energy. At first, many physicists thought this is how our universe began. A false vacuum collapsed down to a true one, and the matter and energy of our universe was the result of its collapse. It's also possible that the collapsing false vacuum didn't create a true vacuum. It simply created, along with all that matter and energy, another false vacuum. The universe we live in now might simply be a long-lived bubble of false vacuum that's not really at its lowest energy state. If you have trouble believing that the vacuum of space that astronomers observe isn't at its lowest energy state - ask yourself what dark energy is if not a higher-than-expected energy state for the universe. We might be in a fragile, and unstable, bubble of universe that could collapse at any time. But There's Hope! (Unless We Screw It Up) It's unpleasant to think the universe might collapse out of existence at any moment. Especially since, as the collapse won't exceed the speed of light, we'll probably see it coming for us, knowing we're unable to escape it. Fortunately, we have (theoretical) options. Dark energy drives the expansion of the universe. Although bubbles decay, they decay along different lines according to the energy state they're in when they start collapsing. If they're in a high energy state, the rate of decay is also high. If they're in a low energy state, the rate of decay is slow. Put the fast rate of decay in a race against the expansion of the universe, and we are all winked out of existence. Put the slow rate of decay in that same race, and we all have the chance to live productive lives. The problem is, when we observe a system, we can keep it in a certain state. Studies have shown that repeatedly observing the state of an atom set to decay can keep that atom in its higher-energy state. When we observe the universe, especially the "dark" side of the universe, we might be keeping it in its higher-energy state. If the process of collapse happens when it is in that state, the universe will cease to exist. If we stop looking, and the universe quietly shifts to a state at which its decay is slower, then we're all saved. The more we look at the universe, the more likely it is to end.

#### Particle accelerator accidents cause extinction—black holes won’t evaporate, high energy densities create vacuums, and strange matter is more stable than regular matter

Toby **Ord**, 10-30-200**8**, Future of Humanity Institute at Oxford. "Probing the Improbable: Methodological Challenges for Risks with Low Probabilities and High Stakes," arXiv.org, https://arxiv.org/abs/0810.5515

Particle physics is the study of the elementary constituents of matter and radiation, and the interactions between them. A major experimental method in particle physics involves the use of particle accelerators such as the RHIC and LHC to bring beams of particles to near the speed of light and then collide them together. This focuses a large amount of energy in a very small region and breaks the particles down into their components, which are then detected. As particle accelerators have become larger, the energy densities achieved have become more extreme, prompting some concern about their safety. These safety concerns have focused on three possibilities: the formation of ‘true vacuum’, the transformation of the earth into ‘strange matter’, and the destruction of the earth through the creation of a black hole. 4.1 True vacuum and strange matter formation The type of vacuum that exists in our universe might not be the lowest possible vacuum energy state. In this case, the vacuum could decay to the lowest energy state, either spontaneously, or if triggered by a sufficient disturbance. This would produce a bubble of ‘true vacuum’ expanding outwards at the speed of light, converting the universe into different state apparently inhospitable for any kind of life (Turner and Wilczek 1982). Our ordinary matter is composed of electrons and two types of quarks: up quarks and down quarks. Strange matter also contains a third type of quark: the ‘strange’ quark. It has been hypothesized that strange matter might be more stable than 11 normal matter, and able to convert atomic nuclei into more strange matter (Witten 1984). It has also been hypothesized that particle accelerators could produce small negatively charged clumps of strange matter, known as strangelets. If both these hypotheses were correct and the strangelet also had a high enough chance of interacting with normal matter, it would grow inside the Earth, attracting nuclei at an ever higher rate until the entire planet was converted to strange matter — destroying all life in the process. Unfortunately strange matter is complex and little understood, giving models with widely divergent predictions about its stability, charge and other properties (Jaffe, Busza et al. 2000). One way of bounding the risk from these sources is the cosmic ray argument: the same kind of high-energy particle collisions occur all the time in Earth’s atmosphere, on the surface on the Moon and elsewhere in the universe. The fact that the Moon or observable stars have not been destroyed despite a vast number of past collisions (many at much higher energies than can be achieved in human experiments) suggest that the threat is negligible. This argument was first used against the possibility of vacuum decay (Hut and Rees 1983) but is quite general. An influential analysis of the risk from strange matter was carried out in (Dar, De Rujula et al. 1999) and formed a key part of the safety report for the RHIC. This analysis took into account the issue that any dangerous remnants from cosmic rays striking matter at rest would be moving at high relative velocity (and hence much less likely to interact) while head-on collisions in accelerators could produce remnants moving much at much slower speeds. They used the rate of collisions of cosmic rays in free space to estimate strangelet production. These strangelets would then be slowed by galactic magnetic fields and eventually be absorbed during star formation. When combined with estimates of the supernova rate, this can be used to bound the probability of producing a dangerous strangelet in a particle accelerator. The resulting probability estimate was < 2 ! 10-9 per year of RHIC operation.8 While using empirical bounds and experimentally tested physics reduces the probability of a theory error, the paper needs around 30 steps to reach its conclusion. For example, even if there was just a 10-4 chance of a calculation or modelling error per step this would give a total P(¬A)!"!0.3%. This would easily overshadow the risk estimate. Indeed, even if just one step had a 10-4 chance of error, this would overshadow the estimate. A subtle complication in the cosmic ray argument was noted in (Tegmark and Bostrom 2005). The Earth’s survival so far is not sufficient as evidence for safety, since we do not know if we live in a universe with ‘safe’ natural laws or a universe where planetary implosions or vacuum decay do occur but we have just been exceedingly lucky so far. While this latter possibility might sound very unlikely, all observers in such a universe would find themselves to be in the rare cases where 8 (Kent 2004) points out some mistakes in stating the risk probabilities in different versions of the paper, as well as for the Brookhaven report. Even if these are purely typesetting mistakes, it shows that the probability of erroneous risk estimates is nonzero. 12 their planets and stars had survived, and would thus have much the same evidence as we do. Tegmark and Bostrom had thus found that in ignoring these anthropic effects, the previous model had been overly narrow. They corrected for this anthropic bias and, using analysis from (Jaffe, Busza et al. 2000), concluded that the risk from accelerators was less than 10-12 per year. This is an example of a demonstrated flaw in an important physics risk argument (one that was pivotal in the safety assessment of the RHIC). Moreover, it is significant that the RHIC had been running for five years on the strength of a flawed safety report, before Tegmark and Bostrom noticed and fixed this gap in the argument. Although this flaw was corrected immediately after being found, we should also note that the correction is dependent on both anthropic reasoning and on a complex model of the planetary formation rate (Lineweaver, Fenner et al. 2004). If either of these, or the basic Brookhaven analysis is flawed, the risk estimate is flawed. 4.2 Black hole formation The Large Hadron Collider experiment at CERN was designed to explore the validity and limitations of the Standard Model of particle physics by colliding beams of high energy protons. This will be the most energetic particle collision experiment ever done, which has made it the focus of a recent flurry of concerns. Due to the perceived strength of the previous arguments on vacuum decay and strangelet production, most of the concern about the LHC has focused on black hole production. None of the theory papers we have found appears to have considered the black holes to be a safety hazard, mainly because they all presuppose that any black holes would immediately evaporate due to Hawking radiation. However, it was suggested by (Dimopoulos and Landsberg 2001) that if black holes form, particle accelerators could be used to test the theory of Hawking radiation. Thus critics also began questioning whether we could simply assume that black holes would evaporate harmlessly. A new risk analysis of LHC black-hole production (Giddings and Mangano 2008) provides a good example of how risks can be more effectively bounded through multiple sub-arguments. While never attempting to give a probability of disaster (rather concluding "there is no risk of any significance whatsoever from such black holes") it uses a multiple bounds argument. It first shows that rapid black hole decay is a robust consequence of several different physical theories (A1). Second it discusses the likely incompatibility between non-evaporating black holes and mechanisms for neutralising black holes: in order for cosmic ray–produced stable black holes to be innocuous but accelerator-produced black holes to be dangerous, they have to be able to shed excess charge rapidly (A2). Our current understanding of physics suggests both that black holes decay and that even if they didn’t, they would be unable to discharge themselves. Only if this understanding is flawed will the next section come into play. 13 The third part, which is the bulk of the paper, models how multidimensional and ordinary black holes would interact with matter. This leads to the conclusion that if the size scale of multidimensional gravity is smaller than about 20 nm, then the time required for the black hole to consume the Earth would be larger than the natural lifetime of the planet. For scenarios where rapid Earth accretion is possible, the accretion time inside white dwarves and neutron stars would also be very short, yet production and capture of black holes from impinging cosmic rays would be so high that the lifespan of the stars would be far shorter than the observed lifespan (and would contradict white dwarf cooling rates) (A3). While each of these arguments have weaknesses the force of the total argument (A1,A2,A3) is significantly stronger by the combination of them. Essentially the paper acts as three sequential arguments, each partly filling in the grey area (see figure 1) left by the previous. If the theories surrounding black hole decay fail, the argument about discharge comes into play, and if against all expectation black holes are stable and neutral the third argument shows that astrophysics constrains them to a low accretion rate.

#### Humans will try to explore black holes---risks spaghettification

Bill Andrews 19 {Senior Associate Editor for Discover Magazine, citing NASA research on black holes. 7-30-2019. “If Wormholes Exist, Could We Really Travel Through Them?” https://www.discovermagazine.com/the-sciences/if-wormholes-exist-could-we-really-travel-through-them}//JM

The second issue is that, despite years of research, scientists still aren’t really sure how wormholes would work. Can any technology ever create and manipulate them, or are they simply a part of the universe? Do they stay open forever, or are they only traversable for a limited time? And perhaps most significantly, are they stable enough to allow for human travel?

The answer to all of these: We just don’t know.

But that doesn’t mean scientists aren’t working on it. Despite the lack of actual wormholes to study, researchers can still model and test Einstein’s equations. NASA’s conducted legitimate wormhole research for decades, and a team described just this year how wormhole-based travel might be more feasible than previously thought.

That research concerned one of the most popular conceptions of wormholes, with black holes serving as one of the openings. But black holes are famously dangerous, possibly stretching apart anyone who approaches too close. It turns out, though, that some black holes might allow objects to pass through relatively easily. This would allow a traveler to explore the space beyond, and thus eliminate one of the biggest hurdles to entering such a wormhole. But again, that’s only if they exist in the first place.

So, until we either find an actual wormhole to study, or realize that they can’t help us explore the universe, we’ll have to do it the old fashioned way: By taking rockets the long way around, and taking our minds on fictional adventures.

#### Spaghettification causes infinite suffering

Harry Pettit 19 {Formerly a science and technology reporter at MailOnline, Harry Pettit joined The Sun in December 2018. He holds an undergrad degree in Physiology from the University of Manchester and a Masters degree in Science Communication from Imperial College London. 4-11-2019. “What happens if you fall into a black hole? Infinite suffering, body ‘spaghettification’ and your past.” https://www.thesun.co.uk/tech/8839382/what-happens-fall-in-black-hole/}//JM

'Spaghettification' Black holes are blobs of unbelievably dense matter with a gravitational pull millions of times greater than the force we feel on Earth. If you got too close, these gargantuan forces would pull your body apart. As you got closer, the difference in gravity between your head and your feet would stretch you out like a piece of chewing gum. Scientists affectionately call this process "spaghettification". You eventually become a stream of subatomic particles that swirl into the black hole like water down a plug. According to TV physicist Neil De Grasse Tyson: "As you get closer and closer, the force of gravity grows astronomically. You stay whole until the stretching force exceeds the molecular bonds of your body's flesh. "At that moment, your body would snap into two segments. Everything of you that ever was gets funnelled to the black hole's centre. "Not only have you been ripped in half – you've been extruded through the fabric of space and time like toothpaste through a tube." Live forever The bigger a black hole is, the smaller its gravitational pull. That's led some experts to ponder whether larger black holes would spaghettify you at all, as the forces aren't strong enough to pull you apart. Instead, getting caught in one of these beauties could help you cheat death altogether. Time is said to freeze at the edge of a black hole, due its extreme forces bending the very fabric of space and time. If you reach this spot without being torn apart, you could become immortal – well, almost.

#### “Extinction” is a decision rule -- it solves future generations of nonhuman suffering.

Sittler-Adamczewski 16 Thomas M. Sittler-Adamczewski (University of Oxford). “Consistent Vegetarianism and the Suffering of Wild Animals.” Journal of Practical Ethics. OXFORD UEHIRO PRIZE IN PRACTICAL ETHICS 2015-16. December 2016. JDN. http://www.jpe.ox.ac.uk/papers/consistent-vegetarianism-and-the-suffering-of-wild-animals/

Ethical consequentialist vegetarians believe that farmed animals have lives that are worse than non-existence. In this paper, I sketch out an argument that wild animals have worse lives than farmed animals, and that consistent vegetarians should therefore reduce the number of wild animals as a top priority. I consider objections to the argument, and discuss which courses of action are open to those who accept the argument. Many consequentialists are vegetarian because they care about the harm done to farmed animals. Some consequentialists may be vegetarian because of environmental concerns, and others for non-consequentialist reasons, but these are not my main focus here. More precisely then, ethical consequentialist vegetarians believe that farmed animals have lives so bad they are not worth living, so that it is better for them not to come into existence. Vegetarians reduce the demand for meat, so that farmers will breed fewer animals, preventing the existence of additional animals. If ethical consequentialist vegetarians1 believed that animals have lives that are unpleasant but still better than non-existence, they would focus on reducing harm to these animals without reducing their numbers, for instance by supporting humane slaughter or buying meat from free-range cows. I will argue that if vegetarians were to apply this principle consistently, the suffering of wild animals would dominate their concerns, and would plausibly lead them to support reducing the number of wild animals, for instance through habitat destruction or sterilisation. SUFFERING IN NATURE, AND ITS IMPLICATIONS If animals like free-range cows have lives that are not worth living, almost all wild animals could plausibly be thought to also have lives that are worse than non-existence. Nature is often romanticised as a well-balanced idyll, so this may seem counter-intuitive. But extreme forms of suffering like starvation, dehydration, or being eaten alive by a predator are much more common in wild animals than farm animals. Crocodiles and hyenas disembowel their prey before killing them (Tomasik 2009). In birds, diseases like avian salmonellosis produce excruciating symptoms in the final days of life, such as depression, shivering, loss of appetite, and just before death, blindness, incoordination, staggering, tremor and convulsions (Michigan Department of Natural Resources). While a farmed animal like a free-range cow has to endure some confinement and a premature and potentially painful death (stunning sometimes fails), a wild animal may suffer comparable experiences, such as surviving a cold winter or having to fear predators, while additionally undergoing the aforementioned extreme suffering (Tomasik 2013). Wild animals do experience significant pleasure, for instance when they eat, play, have sex, or engage in other normal physical activity. One reason to suspect that on average this pleasure is outweighed by suffering is that most species use the reproductive strategy of r-selection, which means that the overwhelming majority of their offspring starve or are eaten shortly after birth and only very few reach reproductive age (Horta 2010; Ng 1995). For instance, ‘in her lifetime a lioness might have 20 cubs; a pigeon, 150 chicks; a mouse, 1000 kits’ (Hapgood 1979), the vast majority of which will die before they could have had many pleasurable experiences. Overall, it seems plausible that wild animals have worse lives than, say, free-range cows. If vegetarians think it’s better for the latter not to exist, they must believe the same thing about wild animals. A second important empirical fact is that wild animals far outnumber farmed animals. Using figures from the FAO, Tomasik estimates that the global livestock population is 24 billion (including 17 billion chicken) (Tomasik 2014). I restrict my count of wild animals to those at least as complex as chicken or small fish, which vegetarians clearly believe do have moral weight. Using studies of animal density in different biomes, Tomasik estimates conservatively that there are at least [60 Billion] 6\*10^10 land birds, [600 Billion] 10^11 land mammals, and [60 trillion] 10^13 fish. Animals in each of these categories alone are several times more numerous than livestock. If wild animals’ well-being is indeed below the threshold for a life worth living, and the above numbers are remotely correct, the scale of wild animal suffering is vast. As Richard Dawkins writes, ‘During the minute it takes me to compose this sentence, thousands of animals are being eaten alive; others are running for their lives, whimpering with fear; others are being slowly devoured from within by rasping parasites; thousands of all kinds are dying of starvation, thirst and disease.’ (Dawkins 1996) If they accept the premises so far, consistent vegetarians should focus on preventing the existence of as many wild animals as possible, since even a small reduction in the global number of wild animals would outweigh the impact of ending all livestock production. For example, they could reduce animal populations by sterilising them, or by destroying highly dense animal habitats such as rainforests. It may even be the case that vegetarians should react to this argument by eating more meat, since feeding livestock requires more surface area for agriculture, and fields contain far fewer wild animals per square kilometre than other biomes such as forests (Matheny and Chan 2005, 585). Of course, to the extent that it is more difficult to reduce wild animal populations than farm animal populations, vegetarians should focus more resources on the latter. But it seems implausible that it would be over a hundred times more difficult to achieve the same proportional reduction, which is what would be needed to reverse my conclusion that wild animal suffering dominates. There could be some simple ways, for instance, for vegetarians to reduce habitat sizes: supporting the construction of large parking lots, or donating to a pro-deforestation lobby. In the final paragraph, I touch upon the issue of how most effectively to reduce wild animal suffering.

#### Non-human suffering is the largest impact -- in quantity and severity – r-selection guarantees it

Moen 16 Ole Martin Moen (University of Oslo, Centre for the Study of Mind in Nature). “The ethics of wild animal suffering.” Etikk i praksis. Nord J Appl Ethics (2016), 91–104. JDN. <http://www.olemartinmoen.com/wp-content/uploads/TheEthicsofWildAnimalSuffering.pdf>

If you have an open wound, a fractured bone, or terminal cancer, you suffer. But how do wounds, bone fractures, and cancers feel for animals such as sparrows, rabbits, and bears? Theoretically, it is possible that it does not feel like anything at all, because animals might not be conscious. Perhaps animals are just complicated machines, more like clocks and cars than like humans. Though it is difficult to establish conclusively that animals really are conscious, however, it is also increasingly difficult to see why rejecting consciousness in animals is any more reasonable than rejecting consciousness in other human beings. Although solipsism at the species level might make sense within religious contexts where humans are taken to have originated separately from all other animals, it coheres well with neither neuroscience nor evolution. Comparing ourselves to sparrows, rabbits, and bears, we may observe that we have the same kind of neurons, the same main brain parts, and the same pain pathways (C and A delta fibers) that they have. Sparrows, rabbits, and bears, moreover, react to noxious stimuli the same way we do, and they stop doing so when anesthetized (see Griffin & Speck 2004; Dawkins 2015). Since we and other animals are genetically, neurologically, and functionally very close, we would need weighty evidence to conclude that, despite these similarities, humans work in fundamentally different ways from other animals: humans consciously, animals non-consciously.1 Increased understanding of animal consciousness helped spur the animal ethics movement. Keeping animals in small cages, castrating them without anesthetics, and branding them with glowing irons—practices that, if performed on humans, would land the perpetrator in prison for decades—are common farming practices around the world. Millions of farm animals live and die under such conditions. Opposing human disregard for animal welfare, Peter Singer (1990) famously argues that just as we have gradually expanded our circle of moral concern to encompass ethnic groups other than our own, and finally humanity as a whole, we should further expand it to include other sentient species. According to Singer, it is suffering as such that is bad, and it is bad whoever experiences it. Though the animal ethics movement is commendable, its circle of moral concern has hitherto expanded almost exclusively to captive animals. With very few exceptions—most notably, David Pearce and Jeff McMahan, whom I shall discuss in detail below—animal ethicists have failed to adequately take into account the suffering of animals living in the wild. Wild animals, however, vastly outnumber captive animals, and arguably, billions of wild animals live lives that are even more painful and distressing than those of their captive counterparts. Though it might well be difficult to alleviate suffering in the wild, and comparatively easier to alleviate suffering caused by humans, disregarding wild animal suffering from the outset involves a form of anthropocentrism that, sadly, enjoys wide acceptance even among those who purport to oppose the doctrine. We might dub this the second anthropocentrism. While traditional anthropocentrics are concerned only with human suffering, anthropocentrics of the second kind are concerned only with human-caused suffering. I will suggest, however, that if we take suffering as such to be bad (roughly along the lines that Singer does), it is unclear why the species membership of those who cause the suffering is morally relevant while the species membership of those who suffer is not. My aim in this paper is not to sway those who are indifferent to animal welfare. Rather, my aim is to make those who are concerned with animal welfare more concerned with the welfare of wild animals. Moreover, I shall exclusively discuss welfarist concerns, so if there are other grounds to care for animals, they lie beyond the scope of this paper. My discussion is limited to mammals and birds, the reason for which is that these are the animals whose ability to suffer is least disputed. If fish, amphibians, reptiles, and/or invertebrates can also suffer, my conclusion is amplified. The empirical side Let me start by defending three empirical claims: (1) that there are vastly more wild than captive animals; (2) that wild animals have the same capacity to suffer as captive animals; and (3) that many, perhaps most, wild animals suffer at least as much as their captive counterparts. These are all empirical claims that say nothing about the value significance of wild animal suffering. As such, we should accept or reject these claims irrespective of our ethical views. How many captive animals are there? According to the Food and Agriculture Organization of the United Nations (2014), the total number of livestock in the world is—at any given time—roughly 25 billion, the majority of which are chicken, followed by ducks, cattle, and sheep. Although this figure leaves out pets and laboratory animals, let us take for granted, for the sake of convenience, that the number of livestock is roughly representative of the number of captive animals. How many wild animals are there? According to Brian Tomasik’s (2014a) estimations, which are generated from research data on the typical prevalence of various animals in various environments coupled with data on the global prevalence of these environments, there are—at any given time—between 60 and 200 billion birds and between 100 and 1,000 billion mammals. If we assume the middle estimate for both birds and mammals, there are, at any given time, 700 billion wild birds and wild mammals combined. This is roughly 25 times the number of birds and mammals in captivity. (If we were to include in our estimates fish, amphibians, reptiles, and invertebrates, which are rare in human captivity but very prevalent in the wild, we would end up with thousands of times more wild than captive animals.) A further empirical premise is that wild animals have the same ability to suffer as captive animals. By this I simply mean that if you tear the skin of both a wild and a captive animal, there is no compelling reason to believe that this would hurt more for the captive animal than for the wild animal. In fact, if we were to conclude that there is a difference between the two, we should probably conclude that while captive animals are more docile (due to drugs and lack of stimulation), wild animals remain sharp and focused. Let us assume, however, that the ability to suffer is the same, or roughly the same, in captive and wild animals. How much do wild animals actually suffer? Very likely, some wild animals suffer very little. Some live long and peaceful lives, have few natural enemies, and have ample supplies of food. When they die, moreover, many animals die quick and painless deaths. The fact that some lives in the wild are pleasant, however, does not contradict the fact for billions of wild animals, life is filled with suffering. One prominent source of suffering is predation. Every day, millions of animals are eaten alive, and though some of them are killed quickly, larger animals will often stay alive for minutes or hours before they die of blood loss, suffocation, drowning, or internal bleeding from poisoning (Tomasik 2014b). While some become paralyzed, and are likely to feel nothing, others feel excruciating pain. Predation is a very visible cause of suffering. In response to this, Tyler Cowen (2003) and Jeff McMahan (2010) have argued that if we can easily prevent a predator attack, we have at least a pro tanto moral reason to do so. In their view, the way predators kill their prey is often so gruesome that if a human were to treat animals similarly, we would have strong reasons to intervene – and for the animal that is eaten alive, the species membership of the attacking predator is likely to matter very little. Though this is an important observation, I think Cowen and McMahan fail to appreciate that suffering caused by predation is likely to account for only a small fraction of the total suffering in nature. Though death from predation might be the most violent and visible cause of suffering, deaths from disease and parasites tend to be more drawn out in time. The same is true of deaths from droughts, floods, and freezing. Life in the wild is also a constant quest for nutrition; at any given time, thousands of animals are in the process of starving to death. Though there is no agent responsible for this suffering, and though it might be hard for us to detect it, the suffering is nonetheless real and prevalent. When a parent animal starves or freezes to death, gets eaten, or dies from disease, its young offspring will often face an equally painful death. This borders on an important point, namely that most suffering in nature is likely to be endured by very young individuals. The reason is not primarily that many parent animals die (although that is also the case), but that most wild animals give birth to many more offspring than are likely to reach adulthood. While humans normally give birth to just one child per year, and provide extensive care to each child (this is called the Kselection strategy), many animals follow a different reproductive strategy: they give birth to dozens or hundreds of offspring every year, and care very little for each individual (the r-selection strategy). These strategies both work to spread the parents’ genes in the population, but the r-selection strategy—which is most common in smaller animals—leads to enormous amounts of suffering because of the very large number of young individuals that are left to starve to death or get eaten, either by their stronger siblings or by other predators (for an elaboration, see Horta 2010). If the average female in a given animal population gives birth to 50 offspring every year—and the population size remains stable year after year—then the majority of individuals in that population will be individuals dying before reaching adulthood. If we grant that animals become conscious shortly after birth, as we assume to be the case with humans, their deaths will often involve pain, and since their lives are very short, they will have very few good things in life to weigh up for all that is bad. For these reasons, Richard Dawkins is almost certainly correct when he writes: The total amount of suffering per year in the natural world is beyond all decent contemplation. During the minute that it takes me to compose this sentence, thousands of animals are being eaten alive, others are running for their lives, whimpering with fear, others are being slowly devoured from within by rasping parasites, thousands of all kinds are dying of starvation, thirst and disease (Dawkins 1995: 131-32). Wild animal suffering is mostly invisible to us. Humans never see the vast majority of wild animals, and those that are seen by us are predominantly healthy and moving. We do not see the young individuals starving to death or the adult individuals being devoured by parasites, and we must keep in mind that even if we saw them, their suffering would often not be apparent to us. While we have evolved to pick up pain cues from other human beings, we are much worse at picking up pain cues from non-human animals, especially those that are genetically remote from us. Moreover, many animals hide signs of weakness and disease to avoid attracting predators (including humans) looking for easy prey. When Thomas Hobbes wrote that life, in the state of nature, is “solitary, poor, nasty, brutish, and short,” he meant human life (Hobbes 1651/1996: XIII.9). It seems, however, that the description is also fitting for the lives of many non-human animals. Because of the brutality of wildlife, one could even make the provocative case that a typical life in the wild is even more painful and distressing than a typical life in human captivity. Although factory farming is often grotesque, animals in captivity are seldom killed in ways that draw out their deaths over several minutes or hours; they are not exposed to predators until they are slaughtered; they typically have access to sufficient amounts of food and water; and the temperature tends to be comfortable. Concerning larger animals, such as cattle, individuals with serious Moen, O.M. Etikk i praksis. Nord J Appl Ethics (2016), 91–104 95 diseases will often be euthanized. For this reason, it is not clear that the average life in the wild is filled with any less suffering than the average life in captivity. However, even if wild animals do, on average, suffer less than captive animals, the sheer number of wild animals is still so overwhelming that the majority of suffering on Earth almost certainly takes place among animals living in wild nature.

#### Species-neutral valuations are the most ethical -- prioritizing humans is arbitrary, clearly self-interested, and the same logic as racism and sexism.

Harris 99 – Dr. John Harris, Ph.D., Sir David Alliance Professor of Bioethics and Research Director at the Centre for Social Ethics and Policy and Director of the Institute of Medicine Law and Bioethics at the University of Manchester, “The Concept of the Person and the Value of Life”, Kennedy Institute of Ethics Journal, Volume 9, Number 4, December, Project Muse

Some people have attempted to overcome, or rather side-step, this problem by simply stipulating that it is human beings that matter (see Warnock 1983). Although this move certainly avoids the problem, it does so at some cost. It is difficult to imagine how one would defend a moral theory that was founded on the stipulation of an arbitrary (and totally unjustified) preference for one kind of creature over another, particularly when this preference is asserted by self-interested individuals on behalf of their own kind. We are all too familiar with the sordid and disreputable history of similar claims in which the moral priority and superiority of "our own kind" has been asserted on behalf of Greeks at the expense of barbarians, whites over blacks, Nazis over Jews, and men over women. Simply stipulating arbitrarily the superiority of our own kind, whether defined by species membership, race, gender, nationality, religion, or any other nonmoral characteristic is, and has always been, disreputable. Membership of a natural kind, or of an ethnic, religious or other grouping, is not of itself a moral property. Potentiality The problem is to distinguish in some morally significant respect, human embryos from the embryos and indeed the adult members of any other species. Species membership is not enough because human embryos seem not to differ, except in species membership and in one other feature that I will discuss in a moment, from the embryos and indeed adult members of other species. Unlike adult members of many other species they are not conscious, although they may become so at some stage during their development. The one thing human embryos have that members of other species do not is their potential not simply to be born and to be human, but to become the sort of complex, intelligent, self-conscious, multifaceted creatures typical of the human species. There are, however, two fatal difficulties for the potentiality argument. Two Problems with Potentiality The logical difficulty. The logical difficulty is straightforward but telling. We are asked to accept that human embryos or fetuses are persons, morally important beings whose interests trump those of other sorts of beings, in virtue of their potential to become another sort of being. But it does not follow logically, even if we accept that we are required to treat ‘x’ in certain ways, and even if ‘a’ will inevitably become ‘x,’ that we must treat ‘a’ as if it had become ‘x,’ at a time or at a stage prior to its having become ‘x’. This is a rather cumbersome and inelegant way of making the point that acorns are not oak trees, nor eggs omelettes. Anyone reading this essay shares with its author one very important, inescapable potential. [End Page 297] We are both potentially dead, however, I hope neither of us is required to concede that it is therefore appropriate for anyone to treat us now, as if we already were dead. Further, it should be noted that the reader and I have this potential with far greater certainty than does the human embryo have the potential to become a glorious, sophisticated adult member of the human species. The scope of potential for personhood. The second difficulty with the potentiality argument involves the scope of the potential for personhood. If the human zygote has the potential to become an adult human being and is supposedly morally important in virtue of that potential, then what of the potential to become a zygote? Something has the potential to become a zygote, and whatever has the potential to become the zygote has whatever potential the zygote has. It follows that the unfertilized egg and the sperm, taken together, but as yet un-united, also have the potential to become fully functioning adult humans. It is sometimes objected that the individual sperm that will fertilize the egg is not identifiable in advance of conception. I am not sure why this is an objection, and it is true that in normal reproduction the identity of the sperm that will successfully fertilize the egg is unpredictable. But the identity of the sperm is not necessarily opaque. The technique known as ICSI (Intra Cytoplasmic Sperm Injection) does identify the individual sperm prior to fertilization. In addition, it is theoretically possible to stimulate eggs, including human eggs, to divide and develop without fertilization (parthenogenesis). As yet it has not been possible to continue the development process artificially beyond early stages of embryogenesis, but if it becomes possible then unfertilized eggs themselves, without need of sperm or cloning (see below), also would have the potential of the zygote. Finally, cloning by nuclear transfer, which involves deleting the nucleus of an unfertilized egg, inserting the nucleus taken from any adult cell, and electrically stimulating the resulting newly created egg to develop, can, in theory, produce a new human. This means that any cell from a normal human body has the potential to become a new “twin” of that individual. All that is needed is an appropriate environment and appropriate stimulation. But this of course is true of normal reproduction. The zygote only has the potential to become an adult member of the species if placed in the appropriate environment and treated thereafter in appropriate and complex ways. The techniques of parthenogenesis and cloning by nuclear substitution mean that conception is no longer the necessary precursor of human beings. [End Page 298] Thus if the argument from potential is understood to afford protection and moral status to whatever has the potential to grow into a normal adult human being, then potentially every human cell deserves protection. I shall not be concerned to refute such an ethic here, but will simply note that it is a very exhausting ethic. What is important about potential? The account of potentiality given here and elsewhere has been criticized for its simplicity. John Finnis (1995, p. 50), for example, has argued that: “[a]n organic capacity for developing eye-sight is not ‘the bare fact that something will become’ sighted; it is an existing reality, a thoroughly unitary ensemble of dynamically inter-related primordia of, bases and structures for, development.” He concludes that “there is no sense whatever in which the unfertilized ovum and that sperm constitute one organism, a dynamic unity, identity, whole.” On the other hand, the account of potential I have outlined treats potentiality as a rather more straightforward idea. A has the potential for Z if, when a certain number of things do and do not happen to A (or to A plus N), then A or A plus N will become Z. For even a “unitary ensemble of dynamically inter-related primordia of, bases and structures for development” must have a certain number of things happen to it and a certain number of things that do not happen to it if its potential is to be actualized. If this monstrous beast of Finnis’s is a zygote, it must implant, be nourished, and have a genetic constitution compatible with survival to term and beyond. Why, the list of things that must happen in normal reproduction, should not also include fertilization is unclear to me. Moreover Finnis’s insistence on a “unitary ensemble,” on “one organism,” seems vulnerable to cloning by nuclear substitution. For any of Finnis’s skin cells, if treated appropriately, might be cloned. As Julian Savulescu (1999, p. 91) has recently reminded us, “What happens when a skin cell turns into a totipotent stem cell is that a few of its genetic switches are turned on and others are turned off. To say it doesn’t have the potential to be a human being until its nucleus is placed in the egg cytoplasm is like saying my car does not have the potential to get me from Melbourne to Sydney unless the key is turned in the ignition.” Most importantly, however, Finnis’s objections, and those of a similar kind, miss the main point of the argument from potential. The potentiality of something, or some things, has moral importance on the assumption [End Page 299] that actualizing a particular potential is what matters. We would not worry about what precisely it is that has the potential to be a person, or an adult human being, if persons or adult humans did not matter. We are only interested in the potentiality argument because we are interested in the potential to become a particular, and particularly valuable, sort of thing. If, as I suggested above, the zygote (Finnis’s unitary ensemble) is important because it has the potential for personhood, and that is what makes it a matter of importance to protect and actualize its potential; then whatever has the potential to become a zygote must also be morally significant for the same reason. Those with their “eyes on the prize,” value potentiality for personhood, not because the potential is contained within “one organism,” but because it is the potential to become something the actualisation of which has moral importance. Gradualism Another approach to the question of when human life becomes morally important is the gradualist approach to moral status. It is suggested that since we know that a morally important person will almost certainly, eventually emerge, it is appropriate to accord a gradually increasing moral status to the embryo or fetus. This view is attractive and has about it the classic air of political compromise. However, if we know why, in virtue of what, it is that normal human adults possess personhood, then we will in principle be able to gauge more precisely when these features, whatever they are, might with some plausibility be said to be present in the emerging individual. Furthermore, if, as I suggest later, personhood turns out to be a threshold concept, then proximity to the threshold is unimportant compared with the importance of crossing it, and there is no justification for taking a gradualist approach to personhood or moral status. Brain Birth Finally, Michael Lockwood (1988) has suggested an elegant solution to the problem of when morally important life begins. Noting that “brain death” is an almost universally accepted criterion of death, and hence of the termination of the moral status of the individual, he has proposed that “brain birth” might be a sensible point at which to date the genesis of moral status. The problem is that “brain death,” although almost universally accepted as a criterion of death, seems less acceptable as a criterion of loss of moral status. Discussion of why this is so is postponed, [End Page 300] however, until the consideration of a case of persistent vegetative state in the penultimate section of this paper. The Meaning of Life Let us step aside for a moment from the previous concerns and consider the question “what is the meaning of life?” rather than “what is it that gives moral status or ultimate value to life?” Philosophers, of this century at least, have generally shied away from this sort of question, except, that is, for the distinguished and much underrated Douglas Adams. In his seminal trilogy, “The Hitchhiker’s Guide to the Galaxy,” Adams (1972, Ch. 27) conducted a famous thought experiment. He imagined a race of beings that wished to solve the ultimate question, the question of the meaning of “life, the universe and everything,” and to this end constructed a hyper-intelligent computer to solve the problem. After seven and a half million years, the computer came back with the answer “42.” This answer is illuminating in an interesting way. Clearly it seems unsatisfactory as an answer to the question: “What is the meaning of life, the universe and everything?” However, the problem with criticizing the answer is that we have not the most rudimentary of idea of what a more plausible (less outrageous) answer might look like. We seem to lack a perspective from which to criticize any answer offered. Nonhuman Persons If we turn now from this question of the meaning of life to questions of its value and ultimate status, things are rather different. Here we do seem to have a perspective, not only from which to criticize possible answers to the question, but from which to construct our own answer. Consider the question of whether there are persons on other planets. Although we do not know the answer to this question, we do know what would convince us that we had found an affirmative answer. We have, in the back of our minds at least, an idea of what we are looking for when we look for people, or evidence of people, on other planets. Let us be clear, however, about what we are *not* looking for. First, we are not looking exclusively or primarily, for human beings. We do not expect persons on other planets, if there are any, necessarily to be members of our own species. Second, we are not necessarily even looking for organic life forms, it may be that we will become convinced that self-constructing machines of sufficient intelligence would count as persons. Third, we are not looking for nonpersonal life forms, although we may also find these and be excited if we do. Neither are we looking for the sort of machinery that would not count as a person (perhaps machinery left behind by persons long since deceased). These observations show us that we do not, in fact, regard species membership as hugely significant in trying to understand what a person might be. Nor even do we require that persons be organic life forms. What then are we looking for? What should convince us that we had discovered persons on other planets? Suppose, that instead of us discovering persons on other planets, they discovered us. Demonstrating their vastly superior technology by arriving on Earth having traversed unimaginable interstellar distances, the extraterrestrials are hungry and tired after their long journey. What could we point to about ourselves that ought to convince the extra-terrestrials that they had discovered persons, morally significant beings of special importance, on another planet? What could we say of ourselves that should convince them of the appropriateness of "having us for dinner" in one sense rather than another? What should convince them to treat us as dinner guests rather than the dinner itself? What makes for a moral distinction between ourselves and, say, lettuces or turnips? Toward the end of the seventeenth century in his "Essay Concerning Human Understanding" the philosopher John Locke attempted to answer this question in a way that has scarcely been surpassed. He wrote: We must consider what person stands for; which I think is a thinking intelligent being, that has reason and reflection, and can consider itself the same thinking thing, in different times and places; which it does only by that consciousness which is inseparable from thinking and seems to me essential to it; it being impossible for anyone to perceive without perceiving that he does perceive. (Locke 1690, Ch. 27, Book II, p. 188) It seems to me that it is beings possessing these capacities, or something closely akin to them, that we are looking for when we ask the question "Are there persons on other planets?" And we must hope that if it is others of vastly superior technology that are asking the question, that they recognize in us fellow creatures of moral standing, fellow persons. It is a species-neutral description but it identifies those features, the potential for which is so important to the failed potentiality argument and the presence of which in space creatures should surely convince us that we had at last encountered persons elsewhere in the universe.

1. https://www.google.com/search?q=member+definition&rlz=1C1CHBF\_enUS877US877&oq=member+definition&aqs=chrome.0.69i59j69i60l3.1863j0j7&sourceid=chrome&ie=UTF-8 [↑](#footnote-ref-1)
2. https://www.google.com/search?q=of+definition&rlz=1C1CHBF\_enUS877US877&oq=of+definition&aqs=chrome.0.69i59j69i61l3.1473j0j7&sourceid=chrome&ie=UTF-8 [↑](#footnote-ref-2)
3. https://www.google.com/search?q=the+definition&rlz=1C1CHBF\_enUS877US877&oq=the+definition&aqs=chrome..69i57j69i64j69i61j69i60l2.1976j0j7&sourceid=chrome&ie=UTF-8 [↑](#footnote-ref-3)
4. https://www.google.com/search?q=to+definition&rlz=1C1CHBF\_enUS877US877&oq=to+definition&aqs=chrome..69i57j69i60l3.1415j0j7&sourceid=chrome&ie=UTF-8 [↑](#footnote-ref-4)
5. https://www.google.com/search?q=reduce+definition&rlz=1C1CHBF\_enUS877US877&sxsrf=AOaemvI3lZsbmnXg5WHeL4m6rYGn8Vf6Aw%3A1630610232638&ei=OCMxYbCaJpO0tQb6wpGoCA&oq=reduce+definition&gs\_lcp=Cgdnd3Mtd2l6EAMyCQgjECcQRhD5ATIECAAQQzIECAAQQzIFCAAQgAQyBQgAEIAEMgUIABCABDIFCAAQgAQyBQgAEIAEMgUIABCABDIFCAAQgAQ6BwgAEEcQsAM6BwgAELADEEM6BwgjEOoCECc6BAgjECc6BQgAEJECOhEILhCABBCxAxCDARDHARDRAzoKCAAQsQMQgwEQQzoHCAAQsQMQQzoICAAQgAQQsQM6CAgAELEDEIMBOgoIABCABBCHAhAUSgQIQRgAUMLMBFjS3QRgnt8EaAJwAngDgAG2A4gB-heSAQozLjExLjEuMi4xmAEAoAEBsAEKyAEKwAEB&sclient=gws-wiz&ved=0ahUKEwiwlru9gOHyAhUTWs0KHXphBIUQ4dUDCA8&uact=5 [↑](#footnote-ref-5)
6. https://www.merriam-webster.com/dictionary/for#:~:text=English%20Language%20Learners%20Definition%20of,meant%20to%20be%20used%20with [↑](#footnote-ref-6)
7. https://www.google.com/search?q=medicine+definition&rlz=1C1CHBF\_enUS877US877&oq=medicine+definition&aqs=chrome.0.69i59.2986j0j7&sourceid=chrome&ie=UTF-8 [↑](#footnote-ref-7)
8. <http://dictionary.reference.com/browse/negate>, <http://www.merriam-webster.com/dictionary/negate>, <http://www.thefreedictionary.com/negate>, <http://www.vocabulary.com/dictionary/negate>, <http://www.oxforddictionaries.com/definition/english/negate> [↑](#footnote-ref-8)
9. *Dictionary.com – maintain as true, Merriam Webster – to say that something is true, Vocabulary.com – to affirm something is to confirm that it is true, Oxford dictionaries – accept the validity of, Thefreedictionary – assert to be true* [↑](#footnote-ref-9)