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The Desirability of Immortality
An Analysis of the Arguments

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Philosophy Master's Thesis,
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Faculdade de Letras da Universidade do Porto

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To the first generation of immortals

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Declaration of Honour

I hereby declare that: I am the sole author of the present work, this work was not previously used in academia or in any other place since it was created specifically to be this master's thesis, references and citations follow the usual rules of attributing the work/idea to the correct source (see *Section 5 – Reference List*), and I acknowledge that plagiarism is illegal.

Acknowledgements

I want to thank every human that came before me and made this work possible. Standing on the shoulder of giants was necessary to see this far into the future and consider immortality a real possibility.

I also want to thank Aubrey de Grey and João Pedro de Magalhães for their work. Their struggle against aging had a large impact on my life and worldview, and they were inspirations for this project.

On a more personal level I want to thank my parents for providing me with support, shelter, and food during my student years (including the current one), something well beyond their obligations, and my brother for his company. I also want to thank both my supervisors for the feedback they provided, as well as to my friend Devesa. Lastly, I want to mention my group of close friends, known as JJ, who supported me throughout this project, especially Miguel for his motivation, coaching, and for being a great friend.

Abstract

The objective of this work is evaluating the desirability of immortality. By immortality I mean physical immortality: living as long as one wishes in our current world without senescence. This means the possibility of living to 10 000 years or more with at least the same physical and intellectual capacity as if one is always 25 years old. By desirability I mean a stance regarding actualizing immortality. If immortality is desirable, then that means we ought to actualize it. I evaluate a total of ten arguments against immortality, often employed in the literature, and conclude they all fail. I also evaluate three arguments pro immortality and conclude they work, albeit with some caveats. Overall, I conclude that immortality is desirable. This view is contrary to the view held by the majority of the population. Then I identify two problems with the conclusion that <immortality is desirable>, one regarding opportunity costs and another regarding the burden of proof. To solve those problems I present an original argument in support of immortality that I call the ultimate argument for immortality (UAI). The UAI starts from a skeptical meta-ethical position and concludes that actualizing immortality is one of the few moral behaviours for the time being. This strengthens my previously conclusion: immortality is not just <desirable>, it is one of the few desirable goals for the time being. The consequences of the UAI are in stark contrast with commonly held ethical positions, both at a normative level and at a meta-ethical level. Because the UAI has a character of urgency I encourage everyone to consider it seriously and follow what results from it: actualizing immortality over almost everything else.

Keywords: Immortality, Ageing, Aging, Applied Ethics, Transhumanism.

List of Tables, Diagrams, and Abbreviations

Tables:

There is only one table in the whole document in section *4.1 – Dealing with PCBA: Is Immortality Desirable?*. It shows an overview of each argument and the result of my analysis.

Graphs:

There is only one graph in the whole document in section *3.1.1.3 – Counter 2: The Overpopulation Taboo and Rhetoric Manoeuvres*. It shows the evolution of the world population from 10 000 BCE to the present and includes UN projections until 2100. The graph is on a log scale.

Abbreviations:

⏚ – See *2.2 – Notes of Interest.*
A(S)I – Artificial (Super) Intelligence;
B – Billion(s) (American);
BCE – Before Common Era;
(BE)CCS – (Bio-Energy combined with) Carbon Capture and Storage;
C – Consumption;
CO(s) – Opportunity Cost(s);
D – Demands on Nature;
ECHR – European Convention on Human Rights;
EU – European Union;
GDP – Gross Domestic Product;
HDI – Human Development Index;
IPBES – Intergovernmental science-policy Platform on Biodiversity and Ecosystem Services;
IPCC – Intergovernmental Panel on Climate Change;
K – Thousand(s);
M – Million(s);
NTI – Negative Income Tax;
OAA – Overpopulation Argument Advocate;
P – Population;
PCBA – Premise of Cost-Benefit Analysis;
RP1 – Raspberry Pi 1;
RPz – Raspberry Pi Zero;
SENS – Strategies for Engineered Negligible Senescence;
SMS – Short Message Service;
T – Technology;
TELCO(s) – Telecommunications Companies;
UAI – Ultimate Argument for Immortality;
UBI – Universal Basic Income;
UI – Under Immortality;
UN – United Nations;
US – United States of America;
W, X, Y, Z – stand for general variables used in several examples throughout the text.

Other:

The naming of objects, like **P36A4A1**, is detailed in *2.2 – Notes of Interest.* All diagrams present in *Section 6 – Appendix*, share the name of the objects they refer to. Their interpretation is also detailed in *2.2 – Notes of Interest.*

Section 1 – Introduction and Preliminary Considerations

1.1 – What is This About?

The aim of this project is to collect, within the literature, arguments for and against the *desirability* of immortality and assess each one for its merits and weaknesses. Not every argument related to this theme will be evaluated. I do not think such a task is possible in the timeframe allotted to this project, and the benefits would be subject to diminish marginal returns with each additional argument[1]. Nevertheless, I do intend for this project to be representative of what is discussed in the literature. I will consider the most common arguments, for a total of 13 arguments, plus one that I believe to be original.

I decided to write about this subject because I believe it to be fundamental to all of ethics and as such has a bearing on what ought to be. I will argue for this claim in *4.3 – Two Birds, One Stone*.

I divided this work in six sections. In the remaining of this section I will present the necessary clarifications and context for what will follow. Because I divided the arguments into two categories, the next two sections will present arguments regarding the desirability of immortality: the second section will discuss intrinsic arguments (about immortality itself); and the third section will discuss consequential arguments (about the consequences of immortality). Next, in the fourth section I will present a conclusion of the analysis, advance it further by bringing in pragmatic obstacles, and present what I believe to be a novel argument on the subject of this project: the desirability of immortality. The fifth section contains a reference list, and the sixth and last section contains visual aids to improve the reading experience.

1.2 – What is Immortality?

I am sure that if one goes outside and asks passers-by what the meaning of immortality is, one would inevitably obtain a plethora of different answers. The same happens within the literature. Zaleski (2004) went as far as identifying seven definitions of immortality which do not exhaust those I will offer here. Immortality as a word seems like a buffet of concepts.

Right of the bat we can put aside two types of immortality that I will not be discussing because they are immaterialist concepts. First, there is the metaphysical immortality usually present in spiritual and religious traditions such as reincarnation, or life in paradise (or hell).

[1] Less common arguments are harder to find.

Secondly there is the biographical concept where one leaves some sort of heritage in the material world to be remembered by others, be it through work, reproduction or other means.

The sort of immortality this work is about is immortality in the material world, in the here and now. Unlike the two concepts above, the type of immortality I have in mind happens before the event society calls death, and thus I believe fits the word better. For the sake of argument let us assume an information-theoretical concept of death – death is when one ceases to be, and it becomes impossible to reconstitute/repair/rebuild the relevant physical structures that constitute the individual. Immortality must mean something related to the avoidance of that concept death. With that said I have identified four concepts that make use of the word immortality and fit the description I have just put forward. For clarity's sake there is a need to narrow down the relevant one. I will present them in an order such that the next concept encompasses the previous one and adds something extra:

- Level I – The negation of an increase in mortality rates as a function of age. This definition is used by Rose (2004a, 2004b). Rose goes on to defend, using his definition, that organisms are either born immortal (if their mortality rates do not increase with time), or they age (increase in mortality rates as a function of time) and then become immortal, thus immortality always obtains. According to this definition we become immortal when we become old because our rates of mortality do not increase past a certain point. Because we become immortal when we are more likely to die, this seems a perversion of the word "immortal". To his credit, Rose uses the qualifier <biological>, which can become a shield by arguing that this is a technical/scientific concept and therefore allowed to be counterintuitive to the layman. Nonetheless I believe the choice of words to describe Rose's concept could have been such that no confusion would remain, leaving the word immortality for more serious matters. In essence, achieving this concept of immortality requires no change to the current state of affairs since elders are already immortal and, *ceteris paribus*, we will be one of them. Death will occur just the same. It will not do for the kind of immortality I have in mind.
- Level II – The elimination of aging. Causes of death not related to aging would still happen, such as murders, natural disasters, infectious diseases, etc. This definition is used by Overall (2003, 131) and Harris (2013), called superlongevity by More (2004), and called virtual immortality by Binstock (2004a) and Dekkers (2013). This concept is still not what I am looking for since I do not think we should call someone immortal if we can easily kill them by running them over with a car. This definition fulfils the

Level I criterion because if there is no aging, the rate of mortality in relation to age (in the sense of time lived) should be constant – non-age-related causes of death should affect every generation equally.

- Level III – Dying is only possible voluntarily. This definition is used by the Immortality Institute (2004, 7), now called Longecity. This concept of immortality, unlike the previous two, is not based on a biological framework – it uses agency instead as its foundation. Here we get everything that we had with the Level II concept plus the elimination of every cause of death not already contemplated by the elimination of aging (murders, infections, etc), except for suicide. The exception of suicide is allowed because of what I call the agency allowance. Since the concept is rooted in an agency framework it does not eliminate voluntary causes of death. This concept of immortality is not the same as living forever, it merely requires the option to do so (see *2.4.1 – Optionality Argument*).[2]
- Level IV – Dying is not possible. Zaleski (2004) calls it alpha immortality and Harris (2013) calls it invulnerability. The previous level included an elimination of every involuntary cause of death. This level adds to it by eliminating the voluntary ones making it impossible to die.

Economic soundness will show that either no level is preferred, which, best case scenario, results in an instant death once mortality rates stop increasing with age; or Level IV is preferred, because every level up represents a Pareto improvement.[3] This is so because every level can emulate lower levels without any phenomenological difference to the subject.[4] The subject loses nothing by moving up a level. By that logic, to narrow down the relevant concept I need not point to a specific level, I just need to define a floor and accept every level above it. In other words, I need to define the minimum acceptable to be able to employ the word immortality. I put that line at Level III. Immortality, as discussed here, must only allow for voluntary death (or eternal sleep if we are emulating it from Level IV). Immortality is bringing death inside the scope of things one controls. As such this work can be read as using a Level III concept of immortality. Henceforth the word immortality will mean Level III immortality unless stated otherwise.

[2] Rest assured that the heat death of the universe is not ignored. It is discussed in **P36A4A2A1A1**.

[3] A Pareto improvement can be described as an improvement of position without trade-offs. For example, take the use of a fast food discount. From the consumer perspective, the shift from paying full price to paying a discounted price is a Pareto improvement: the consumer did not have to give something in exchange for the use of the discount.

[4] With the use of a venom or substance that kills instantaneously - or puts the subject to eternal sleep - released according to certain triggering conditions mimicking the emulated level.

1.3 – Illness and Frailty

One can argue that Level II is not necessary to a Level III conception of immortality. In this case, we would imagine someone aging forever but not dying, getting weaker each year.

The problem is that, for someone to be in that state, technology must have been developed in order to avoid death, but not to repair all the maladies of senescence. Say that someone has a problem with an organ that will result in certain death if nothing is done. We need be able to deal with that problem without improving the state the individual is in if we are to argue for the strange conception of immortality put forward in the previous paragraph. This means avoiding death, while leaving the individual in the same poor conditions regarding its organ so that senescence could continue to operate without causing an involuntary death. This is clearly not the case when one goes to the hospital to receive treatment for certain maladies, even those age related. Sometimes the opposite happens – treating the symptoms and not the cause instead of treating the cause and leaving the symptoms in place as this concept of immortality suggests. The knowledge and technology that allows for the intervention to solve the death threat also solves its contribution to senescence – same source, same knowledge required. The only way to make a scenario of immortality of Level III without Level II is if we also conceive of evil masterminds which purposely want to maintain humanity in a permanent state of frailty, denying us the complete treatment, or, alternatively, evil masterminds that after each treatment make just enough damage to replenish the correct amount of senesce the patient had before the treatment. Let us call this concept level 2.5 immortality.

Level 2.5 immortality is not to be taken seriously since no one is arguing for it. Not only that, but Level II immortality is conceived in a way where one's life is not lived in illness, frailty, or weakness. Christine Overall (2003, 41, 65, 130) put it better:

> There is no reason to assume, a priori, that a long life must necessarily be a life of physical pain, illness, and disability.
>
> Hardwig (1997a, 35) writes, "If further medical advances wipe out many of today's 'killer diseases'—cancers, heart attacks, strokes, ALS, AIDS, and the rest—then one day most of us will survive long enough to become demented or debilitated. These developments could generate a fairly widespread duty to die." (…) Prolongevists could perhaps try to dodge Hardwig's claims by pointing out that prolongevitism advocates the extension of life only if it can be lived in a healthy, functional state. They advocate the extension of life only if it will not involve the severe illness, unrelieved pain, or disablement that undermine an individual's capacity to pursue his or her life projects. Hence, the prolongevist might argue that the problems Hardwig hypothesizes as arising from progressive mental and physical deterioration, and their alleged moral significance with respect to the prolongation of human life, do not have any force against prolongevitism.
>
> Individuals who chose immortality would be reasonably healthy and energetic. For them, the elimination of death would also mean the elimination of aging. Any objection to immortality on the grounds that one would still be subject to the worst effects of extreme old age would be obviated.

Sethe & de Magalhães (2013) also state that immortality of Level II implies a healthy living: "What can rather be excluded as a possibility is that significant life extension will simply prolong the period of old age". And de Magalhães (2011) expands:

> One of the most pervasive public misconceptions about biogerontology is the idea that the goal of anti-ageing medicine is to make old people live longer by merely extending life and consequently extending age-related debilitation and suffering. This is known as the Tithonus error. In Greek mythology, Tithonus was a mortal to whom Zeus conceded immortality but not eternal youth, rendering Tithonus increasingly debilitated and demented as he aged. Contrary to the immortality granted to Tithonus, the goal of biogerontology is to extend healthy lifespan by postponing disease and extending the healthy period of life. Rather than focus on specific age-related diseases or changes, the goal of biogerontology is also to delay the process of ageing as a whole and not just its individual manifestations.

Life is supposed to be lived in a healthy state, and that is the scenario under analysis. Immortality 2.5 is a straw man mounted by those wishing to attack the side that says <immortality is desirable>. For example (Overall, 2003, 44):

> Peter Singer argues that extending human life significantly—for example, by seventy or eighty years—will inevitably lead to a lower average quality of life because "individuals will enjoy the freshness of youth for a comparatively small portion" of their total life span and because their average level of health will be not quite as good as the average level of health of those leading shorter lives.

This work can be read with the assumption that immortals will live at least at the peak of their physical and mental capacity (say at age 25), or at any other preferred stage (the agency allowance gives individuals the option to live with as much senescence as they wish).

1.4 – Desirability vs Feasibility

Another clarification I wish to present is about the word <desirability>. It is not to be interpreted as the possibility of immortality being an object of desire. There is no doubt that people can desire to be immortal. Instead, desirability has an ethical connotation. Asking if immortality is desirable means asking if it *should* be actualized. Note, however, that asking if it *should* be actualized is not the same as asking if it *can* be actualized. There is a distinction between what is feasible and what is desirable. I am not concerned with the feasibility of immortality for that is an empirical matter, a subject of science and engineering. Regardless of the answer about its feasibility, the question of its desirability still stands and must be addressed separately (e.g. see Capron, 2004; Overall, 2003, 127). Desirability and feasibility are independent – all four combinations between the two can obtain.

There are, however, several interactions between the feasibility and the desirability, that are shared not only by the technology of immortality but by any other technological endeavour. For example, how much something is desired can influence the efforts to achieve it and thus

change the prospects of its feasibility. And the closer we are to achieve a new technology the more important is the debate about its desirability.

A good method of assessing each question independently is to assume the other to be already answered positively. If we want to assess the feasibility of something we should assume that it is desirable. And if we want to assess the desirability of something we should assume that it is feasible. That way we avoid the mistake of confounding both question and answering none, or circularity. As such, this work can be read with the assumption that immortality is feasible.

This means that reasonings such as the following <it is inevitable that we die so it is better to accept our fate>, will not be considered as arguments for the debate. They not only (i) suffer from the possibility of falling into a self-fulfilling prophecy but also (ii) fail to adequately separate both questions.

(i) People believe X cannot be actualized. Because people do not believe X can be actualized they do not try to actualize it. The end result is that X will not be actualized not because of some physical impediment but because people tricked themselves into it. The belief that X cannot be actualized caused itself to be true. One would think that professionals would know better, but here is an example from Dekkers (2013) [5]:

> The idea of arrested aging which would bring about 'virtual immortality' is simply inconceivable to me. (…) I agree with anti-posthumanist thinkers that we can better focus on the acceptance of aging rather than on its scientific modification. Although it might be possible that in the future we could live a few years longer, we cannot escape the aging process. Aging just happens. Old age will catch up with us and finally we will die. This fact will continue to stimulate the search for a meaning-giving process and, ideally, for an acceptance of **the fact** (emphasis mine) that we are all going to die.

(ii) Examples when authors outright mix <what is> with <what ought to> also exist in the literature. It often happens when, presented with the desirability (feasibility) question, the author answers instead to a different question, that of feasibility (desirability). As Overall (2003, 156) shows:

> John Macquarrie writes, "People usually want to postpone death, but death and temporal finitude are so much a constitutive part of humanity that an unending human life would be a monstrosity" (Macquarrie 1972, 197)
>
> [Note 1] - In the 1994 Miss USA contest, Miss Alabama replied to the question "If you could live forever, would you and why?" as follows: "I would not live forever, because we should not live forever, because if we were supposed to live forever, then we would live forever, but we cannot live forever, which is why I would not live forever." Miss Alabama could be interpreted as arguing that the empirical evidence that human beings do not live forever supports the normative claim that, as human beings, we ought not to live forever. This claim is not so very different from Macquarrie's.

[5] It is interesting to note that in the very same article the author seems to contradict himself: *"*in recent decades science and technology have begun to suggest that what once was just utopian thinking might become a practical possibility*"*.

1.5 – Proxys for Discussion

Literature discussions about normative ethical implications of immortality are new, scarce and do not have a well-defined place, as Overall (2003, 15) explains:

> Relatively little contemporary philosophical work takes as its specific focus the exploration of normative aspects of human longevity. Thus, for example, a computer search of The Philosopher's Index (1940– 2001) reveals that only a handful of articles exploring questions about the possible value of human longevity were published during the period covered by the Index. Indeed, Gerald Gruman (1977, 6) is not exaggerating when he remarks that the subject of prolonging human life has been "relegated to a limbo reserved for impractical projects or eccentric whims not quite worthy of serious scientific or philosophical consideration."

And Binstock (2004a) provides the same analyses on the scientific side of things:

> Published over 20 years ago, political scientist Betty Lockett observed: "Those who would study aging in order to retard or halt the process have been considered on the fringe of biomedical research, looking for the fountain of youth ... . a marginal area . . . with so little backing from the scientific community" (Lockett, 1983, p. 5).

With this in mind, to procure the arguments that form the basis of this project, I decided to look at proxy discussions. These are discussions that can entail immortality (of any level) and thus produce arguments that can be applied to the concept of immortality proper.

One way of discovering such discussions is by trying to foresee which technologies will enable immortality and look at the current debate of such endeavours, if possible. I can think of three ways to achieve immortality:

a) Mind uploading;
b) Timeconsciousness scaling;
c) Curing aging.

a) Discussions about mind uploading usually focus on its feasibility (e.g. Chalmers, 2014; Bainbridge, 2004), involving two main concerns: the nature of consciousness, and personal identity. If we are to discuss the desirability of mind uploading as a proxy for immortality, we would need to have strong assumptions about consciousness and personal identity. I certainly do not think it is impossible that mind uploading could work, but I also do not take it for granted, mainly because of questions regarding personal identity (see Perry, 1978). Mind uploading does not seem to be an ideal proxy for discussion since its strength would be correlated to the strength of its assumptions regarding consciousness and personal identity. The problem here is not one of assuming positive feasibility (see *1.4 – Desirability vs Feasibility*). One could clearly assume that an upload, with assumptions so and so about consciousness and so and so about personal identity would be feasible, and then tackle its desirability. The problem is that the scenario under consideration is going to be specific to those assumptions and consequently too narrow a proxy for what I have in mind. On the other

hand, considering every possible interaction between consciousness and personal identity, i.e. all scenarios, does not seem feasible for this project, and is not a good methodological choice if better proxies are available. Take, for example, the problem of personal identity – if upload produces something that is not matched by the concept of personal identity we use today in our day to day lives, how should we go about analysing it? The focus will clearly shift from the desirability of immortality to the desirability of a certain conception of personal identity. And if I assume that it does produce the same personal identity we use in our daily lives, then it becomes very hard to find desirability arguments within mind uploading literature compared to alternatives down the list. In any case, my search for proxies is not exclusive, i.e. if I happen to find a discussion about uploading with relevant arguments I will use it, no doubt. Rejecting uploading as a proxy only means I will focus my attention on some other discussion.

b) Next in line is timeconsciousness scaling. This idea has been around for at least some decades (see Dyson, 1979). Timeconsciousness is to be understood as the speed at which we perceive time. In the words of Clynes (2004): "On a different galaxy, say, a living being could exist to whom night and day would be a flicker". Since "there is nothing absolute about our timeconsciousness" (ibid.), there is, in theory, freedom to redesign our timeconsciousness rate. That would mean that our current life expectancy of 80 years (give or take) could be experienced as 80 000 years, just by scaling our timeconsciousness by a factor of 1000. One second for us is more than 15 minutes for the timeconsciousness scaled individual. And there is no reason to stop at a factor of 1000. There is, however, one problem in using this proxy for discussions about the desirability of immortality and that is the lack of relevant discussions.

c) Lastly, let us scavenge discussions about curing aging. By curing aging I mean not only the end result but also a specific way of achieving it. Off course that curing aging by mind uploading and/or timeconsciousness scaling are excluded. What I have in mind is biological tweaking, with the goal of taking full control of the aging process and then either turn it off or make it negligible. Unlike mind uploading, curing aging will not bring attached (at least not immediately) the nature of consciousness and/or personal identity, and unlike timeconsciousness scaling there is an abundant amount of discussions. However, there is one problem with this proxy – it amounts only to Level II immortality. I think this is not a problem since Level II is a necessary condition for Level III and at the same time discussions about its possibility/feasibility are more settled than the other two alternatives (we know more about aging than we know about consciousness or timeconsciousness). I believe this to be the best proxy for this project. I will expand on the relation between immortality and curing aging in *1.6 – Curing Aging vs Immortality*.

Apart from these 3 technologies that can enable immortality directly, there are some indirect ways to achieve it. By indirect I mean something that will enable the attainment of at least one direct technology. I can think of 4 indirect endeavours/discussions:

d) Cryonics;
e) Transhumanism;
f) Religion;
g) Artificial (Super)Intelligence.

d) Cryonics[6] is considered the plan B for immortality. If one does not happen to survive until a), b) or c) is actualized, there is the option of going under the cryonic process and conserve the body in the hope of future reanimation (when at least one of the direct technologies is operational). There is a strong connection between wanting to go under the cryonic procedure and wanting to be immortal, since the former is usually caused by the latter. If the preserved body is used as a source for an uploading, for example through a brain scan, then this proxy discussion has the same downsides as uploading. Those obstacles seem to be eliminated if, on the other hand, the preserved body is reanimated, which merits serious consideration. According to Wowk (2004):

> Anesthetic drugs, such as barbiturates, can flatten EEG (brain electrical activity) readings for many hours while still permitting later recovery. This prolonged drug-induced elimination of brain activity is sometimes used as a treatment for head injuries. Patients do not emerge from these comas as blank slates. Evidently human beings do not require continuous operation like computer chips. Brains store long-term memories in physical structures, not fleeting electrical patterns.

Regardless the outcome of reanimating the person using the original body, this proxy offers no new arguments over discussion about curing aging, since it is a means to it. Furthermore, one would need to assume reanimation would be chosen over mind uploading to avoid the assumption problems regarding consciousness and personal identity.

e) By transhumanism (or posthumanism) I mean "a way of thinking about the future that is based on the premise that the human species in its current form does not represent the end of our development but rather a comparatively early phase" (Transhumanist FAQ Version 3, 2016). The connection with immortality is clear since immortality is an upgrade over the *status quo*. The debate between bioconservatives and transhumanists should render some arguments to the analysis of the desirability of immortality. In fact, any value system that includes immortality can, in principle, produce arguments useful for this project. The drawback

[6] Cryonics means the process of conserving the human body in low temperatures with expectations of future reanimation. For more see Urban (2016). Not to be confused with cryogenics – the study of things at extremely low temperatures.

is that immortality is but one of many enhancements included in the transhumanist movement (e.g. of another enhancement: superintelligence). It seems that while curing aging is less than ideal for our analysis (since immortality requires more), transhumanism encompasses too much (since immortality does not require it fully). Curing aging is necessary, while transhumanism is sufficient, so while one can be pro immortality and not a transhumanist, it is impossible to be pro immortality and not wanting to cure aging. Given that, I decided to put more emphasis on analysing discussions about curing aging. Let it be said, again, that this is not a black or white matter, but an overlapping one. By focusing on discussions about curing aging I will eventually come across transhumanist arguments. Curing aging also has a more short-term importance given the current state of technology (see *1.8 – Delving Deeper into Aging*), than the foresighted transhumanist dream.

f) By religion I mean the afterlife – the metaphysical place where one goes after dying in this material world. This comes in plenty of flavours such as heaven, hell, or reincarnation. Although I have already clarified that this is not the sort of immortality I will be focusing on, that does not mean the literature lacks interesting arguments about its desirability that can be proxied to a discussion about immortality proper. However, the afterlife has the same problems as mind uploading – nature of consciousness and personal identity – since going to heaven is an effective upload: one ditches one's body and transfers one's mind to another vessel in another place. But the drawbacks do not end there. The afterlife also involves some questionable metaphysical assumptions about the destination where the mind is uploaded to, which subtract to the value of using this discussion as a proxy. Lastly, the question about its desirability seems largely undebated – people desire to go to wherever their faith say they will go in the afterlife and many make it their whole point in life in this material world.

g) Lastly, there is artificial superintelligence (ASI). ASI can enable us to discover/invent the missing scientific and technological steps to achieve immortality. However, given the incredibly powerful and unknown consequences of an ASI the discussion usually focuses on the risk of losing control and mitigation strategies. That is clear in the work of philosopher Nick Bostrom (e.g. 2014) and on more public shows of concern such as the open letter (The Future of Life Institute, 2015) signed by dozens of artificial intelligence researchers and important public figures such as Elon Musk, Stephen Hawking, and others, calling for the ban of autonomous weapons systems. Discussions that merge ASI and immortality are usually about the question of feasibility (what specific technical task can we delegate to the ASI?), not about the question of desirability.

1.6 – Curing Aging vs Immortality

As stated previously, there is not a specific place where discussions about the desirability of immortality are. They are scattered across the literature. I decided to identify the best proxy discussions in order to proceed with this work. This is my first reason to delve into discussions about curing aging.

My second reason is that it offers advantages relative to other discussions, also mentioned in the previous section and that I will recap here: does not require shaky assumptions (uploading, religion, cryonics), it is not lacking in the number of discussants (timeconsciousness), or has a radically different focus (ASI), or is too broad (transhumanism).

My third reason is that, by being a necessary condition for immortality, it will rally arguments found on almost all of the alternatives.

My fourth reason is that the question of feasibility is somewhat settled compared to the alternatives. In principle aging is not necessary (see *1.8 – Delving Deeper into Aging*).

My fifth reason is time constraints. Perhaps in the future there will be an opportunity to scourge all the different areas of the literature and collect all the arguments put forward, but for this project this is not an option. Diminishing marginal returns are very real.

Lastly, my sixth reason is that other philosophers also think that this is a good proxy discussion. "Debates about the possibility and, more relevantly still, the value of immortality are closely connected to debates about human longevity." (Overall 2003, 125)

So, the next step is to say a few words about the relation of immortality with curing aging, besides noting that the latter is necessary for the former.

If we start with (the goal of) immortality, we can arrive at curing aging, by noting that aging brings forth states of affairs that provoke involuntary death: heart failure, stroke, etc. that need to be solved. On the other hand, if we cure ageing we can, in principle, live forever, we just need to avoid infectious diseases, murder, being hit by dangerous moving masses, and other non-age-related deaths. Capron (2004) writes: "If longevity is altered by X years now, why not by X + Y years tomorrow, and so forth? There is no limit inherent in the process of lengthening life, so the end point would be virtual immortality." Curing aging without appealing to some cause of involuntary death means endorsing immortality. But what is aging after all?

1.7 – What is Aging?

The word aging usually means two different things that so far in history have been bundled together. But by not clearly separating them, one runs the risk of committing a false equivocation. To age, to be old or young, can be understood as simply as to have lived a certain amount of years – let us call this the chronological meaning of aging (to use the same expression as Caplan, 2004). I am old if I have lived 70 years, I am of age after 20ish, I am x years old, etc. But age can also mean the state of frailty of the elder, the accumulated senescence the forbids the old of competing in marathons or having children – let us call this the capability meaning of aging. It just happens that, in the current state of affairs, ageing, or to age, or to be old, involve simultaneously the chronological, and the capability meanings of aging. It is by ageing (chronological meaning) that one gets old (capability meaning). However, when considering the concept of immortality, we have to clear the waters. The two meanings will no longer be tied together (see section *1.3 – Illness and Frailty*). To be old in a context of immortality, can only mean to have lived a certain amount of years, not something capability related. Picture one 25y old of today (capability meaning) and then add in the information that he is 4000 years old (chronological meaning). The English language is ambiguous. I have to tell you that a person is 25 and 4000 years old at the same time, if I want to desynchronize the meanings of ageing.

Discussions about curing ageing mean getting rid of the problems associated with the capability meaning of the word. One would still age in the chronological sense, but the ability to run a marathon will no longer be affected by the passage of time. Let us take a look at some definitions of aging (capability meaning) used by specialists:

1 – Rose (2004a): "The most objective definition of aging is that which occurs when rates of survival or reproduction inexorably decline, even when organisms are kept in excellent environments, in which contagious disease has been virtually eliminated, with abundant food and no prospect of being eaten."

2 – de Magalhães (2004): "Human aging is a universal process of loss of viability and increase in vulnerability (…) Aging is a sexually transmitted terminal disease"

3 – Masoro (1995, 3) as quoted in de Grey (2004b): "Deteriorative changes with time during postmaturational life that underlie an increasing vulnerability to challenges, thereby decreasing the ability of the organism to survive."

4 – de Grey (2002) as quoted in de Grey (2004b): "A collection of early-onset, slowly progressive, mutually synergistic degenerative processes, whose later stages are fatal but tend to be given "disease" status only if they fairly often kill or severely debilitate people before they reach their society's life expectancy."

5 – de Grey (2004b): "A collection of cumulative changes to the molecular and cellular structure of the adult organism, which result from essential metabolic processes but which, once they progress far enough, increasingly disrupt metabolism, resulting in pathology and death."

The common feature seems to be the changes that underlie our loss of physical and mental capacity with the passage of time, and that ultimately lead to death. Perhaps the analogy that de Grey uses in conferences and interviews (e.g. talk at St. Gallen Symposium in 2014) is the easiest to grasp: aging is the damage the body does to itself in the process of its normal functioning. Like any machine, the body suffers wear and tear (damage) just by its normal operation – and that is aging. If enough damage is accumulated the machine halts, or dies. The analogy of aging with a machine (usually a car) is used in formal models (Aaron & Harris, 2004; Olshansky & Carnes, 2004).

Although it is very difficult to measure aging (see de Magalhães 2012; Miller, 2004), death, or in other words, the amount of life attained, can be used as a proxy. This is so because aging refers to changes and processes that ultimately lead to death. That brings us closer to the definition of Rose (cited above). It is as if this definition regards the symptoms and not the causes of aging, but as such it is enough to measure aging, at least when it comes to populations. Perhaps it is useful now to precise some concepts, in order to help us clarify what is at stake:

a) Lifespan: This is the amount of life that one expects to live in a controlled environment (see Rose's definition of aging above). In essence it takes the best possible environment states and evaluates how long an individual can last in such a scenario on average. Death will be caused exclusively by ageing. For humans in the present, if it exists, this value is hypothesized at around 120 years (110 in Goss, 2004; 120 in Aaron & Harris, 2004).
b) Life expectancy: This is the amount of life one expects to live. Unlike life-span it accounts for external factors, such as medicine, hygiene, security, nutrition, etc. Life expectancy has been rising on average 6 hours per day for the last 160 years for humans (Pinxten, 2013) due to changes in our society, most notably decreases in child mortality rates (Olshansky & Carnes, 2004). Progress against infectious and parasitic diseases (ibid; Pinxten, 2013), availability and quality of food, improved infrastructure, and educational levels (ibid.) also played an important role.
c) Healthspan: This is the amount of life one expects to live in a relative healthy state. "For a wide range of physiological parameters derived from published studies of humans, it appears that approximately 80% of functional capacity is lost by age 80" (Olshansky & Carnes, 2004, citing Harman et al. 2000).

Immortality means making the life-span infinite and the other two dependent on the agency of the self. Unlike immortality, curing aging only requires making the life-span infinite and eliminating the health-span and life expectancy effects of aging.

1.8 – Delving Deeper into Aging

But where does aging comes from? Why does it exist? Why do people die in the end? There are two answers to this question. A developmental biologist might answer that aging is the result of a series of changes such as cell oxidation, accumulation of free radicals, etc. But an evolutionary biologist might answer that aging is a by-product of evolution (Rose, 2004b; Arking, 2004, and Caplan, 2004 separate the questions into the why and the how). Both answers are correct, but they are tailored for why questions of different depth. If we ask the reasons why the processes described by the developmental biologist happen, and then apply another why question to his answer, and so on, soon or later we will need to come up with the evolutionary biologist answer. Allow me another example: why are polar bears white? One answer is that they have hollow and clear hair (not white) that scatters light in different wavelengths. Another answer is that a random mutation made their hairs that way and at the same time provided an advantage – camouflage. The former is the developmental biologist answer, and the latter is the evolutionary biologist's. When we ask why aging exists, the deeper question is not about the specific mechanisms that are operating inside the body, but how the aging process has come to be in the first place.

Evolutionarily, aging serves no purpose and is instead a by-product. Let that sink in for a moment. Nature did not come up with aging so we could leave space for new generations (Miller, 2004). Likewise, aging is not the result of some god's tantrum. It is an unintended result of other processes. Long story short, genes that express themselves after reproduction are not subject to the process of selection. (see Olshansky & Carnes, 2004, for a more detailed explanation of what follows; cf. Arking, 2004, and Miller, 2004; for a well written and recent overview of theories of aging see de Magalhães, 2011). Suppose a trait that kills before reproduction and another that kills after. Natural selection only works for the former. The latter will be completely ignored by the selection process because when it kills reproduction has already happened. Traits that work on longevity, preservation and repair of the body at late stages in life, are not being either selected or rejected by the selection process because they will usually express themselves only after reproduction. People age because they lack the relevant genes, and there is no selective pressure to have them.

But it remains to be explained why then we are sexually active starting X years after we were born. Different species, even mammals (and apes if we want a narrow comparison), have different maturation cycles and different life spans. In other words, some species require several years until they can produce offspring while others only need a few months. The weakness of natural selection post-reproduction does not explain why that is so. We need the second half of the explanation. Some species live longer than others because nature explores different strategies and continuously finds the local optimum for each species. It boils down to how adverse the environment is. Perhaps it is better to reproduce quickly, since the survival rate of the marginal year is not worth it. For example, if a species has predators, *ceteris paribus*, it will have a shorter period of time until sexual maturity, or else it would run the risk of being eaten before leaving offspring – in this case selection favours rapid maturity so reproduction can happen quickly after the individual is born. On the other hand, by taking longer to reach the age of reproduction the organism will be better prepared to deal with damage and repair in its body and possibly have the time for multiple tries at reproduction. This is so due to the disposable soma theory (for more on somatic cells see West, 2004, for more on the disposable soma theory see Arking, 2004). This theory states that there is a trade-off between allocating resources to reproduction *or* to somatic maintenance and repair. Every species has a budget of energy that can be allocated between repair (living longer) or reproduction. If the strategy is to reproduce as quickly as it can (because of its adverse environment), that species will neglect the repair and preservation of the soma, i.e. age quickly. Conversely, other species can allocate resources to somatic repair and reproduce later in life and/or during a longer period, as long as the cost of repair does not exceed the cost of reproduction: if it costs too much to repair your car, you might as well get a new one, hence the name *disposable soma* theory.[7] Summing up in the words of Olshansky & Carnes (2004), and Arking (2004), respectively:

> All modern evolutionary theories of senescence rely on the premise that selection is blind to the consequences of gene expression in the postreproductive period of the life span: aging and death genes or programs cannot arise from the direct action of natural selection. Senescence-related diseases and disorders observed in the postreproductive period are unintended by-products of selection acting upon genes participating in biological processes important earlier in the life span.
>
> And so we age, not because of some philosophically satisfying cosmic reason that requires our senescence and death, but simply because the body's energy allocations are such that our failure to repair ensures that there is no reason not to age.

[7] Do not make the mistake of believing that by avoiding sex, someone can trick their body into living longer. The reasoning presented here is valid for species not for individuals. In fact, the opposite *seems* to happen when considering individual humans. A positive *correlation* between the quantity of orgasms and life expectancy has been found (Smith et al, 1997).

Cancer shows us that somatic cells can be immortal. Perhaps the most famous example are HeLa cells[8]. And recently scientists were able to tweak somatic cells to overcome the Hayflick limit[9], by artificially introducing telomerase[10] (Potts & Schwartz, 2004, West, 2004).

Furthermore, there seems to be entire organisms that do not age, in the sense that their mortality rates do not increase with aging. "Some animals appear not to age at all (…). Various studies, in some cases spanning decades, showed that these animals failed to exhibit functional or physiological decline, or an increase in mortality with age. " (de Magalhães, 2015).

Experiments made with fruit flies doubled their lifespan just by artificially selecting only long-lived members (Potts & Schwartz, 2004). The experiment eliminated the blindness that natural selection has after reproduction.

Another way of expanding the life span is through caloric restriction[11]. Caloric restriction seems to drive the body to a state of repair leaving the focus of reproduction. It increased life span as much as 40% in mice if started early in life, with the side effect of less or no reproduction (Wade, 2004; Miller 2004). Modern procedures involve techniques such as: telomerase gene therapy[12], NAD+, metformin, resveratrol, etc. (for analysis on the means to combat aging, see: de Magalhães et al., 2017; Rejuvenation Roadmap, n.d.; de Magalhães, 2004; de Grey, 2004b; see also de Magalhães et al., 2012).

Curiously, scientific research on aging is fairly recent (one ought to imagine if it had started earlier). Binstock (2004a), presents an interesting history of the modern scientific endeavour on aging in the US. It is a path in which obstacles were more political than scientific or technological. Here are some highlights from Binstock's story:

> Although a National Institute of Health (NIH) Gerontological Study Section for reviewing extramural research applications was created in 1946, it was abolished in 1949. Lockett's documentary research and interviews reveal that this review panel was perceived by some NIH officials as too favourably biased toward applications because there were so few researchers in the field of aging that many of them were members of the Study Section and were evaluating their own research proposals. Ironically, according to one member of the Study Section, the community of gerontological researchers had fought for their own study section because they thought that there was a bias against them—"they felt that other study sections automatically turned down proposals that had the word 'aging' in them" (quoted in

[8] HeLa cells are named after Henrietta Lacks, the human where they came from. She died in 1951 from cancer, but 'her' cells are immortal (they seem to be able to reproduce forever) and are still used in medical research.
[9] The Hayflick limit is the number of times a population of normal human cells divides before the process stops: around 40-60 times. It was discovered in 1951 by Leonard Hayflick.
[10] Telomerase is an enzyme that can extend the telomeres. The telomeres are protective end caps of the chromosomes that perform a similar function as the plastic end caps of the shoe strings do. Each time the cell undergoes mitosis it loses a bit of their telomeres, and eventually the telomeres become so small the cell reaches its Hayflick limit and is incapable of further division. Telomerase is not active in the majority of somatic cells.
[11] Unlike malnutrition, a caloric restricted diet contains all micronutrients of a healthy diet, but contains around 30% fewer calories. (Wade, 2004)
[12] Such treatment was pursued the first time in humans by Liz Parrish in 2015 (Mole, April 2016). It generated controversy regarding the right of self-experimentation.

> Lockett, 1983, p. 36). In any event, gerontological applications were subsequently reviewed by other study sections that, according to one NIH staff member, "downgraded gerontology research," and the percentage of approvals "went from one extreme to another" (Lockett, 1983, p. 37)
>
> When one version of the bill passed in 1972 [for the creation of a National Institute of Aging], a memo from the Office of Management and Budget to President Richard Nixon urged him to veto it—which he ultimately did—because an NIA "could raise false expectations that the aging process can somehow be controlled and managed through biomedical research" (quoted in Lockett, 1983, p. 139).
>
> During the subsequent political processes that finally led to the establishment of NIA in 1974, themes suggesting the marginal status of biogerontology persistently emerged. For one thing, the key political actor in the successful lobbying effort, Florence Mahoney, was an ardent pursuer of anti-aging interventions. Mahoney was a powerful Washington insider with politically elite connections, a long-time behind-the-scenes effective advocate for expanded government support for biomedical research
>
> Regarding her National Institute of Child Health and Human Development experience, Mahoney observed: "Every time a grant came up about aging, it was turned down... Everyone said aging came naturally. I never believed the effects of old age were irreversible... I kept telling them not to discourage those grants, or they would have to have another institute. (Robinson, 2001, pp. 237-238)"

Although an NIA was eventually created, disputes within the institution prevail (ibid.):

> The NIA budget, which was only about $20 million in 1976, its first year of operation (Lockett, 1983, p. 169), has grown rapidly over the years to reach just under $1 billion by fiscal year 2003 (National Institute on Aging, 2002a) To be sure, biogerontologists argue that they require a larger share of this budget in order to purse their promising and exciting lines of research. They contend that NIA invests a disproportionately large share of its resources in disease-oriented research, especially on Alzheimer's disease (Adelman, 1995), while marginalizing basic biological research on aging in terms of both strategic planning and actual research funding. The consequence, they argue, is that the sector of research that has the greatest promise for improving health in old age is being shortchanged, because the fundamental mechanisms of aging are the underlying and leading risk factors for virtually all age-associated diseases (Hayflick, 2002; Miller, 2002; Martin, 2003).

Political obstacles (e.g. regulation, lack of funding, bureaucracy), contrary to technological or scientific challenges, continue to be the main drawback of aging research. Miller (2004) listed reasons why research on aging was not on top of the agenda and more than the first half of the list concerns political obstacles, human biases, funding struggles and long-term blindness. According to him "the obstacles blocking the development of the hypothetical discipline of applied gerontology are at this point about 85% political and 15% scientific, and they will not be overcome by biologists alone."[13] de Grey (2004b) agrees with Miller: "he is forthright in the view that the scientific obstacles to doing so are much less severe than the political ones." It seems that the obstacles between the present and a cure for aging lend much of themselves to bureaucracies instead of physical laws, ontological considerations, or the realm of the unknown:

[13] This also underscores the importance of a philosophical analysis of this subject.

1 – Aaron & Harris, 2004: "Conceivably, biologists and physicians could learn how to stop the aging process entirely."

2 – Arking, 2004: "The study of biogerontology is today where aeronautical science was in 1900. Laboratory data have made some of us sure of attaining a goal that many skeptics once considered impossible. (…) We do not have an organismal death program built into our genes. We are not required to age. And if we age only because there is no biological reason for us not to age, then this clearly implies that we need not age (or at least not age so quickly) if we can supply our bodies with a relevant biological reason not to age".

3 – Rose, 2004b: "Despite hysteria on both sides, extending human life now seems about as difficult as building an atomic bomb in 1935. But unlike the atomic physicists of that time, who were motivated by the threat of Hitler, biologists generally are not inclined to develop the tools appropriate to the problem of extending human life. A few biologists have set about developing the tools required for such life extension, and they may yet triumph over the hostility of the National Institutes of Health, the medical establishment generally, and many of their religiously or politically biased allies."

4 – Miller, 2004: "In the past two decades, biogerontologists have established that the pace of aging can be decelerated routinely in mammals by dietary or genetic means. These discoveries, still largely unappreciated by the lay and scientific public alike, overturn the common assumption that human aging is likely to be unalterable and raise the question of whether we can make use of our growing knowledge about aging to produce 90-year-old adults who are as healthy and active as today's 50-year-olds."

5 – Sethe & de Magalhães, 2013): "Most biogerontologists agree that life extending applications of research on aging are plausible (Butler et al. 2004). Contested remains the factor by which life expectancy can be increased (Richel 2003). Assuming we 'cure' aging and thus eliminate (or at least prevent the age-related increase in incidence of) all age-related pathologies (…) a life expectancy of over a thousand years seems theoretically feasible (…) Some commentators have boldly suggested have that it may be possible to cure aging within the next few decades (de Grey and Rae 2008; Kurzweil and Grossman 2004). Consequently, many are very critical of the suggestion that aging can even be cured (Warner et al. 2005) (…) Based on what we know about the aging process, there is no scientific reason why a dramatic extension of the mean as well as the highest achieved lifespan should not be possible. Precisely because aging is such a multi-facetted issue, it seems entirely feasible to solve the problem in a piecemeal fashion using a portfolio of medical and technological alternatives. It seems unlikely that a single intervention will suddenly abolish aging. More realistic is a stepwise approach, where life-years are added in small instalments. A paradigm shift would arguably come if this progress were to occur at such a high rate that it outpaces the rate of aging (de Grey 2004a)."

6 – de Grey, 2004a: "In a nutshell, I claim it is probable that most of the first generation of 150-year-olds (defined as those who reach 150 and are aged at most 30 years younger than the first 150-year old) – a group who are almost certainly already alive and may well be middle-aged – will not die unless at their own hand."

7 – de Magalhães, 2004: "There is no law of nature to prevent us from instructing the cells of an adult human being to avoid aging by, for example, changing the genetic program at a DNA or epigenetic level."

8 – Ehni, 2013: "Two prominent researchers have stated at various congresses, which united more than 20 % of the scientific community, that biological aging is no longer an unresolved problem (Hayflick 2007;

Holliday 2006) (…) Gaining knowledge about these biological mechanisms opens up the prospect of biomedical interventions that might slow down, prevent or even reverse biological aging."

Others (Olshansky & Carnes, 2004) are more conservative in their predictions, even claiming the impossibility of immortality:

> Although it is likely that anticipated advances in biomedical technology and lifestyle modification will permit life expectancy to continue its slow rise over the short term, a repetition of the large, rapid gains in life expectancy observed during the twentieth century is extremely unlikely. Such gains would require an ability to slow the rate of aging. (…) indefinite survival is not possible.

But critics (Potts & Schwartz, 2004, and Wade, 2004, respectively) are quick to point out that when it comes to cutting edge technologies and their possibility or impact we are usually not very good at prediction.

> Forecasters tend to underestimate longterm change. For example, no early designer of mainframe computers foresaw that personal computers would replace mainframes for most uses.
>
> Until recently, research on aging was something of a scientific backwater, and there were powerful reasons for thinking that no dramatic change in human longevity would ever be possible. (…) Longevity increases might be one of those big steps that arrive much sooner than expected.

And even staunch opponents of the idea of curing aging, like Kass (2004) do not deny its possibility:

> Should we not regard death as a disease and try to cure it? Although this formulation of the question may seem too futuristic or far-fetched, there are several reasons for taking it up and treating it seriously. (…) Quite frankly, I find some of the claims and predictions to be overblown, but it would be foolhardy to bet against scientific and technical progress along these lines.

Scientists agree that aging is malleable, although there is not a consensus on how much it is feasible. So, what are the alternatives? (see Capitaine & Pennings, 2013 for what follows; cf. Dekkers, 2013, Post & Binstock, 2004a, Capron, 2004).

1 – Prolonged Senescence: this alternative increases the life expectancy without increasing the healthspan. Increases in the lifespan are not required but can happen. In practical terms this means that we are able to extend the period of frailty and disease before death, but no changes were made to the period before that. This can be an undesirable state of affairs *if* the only thing prolonged was a life of suffering not worth living.

2 – Compression of morbidity: on this model the health span increases without an increase in the lifespan. The life expectancy can approximate the lifespan, but it is not required. This is somewhat opposite to the alternative above. In practical terms we would live a relative healthy life before a quick period of decline followed by death. It trades a period of frailty and disease for a healthy one, without increasing the duration of one's life. A more extreme view of this alternative takes the increase in the size of the health span *relative* to life expectancy –

I consider this view nonsense since the easiest path to achieve it is to kill everyone before the end of their health span (e.g. 40 years).

3 – Decelerated Aging: on this model lifespan and health span increase. Life expectancy is assumed to increase, if no external factors offer resistance enough to keep it in place (wars, natural disasters, etc). On this model aging happens more slowly so everything is increased in absolute terms and proportionately.

4 – Arrested Aging: on this model aging is reversed. This means the elimination of the life span (or considering it infinite). Life expectancy should increase but how much depends on how society deals with the remaining causes of death (murders, virus, etc). The health span should converge to life expectancy but how much depends on how society deals with repair and replacement of functions lost or damaged to causes other than aging (e.g. permanent injury from car crashes). This scenario is immortality of Level II, i.e. curing aging.

There is no consensus on which alternative is going to be actualized (see Aaron & Harris, 2004, for a discussion on this). However it seems we can discard the prolonged senescence scenario according to *1.3 – Illness and Frailty*. The compression of morbidity scenario also seems highly unlikely given our ability to extend the lifespans of several animals.[14] More likely is the decelerated aging scenario. From there the transition to an arrested aging scenario might come from what de Grey (2004a) calls <escape age velocity>. This will happen through bootstrapping, i.e. the first package of life extension therapies will extend our life enough so that a second package of life extending therapies can be developed, which will give us enough time to develop a third package… Once those therapies can extend life expectancy at a faster rate than our rate of aging, we will have defeated aging, making the last scenario plausible.

1.9 – Conclusion

Before summing up, I think it is important to make a disclaimer. If someone wants to maximize their life expectancy, before thinking about acquiring state of the art, although not dutifully tested, treatments (e.g. telomerase gene therapy) or compounds (e.g. NAD+) the best options are to follow up on the wide available and recognized advice: to get a healthy diet, exercise regularly, maintain a good sleep hygiene, eliminate drug consumption (namely

[14] Arking (2004) referring to extensions of the lifespan in mice through caloric restriction said, "These findings have been replicated hundreds of times and are probably the most robust experimental findings in the field." See also de Magalhães et al. (2012).

alcohol[15] and tobacco) and avoid dangerous activities such as: reckless driving, enrolling the army, etc. Consider Pinxten (2013):

> As one researcher stated: "One could say: If it is my objective to help people age healthily, then I can stop doing my research in molecular biology. Because there is one thing that certainly will enable many more people to age healthily, and that is getting them—from middle age on—to have sufficient physical activity and a healthy diet. In fact, we already know that."

Only if one does not find this advice enough to extend their life expectancy, should they adventure into the unknown and try those promising compounds/treatments. Supporting research, either by participating directly, donating money, lobbying or creating awareness can greatly reduce the time it takes to bring those treatments to the regulated market. If someone is unable to wait much longer, the cryonics route is an option.

The goal of this section was to present the relevant context for the work proper that follows: an analysis on the desirability of immortality. The first big issue was with the word immortality. As discussed in *1.2 – What is Immortality?* and *1.3 – Illness and Frailty*, we need to picture people living at the peak of physical and intellectual capacity for as many years as they desire. The next big obstacle was to find where in the literature is this discussion, or something similar enough, taking place. It was no easy task, and although the several places discussed in 1.5 – Proxys for Discussion are not exclusive, I opted to focus my attention on discussions about curing aging. As noted in *1.6 – Curing Aging vs Immortality*, curing aging is not the same as immortality, but its discussions are an input equally useful. Although I am not discussing the feasibility of curing aging or immortality (see *1.4 – Desirability vs Feasibility)* since it is not needed for a theoretical analysis, sections *1.7 – What is Aging?* and *1.8 – Delving Deeper into Aging*, show how far science has come and the role of politics in the current rate of progress. As such this analysis is more than a mere exercise of thought – it will, I hope, be helpful in guiding policy and ultimately our future.

[15] No amount of alcohol is healthy (Gakidou et al, 2018): "Our results show that the safest level of drinking is none. This level is in conflict with most health guidelines, which espouse health benefits associated with consuming up to two drinks per day."

Section 2 – Intrinsic Arguments

2.1 – Intrinsic Arguments vs Consequential Arguments

This section will focus on what I decided to call intrinsic arguments. There is nothing special about them, but due to the amount of arguments I decided to tackle, the need of some sorting system was evident. I decided to box the arguments into 2 categories: intrinsic, and consequential. Although the word intrinsic might give some clue about what makes an argument fit into this category I ought to offer more detail about what I mean. Intrinsic arguments are those which appeal to some feature of immortality, instead of to some consequence of it (Geddes, 2004 uses the words practical and philosophical in place of consequential and intrinsic, respectively). Take, for example, me punching a random stranger in the face. If I argue that this is good/bad due to my arm moving (e.g. good because I am exercising, bad because it involves effort) I´ll consider it an intrinsic argument, since it is not possible (read, I cannot conceive) to punch someone in the face without moving one's arm. However if I argue that it is good/bad due to the possibility of getting punched back (e.g. good because I will get to exercise more, bad because I might get hurt) I will consider it a consequential argument, since getting punched back can, but needs not, happen (e.g. perhaps the other person is a non-hypocrite Christian and turns the other cheek, or their fight or flight response triggers the former option).

I can try and give a more precise definition. Intrinsic arguments appeal to something *necessary* to immortality, and consequential arguments appeal to something *contingent*. But note, this is not equivalent to the possible worlds' language. I am only interested in what happens in this world. There might be a possible world were the speed of light is not the same, or another where Stephen Hawking is still alive. The possible worlds language is a useful tool in the context of this work only for a subset of future contrafactuals. Although I do believe that a logic driven approach and language might be beneficial to improve the quality of this project I will not pursue such endeavour because of some drawbacks that it brings: the amount of time to do it increases greatly, and the focus of the reader can deviate from the content of the work to this accessory tool. So I will not touch upon the subject of possible worlds again.

2.2 – Notes of Interest

Just some brief notes for what follows.

1. There will be plenty of citations from, and references to, authors exemplifying arguments and counter arguments. Do not mistake a citation or reference for the author support of what is cited. Sometimes authors present an argument just to follow it by its rejection.

2. I divided my analysis by what I call objects. An object is denoted by a string of letters and numbers and come in two types: Px and Cx. I will use Px to identify each premise of an argument, x being a unique identifier. If there are several arguments in support of a premise the notation will be Px.z, with z being a unique identifier. The same formula applies to Cx to identify conclusions. To denote counters/answers to each object I will suffix the notation of the relevant object with Ay, y being a unique identifier. As an example **P36A4A1** means the <counter 1 of <counter 4 of <premise 36>>>. In other words **P36** was argued against by **P36A4**, and in turn **P36A4** was argued against by **P36A4A1**. A thread (of objects) designates a group of objects composed of the main object and all objects that share the same notation of the base object plus any suffixes. For example, the thread **P36A4**, includes itself and **P36A4A1**, **P36A4A1A1**, **P36A4A2**, **P36A4A2A1**, and **P36A4A2A1A1**. The parent of an object is the object which shares the notation without the *last* suffix. There is, at most, one parents for each object. For example: **P36A4** is the parent of **P36A4A1**. This design was inspired by online discussion forums (e.g. reddit) with minor tweaks, and is, in my opinion, the most adequate for discussions of any subject. However this format is extremely hindered by the limitations of written text on A4 sheets of paper since its natural habitat is in purely digital formats[16]. This results in text which at times is hard to read. To overcome this problem I created diagrams of the discussion that can be found in the last section. My advice is to have those at hand while reading the arguments, either by printing them or by displaying them in a second screen. This will provide the useful contextualization that is easily lost by the medium of written text on A4 sheets. Each box on the diagram represents an object and contains at the top the last suffix of that object. To find object **P36A4A1**, one needs to start at the **P36** box, then follow the line to the box named A4, which represents the object **P36A4**, and from there follow the line to the box A1, which represents the object **P36A4A1**.

3. There will be several instances where the content of an object will be just the following symbol: ⍿. This symbol will mean, depending on the context, something along these lines: <incredulity, disgustingness, the number of supporters/contrarians, is not enough to dismiss a claim of value, since other cultures, individuals, or systems of value could

[16] I wonder how much time documents like this master's thesis will take to abandon their extremely limited medium of written text in the arbitrary A4 size in the typical text editor and adopt instead a fully digital approach with much less constraints. This work would benefit immensely from such change.

accommodate what is being argued against.> Furthermore, premises of value and related objects will be modified with an asterisk[17], like this: **P*2**. While this procedure might seem to come out of the blue, it will be useful to make a point later on in section *4.2.2 – ⸸ and the Burden of Proof*. I will also clarify the metaethical claim represented by ⸸ in that section.

4. PCBA – is a **P**remise patent in each argument that provides the **C**ost – **B**enefit **A**nalysis to conclude about the desirability of immortality.[18] To understand if immortality is desirable, I need to consider all arguments, both pro and con (benefits and costs), as a whole. However I want first to analyse each argument isolated, in order to understand how much of a cost or benefit they provide. Suppose I conclude that an argument does indeed identify a cost regarding bringing about immortality. Is that enough to conclude that immortality is not desirable? No. I need to consider the other arguments too. It might be the case that there are arguments that identify benefits which, despite the already identified cost, tilt the net value of actualizing immortality to positive. Only after presenting and analysing all arguments, will I, in section *4.1 – Dealing with PCBA: Is Immortality Desirable?*, conclude about the net value of immortality. It could not be otherwise. In the meantime the PCBA premise present in each argument will function as a ceteris paribus, that is, it will be as if the argument under consideration is the only that exists for the purposes of the cost-benefit analysis. That way I can evaluate singular contributions to the discussion (i.e. arguments) and clearly conclude about the value of each.

2.3 – Arguments Against Immortality

2.3.1 – Death is Normal/Natural Argument

Before starting the analysis, it is necessary to note the richness of meanings that natural and normal have. To add to the problem many authors use the qualifier normal and the qualifier natural interchangeably (e.g. Caplan, 2004). I decided to categorize arguments that used these words in five versions. First, I allocated the word normal to the argument where normal is associated with statistical relevance. Then I decided to use the word natural for the remaining

[17] This is purely to make for an easier reading. I do not wish to take a position on the fact-value distinction debate.
[18] Cost-benefit analysis is just a fancy term to denote the common process of listing cons, called costs (cost is to be understood in the economic sense, not in the financial sense) and pros, called benefits, of something to arrive at a conclusion, called net value. Although this process seems quite ordinary, sometimes people forget about it and arrive wrongly at conclusions. Suppose I want to evaluate the net value of smoking weed. I know that it is bad for my health, but is that enough to conclude that it has a negative net value? Obviously not. I merely identified a cost, but what I need to do is to perform a cost-benefit analysis. I also need to consider benefits such as pleasure and social interaction and other costs such as the morality of breaking the law and monetary costs. The cost-benefit analysis takes all costs and benefits into account and then concludes about the net value. Just merely identifying a cost or a benefit and then claiming something about the net value is wrong, hence the expression cost-benefit analysis.

four versions: natural as human nature, natural as created by god, natural as opposed to artificial, and natural as function.

2.3.1.1 – Normal Version

P1: Death is normal.

P*2: What is normal is good.

C3 (P1+P*2): Death is good.

P4: Immortality eliminates death.

C5 (C3+P4): Immortality eliminates something good.

P6: The good that death provides cannot be replaced by something equivalent or better.[19]

PCBA: Immortality does not provide goods of equal or greater value than the good of death + other incurred costs (lost goods and/or direct costs).[20]

C7 (C5+P6+PCBA): Immortality is not desirable.

P1 – This is a proposition of fact (in contrast to **P*2**). Here the crux is to clarify the meaning normal. By normal, I understand what is standard, usual, ordinary, common. More precisely it refers to events of a certain set that comprise the majority of instances. For example: I can say that it is normal for rain to occur in winter, that it is normal for humans to have two legs, etc. To say that death is normal seems to be, at present, a true statement. As far as we can prove, everybody who was born has either died or, ceteris paribus, is expected to[21] in a very regular pattern. This premise does not imply that death is universal or necessary, it clearly is not (Rose, 2004a contra Dekkers, 2013). Caplan (2004) seems to agree with this premise:

> The belief that aging is a normal and natural part of human existence is reflected in the practice of medicine. For example, no mention is made in most textbooks of medicine and pathology of aging as abnormal, unnatural, or indicative of disease. It is true that such texts often contain a chapter or two on the related subject of diseases commonly associated with aging or found in the elderly. But it is the diseases of the elderly, such as pneumonia, cancer, or atherosclerosis, rather than the aging process itself, that serve as the focus of description and analysis. (…) aging is a common and normal process. It occurs with a statistical frequency of 100%.

Schemer (2013) also cites an author that joins normality and statistical features:

> What counts as normal functional ability is determined by looking at the typical statistical distribution of a biological function among a reference class, which means that normal biological functioning must be defined relative to sex and age (Boorse 1977, 1997). (…) In social terms aging, growing older, is a normal or natural process, in the sense that is happens to everyone (at least in the West).

[19] This is not the same as PCBA, although similar. In PCBA we are appealing to other costs and benefits. Here we are appealing to something that replaces the cost or benefit under consideration.
[20] Henceforth this description of PCBA will be omitted. It is only here to exemplify how it works in each argument.
[21] I am disregarding technical advances such as those who might enable immortality for the sake of argument.

P1A1 – Nonetheless normality is contextual. I can say that it is normal for people born in Oporto to be of Portuguese nationality, but if some time from now, the concept of Portugal, or of nationality, or of Portuguese nationality ceases to exist, or if Oporto becomes sovereign, etc. it will not take much time for that statement to become false. In the same way, death is normal until no longer is. If we become immortal, then the statement: "death is normal" can cease to be true. Death under immortality (UI) is only caused by suicide. UI, for the statement <death is normal> to be true, the statement <suicide is normal> also needs to be true. Here is an example from the literature, (Capron, 2004):

> If normal is used in a statistical sense, as Daniels suggests (…) as normal causes of death in old age become avoidable through routine medical intervention, these conditions would change status. (…) the contours of normal species functioning would now be altered to encompass many more years. (…) Appeals to (…) normal opportunities simply fall apart as life expectancy expands.

P1A1A1 – UI suicide will be normal. Since it is the only way to die, it will be something not uncommon. And if suicide is normal then death will also be.

P1A1A1A1 – Even if UI suicide is the only means to die, that is not enough to classify it as normal. For death/suicide to have the property of normal it needs to be standard, ordinary, common, etc. What if no one chooses to die? Then death is no longer normal. The truth of **P1** hinges on how normal death is UI. But notice that arguing that death is normal UI is denying **P4**, a move discussed in the **P4A1** thread. In any case those individuals who want to die UI will select themselves out of the population. Thus, equilibrium will be achieved when there is a population of people that do not desire to die anymore and where death will no longer be normal. As Sethe and de Magalhães (2013) speculate:

> Ultimately, it is intriguing to speculate that far from having reached its endpoint due to medical technology, evolution by natural selection would come into its own in these futuristic scenarios: Not only will there be strong dispositional selection pressure against those who reject such treatments for ideological reasons, it might well be the case that humanity will undergo a selection where those who can experience the greatest fulfilment from ongoing discovery will choose to live substantially longer, compared to other character types.

P1A2 – Timeframes make the concept of normality weak. What should be the timeframe to consider things normal? One week? One year? One century? Humans are not normal given the history of the universe. But humans are normal in the past few thousand years. What about cars: cars have 120 years only, are they normal? What about a new 100% effective cancer treatment that entered the market a week ago and achieved an astonishing adoption rate? What if a great deal of people have bought the new Nutella flavour during the past 10 minutes? Is it normal? The timeframe chosen to evaluate the normality of something can produce different results, and there seems to be no reason to choose one timeframe vs another.

P1A2A1 – It is still the case that every timeframe backwards looking has death considered as normal.

P1A3 – Specificity makes the concept of normality weak. Let us say that there are groups of 10 balls with numbers 1 to 10. Nine balls are grey, and one is blue. I can say of a random ball that is normal for it to be grey. However, the same does not apply if I add conjunctive descriptors, e.g. to be grey and have the number 4. It seems that as we add more conjunctive descriptors normality fades away. Likewise, even if death is normal, death by murder, or death by shotgun, or death by impalement, and so on are less so. The argument then is: perhaps there is a more general class of phenomena of which death is but a subset – the word death containing subsumed various descriptors. If this is the case, then from this point of view death is not normal in the same way that a number 4 grey ball is not.

P*2 – This is a proposition of value (in contrast with **P1**). The meaning of normal was expanded on the commentary about **P1.**

P*2A1 – It is highly doubtful that normality offers a criterion for goodness. One can straight on accuse this premise of being a form of appeal to popularity. Although this is not the typical: because many people think that A therefore A must be true; it is something closely related: because A happens frequently A must be good. If it does not hold for matters of fact it should not hold for matters of value.

P*2A1A1 – Matters of value and matters of fact are in different spheres so the comparison does not hold.

P*2A2 – Hindsight makes this premise weird. Slavery, women without a vote, wars with swords, death by bacterial infections, were all once considered normal. We also largely do not consider these things good at the present. So, to conserve this premise one must hold that these things were good in the past but are no longer good in the present (and might be good again in the future). That the same exact event is good or bad in different periods is a weird notion. Perhaps one ought to say that high infant mortality rates are *only* bad because we are in the XXI century. Were we five centuries before they would have been good. That strikes me as something hard to swallow. How can the same behaviour be good at a certain moment but not good at another, if the only difference is that there are people in Mars doing it differently?

P*2A2A1 – ☩.[22]

[22] Remember this symbol means: personal incredulity, even if widespread does not provide ground to reject the premise. Other cultures or value systems might think differently. No more notes will be made henceforth.

P*2A2A1A1 – But if it is normal for people to not consider an event good, and if it is normal for that event to happen, then is the event good or not? There seems to be a contradiction.

P*2A2A1A1A1 – The event is normal and therefore good. *Saying* <the event is bad> is normal and therefore also good. But the event and the saying are not the same thing. The event and the saying are both good. It is just a coincidence that the saying involves denying the goodness of the event.

P*2A3 – It amounts to too much, i.e. there are things that are not normal that we consider good. For example, why is it that having sex during the night good, but not during the day?

P*2A3A1 – Although the premise states that which is normal is good, nothing is stated regarding non-normal things. So, sex during the morning can also be good even when this premise is stated. For a counter one needs to find something normal and considered not good, as in **P*2A2** or **P*2A7**.

P*2A4 – It is against common sense. Suppose we start to *frequently* kill children for no reason. According to this premise this behaviour should be catalogued as good. However, this will be a hard sell. If something is bad, by definition, we should want less of it. But this premise states that if a bad thing gets performed enough times it suddenly becomes good which runs contrary to common sense. Take for example this view applied to old age from Schermer (2013):

> Certain functions may decline with aging, but if they decline in most elderly people, it is statistically normal for the reference class and therefore not pathological. (Boorse 1977, 1997)

And the equivalent to the argument made here (**P*2A4**) by Hartogh (2013):

> It is sometimes suggested that such disabilities do not belong to the medical domain, because they are the result of a statistically normal process of physiological aging. But the diseases which cause them may occur at any age, although as a result of the 'cascade' process they are most characteristic of old age. It makes no sense to count them as medically classified diseases at other ages, but not at old age, because at that time they occur more often.

It is true that my example of killing children and that of dying can be said to have a wedge: agency. It seems that killing children requires agency, while dying does not. I do not think this is a problem. I assume as argued in *1.4 – Desirability vs Feasibility*, that immortality is feasible, making dying also a matter of agency. See also *2.4.1 – Optionality Argument*.

P*2A4A1 – If something once considered bad starts to get performed frequently, then it is because society's values changed, and it is no longer bad. Take for example divorce.

P*2A4A1A1 – The change from bad to good usually causes the normality of the behaviour not the other way around.

P*2A4A2 – ⏚

P*2A5 – Since this premise also appeals to the concept of normality, we can prima facie apply **P1A1**, **P1A2** and **P1A3**. I do not think **P1A1** is much of a problem to this premise since as it is stated in **P*2A2**, it only means that good is a time/period/context sensitive property. **P1A2** applies, mutatis mutandis, to **P*2**. And the first part of **P1A3** also applies: every instance of something normal can be subject to the addition of enough descriptors until no longer is.

P*2A6 – The premise is contradictory. If we argue that change is normal,[23] then adding **P*2** results in <change is good>. However, by following **P*2**, change will never happen, because the most performed behaviour will be the good one. So, we have two mutually exclusive and complementary exhaustive options that are both considered good. Should we perform the same behaviour because it is normal and therefore good, or perform a new one because it will drive change and therefore also good? Particularly, wanting to postpone death seems to be normal, since it has been happening throughout human history. It is a theme present in the most ancient literature, the Epic of Gilgamesh, and the after-life is an important feature in most (if not all) religions. Post and Binstock (2004) list some attempts at reversing aging through history:

> Perhaps the oldest written record of attempts to reverse aging is in an Egyptian papyrus, circa 1600 B.C., which provides instructions for preparing an ointment that transforms an old man into a youth of 20 and claims that it has been "found effective myriad times" (quoted in Hayflick, 1994, p. 267). Through the centuries, a variety of anti-aging approaches have recurred. Among them have been alchemy, the use of precious metals (e.g., as eating utensils) that have been transmuted from baser minerals; shunamatism or gerocomy (cavorting with young girls); grafts (or injected extracts) from the testicles, ovaries, or glands of various animal species; cell injections from the tissues of newborn or fetal animals; consumption of elixirs, drugs, hormones, dietary supplements, and specific foods; cryonics; and rejuvenation from devices and exposure to various substances such as mineral and thermal springs and the classic Fountain of Youth that the governor of Puerto Rico, Juan Ponce de Leon, searched for in Florida in the early sixteenth century (Hayflick, 1994; Cohen, 2000; Gruman, 2003).

Curiously, Francis Bacon was also a supporter of immortality, as stated by Post (2004):

> Francis Bacon, a founder of the scientific method, in his millennialist and Utopian essay "The New Atlantis" (1627), set in motion a biological mandate for boldness that included both the making of new species or chimeras, organ replacement, and the Water of Paradise that would allow the possibility to "indeed live very long" (Bacon, 1996) (…) At the end of "The New Atlantis," Bacon lists more specifically among the goals of science "the prolongation of life, the restitution of youth to some degree, the retardation of age," along with "making of new species, transplanting of one species into another" (1996, p. 481).

P*2A7 – There is at least one normal event that people largely do not consider good. If it exists it is sufficient to counter **P*2**. Overall (2003, 213-214) presents several of them:

> (…) it is at least premature to suppose that what is "normal" now for some statistically average old person should constitute the norm for determining the allocation of health-care resources. Suppose, for example, as Jecker suggests, that a means could be found that is both inexpensive and virtually unlimited to sustain memory functioning in extreme old age. "On Daniels' analysis, such treatment is not important, because normal species functioning in

[23] I would guess most historians would agree. The study of history would not make sense if there was no change.

> extreme old age does not include clear and vivid recall. Moreover, memory loss does not diminish the age-relative normal opportunities of someone who is, say, ninety years old, since the opportunities a sound memory affords are not normally available to the very old. Consequently, government would not be under a strict obligation to make such treatment available to the elderly, for example, by reimbursing it under Medicaid and Medicare programs. This is so, even if the treatment in question were extremely cheap and abundant. (Jecker 1989, 667–668)" As Jecker (1989, 668) points out, such an approach seems unjustified "because normal functioning can be sorely inadequate," and hence altering what is currently considered to be normal species functioning could be a requirement of justice. Societies already accept this principle when they devote research time and money to developing improved hearing aids and eyeglasses, as well as surgical alterations of the eyes and ears, all of which mitigate the "normal" age-related decline in hearing and sight.

P*2A7A1 – ⏚

C3 – I do not think that **C3** holds. **P1** cannot be refused by **P1A1** or **P1A2**. **P1A3** poses some problems that can perhaps be solved with a more precise definition of normality. When it comes to **P*2**, both **P*2A1** and **P*2A3** fail. Both **P*2A2**, **P*2A4** and **P*2A7** only go as far as to show that western culture[24] will have a hard time accepting **P*2**. But even if all the peoples in existence (even considering those who existed but no longer are) did not support **P*2**, that would not be grounds, I think, to discard it[25]. **P*2A5** poses some problems but as with **P1A3**, they are perhaps mendable by providing a more precise definition of normality. Lastly **P*2A6** does successfully allow for the refusal of **P*2**.

For what follows let us grant **C3** for the sake of argument.

P4 – As discussed in *1.2 – What is Immortality?*, UI only involuntary death is eliminated.

P4A1 – Death is not eliminated UI**.** It still exists as a possibility through suicide. Therefore, if the good of death relies on voluntary death, the goodness of death is preserved.

P4A1A1 – The parent object lacks charity. What this premise really entails is either: that immortality eliminates *the* part of death that is good, or that it eliminates *a* part of death that is good. The only difference between these claims is the value of the death that is not eliminated (the voluntary one): unknown in the former, good in the latter. It suffices to consider which is common to both claims: the part of death that is eliminated UI – non-voluntary death – is good.

P4A1A1A1 – C3 does not state that non-voluntary death is good, it only states that death is good. And even if we try to reformulate **C3** we hit a roadblock since **P*2A5** (**P1A3**) tells us that adding descriptors weakens the normality/goodness.

[24] I use the term western culture to denote common values of the present western developed world (e.g. Human Rights). Unless something is said explicitly, I do not want this expression to be understood as judging (negatively or positively) said values.

[25] I understand that I am assuming a metaethical position here. I will expand on that in *4.2.2 – ⏚ and the Burden of Proof.*

P4A1A1A1A1 – Even if non-voluntary death is a descriptor up from death simpliciter, non-voluntary death still passes the threshold of normality. Therefore, to correct the argument, **P1** only needs to be changed to <non-voluntary death is normal>.

C5 – Considering the modification referred to in **P4A1A1A1A1**, because death is good, and UI non-voluntary death is eliminated, then immortality eliminates something good.

C5A1 – Because the good of non-voluntary death is based on it being normal, if it is eliminated, then it no longer is normal and therefore no longer is good based on **P*2**. UI nothing good was eliminated, because by the mere fact of involuntary death ceasing to exist it will no longer have the property of normality and thus goodness, i.e. the sentence <something good was eliminated> is false.

C5A1A1 – Although the sentence <something good was eliminated> is false, the sentence <something that was good was eliminated> is true.

C5A1A1A1 – The same objections of **P*2A2** apply. For clarification, the issue is not that people in the past had a different conception of what is considered good than people of today. The issue is that this argument states that the behaviour having the property of goodness is context sensitive, not that the value system changes.

P6 – Tries to evaluate if there is something that can replace the lost good, for something similar, or with similar effects. It asserts there is nothing capable of replacing what is lost.[26]

P6A1 – Individualistically nothing is lost since one can voluntarily express desire to die like in the old days. Installing a device with a lethal substance that triggers based on an algorithm that mimics the rates/probabilities of death according to a great number of variables (be it time, long-term behaviour, short term behaviour, etc) will result in a death exactly like in the old days but voluntarily wanted. Not desiring immortality is the same as a voluntary claim to want to die as in the old days as is discussed on *2.4.1 – Optionality Argument*.

P6A1A1 – The good of death does not come from individualistic considerations, but from a social standpoint. For the individual person it is not normal to die, we can only tell that it happens once. From the point of view of a population death of the non-voluntary kind is indeed normal. Therefore, the possibility of individuals choosing to die UI like in the old days is not enough to replace the good lost. Only if everyone chooses to die voluntarily is there a replacement, but that means immortality would have no pragmatic effect. Besides, as argued in **P1A1A1A1** equilibrium will be achieved once there are only individuals who do not desire to die, so it does not seem likely that UI people would want to continue business as usual.

[26] See note 19.

P6A2 – Because the good of (non-voluntary death) is based on it being normal, if it turns out that it is eliminated, then another thing will fill the void and be the new normal. Therefore, a perfect replacement would obtain. This is not the same argument made in **C5A1**. Here it is stated that a new something will inherit the property of normal, while in **C5A1** it is stated that involuntary death will lose the property of normal.

PCBA – Since this is the first time this premise appears I will expand a bit. So far **C5** grants us a cost, but deciding something based only on one cost, or even based solely on costs is a mistake. One needs to take into consideration the net effect after all costs and benefits have been accounted for. This is in essence answering the question <is immortality desirable?> It will make sense to discuss the question only after presenting each argument, so the answer is only presented in *4.1 – Dealing with PCBA: Is Immortality Desirable?*. As I stated in *2.2 – Notes of Interest* in each argument this premise, PCBA, will act as if no other arguments existed, in other words, it adds a ceteris paribus. The benefits are twofold: it allows us to isolate the evaluation of this argument, and serves as a reminder that whatever we conclude about this particular argument might be overruled when considering the other arguments. Therefore, **C7** is arrived at within a very restricted framework – it discards, a priori, every other argument. Henceforth, no more considerations will be made about PCBA.

C7 – Although **P6A1** fails, **C7** does not hold because **P6A2** allows for its refusal.

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Verdict: FAIL

Arguing that something is good if it is normal comes with unescapable traps. **C3** does not obtain because it seems normal for humans to avoid death (**P*2)**, and that UI death will no longer be normal (**P1). C5** also fails because UI death is no longer normal. Lastly, **C7** fails, because a perfect replacement occurs.

2.3.1.2 – Human Nature Version

P8: Non-voluntary death is natural.

P*9: What is natural is good.

C10 (P8+P*9): Non-voluntary death is good (and eliminating it is bad).

P11: Immortality eliminates non-voluntary death.

C12 (C10+P11): Immortality eliminates something good (and creates something bad).

P13: The good that non-voluntary death provides (and the bad that immortality creates) cannot be replaced by something equivalent or better.

C14 (C12+P13+PCBA): Immortality is not desirable.

P8 – Here natural means what is according to human nature, some property or properties characteristic of what it is to be human. Unlike normality which has no fixed standard – it just picks whatever is statistically relevant – naturalness seems to claim a fixed standard independent of what is common at the time. Callahan (2003, 136-137) [27] puts it better:

> We will need to know what ought to count as "normal" (…). For those purposes we will have to resist the implications of the modernizing view of old age, which would deliberately make it an unending frontier, constantly to be pushed back, subject to no fixed standards of "normal" at all. (…) We require an understanding of a "normal opportunity range" that is not determined by the state-of-the-art of medicine and consequently by fluctuating values of what counts as a need. "Need" will have no fixed reference point at all apart from a technology-free (or nearly so) definition. Where Daniels uses the term "normal" in a statistical sense, it should instead be given a normative meaning; that is, what counts as morally and socially adequate and generally acceptable. (…) Such a life can be achieved within a certain, roughly specifiable, number of years and can be relatively impervious to technological advances.

The intersection between human nature, and ageing/death is what some call the lifecycle or the rhythm of life: the belief that human life has a certain progress to it, from birth to childhood to adolescence, then adulthood, followed by the third age and finally death. Schermer (2013) referring to Kass writes:

> Growing older is also embedded in our ideas about the human life cycle and about specific stages of life. As it is phrased in a report of the President's Council on Bioethics: "Aging is not just about old age. It is a crucial part of the nearly lifelong process by which we reach old age ... . its product is... . the life cycle itself: The form and contour of our life experienced in time"(President's Council 2003, p. 208).

P8A1 – Hindsight makes this concept weird. If the natural life cycle concerns today's life expectancy, then people in the past had to cope with their too short unnatural lifecycles. And in the future, if we do not stop, we will have to cope with too long and unnatural ones. But were we, at the time of writing, lucky to be born just at the right time, where the lifecycle is just perfect? Were those people in the past deluded by believing their lifecycle was the natural one? If so, maybe we are deluded too and those in the future will know better. Why should we believe that we have *the* natural lifecycle? The answer seems to be that people adapt their concept of the lifecycle as life expectancy grows. So, the lifecycle has its roots on what is expected, and not on some fixed natural properties. As Capron (2004) [28], states:

> Callahan thinks that normal "should instead be given a normative meaning; that is, what counts as morally and socially adequate and generally acceptable." Yet the standard of a natural life span, which is based on passing through certain important biographical stages that together make up a whole life, is itself subject to expansion even within the rationale

[27] Note that the author uses the word normal for this argument whereas I use the word natural. See notes 28, 30, 33, and 34 for examples where, for this same argument, the word natural is used instead.
[28] Cf. footnote 27 – The author uses various times the word natural.

> Callahan provides. There is no reason to say that a person who was born in 1875 and lived to the point of average life expectancy did not live a natural life span in the biographical sense employed by Callahan. If a hundred years hence average life expectancy were 150 years for adults, there is every reason to think that appropriate adjustments would have been made in people's thinking about what constitutes each of the life stages, with a concomitant lengthening of the natural life span. (…) appeals to a natural life span or normal opportunities simply fall apart as life expectancy expands. The tolerability of death in Callahan's terms is always relative to cultural expectations

Overall (2004) presents us with a similar approach, expanding it:

> But what is a full life? Callahan claims that it is an existence in which "one's life possibilities have on the whole been accomplished" (1987, p. 66). Yet one's life possibilities might well mean one thing under the current life expectancy and something else rather different with a longer life expectancy and a greater maximum life span (…) if our lives become increasingly long, then the concepts of "one's life work" and "one's moral obligations" are likely to change and their dimensions to expand. It is an error, the fallacy of begging the question, to make use of the limited parameters set by current life expectancies in order to argue against increasing human longevity. (…) it is also likely that as lives get longer, the scope of individuals' goals will become greater, and people will play a variety of working roles during their lifetimes. Generally, our ideas of what we are capable of taking on will evolve and develop. As they do today, people will undertake new tasks, projects, and interests at different life stages, but if those life stages are longer, then the range of tasks, projects, and interests can become broader (…) Responsibilities may last longer; the nature of the responsibilities may change; and one may acquire and then discharge responsibilities at various points in a longer life. Once again, to assume that current social and moral exigencies—defined by Callahan in a limited fashion as responsibility for one's immediate biological children (1987, p. 69)—delineate the outward limits of what human beings should expect and do is to beg the question.

P8A2 – The concept of human nature is contested. There is, to my knowledge, no scientific experiment where it was consistently observed.

P8A2A1 – For the purposes of the argument this is not needed, we just collapse **P8** and **P*9**, and state directly that the concept of human nature that the authors allude to is the one that is good, regardless if there is a fixed human nature in the grand scheme of things. In essence we would skip **P8** and state directly that the current life cycle is good.

P8A3 – This can be considered an extension of **P8A1**, but I thought it deserved special attention. I believe it is very revealing when even one of the proponents of the concept of a natural lifespan cannot fix its value. Straight from the horse's mouth (Kass, 2004)[29]:

> Some, of course, eschew any desire for longer life. They seek not adding years to life, but life to years. For them, the ideal life span would be our natural (once thought three-, now known to be) fourscore and ten, or if by reason of strength, fivescore, lived with full powers right up to death, which could come rather suddenly, painlessly, at the maximal age.

According to Kass, in the past the natural life span was thought to be ~70 years. We now know, *because it expanded*, that it is ~90y, and perhaps even ~100y, according to the same author. But what stops us from reaching the age of 120, 1200, or 12K years and say something equivalent at that moment? What is special about ~90/100y? If our hindsight tells us something

[29] Note that the author is not referring to lifespan as defined in *1.7 – What is Aging?*, but instead to life expectancy.

is that we have no foresight whatsoever to what constitutes a natural life span. Had people followed on advice that ~70 years was the natural life span to oppose its extension to ~90/100y and we would not have known the *natural* life span according to Kass. The same can happen again, so there is no justification to say that ~90/100y is enough. There is absolutely no credibility to the claim that a certain life span or lifecycle is the natural one. Just as in **P8A2**, the natural lifespan seems malleable (Ehni, 2013):

> After having reached a certain age people have made all experiences that were useful to a certain character. But even if this were true, which is again based on a very doubtful and thin empirical basis, new interventions into aging might also change this alleged aspect of the human life cycle.

P*9.1 – This premise states that human nature has grounds for normative value or considering **P8A2A1**, that the current lifecycle is good and changing it is bad. There are plenty of examples in the literature of authors supporting this:

Dekkers (2013)[30]: "I sympathize with Callahan's notions of 'natural lifespan' and 'natural death' and with his argument that "medicine should be used not for the further extension of the life of the aged, but only for the full achievement of a natural and fitting lifespan and thereafter for the relief of suffering" (Callahan 1987, p. 53)."

Binstock (2004a): U.S. bioethicist Leon Kass, chairman of the President's Council on Bioethics, appointed by President George W. Bush in 2001, rejects the goal of arrested aging and virtual immortality—as well as the goal of decelerated aging—on philosophical grounds. He believes that "the finitude of human life is a blessing for every human individual, whether he knows it or not" (Kass, 2001, p. 20).

Capron (2004): The critics perceive a problem, nonetheless, and that is the ambition to achieve a "full escape from the grip of our own nature" in the drive to render people "better than well." (…). In Kass's view, the problem is the very desire to escape what is inescapably human (…). After a person has lived out a natural life span, which Callahan suggests occurs by the late seventies or early eighties, medical care should no longer be oriented to resisting death but to the relief of suffering. (…) Others argue that life extension is an inappropriate goal for medicine and that a lengthening of life violates the natural order and the ethical dictates that derive therefrom. (…) These grounds for rejecting increased longevity share a sense that the current life span is acceptable and that efforts to lengthen it are wrong because they are, in effect, part of a larger project of seeking perfection and, specifically, immortality.

Caplan (2004): Philosopher/physician Leon Kass (2002), the political theorist Francis Fukuyama (Fukuyama, 2002), and the theologian Gilbert Meilander (2002) argue that the extension of life should not be pursued because lengthening life is not consistent with human nature. It is "unnatural" to extend human lives beyond the proverbial three score and ten that the demographers assure us is what the average citizen of an economically developed nation can expect. (…). They maintain that it is unnatural to live much longer than we now do. Of course, to make this argument hold, they must show why the extension of life is unnatural. Or to put

[30] Cf. footnote 27 – Note the use of the word natural.

the point another way, they must be able to show that aging and senescence are both natural processes and, as such, intrinsically good things.

Post (2004): (...) anti-posthumanists caution us to accept the existing contours of human nature as the gift of evolutionary or divine wisdom. (…) Kass for the most part accepts biotechnological progress within a therapeutic mode; his issue is chiefly with efforts to enhance and improve upon the givenness of human nature. (…) Human nature, the gift of millennia of evolutionary selection, should be approached with respect rather than with disregard. Our attitude should be one of working with our human nature to get the best out of it, rather than one of cavalier dominion in an effort to re-create what is already good. Better to accept natural limits—or so, anyway, is the spirit of anti-posthumanism.

Overall (2003, 30, 38): Apologists believe not only that our current life limits have a basis in biology but also, just as important, that they have moral significance. (…) Neither the human species as a whole, nor most individuals, need more than the present average life expectancy in the developed countries (the mid-seventies to low eighties) for a perfectly satisfactory life. This idea of a steady-state life expectancy at its present level would establish, happily, a finite and attainable goal: "Enough, already." (Callahan 1998, 82, his emphasis). Callahan (1996, 442) refers to the late seventies or early eighties as constituting a "natural life span." He concludes that society should not use its common resources to extend life, for "the present average life expectancy in the developed countries has proved perfectly adequate for most people to live a full life and for those countries to flourish economically and intellectually."

P*9.1A1 – P8A1 applies here. Hindsight makes this concept weird. As Overall observes (2003, 35-36), regarding both the past and the future:

> We are fortunate that medical scientists in the previous two centuries were not persuaded by the supposed normative force of earlier human life-span limits.(See **P8A3**) What is now normal and natural for the human life span does not, of itself, necessarily imply anything about the desirability of or justification for prolonging human life, either for individuals or as a matter of policy (…) we do not yet fully comprehend what is possible from those who are enabled to live healthy longer lives. Nor do we know what human lives would be like if they were not inevitably structured by "stages" replete with an ideology of expected decline.

Both Overall (2003, 47) and Capron (2004), respectively, state that natural is not some fixed property but something based on expectations:

> It may well be that human beings have adjusted, and continue to try to adjust, their life strategies and goals to fit within the life span that they can reasonably expect. Our lives are satisfactory because, of necessity, we circumscribe them to fit the limits set by the current average life span. But this fact, if it is a fact, tells us nothing about what human beings might aspire to and might legitimately hope to experience, enjoy, and achieve if they were to have the opportunity of living longer.
>
> If Daniel Callahan's "natural life span" and Norman Daniels's "normal species functioning" do not work as devices to resolve questions of interpersonal equity in a world of greatly prolonged lives, then basing the good on that which is "natural" presents an even more severe problem when the changes one opposes could alter what is experienced as a natural life. Thus a first and easy objection to critiques based on current experience is that they amount to nothing more than objections to change as such. Kass dismisses the suggestion that his position rests on rejecting all of medicine as unnatural. Yet if medical artifice produces a future world populated by millions of people who live as long as Jeanne Calment, the French woman who was 122 when she died in 1997, might not the residents of that world regard their longevity as being as natural as we regard ours?

The answer seems to be a clear yes as Caplan (2004) explains:

> Have we adjusted to changes in the life span in the past in our species such that longer lives are viewed as better lives? The answer to that question if one compares life for, say, the ancient Hittites, Hebrews, Greeks, and Romans and life for Americans or Italians or Japanese today would seem to be yes (…) Few, in other words, would trade their longer life span for the much shorter lives lived by their ancestors thousands of years ago.

To put it more broadly, as Juengst (2004) states:

> Social, technological, and biological dimensions of the typical human life story have been rewritten continuously over our species' history without diminishing the moral status of those people whose lives have been made possible by that evolution.

Note that by not denying life expectancy improvements of the past[31] there is no reason to deny them now, because in the future we might learn that we had not had the perfect lifecycle after all. And due to this impasse Capron correctly concludes that this argument is deep down an argument against change[32]: since it is assumed that our lifecycle is perfect any deviation is not welcome. That our lifecycle is the perfect one is against all odds.

P*9.1A1A1 – Callahan answers by pointing out that, even if when we look to the past we see that that the standard was not good enough, the same will not happen when we look from the future to the present. That is so because we now live longer and are better off than in the past. In the words of Overall (2003, 36):

> He writes that it risks two errors: The first is to think that what was appropriate in the past remains equally appropriate in the present. Precisely because we made those past advances, we can now afford to think about changing our priorities; we are now far better off (Callahan 1990, 121).

P*9.1A1A1A1 – I do not see why Callahan's reasoning cannot still be applied to the future when looking to the present.

P*9.1A1A1A2 - Overall (ibid.) considers Callahan's answer insufficient: "an adequate case must be made for the changing of priorities."

P*9.1A1A2 – Callahan has another argument. That it is more difficult for science to advance now than in the past. (ibid):

> The second error is to believe that the future must always repeat the past, that because we were successful earlier with one group of diseases, we will be equally successful with another... We have now, in general... entered the era of chronic disease and illness as well as conditions associated with advanced old age, and they are proving far more resistant to conquest. (Callahan 1990, 121)

[31] Capron (2004): "During the last century, average life expectancy increased by 40–50 percent without provoking ethical debate or even after-the-fact ethical handwringing."

[32] Note a difference between this opposition to change in comparison with the <normal version argument>. People two centuries ago if using the normality criterion would oppose change in the lifecycle in relation to their standard. But, if using the human nature criterion, change would be accepted in order to attain the present lifecycle standard, the one considered good.

P*9.1A1A2A1 – Note that Callahan is mixing questions of feasibility with questions of desirability that should not be mixed as stated in *1.4 – Desirability vs Feasibility*. Besides, as seen in *1.8 – Delving Deeper into Aging*, scientists are not considering a matter of <if> but one of <when> regarding continuous advances to the length of life-expectancy.

P*9.1A1A2A2 – The answer that Overall provides amounts to a <you do not know>:

> The response to Callahan's second alleged error is just that we cannot know, now, that the scientific future will not be like the past and that researchers will no longer be successful in combating chronic diseases and illnesses associated with old age.

P*9.1A1A3 – Callahan and others make their arguments in relation to resource allocation in the healthcare system. Their arguments are being taken out of context. Lange (2013)[33]:

> Callahan uses "age as a specific criterion for the allocation and limitation of healthcare" by denying publicly financed, life-extending healthcare to persons who have lived out a natural lifespan. Although no precise chronological age can be set for determining when a natural lifespan has been achieved, it will normally be expected "by the late 70s or early 80s" (Callahan 1987, p. 171).

P*9.1A1A3A1 – I explained in 1.5 – Proxys for Discussion that direct discussions about immortality are scarce and thus this work will scavenge for arguments from proxy discussion, even if they are not directly about immortality, to see how far they go when applied to immortality. In any case, following Callahan's criteria will amount to not achieving immortality, so the argument is not taken out of context.

P*9.1A1A3A2 – The critique is still valid. As we have seen, the problem is not the implications to the healthcare system, but the premises that these authors use. As Holm (2013)[34] points out:

> Daniel Callahan has for many years argued that aging, and 'the natural lifespan' that follows from aging has implications for what claims people ought to make of the healthcare system (Callahan 1987). Whether or not we agree with the specific implications Callahan draws from his 'natural lifespan' idea, it is undoubtedly worth noticing that many of his opponents do not criticise the specific implications but criticise the basic idea that aging or a natural lifespan could have any ethical implications (see for instance Cutas and Harris 2007).

P*9.1A1A3A3 – In any case arguments about opportunity costs[35], as his Callahan's, are described in *4.2.1 – Opportunity Costs: How much desirable?* and dealt with in later sections.

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[33] Cf. footnote 27 – Note the use of the word natural.

[34] Cf. footnote 27 – Note the use of the word natural.

[35] Opportunity costs (OCs) are an important economic concept and are usually unappreciated by the layman. An OC is a cost that represents the lost net benefit of the best alternative use of resources. For example the cost of opportunity of enrolling in a PhD can be, for example, all the professional experience and income differences that one would gain if instead pursued a corporate career. The OC of buying nuclear submarines can be the increase of university professors' salary and the opening of new positions. Whatever the best alternative opportunity not chosen is, has its net benefits listed as a cost in the cost-benefit analysis. OCs are useful because they allow us to avoid suboptimal decisions. Suppose that I ignore them and conclude that X has a net value of 4, should I pursue X? No, because there might be better alternatives. Suppose Y is an alternative with a net value of 7. If we come back to our evaluation of X and incorporate OCs the net value of X is now 4-7=-3, a negative value, while the net value of Y is now 8-4=4. It is clear that we should pursue Y, even when we conclude that X had a net positive

P*9.1A2 – Human nature, if it exists, seems to have a component of death avoidance, as Geddes (2004) states: "the preference for life appears to be a universal throughout human culture. It is near universal for humans to celebrate birth and lament death". So, if avoiding death and dying are both part of human nature, where does that leave us? Should we take seriously the scientific endeavour to tackle death once and for all, or should we stop it and also act contrary to human nature? This argument is similar to **P*2A6**.

P*9.1A2A1 – But UI suicide is the only way to die, something clearly not natural.

P*9.1A2A1A1 – UI people are not required to die. Even if suicide is an option they can ignore it like they do today's.

P*9.1A2A2 – There is a need to drop the concept of human nature and leave only the current lifecycle as good to avoid such contradictions, a manoeuvre similar to **P8A2A1**.

P*9.1A3 – Aging is a disease and thus something contrary to human nature. Aging being a disease is an issue that would merit is own argument. I will be brief with my discussion here. It seems that aging meets whatever definition of disease one puts forward.

Caplan (2004): If one accepts the relevance of the five suggested criteria [for employing the term organic disease], aging as a biological process is seen to possess all the key properties of a disease. Unlike astigmatism or nervousness, aging possesses a definitive group of clinical manifestations or symptoms; a clear-cut etiology of structural changes at both the macroscopic and microscopic levels; a significant measure of impairment, discomfort, and suffering; and, if we are willing to grant the same tolerance to current theories of aging as we grant to theories in other domains of medicine, an explicit set of precipitating factors. (…) Aging has all the relevant markings of a disease process. (…) The explanation of why aging occurs has many of the attributes of a stochastic or chance phenomenon. And this makes aging unnatural and in no way an intrinsic part of human nature. As such, there is no reason why it is intrinsically wrong to try to reverse or cure aging.

Freitas (2004): According to the volitional normative model of disease that is most appropriate for nanomedicine, if you're physiologically old and do not want to be, then for you, oldness and aging – and natural death – are a disease.

Schermer (2013): Andrew Twaddle (…) gives the following definition: Disease is a health problem that consists of a physiological malfunction that results in an actual or potential reduction in physical capacities and/or reduced life expectancy. (…) Gerbrand Izaks and Rudi Westendorp, who are both physicians and biomedical researchers, claim that many doctors mistakenly belief that aging is not a disease and that they wrongfully attempt to separate pathological aging from normal aging. They state that normal aging cannot be separated from pathological aging: Aging is the accumulation of damage to somatic cells, leading to cellular dysfunction, and culminates in organ dysfunction and an increased vulnerability to death" (Izaks and Westendorp 2003, p. 6).

value on its own. Afterall Y is worth 7 compared to only to the 4 of X. Thus any cost-benefit analysis should also include as a cost the net value of the best alternative use of resources, i.e. OCs.

Dekkers (2013): Terms such as ‘pathology’, ‘faults’, ‘defect ‘and ‘damage’ reflect that aging can be considered a pathological process which must be approached from a disease model.

de Magalhães (2004): A disease, any type of disease, is a time-dependent change in the body that leads to discomfort, pain, or even death. (…) Aging is a sexually transmitted terminal disease.

P*9.1A3A1 – One can argue against the concept that aging is a disease by stating that its cure is instead an enhancement Chapman (2004), and Schermer (2013), respectively:

> Efforts to engineer longer life cannot be justified as a potential contribution to improving health status or relieving suffering. Instead such initiatives would be akin to other types of prospective enhancements, that is, non-disease-related interventions intended to improve normal human characteristics.
>
> If aging itself is a disease, it is a legitimate target for medical intervention. If, on the other hand, aging is understood as normal and natural, interventions to slow or stop aging will be characterized as enhancements, interventions that go beyond therapy. As mentioned, a significant part of the public holds the assumption that treatment is always good, whereas enhancement is morally suspect.

It seems that the criteria to classify aging a disease, or its cure as an enhancement is predicated on what is expected or considered to be normal/natural as Caplan (2004) states:

> The perception of biological events or processes as natural or unnatural is frequently decisive in determining whether physicians treat states or processes as diseases (Socarides, 1970; Illich, 1974; Goldberg, 1975). One need only think of the controversies that swirl around allegations concerning the biological naturalness of homosexuality or schizophrenia to see that this is so.(…) What does seem to differentiate aging from other processes or states traditionally classified as diseases is the fact that aging is perceived as a natural or normal process.

And Olshansky and Carnes (2004) say that “aging is not an unnatural disease but is instead a natural by-product of survival extended into the post-reproductive period of the life span”. The problem is that considering something a disease needs to be supported by normative claims. By defining something as a disease it is already implicit the desire to change that state. As such claiming that aging is a disease is not a good argument against **P*9.** Disease already carries the meaning of being undesirable – employing the label assumes what it is trying to prove, that curing aging is desirable. Sethe and de Magalhães sum it perfectly: “Should we consider aging a disease?” is essentially asking “Should aging be cured?”

P*9.1A3A1A1 – Perhaps there is a way around the problem. If even aging is not a disease, it is a direct cause of disease (something considered undesirable) and as such it should be targeted by medical intervention. Here are some authors supporting this position:

Juengst (2004): Even those who are most concerned with resisting the medicalization of normal aging readily agree that the professional mandate of medicine includes combatting the maladies that plague old age (…) The critics appear not to have noticed, however, that allowing the debate to be framed in this way is fatal to their cause. As long as decelerated aging and disease prevention are two sides of the same coin, the life-extending effects of such interventions will always be eclipsed by the medical obligation to prevent disease, effectively deciding the

question of the intervention's medical appropriateness. (…) As long as the underlying aging processes are understood as the major risk factors for the morbidities of aging, those processes become rational targets for preventive interventions aimed at forestalling the maladies in question. Just as it makes sense for public health officials to attempt to prevent the behaviors that put people at risk for human immunodeficiency virus infection whether or not they are considered healthy in themselves, it does not matter for medicine whether the underlying mechanisms of aging in humans are pathological in themselves.

Schermer (2013): Even if aging itself is not claimed to be a disease, it is said to be 'characterized by a broad spectrum of disease' (Gems 2011).

Miller (2004): Aging, whether it is considered a disease or not, is the root of (nearly) all late-life illnesses.

Post (2004): While I do not think that aging is a disease, it is a process that creates so much susceptibility to disease that it can be approached by researchers with therapeutic intent (Post, 2000). Here therapy and enhancement merge and become one and the same thing.

P*9.1A3A1A1A1 – But even if curing aging solves health problems, there still is room to be against such intervention (Juengst, 2004):

> Anti-aging interventions cannot be part of human health care, because aging is constitutive of what it is to be human. On this view, anti-aging interventions may well address health problems, but they cannot do so without sacrificing patients' identity as authentic human beings (Kass, 2001).

The normative claim is that curing aging is against human nature, so claiming that it is a disease, or that it will help cure some, misses the point, since it does not address the claimed fact of aging being a part of human nature, whatever that is (see **P8A2**). Even if curing diseases is considered desirable, the critics just point that doing it through curing ageing is not acceptable: it is better that people die with diseases they do not want, than to have people not age, because they would be stripped of their label of human.

P*9.1A3A1A1A1A1 – A quick search on the google dictionary for the word human gave back the following result. "Relating to or characteristic of people or human beings; of or characteristic of people as opposed to God or animals or machines, especially in being susceptible to weaknesses. Synonyms: mortal, flesh and blood, fallible, weak, frail, imperfect, vulnerable, susceptible, erring, error-prone, physical, bodily, fleshly." It is conceded that the label human would be lost in this sense. However, one has to wonder if losing the label in this sense is a matter of concern, as these authors seem to believe. It most likely is not.

P*9.1A3A1A1A1A1A1 - ⏚

P*9.1A4 – A considerable portion of western society does not follow this norm consistently. The issue of homosexuality, in the past considered non-natural because of human nature, is not an issue anymore and abortion is following the same path. It seems that plenty of change comes from directly questioning the presumption that human nature, whatever that may be, carries

any form of normative value. If it does not then it seems prudent to ponder if, when authors speak of an inherent wisdom in our lifecycle, they mistake that word with the word folly.

P*9.1A4A1 – ⏚

P*9.1A5 – To prove that our current lifespan is the perfect one it is necessary to do adequate empirical testing. We have access to shorter lifecycles, but we do not have access to longer ones. To have access to them we ought to develop longevity enhancement technologies. Even if the hypothesis is that longer life expectancies are not desirable, we need to develop the technology for the purposes of proof of concept, and this amounts to no pragmatic difference (see also the **P36A1** thread).

P*9.1A5A1 – Not everything needs proof of concept – we could, to the best of our ability, try to judge how life would be like and assess from there.

P*9.1A5A1A1 – Although that is true, in this case that method has failed 100% of the time (see **P8A1** and **P8A3**). No one, hundred years before now risked stating that the present lifecycle would be the good/natural lifecycle in comparison to the one at the time. And this argument is merely repeating that story in regard to the future. Kass, Callahan and others ignore past data regarding human convictions about the lifecycle.

P*9.1A5A2 – If, after conquering death, we have no turning back, then pursuing the proof of concept is not an option. As Kass (2004) states:

> We are not talking about some minor new innovation with ethical wrinkles about which we may chatter or regulate as usual. Conquering death is not something that we can try for a while and then decide whether the results are better or worse—according to, God only knows, what standard.

P*9.1A5A2A1 – I see no reason why we cannot go back to the old ways. In *1.2 – What is Immortality?* it is argued that every immortality level can simulate the level below. See also **P6A1**. As a side note, observe how Kass can argue for the <blessings of mortality> (see **P*9.1**) based on some standard but then claim that there is no standard when it is time to evaluate the alternative: either there is a standard or not.

P*9.1A6 – Accusations of a naturalistic fallacy can be made. After all, just because the lifecycle is, does not mean it ought to be. As Juengst (2004), and Ehni (2013), respectively, point out:

> Arguing that the traditional human life cycle is normative for human beings requires a good bit of philosophical work if it is not to be accused of making a virtue of necessity. Just because human beings have always lived within a particular pattern of life experiences is not necessarily a reason to continue doing so.
>
> Daniel Callahan has used his concept of a "natural lifespan" (…) obviously, this argument is a natural fallacy. Even if a certain length of life is natural, this as such has no normative implications.

P*9.1A6A1 – ⏚

P*9.1A7 – Because people are different, a perfect lifespan would also be relative to each person. As Overall (2003, 190) points out:

> As Brennan (2001, 734–735) remarks, it seems unlikely that "one perfect life span . . . would work well for everyone. Some people may well have had a full and complete life by age ninety, others may have tired of it by forty, and still others might be enjoying life at the ripe old age of three hundred... The best of all worlds would be one which involved choice—the freedom to continue one's life or not as one saw fit."

P*9.1A7A1 – ⸸

P*9.2 – There is an argument to be made for the lifecycle that requires a specific answer, so I opted to discuss it separately from the main one. Schermer (2013) [36]:

> It is often said that enhancements are wrong because they intervene in nature, or because they alter human nature. (…) The famous biogerontologist Hayflick—also a dichotomist—supports Boorse's view that we should accept the biological lifecycle as the norm. He says: "The goal of arresting the aging process might be viewed in the same light that we view the arrest of our physical or mental development in childhood—as a serious pathology" (Hayflick 2000, p. 269)

P*9.2A1 – The first objection comes in the following form (ibid.):

> Eric Juengst has argued that this is not a very convincing argument because arresting childhood development cannot be equated with arresting aging; while most people would agree that developing into a mature human being is desirable, because it opens up possibilities, the same is not true for aging (Juengst 2004).

P*9.2A1A1 – One can argue that this is only true from the point of view of adulthood. Perhaps children do not want to become adults and perhaps old people like it that way. As Juengst (2004), and Holm (2013), respectively, point out:

> When my daughter was 12, she once responded to my description of her behavior as adolescent with hot denial, saying she was not a teenager and did not want to become a teenager, because teenagers were all "gross". (…) we would not try to manipulate her endocrine system to prevent or postpone her adolescence, and most people would accuse any parents or physicians who did so with committing a grave moral wrong. (...) Critics of anti-aging medicine suggest that a similar argument might be made for the biological changes of late adulthood if our society were not so pervasively influenced by the perspective of those who have not yet undergone them (Callahan, 1993).
>
> We might wonder whether it is a coincidence that the life stage we valorise in this way is the one that most academics writing on these matters happen to be in.

P*9.2A1A1A1 – However there is no denying that from a capability standpoint, adulthood is superior to both childhood and old age, both in physical and intellectual prowess. So it makes sense to want to stop there, not after and not before. This means fixing the standard on a certain state of the lifecycle and comparing other stages to that state (Schermer, 2013):

> Interestingly, Izaks and Westendorp reject the Boorsian idea of an age-related reference class and take young adults to be the reference for all. They state that "it is not appropriate to use old-age-specific normal values. The decision whether a body function of an elderly patient is impaired or not must be based on the same normal values that are used in young

[36] <Boorse's view> refers to the idea that each age has its own reference class, instead of considering a fixed reference class for all ages (see **P1** and **P*2A4** citations of Schermer).

> adults [...] there is no good reason why the normal values for functions in young adults are not applied in adults at all ages" (Izaks und Westendorp 2003, p. 5). They point out that for elderly people, functional levels below those of young people are often associated with higher mortality and should therefore be considered abnormal.

P*9.2A1A1A2 – It can be argued that adults have seen more of life than teenagers, and thus are in a better position to judge immortality: (Juengst, 2004):

> Unlike preadolescents, middle-aged adults have seen enough of life to allow them to project themselves and their interests beyond their current age and appreciate the trade-offs involved in postponing aging.

P*9.2A1A1A2A1 – But older people have seen more of life than adults.

P*9.2A1A1A2A1A1 – P*9.2A1A1A2 if understood under charitable terms means that adults have experienced *enough* life, that preteenagers did not, that allows them to make decisions regarding not wanting to continue to age in the capability sense. Alternatively, one could argue that pre-teenagers do not have the necessary skills to evaluate risk because their brains have not developed them yet.

C10 – This holds with a very weak foundation. **P8** was not dismissed but its scope greatly reduced by **P8A2**. Then **P8A1** and **P8A3** reduced its credibility to a minimum. **P*9.2** does not hold since it was, in my opinion, convincingly dealt with. Regarding **P*9.1**: **P*9.1A4**, **P*9.1A6**, and **P*9.1A7** fail; **P*9.1A3** also seems to not be enough since it assumes what it is trying to prove. **P*9.1A2** reduces its scope from the all-encompassing human nature to a narrower view of a particular lifecycle, that according to **P*9.1A1** hangs against all odds. **P*9.1A5** makes this argument moot for practical purposes.

P11 – This is a true premise as stated in *1.2 – What is Immortality?*.

C12 – Given **C10** and **P11**, **C12** obtains.

P13 – If human nature is non-existent, there is nothing to replace. If it is not something fixed it can be altered and thus a perfect substitution can occur. But the argument considered with charity concerns the lifecycle of today and that cannot be substituted.

P13A1 – P6A1 applies here, mutatis mutandis. Nothing is lost UI since the same life cycle can be replicated. Immortality can still provide a compression of morbidity scenario.

PCBA – Ceteris paribus.

C14 – P13A1 counters **P13**, and as such **C14** does not obtain.

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Verdict: FAIL

C10 hinges on the supposition that our lifecycle is the good one, which is against all odds. This weakness starts at **P*9.1A1** and propagates to the end of the argument. However, I

do not think it is enough for the dismissal of **C10**. But **C14** can be dismissed via **P13A1**. Regardless the argument is made moot by **P*9.1A5**.

2.3.1.3 – God Version

P15: Involuntary death is natural.

P*16: What is natural is good.

C17 (P15+P*16): Involuntary death is good.

P18: Immortality eliminates involuntary death.

C19 (C17+P18): Immortality eliminates something good.

P20: The good that death provides cannot be replaced by something equivalent or better.

C21 (C19+P20+PCBA): Immortality is not desirable.

This is an old debated issue and as such I recommend consulting the relevant literature if there is a wish to learn the current state of the discussion.

P15 – In this version of the argument, natural is equivalent with what god created. I will consider the word god to refer to an alleged entity who created the universe and everything within. Natural then means according to that entity's intentions. Death and aging fit the bill as Caplan (2004) states in the example of Abrahamic religions:

> God, as a punishment for the sins of our ancestors in the (proverbial) garden of Eden, caused humans to age and die. On this view, people age because the Creator saw fit to design them that way for retribution or punishment. Aging serves as a reminder of our moral fallibility and weakness.

P15A1 – The first problem is arguing that there is such an entity. I will not discuss this problem here. There is plenty of literature throughout history dealing with it. For curiosity's sake, according to Bourget and Chalmers (2013), a survey taken by almost 1000 philosophy faculty members and grad students across the world yielded 72.8% support[37] for atheism. But the survey also found out that differences between philosophers of religion and of other areas, regarding the preference between theism and atheism, was the biggest when considering each question vs each area of study. The support for atheism from philosophers of religion was 4 times lower than from non-philosophers of religion. A missing piece of information is to evaluate the view of philosophers of religion before they started engaging the discipline: did they choose this area because they did not lean towards atheism (were already believers), or

[37] This includes the positions: support, and leaning for.

were their views changed/formed by interacting with the literature (know better than non-specialists)?

P15A2 – The second evident problem is arguing about what the intentions of such an entity, assuming it exists, are. There are plenty of books and stone tablets with several exclusive hypotheses. There seems to be no criteria to prefer between them apart from faith[38]. Even when considering a single source, we find that there are plenty of different interpretations and conclusions about god's intentions. The probability that one of them nails it is inversely proportional to the number of options, which seem to be never-ending. Besides, one can conceive mutually exclusive intentions (of god) that are compatible with the idea of a creator, say: wanting us to dress red on Sundays, not wanting us to dress red on Sundays. Lastly it is possible that no such intentions exist, or if they exist they do not concern humans, or if they did at the moment of creation, they do not anymore.

P15A3 – Some reject the explanation that God created aging deliberatively, since aging is a by-product according to evolutionary theory, or because they feel a theological explanation is incomplete. Caplan (2004) says, that "while the theological explanation of aging may carry great weight for numerous individuals, it will simply not do as a scientific explanation of why aging occurs in humans."

P15A3A1 – Evolutionary theory and god's creation are not necessarily incompatible. God could have created evolution intentionally. And he had foresight to know that evolution would lead to aging, senescence, and death of individuals.

P15A3A1A1 – If he had foresight to by-products of evolution he also had foresight to humans wanting to cure aging and achieve immortality, therefore he also intended it (it is natural). This argument is similar in form to **P*9.1A2**.

P15A3A1A1A1 – God does not have foresight to free willed decisions.

P15A3A1A1A1A1 – If we have free will, **P15A3A1A1A1** is incompatible with **P15A3A1**, since individual choice is a part of evolution: e.g. should I risk this behaviour or not? If we do not have free will then **P15A3A1A1A1** does not apply.

P15A3A1A1A1A1A1 – If aging and death necessarily emerge from evolution, then it does not matter if god has no knowledge about the free willed decisions.

P15A3A1A1A1A1A1A1 – A similar claim can be made regarding the emergence of wanting to postpone death from the process of evolution.

[38] Human intuition, sixth senses, or faith are not good predictors of truth (e.g. Kahneman, 2011).

P15A4 – In the case of Abrahamic religions, there are interpretations defending that because aging resulted from Adam's agency then it is not natural. A Post (2004) explains:

> Three centuries before Francis Bacon, the English theologian Roger Bacon argued that in the future, the 900-year-long lives of the antediluvian patriarchs would be restored alchemically. Like many Western religious thinkers, both Bacons saw death as the unnatural result of Adam's fall into sin. These Western dreams of embodied near-immortality could only emerge against a theological background that more or less endorsed them. There are various other cultural and historical influences at work besides religion, but the initial conceptual context for a scientific assault on aging itself is a religious one (Barash, 1983). The modern goals of anti-aging research and technology, then, are historically emergent from a premodern religious drama of hope and salvation (Benecke, 2002) (…) The Russian Orthodox existentialist Nicholas Berdyaev wrote, "Death is the evil result of sin. A sinless life would be immortal and eternal" (1939, p. 252). Stanley and Harakas likewise note that "Theologically, Eastern Christianity viewed death as an enemy, a consequence of Adamic sin, and therefore a condition to be struggled against" (1986, p. 157) (…) All Christians agree, [Augustine] argued, that aging and death issue not from the "law of nature, by which God ordained no death for man, but by His righteous infliction on account of sin; for God, taking vengence on sin, said to the man, in whom we all then were, 'Dust thou art, and unto dust shall thou return' " (p. 423). Thomas Aquinas (Summa Theologica I, question 97, article 1) asked, "Whether in the State of Innocence Man Would Have Been Immortal?" He responded by citing St. Paul (Romans 5:12: "By sin death came into the world") and asserted that before sin the body was "incorruptable," that is, immortal. (…) It is true that modern theological liberalism has departed from the above orthodoxy. The idea of aging and death as natural, of course, makes eminent sense. My only point here is to underscore that for 1800 years Western culture, insofar as it was dominated by a religious worldview, did not accept the naturalistic view. (…) If aging is associated with human failure against the background of disobedience, one would expect that, while it might be construed as an unalterable part of the divine retributive economy, it might equally well be viewed as a problem to be overcome in a process of millennial restoration because it is not really a part of the economy of nature.

Furthermore, the question seems to not be settled in the present (Mellon, 2004):

> We have found support for the Institute's mission [Immortality Level III] among the ethical and theological principles derived from our Judeo-Christian tradition.

This is a demonstration that **P15A2** currently undermines this argument. We have, at present, no idea if immortality is or is not part of god's intentions, and that depends on whether god intended man to be sinful, or sinless, assuming this sentence is not nonsense.

P*16 – This proposition states that whatever god intended is good. As Capron (2004) writes:

> Critics like Leon Kass not only reject the enterprise but are also convinced it is a perversion of the true goals of medicine. For these critics, the search for immortality—or at least for a very long youth—is at war with our heritage of aging, decay, and death. The critics' efforts to extend life span are but pathetic attempts to rewrite our history: made in God's image, then, as punishment for eating from the tree of knowledge, cast out of the Garden lest we eat from the tree of life and become immortal, we long to overturn our God-given lot.

P*16A1 – Since the concept of natural is used in this premise, **P15A1** and **P15A2** apply here. **P15A2** can be considered just an epistemological issue (unlike its effect on **P15**) – the claim that god's intentions are good does not depend on us having access to those intentions, in the same way that the claim that <someone believes in a god> does not depend on my access to that knowledge. From **P15A1** however there is no escape.

P*16A2 – Following someone's values just because they created us does not seem to be enough. It is possible our creator amuses itself with cancer in new-borns.

P*16A2A1 – That is not intended, it is not natural.

P*16A2A1A1 – If that is not intended, then aging and death might as well not be. Because there seems to be the same amount of justice in a newborn having cancer without having done something wrong (or right), or a newborn be condemned to death and frailty in X amount of years from then on without having done something wrong (or right).

P*16A2A1A1A1 – Appealing to a concept of justice through reincarnation can solve the issue, although it is another ontological compromise besides **P15A1** and **P15A2**.

P*16A2A1A1A2 - ⏚

P*16A2A2 – God works in mysterious ways.

P*16A2A2A1 – Then we do not know our creator's endgame. It's reaffirming **P15A2**.

P*16A2A3 – It is not the case that god intends good, it is the case that good is created by its intentions. Put this way, god's intentions exist before good exists, and thus cannot be judged good or bad.

P*16A2A4 – ⏚

P*16A3 – The argument here is that there are some intentions of god that people do not consider good. However due to the issue reflected in **P15A2**, the multitude of faiths makes it nearly impossible to find an example in them all. I will provide examples from the Christian faith. The obligation of women to cover their heads (1 Corinthians 11:5-6), the immorality of divorce (Matthew 5:31-32), or the subjugation of women under man (1 Corinthians 14:34-35, 1 Timothy 2:11-14), are all behaviours that a large part of the modernized world would not agree as good (or in the case of divorce, would not agree on its immorality). At best they are neutral (neither good, nor bad) such as the head coverings, but others like the subjugation of women under man are outright rejected. Therefore **P*16** should be dismissed.

P*16A3A1 – ⏚

P*16A3A2 – All of these cases and others result from misinterpretations of sacred texts.

P*16A3A2A1 – It seems to me a methodological facade to go that route. If every time we find a discrepancy between the sacred text and the general opinions of society, we reinterpret the sacred text to conform, then it means that the sacred text is worth nothing – the true standard is what society generally accepts. It also shows that we can be wrong and not know it until someone in the future comes along and gets a different interpretation, the "correct" one. We should be wary that we got god's intentions right: this reaffirms **P*16A1** (**P15A2**).

C17 – Regarding **P15**, **P15A1** weakens its strength but does not outright allow for its refusal. I will not pronounce myself over if there is a creator or not but recognize that the matter is not currently settled. **P15A2** makes **P15** insignificant, at least until someone can come up with a method to identify what really are the intentions of the creator. This issue not only affects **P15**, but any premise that shares the structure <X is natural>. However, this can be just a technical[39] hiccup and so does not allow for the refusal of **P15**. The claim that **P15A3** has over **P15** depends on both **P15A3A1A1A1A1A1** and **P15A3A1A1A1A1A1A1**, which I did not research further. Lastly **P15A4** allows for the refusal of **P15**, at least regarding Abrahamism. Regarding **P*16**, **P*16A1** is a drawback. I do believe that **P*16A2** is answered by both **P*16A2A3** and **P*16A2A4**. **P*16A3** is answered by **P*16A3A1**. I conclude that **C17** can be discarded based on **P15A4**. However, it should be noted that I did not research equivalents of **P15A4** for religions other than the Abrahamic ones. As such, for those religions, **C17** although not dismissed, walks on very thin ice for since both of its premises, especially **P15**, are very weak.

Let us grant **C17** for the sake of argument.

P18 – This statement is true as explained in *1.2 – What is Immortality?*.

C19 – This conclusion obtains, given **C17** and **P18**.

P20 – This premise affirms that there is nothing that can replace what is lost, for something similar, or with similar effects.

P20A1 – The same consideration that appears in **P*16A3**, will push me to use the Abrahamic religions for the argument. Mutatis mutandis the argument should be able to function with other religions. Take note of the basis of **P15**: death and aging came as a punishment of not following the intentions of god. This punishment, death and aging, administered by god is now considered god's intention and consequently it is considered good. Therefore, trying to overcome aging/death is unnatural, against god's intentions, thus not good. But this reflects a static analysis that does not hold under a dynamic one. Suppose we go ahead and achieve immortality. If god punishes us again by attaching some other properties to us,[40] then those will be considered the new intentions of god and thus natural/good. We lost one good: ageing and death but gained another – whatever the new punishment is. So, a perfect substitution occurred. If god does not punish us, then it may mean that we got its intentions all wrong (cue **P15A2**, e.g. god wanted us to overcome aging and death all along), it could be because god

[39] In the sense that the relevant technology or knowledge to build such a method is not yet available to us.
[40] The first time it was ageing and death, this second time depends on god's policy on recidivism.

changed its mind about its first intentions, it could be because god stopped caring about what we do, or it could mean that there is no god.

P20A1A1 – It could be the case that god does nothing, but still intends death and aging.

P20A1A1A1 – We do have at least one data point were god intervened and punished us when its intentions were not met. And it seems that according to the scriptures when god does really want something it intervenes to communicate more or less clearly its intentions (e.g. the change of rules that Christians consider from the old to the new testament). By chasing immortality, we are learning more about god's intentions regarding aging and death. In that sense the best way to prove **P15** is to pursue immortality. If god does a no show, then **P15A2** seems to be inevitable, because there will be no objective way to check for god's intentions. Either way (punishment or no show), pursuing immortality is the way to go.

P20A1A2 – It may be said that god has a particular way of doing things and thus we should not be "playing god", by trying to overcome our punishment. Treder (2004), citing Kass: "This is hubris," some tell us. "Death is natural, and we must not play God." Schermer (2013) repeats it without citing Kass but using the exact same adjectives. And Post (2004) also offers another take: "theology might affirm that we humans are not the ones to create everlasting life, which is already a gift rooted in the saving creativity of God."

P20A1A2A1 – It seems to me that those who defend the parent object are the ones playing god, by trying themselves to do the judgment and enforce the punishment.

P20A1A2A2 – Perhaps this is not a generalized sentiment among religious folks. Geddes (2004), states: "Yet some of the strongest allies of the quest for immortality may come from those of Jewish faith."[41]

PCBA – Ceteris paribus.

C21 – I do not think **C21** holds, since **P20** was successfully dismissed. Immortality is not undesirable, it is in fact desirable.

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Verdict: FAIL

Considering Abrahamic faiths, the argument fails with two opposite strategies – the first is negating **P15** with **P15A4**; the second, arguing with **P20A1**.

Religions other than the Abrahamic faiths are exempted from the strategy originated in **P15A4** and thus the central premise of the argument (**C17**) cannot be dismissed. **C17** (and **C19**)

[41] Note that Leon Kass, a staunch opponent of immortality and an important political figure, is of Jewish faith, and Jewish themes are featured on his work (e.g. Kass, 2004).

although not very well supported, are still defensible. But **C21** fails to obtain and thus change the final verdict. Even if **C21** did not fail, the strength of this argument would not be much due to the weakness of its first two premises (**P15** and **P*16**).

2.3.1.4 – Artificial Version

P*22: What is natural is good (and what is artificial is bad).

P23: Involuntary death is natural.

C24 (P23+P*22): Death is good (and eliminating it is bad).

P25: Immortality eliminates death as we know it.

C26 (C24+P25): Immortality eliminates something good (and creates something bad).

P27: The good that death provides (and the bad that immortality creates) cannot be replaced by something equivalent or better.

C28 (C26+P27+PCBA): Immortality is not desirable.

P*22 – Here natural appears in opposition to artificial. Artificial is something created with human input, something man made, "lacking in natural or spontaneous quality" (Merriam Webster dictionary). It is claimed that changing what is natural to something that is not, is not good, because there is a positive value associated with the natural state and a negative value associated with the artificial state. Shermer (2013) puts it briefly: "It is often said that enhancements are wrong because they intervene in nature."

P*22A1 – Society at large rejects this premise. There are plenty of examples of natural things which are considered bad and artificial things considered good such as (Treder, 2004):

> Tooth decay is natural – should dentistry be outlawed? Polio is natural – should we ban the Sabin vaccine? Cholera is natural – should we allow epidemics to rage unchallenged? Death is natural – must it continue to wreak its dreadful havoc? Clearly this is foolishness.

It seems that our current life expectancy is also not a result of natural processes. Ehni (2013) states: "the current average lifespan of humans in industrialized societies is far from being a result of natural evolution." Should we also promote infant death to bring life expectancy to more natural levels? As Dekkers (2013) puts it:

> The rather common argument that it is 'unnatural' to live much longer than we do now, is not convincing. To put it briefly: Natural processes are not intrinsically good things and unnatural and artificial procedures are not necessarily bad things (Caplan 2004).

P*22A1A1 – ⏚

P*22A2 – If we rejected everything that is artificial then how should one live? Perhaps one ought to live with the same living conditions as the first civilizations. But that is not enough since civilization implies man-made things. We need an earlier standard, perhaps pre-historic

hunter gatherers. That also does not seem right because they had artificial tools to hunt and gather. We will need to go so far back that the standards we find were no longer from our species, but from an ancestor one, probably Homo Habilis or earlier.

P*22A2A1 – ⏚

P*22A2A1A1 – If we go that far looking for standards then the problem is: should all evolution since then be considered an artificial process (since it had artificial inputs) and thus bad? On the other hand, early humans started building tools and other artificial objects because natural selection endowed them with intellectual and physical abilities to do so. Their artificial endeavours are a *direct* result of a natural process. Therefore, should not the creation of the very first tools be considered a natural process? And if it is then where does one draws the line? Every man-made increment is built upon the results of the previously, now natural considered, increment. What makes more sense is that the word artificial is but a specific case of a natural process, and thus is not opposed to the word natural. Artificial is a type of natural process where man intervened and created a type of something which did not exist before[42] or that can be traced to such a process. As Treder (2004) states:

> But what is natural? And what is unnatural? By the most precise definition, everything that occurs in our world – whether synthetic or not – is natural, because humans are a part of nature and therefore the products of our hands – or our machines – are also part of nature.

P*22A2A1A1A1 – This makes the word natural trivial since everything is the result of some natural process.

P*22A2A1A1A1A1 – That a problem has been detected can only strengthen the claim that this is an inadequate premise. The problem with the triviality of the word natural exists because there is no dichotomy (artificial/natural) and everything is the result of a natural process since there is only nature. The problem lies in the meaning of natural as conceived here.

P*22A2A1A1A1A2 – The word natural can still be used to differentiate non-natural phenomena such as the paranormal, fiction, and perhaps references to other universes/worlds[43]

P*22A3 – Historically, society sometimes goes through a cycle of rejecting innovations and/or societal changes because they are unnatural just to later accept them without a problem. It can be the case with immortality. Treder (2004) presents some examples:

> It is interesting to note that numerous other scientific measures to improve the human condition have initially been scorned as unnatural and intolerable by many, only to be later accepted almost universally. Examples include anesthesia, blood transfusions, vaccinations, birth control pills, and organ transplants. Consider what our world might be like without these and hundreds of other improvements that may not fit the popular definition of 'natural'.

[42] Only creating something is not enough since it also allows pregnancy to be artificial.

[43] For example, suppose we are in a simulation as described by Bostrom (2003). We can then conceive natural as a descriptor applicable to stuff on our own level of reality, or universe.

> (…) For those who still believe that opposing death is somehow wrong or unnatural, please remember that opposition to human slavery was also once considered crazy and dangerous.

P*22A3A1 – ⏚

P23 – Aging being a by-product of natural evolution is certainly not man made. Death is also something not man made[44]. As such this premise seems true.

P23A1 – P*22A2A1A1 applies here. Can we really think of natural as opposed to artificial?

C24 – I do not believe that **C24** obtains. Although neither **P*22A1** or **P*22A3** are enough to take out **P*22**, **P*22A2** is. And through that thread (**P*22A2A1A1**) also takes down **P23**. The problem is that it is difficult to maintain the division of natural-artificial.

Let´s grant **C24** for the sake of argument:

P25 – This is true as stated in *1.2 – What is Immortality?*.

C26 – Granting **C24** and with no problem with **P25**, this seems to be the case.

P27 – I cannot think of anything that can work as a substitute for what is lost, since it will always involve a human made component. The only way I can conceive of this is if we generate enough repetitions of universes until we find one where: a) there are humans that do not age and do not die, and b) that a) was brought about by non-human action. But per **P*22A2A1A1A1A2**, perhaps the word natural will not apply.

PCBA – Ceteris paribus

C28 – Given **C26** and **P27** I believe **C28** obtains.

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Verdict: FAIL

C26 and **C28** do obtain given **C24**. However **C24** has a big problem denoted by the **P*22A2** thread (**P*22A2A1A1**). It seems that the definition of natural is not opposite to artificial. This affects both **P23** and **P*22**.

2.3.1.5 – Function Version

P29: Involuntary death is natural.

P*30: Eliminating something natural is bad.

C31 (P29+P*30): Eliminating involuntary death is bad.

P32: Immortality eliminates involuntary death.

C33 (C31+P32): Immortality instantiates something bad.

[44] Some faiths believe that death and aging were indeed man made or resulted from man's agency. Most of the time, in those cases <god created> replaces <nature created>, allowing death and aging to maintain the natural qualifier. For more on this see *2.3.1.3 – God Version*.

P34: The badness of eliminating involuntary death cannot be mitigated by direct replacement.[45]

C35 (C33+P34+PCBA): Immortality is not desirable.

P29 – Natural in this version of the argument means to be in accordance to its purpose. Caplan (2004) explains it better:

> This sense of naturalness is rooted in the notions of design, purpose, and function. Axes are designed to serve as tools for cutting trees. Scalpels are meant to be used in cutting human tissue. It would seem most unnatural to use axes for surgery and scalpels for lumberjacking. In some sense, although a skilful surgeon might in fact be able to perform surgery with an axe, it would be unnatural to do so. Similarly, many bodily organs—the liver, spleen, blood vessels, kidneys, and many glands—can perform compensatory functions when certain other organic tissues are damaged or removed. But these are not the purposes or functions they were designed to perform. While the arteries of many organisms are capable of constricting to maintain blood pressure and reduce the flow of blood during haemorrhage induced shock, the function of arteries is not to constrict in response to such circumstances. The presence of vasoconstriction in arteries is in fact an unnatural state that signals the physician that something has gone seriously awry in the body. It would seem that much of our willingness to accept aging as a natural process is parasitic upon this sense of natural function.

If we consider the analogies presented this premise claims, then either: (a) death and aging have a purpose and substituting that job with anything else is unnatural, and/or (b) using aging and death for goals other than their purpose is unnatural, and/or (c) aging/death have a purpose and eliminating them will throw things out of balance, to an unnatural state. Caplan continues:

> The only distinction required for understanding the function of aging is that between the aim of explaining the existence of a particular state, organ, or process and that of explaining how a state, organ, or process works in a particular system or organism – If we ask what is the function, or role, or purpose of the spleen in the human body, the question can be interpreted in two ways: How does the spleen work—what does it do in the body? or Why does the spleen exist in its present state in the human body— what is the historical story that explains why persons have spleens? It is this latter sense of function, the historical sense, that is relevant to the determination of the naturalness or unnaturalness of aging as a biological process. (…) The determination of the naturalness of aging, if it is to be rooted in biology, will depend not on how the process of aging actually operates, but rather on the explanation one gives for the existence or presence of aging humans. This is the sense of naturalness that Kass, Fukuyama, and others must rely upon to make their case that extending life by conquering aging is wrong because it is unnatural.

Here Caplan is explaining what I already alluded to in *1.8 – Delving Deeper into Aging*, where I referred to a developmental biologist and an evolutionary biologist. The purpose of aging, if it exists, must be explained in evolutionary terms. The missing piece of the puzzle is to build a hypothesis about some purpose that aging serves. Caplan suggests the following:

> Particularly widespread in scientific circles, is that the purpose or function of aging is to clear away the old to make way for the new for evolutionary reasons. This theory was first advanced by the German cytologist and evolutionary biologist August Weisman (1891). Weisman argued that aging and debilitation must be viewed as adaptational responses on the part of organisms to allow for new mutational and adaptive responses to fluctuating environments. Aging benefits the population by removing the superannuated to make room for the young.

[45] To be interpreted along the lines of equivalent premises. E.g. **P6**, **P13, P20, P27.**

Aging/death is supposed to make room for new generations. If aging/death ceased to be, something might go awry. The (c) interpretation above seems to be the one that fits best here.

P29A1 – The first and obvious objection to **P29** is to argue that it is false that aging has a purpose. As noted in *1.8 – Delving Deeper into Aging*, aging is a by-product, so it serves no purpose. Caplan (2004) states that very clearly:

> The scientific explanation of aging as serving an evolutionary role or purpose is inadequate. It is simply not true that aging exists to serve any sort of evolutionary purpose or function. The claim that aging exists or occurs in individuals because it has a wider role or function in the evolutionary scheme of things rests on a faulty evolutionary analysis. There is nothing natural about aging and, contrary to the views of Kass, Fukuyama, and many others, aging is not a natural attribute of being human.

And he goes on explaining the trade-off between reproduction and survival: "senescence has no function; it is simply the inadvertent subversion of organic function, later in life, in favor of maximizing reproductive advantage early in life." More specifically he states that:

> Evolutionary selection rarely acts to advance the prospects of an entire species or population. Selection acts on individual organisms and their phenotypic traits and properties. Some traits or properties confer advantages in certain environments on the organisms that possess them, and this fact increases the likelihood that the genes responsible for producing these traits will be passed on to future organisms. Given that selective forces act on individuals and their genotypes and not on species, it makes no sense to speak of aging as serving an evolutionary function or purpose to benefit the species.

P29A1A1 – Multilevel selection seems to be a controversial topic among evolutionary biologists, and although in the minority[46] it seems hard to dismiss outright.

P29A1A1A1 – Selfish gene theories seem sufficient to explain aging. Deep down there is a difference in the direction of causality. Does aging cause benefits, or do benefits cause aging? The former is supported with purposeful interpretations of aging – people die to leave room for young folks, i.e. not competing for resources. The latter states that because organisms traded off reproduction earlier on in their life for repair of their soma, aging occurs – they got a benefit, earlier reproduction, that caused aging. I will not advance this discussion here.[47]

P*30 – Eliminating something natural is bad because it throws the system, which is part of, out of balance. This happens because natural is defined as having a purpose or function.

P*30A1 – Eliminating something natural seems to be bad (or good) due to the possibility of certain consequences. It does not seem to be bad (or good) in itself. Eliminating the natural thing without throwing the system out of balance is not bad (or good). As such **P*30** can be dismissed. What is bad (or good) are the consequences and those will be dealt with in their own arguments. If we consider that the purpose of aging here is to free resources for new

[46] de Magalhães, 2011 states that "(…) group selection, which today is dismissed by most authorities (…)"

[47] To avoid confusion, the theory presented in *1.8 – Delving Deeper into Aging*, is the classical evolutionary theory of ageing.

generations, then the *3.1.1 – Overpopulation Argument* might be the appropriate route, if on the other hand we think it is for renewal, perhaps the *3.1.3 – Stagnation Argument* is the way to go, and so on. The argument is not so much that eliminating aging is bad because aging had a purpose or is natural, it is that eliminating aging is bad because without it X will happen.

P*30A2 – The value of eliminating something natural does not depend on something being eliminated, but on the overall value of the functioning system. Here, unlike in **P*30A1**, the system is disrupted, but it is argued that the moral judgement comes from how much people valued the system in the first place. For the same system, eliminating some natural mechanism that is a part of it can be either bad (good) or not bad (not good). An example is abortion, the disruption of pregnancy. Disrupting aging can be bad, but it can also be good. The mere disruption is not enough to conclude about its value.

P*30A2A1 – ⏚.

P*30A3 – Frame of reference makes this claim contradictory. Take for example contraception: using it is unnatural because it destroys the function of reproduction, but it is also unnatural to damage the contraception method to the point of failure (e.g. condom rupture), because it destroys the function of contraception.

P*30A3A1 – One should look at the order of events. Continuing the example, the only way one can disrupt the function of contraception is if one is using it, which means that reproduction was already disrupted. In this case disruption of reproduction trumps the alternative.

P*30A3A1A1 – If one goes down that route, then perhaps the whole human existence is a disruption to the ecosystems that already inhabited our planet. Perhaps we ought to remove ourselves from existence.

P*30A4 – This claim is self-contradictory. Suppose that the elimination of something natural allows for the survival of other systems (abortion in the case of a lethal pregnancy). Then should one destroy the initial system and thus promoting evil, or should one let the other system fail, thus promoting evil?

P*30A4A1 – This is not a fair assessment. The only two options in the parent object are: this bad thing will happen, or this bad thing will happen. No claim about the criteria of choosing between two bad things is made, just that the things are bad. Suppose the claim is: killing is bad. Having a situation where if you kill John, Mary survives, or if you do not kill John, Mary dies, is clearly not enough to attack the claim that killing is bad. Note the difference between **P*30A4** and **P*2A6**. I accepted the latter but rejected this one. They both present exhaustive exclusive options (do normal/do change vs kill John/not kill John), but in **P*2A6** the contradiction was directly in the options, whereas here the contradiction is between one option

and the consequence of the other. Since said consequence, Mary dying, is just a specific instance of not killing John, or in other words, not necessary, this is just an unfortunate coincidence. If on the other hand this consequence was necessarily tied with not killing John, then this argument would obtain. As it stands it amounts to cherry picking cases.

C31 – I do not think that **C31** holds. Although **P29** should not be refused outright, since it is contested by a minority of specialists, it should not be considered a strong premise, since it is only contested by a minority of specialists. Regarding **P*30** I believe **P*30A4** fails without a doubt. I also think that **P*30A2** is not enough. **P*30A3** poses problems that might be solvable by a more precise definition of natural. **P*30A1**, in my opinion, does allow for the refusal of **P*30**, not because **P*30** has something wrong with it, but rather because it has nothing wrong (or right) with it. I mean that it does not carry a criterion of value, it is instead parasitic upon other arguments.

Let us grant **C31** for the sake of argument.

P32 – This is a true statement as explained in *1.2 – What is Immortality?*.

C33 – Given **C31** and **P32**, **C33** obtains.

P34 – This claim states that there is nothing capable of replacing involuntary death.

P34A1 – This obviously does not work if there are redundancies. Curiously, redundancies exist because eliminating some natural thing is bad. Once they are in place that is no longer the case. Adding to that is the fact that if there is the capacity to create redundancies, then **P*30** goes out of the window. I will not discuss redundancies of aging/death here because, as stated above, they are specific to and dependent on the disruption considered (**P*30A1**).

P34A2 – If less people age/die then there will be more people to solve wherever issues might arise. This argument will be explored in the *3.1.1 – Overpopulation Argument*.

PCBA – Ceteris paribus.

C35 – It is difficult to judge **C35** because both counters to **P34A1** rely on other arguments. The objection **P*30A1** still carries weight.

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Verdict: FAIL

This argument fails not because there is a premise that is refused, but because it is an empty claim that relies on other arguments to base its value (**P*30A1**). As such it should be dismissed. The arguments that it is parasitic upon, should be considered on their own.

2.3.2 – Boredoom Argument

P36: Boredom will inevitable set in at some point in a long enough life.

P*37: Boredom is bad.

C38 (P36+P*37): A long enough life will inevitably be bad.

P39: Immortality implies a long enough life for boredom to set in.

C40 (C38+P39): Immortality is bad.

P41: The bad that boredom provides cannot be mitigated by replacement by direct replacement.[48]

C42 (C40+P41+PCBA): Immortality is not desirable.

P36: This premise states that an immortal person will wind up bored, simple because there will be nothing left to do. After doing everything that there is to do there will be nothing left. I think the word bore*doom* is a nice fit here, meaning: the doom of boredom. Here are some examples from the literature:

Harris (2013): Three main sorts of philosophical or ethical objections have been leveled at life extension: (…) It would be pointless and ultimately unwanted because of the inevitable boredom of indefinite life.

Hermerén (2013): Those who are optimistic in describing the future possibilities of science and play down the possibility of adverse side effects—including the boring prospects of living together for ever (…).

Geddes (2004): The most common philosophical objection to radical life extension is that really long life would simply get too boring. (…) Perhaps we will simply run out of interesting things to do? Would we end up in a static world where there is nothing new under the sun?

Here are instances of specific philosophers arguing the boredom argument:

Overall (2003, 37): Human beings will run out of worthwhile things to do. (…) Lucretius says, quite explicitly, "We are continually engaged and fixed in the same occupations; nor, by the prolongation of life, is any new pleasure discovered" (1997, 143) (…) According to this view, life's enjoyments and gratifications are fixed and limited; if we live too long, we will have no choice but to simply repeat what we have already done, and such repetition would be boring and futile.

Overall (2003, 38): Some people might want to "have eternal youth, to see the clock of the life cycle stopped at a particular point." But the gratification of such a wish would not be good for us as individuals, says Callahan (1998), for "a life perpetually stuck at one stage" would "soon come to boredom and ennui, with the possibility of significant change arrested and frozen." He adds that if, as is possible, one's life did not go well at the particular stage at which one had chosen to arrest it, then the supposed benefit "would soon turn into a straitjacket.

[48] To be interpreted along the lines of equivalent premises. See footnote 45.

Overall (2003, 144): John Donnelly (1994, 304) suggests that one of the main challenges of living forever would be that "our desires, wants, needs, interests, etc., are inherently exhaustible, and life in heaven would prove intolerable in the long run."

Overall (2003, 144): The result is boredom: "a boredom connected with the fact that everything that could happen and make sense to one particular human being . . . ha[s] already happened" (Williams 1975, 418)

Post (2004): Kass, (…) asserts that in such a new world we will grow bored and tired of life, having "been there" and "done that".

Mellon (2004): Callahan cannot accept the idea that extending life could offer a guarantee of indefinite freedom from boredom and other problems associated with the aging process.

Overall (2004): Daniel Callahan, who for 25 years has argued against increasing either the human life span or human life expectancy, states that there is no good case to show that a longer life would be better, for, he says, "More of the same is not, by itself, a very good argument" (Callahan, 1977, p. 37)

Kass (2004): After a while, no matter how healthy we are, no matter how respected and well placed we are socially, most of us cease to look upon the world with fresh eyes. Little surprises us, nothing shocks us, righteous indignation at injustice dies out. We have seen it all already, seen it all.

Blackford (2004) - Most of us fear death, to a greater or lesser extent, though some philosophers believe that we would do well to accept it and to fear any prospect of immortality. Bernard Williams, in particular, has argued that we would eventually suffer unbearable boredom, and come to welcome death.

P36A1 – The first obvious counter to the argument is to argue that this premise is an empirical claim, that needs to be tested. In other words, to prove that is true that we will get bored we need to develop immortality anyways. This argument is similar with **P*9.1A5**.

P36A1A1 – If we have good reasons to believe that something will happen then trying to prove it by making happen might not be a good idea. Suppose that the claim was: nuclear weapons have the power to wipe-out humanity. Going out to prove this with empirical data might not end up good for us since the first observation could well be the last one. As such using the data available to infer for the future is the reasonable thing to do. And data shows that old people, those who are more likely to become bored, according to this argument, do indeed get bored of life. It will be a matter of time until it gets to us all. As Hartogh (2013) states:

> We are talking about explicit and permanent death wishes of old people who do not have any life-threatening illness and do not suffer severely from pain, breathlessness or other physical symptoms. (…) In the Netherlands such death wishes are by now commonly referred to as cases of a completed life. I do not like that euphemism. (…) Because I need a name for the class of cases I will discuss, I will normally refer to them as tired-of-life cases. (…) How often do old people long for death? Research in several European countries consistently gives us percentages of 15–20 % of the older population.

P36A1A1A1 – This amounts to a fallacy of equivocation. Remember the distinction made in *1.7 – What is Aging?*, regarding the two meanings of aging. People get tired of life because they age in the capability meaning of aging, not because they age in the chronological sense.

Because UI aging in the capability sense will not happen, it follows that the observed cases of supposed *boredoom* will no longer obtain. Here is Hartogh again:

> According to recent insight aging is a process of accumulated random damage to a complex system which as a result gradually loses its reserve capacity, hence its ability to compensation and to recovery from stress. As a result there is an increase and accumulation of diseases and ailments, and an acceleration of both the increase and the accumulation. These afflictions include arthritis, Parkinson's disease, glaucoma, macula degeneration, diabetes, stomach problems, heart attack, stroke, hypertension, flu, broken hip, broken bones, infections of the urinary tract, dementia, angina, incontinence, impotence, problems with teeth and feet, with vision and hearing, as well as depressive symptoms. The process results in an increase of functional disabilities which has the same 'cascade' characteristics of accelerated increase and accumulation. These include difficulties with eating, dressing, walking around, climbing stairs, getting in and out of bed, bathing, toileting, using the telephone, going out, shopping, cooking, doing light house work, reading, looking television, taking medicine and managing money, but also sleeplessness, daytime drowsiness, fatigue, loss of energy, loss of appetite, anxiety, anhedony and other negative affective states (…) **This process of aging is the causal background of the emergence of the characteristic death wishes of the elderly** (emphasis mine). The most prominent factors seem to be declined eyesight, hearing and mobility, as well as depressive symptoms. The effect of these factors is reinforced by other losses, of energy, memory and concentration etc. It is true that often biographical factors are also relevant, the loss of a partner, of a job or of other meaningful occupations, of peers, all of which may result in a sense of emptiness and loneliness, often made worse by disappointment about the perceived lack of attention. and care from significant others (Rurup et al. 2011). But the effect of such factors is often dependent on functional disabilities. When you lose your comrades when you are 30, you may be able to build a new social network, but probably not when you are 90.

P36A2 – This premise says more about its bearer than about immortality. Arguing that immortality will lead to boredom is really just saying <immortality will be boring *for me*>. The claim is something similar to <I do not like cinema therefore movies should not exist>. Harris (2013) states:

> Suffice it to say that only the terminally boring are in danger of being terminally bored, and perhaps they do not deserve indefinite life. (…) But those of us who do not have terminal failure of the imagination should be left to create new ways of enjoying life and doing good.

And Minsky (2004) seems to have detected a pattern:

> When I decided to write this article, I tried these ideas out on several groups and had them respond to informal polls. I was amazed to find that at least three quarters of the audience seemed to feel that our life spans were already too long. Why would anyone want to live for five hundred years? Would not it be boring?(…) I find it rather worrisome that so many people are resigned to die. (…) My scientist friends showed few such concerns. "There are countless things that I want to find out, and so many problems I want to solve, that I could use many centuries," they said.

P36A2A1 – ⏚.

P36A3 – Even if immortality would amount to more of the same, that does not mean people would not enjoy it. There seems to be some activities that are always pleasurable, as Overall (2003, 146) explains:

> Boredom is not a necessary and inevitable result of the repetition of experiences. Williams appears to acknowledge this point, indirectly, when he comments that the sole condition

> under which an immortal might conceivably be able to avoid impending boredom would be if he were to have an "impoverishment" of consciousness, for, Williams claims, "not being bored can be a sign of not noticing, or not reflecting, enough." (…) This description of the absence of boredom certainly makes sense when applied to nonhuman animals. A dog, for example, wakes up each morning with apparent eagerness and enthusiasm. As on every other day, he is excited about the prospect of having breakfast and going for a walk, two of the most pleasurable activities in his life. (…) Might a human being enjoy the same sort of immunity from boredom in the repetition of certain experiences that nonhuman animals possess? Momeyer (1988, 19) suggests, "Consider satisfaction of the basic biological drives: so long as appetite remains strong, food and sexual union remain satisfying. It is in the very nature of such desires that they are self-renewing, never once and for all satiated and abandoned." So some experiences, at least those related to fundamental biological drives, could be repeated indefinitely without boredom's being the inevitable outcome.

P36A3A1 – This does not sound very promising. Should we dumb ourselves down and be like a dog who never gets bored? Williams seems to be right. The dog does not get bored because it is not reflecting about itself. So this argument has a catch: we have to forego intelligence to avoid boredoom, taking the old adage <ignorance is bliss> to an extreme. Overall (2003, 143):

> Now it is not clear whether our limitations as human beings and our ability to return to the same activities over and over would, in and by themselves, be sufficient to rescue an immortal human being of ordinary intelligence and perspicuity from the tedium of eternal boredom. Individuals suffering from certain sorts of senility can always be content with repeating an activity over and over again. Because of the failure of their memory and intellect, the activity continues to retain the original enjoyment it held for them. But such a life would likely seem pointless to those without such impairments. (…) So I am not entirely convinced that the mere repetition of certain categories of activities, however pleasurable they may once have been, would not result in stultifying boredom during a lifetime of eternity.

P36A4 – Those who argue for this premise are correct in that the amount of stuff that there is to do is finite. But being a finite amount is irrelevant to judge the claim that we will eventually be able do everything there is to do. What is really at stake is a matter of rates, namely the rate at which we can do stuff must be greater than the rate of growth of stuff to do. We need to be able to catch up – in technical terms, converge. Take this simple model. Assume each person has 10 units of time per day and can only read or write. Suppose it spends 1 unit of time writing and 9 units of time reading. We only need 9 more persons to break even[49]. Two more and we will be unable to read everything that there is to read. Now imagine the plethora of activities that there are. Furthermore, new types of activities continuously pop up, e.g. space exploration is a relatively new activity. It is not clear that convergence will be achieved. Overall (2003, 150-153) proposes some activities where convergence seems difficult to obtain:

> Is it so far-fetched to suppose that a deep understanding of this infinite universe would take an eternity? (…) Another example of an unending and boredom-defying activity is the quest for wisdom or enlightenment. In many traditions, the fulfillment of that quest is thought to require many lifetimes. An immortal life on earth appears to provide the opportunity for

[49] Assuming people write at the same speed as they read. This obviously is not the case, but the example can be modified to accommodate this fact without changing the overall conclusions. I did not model this feature for simplicity's sake.

> taking seriously the pursuit of satori. My point here is just that a view like that of Williams assumes far too hastily that any immortal individual, of whatever moral caliber, would inevitably and easily become bored. Those for whom moral integrity matters would find more than adequate challenges.

P36A4A1 – Even granting that the rate at which stuff grows is greater than the rate at which we do stuff, and that there are infinite things to do, in the end it will not matter. The Ross-Littlewood paradox can be applied here: even if for each 10 new activities one adds, we can only do one, in the end we would end up doing every one of them.

P36A4A1A1 – The paradox is not applicable here because we do not have bounded time constrains, i.e. a supertask, in this case there is no end to doing different stuff. Infinity is not a place one can be, one is always at a determined point in spacetime.

P36A4A2– Differing from **P36A4A1**, here it is claimed that with an infinite amount of time the finite amount of things to do will be done. *In extremis*, the claim is that every permutation of particles in space will happen. In the exemplified model, every permutation of words will happen and as such everything that there is to read will be read.

P36A4A2A1 – Current physics does not seem to posit such a possibility due to the heat death of the universe. There is not enough time.

P36A4A2A1A1 – Using the heat death of the universe *in an argument* defeats the concept of immortality. Although science is subject to never ending revision, one should not make reality what one would wish it to be, i.e. denying the heat death of the universe. Nevertheless this is the prediction further in time that we can possibly make and as such it should carry an extremely low confidence. We have not completed physics yet, we do not know what technology will be like in a few billion years, and we have not yet fully explored the universe. It is possible to conceive of states of affairs where this problem does not obtain or is solvable such as: the laws of physics are different in other places of the universe, or there are several universes, or time travel is actualized, or we might live inside a simulation, or timeconsciousness scaling is implemented as Geddes (2004) suggests below. In any case that is not an urgent problem to solve as other causes of death are.

> Even if the universe comes to an end, it may still be possible for life to survive forever. In 1979, English physicist Freeman Dyson published a paper in which he argued that even in a universe with finite energy an intelligent being could still think an infinite number of thoughts. He considered the case where the universe kept expanding, but started to 'die' as useable energy ran out. He found that as the universe grew colder and colder advanced beings could still live forever by thinking thoughts at a slower and slower rate.

P36A5 – Another counter to *boredoom* is to simply alter ourselves so that it never catches up. As Geddes (2004) exclaims:

> Once technology becomes advanced enough to radically extend human lifespan, it is likely that technology will also be advanced enough to radically alter the minds and bodies of those who desire it.

Overall (2003, 166) also seems to consider this argument, completing upon Geddes:

> There is an important objection to this argument that the body's limitations would eventually doom the desirability of immortality. Current and prospective research, as well as some science-fiction stories, suggests that perhaps we should not too hastily assume that the human body must necessarily have limited capacities, especially in an immortal person. Perhaps also we should contemplate the possibility of replacing an individual's body parts not with a succession of qualitatively identical or similar parts but rather with a succession of different and possibly superior organs. If we imagine a future in which body technologies are far advanced, then the material environments created would allow one to select new body parts or additions in order to become the painter or basketball star one always wanted to be. Thus the human being would achieve eternal life as a cyborg.

P36A5A1 – We can only improve humans so much until we have to deal with upgrading or substituting the brain (or whatever the physical structures that constitute or instance the individual according to the variety of metaphysics one endorses). The problem is that we enter into consciousness and personal identity territory, issues that I wish to avoid discussing here.

P36A6 – We could eliminate the feeling of boredom and thus solve the problem. I am talking about eliminating the sensation itself in the same way the numbing shot the doctor gives us when performing surgery eliminates pain.

P36A6A1 – Assuming boredom is not pleasurable/desirable is still not enough for arguing for its elimination. Let us look at physical pain as an example. Assuming, in a normal circumstance, no one wants to feel pain can still give space to defend that pain is useful or desirable. Pain gives us information when something goes awry with our body, so we do not wreck more damage and instead tend to its source. It is not pleasurable, but it is useful – it is our own warning system. The same can be said about boredoom.

P36A6A1A1 – Suppose we could build an app to get us more information about the state of our body than pain does. This allows us to have the cake and eat it: access to the information without the miserable sensation.

P36A6A1A1A1 – This can work for boredom, but not for *boredoom,* since the argument is claiming that it will set in forever regardless of how we get informed of the matter. It is not the symptoms that matter, but their cause.

P36A7 – A different suggestion is to make pauses to alleviate boredom. Overall (2003, 149):

> [Note 24] Sue Donaldson has suggested that another way around the problem of boredom would be to imagine a life of consciousness interspersed with long "timeouts," during which one would rest and recover, and then one would reawake to a world different from the past and hence sufficiently stimulating as to obviate boredom. Cf. Heinlein 1973, 106

P36A7A1 – Even if this procedure goes into effect it does not cause much damage to the boredoom argument. It will only take longer to achieve *boredoom*.

P*37 – Boredom, by definition, is something that people should not want. This is a trivial premise, and I will grant it easily.

C38 - P*37 is granted. Regarding **P36**, **P36A6**, **P36A2** and **P36A7** fail. **P36A3** either fails or has the same fate as **P36A5** due to involving consciousness tweaking. And because I prefer to err on the side of caution I will consider **P36A5** unsuccessful, since it enters into discussions about consciousness and personal identity. But if **P36** means something like **P36A4A2** there is still room to evade both of these attacks. I am not comfortable in exploiting **P36A4** and prefer instead to wait and see. In any case confirming the heat death of the universe or that boredoom obtains will lead to consider **P36A1**, which makes the argument moot.

P39 – As with the previous arguments this premise brings immortality to the argument. It is stated that immortality will bring with it a very long life.

P39A1 – This premise is simply not true. Immortality can but needs not bring with it a very long life. UI individuals can die whenever they please[50]. The question "do you want to be immortal?" should not be interpreted as "do you want to live forever?". First because immortality *is having the option* of living more, immortality *is not choosing the option* of living more. This is explored in detail *2.4.1 – Optionality Argument.* And secondly, this is not a black and white matter, and so the choice is not between everything or nothing. The choice is if one wants a marginal day (or other unit of time). So the question <do you want to be immortal> should instead be read as <do you want the option to live tomorrow?> This is what is meant by bringing death inside the scope of things one controls. Being immortal is having *the option* to continue alive each day. If someone decides they are bored and do not want to live anymore, they are free to do so. There is nothing in the concept of immortality stopping people of doing just that. But *until people are bored, immortality has value*. Harry (2013) sums it up nicely: "those who are bored can, thanks to their vulnerability, opt out at any time", and Overall (2003, 130): "Nothing inherent in the concept of immortality entails that one would lack the option to end one's life whenever it became advisable to do so."

C40 – **P39** is destroyed by **P39A1** and as such **C40** does not obtain. Immortality cannot be bad since it only gives people the option to continue alive, allowing opting out in case of *boredoom.*

[50] Immortality of level 4, or invulnerability, allows for eternal sleep – the equivalent to death in immortality of level 3. However instead of eternal sleep I believe contracts that put people to sleep for a limited time, say 5 or 50 years (see **P36A7**), with the ability for renewal at each wake-up will be more common, since they allow more choice/less risk. And these can also happen in immortality of level 3. In the case boredoom does inevitably obtain we will know it wasn't because of lack of empirical testing.

Let us grant **C40** for the sake of argument:

P41 – This premise states that there is nothing UI, capable of replacing the damage of immortality.

P41A1 - Immortality is reversible. See **P6A1**, **P13A1**. This in essence restates **P39A1**. We could, for example, reinstate a law to mandate the death of everyone in order to simulate the pre-immortality state of affairs

P41A1A1 – But we would be killing persons.

P41A1A1A1 – It is no different than disallowing life extension. The point is that either way we decided to not allow people to live more than a certain number of years, regardless of what we name this decision. This is explored in detail in *3.1.1.7 – Counter 6: Reducing D via P: The Death Rate*.

PCBA – Ceteris paribus.

C42 – **P41A1** allows for the dismissal of **P41**. **C42** does not obtain.

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Verdict: FAIL

According to **C38** it is not clear if *boredoom* will set in. In any case, if we want to find out we ought to actualize immortality, making the argument moot. In addition to this, **P39A1** annihilates this argument. Even if boredom sets in there is no mandate to endure it and until then immortality has value. **P41A1** also shows that immortality is reversible.

2.3.3 – Deadline Argument

P43: Death gives meaning to life.

P*44: Life without meaning is bad.

C45 (P43+P*44): Life without death is bad.

P46: Immortality eliminates involuntary death.

C47 (C45+C47): Immortality is bad.

P48: There is no way of replacing the meaning of life UI.

C49 (C47+P48+PCBA): Immortality is not desirable.

P43: First things first: allow me to go beyond the obscure meaning of the expression <meaning of life> that I used here. I intended it to be a short placeholder. By this expression I mean that there is a desire to do something and to act upon it. Lack of meaning in life here does not mean that one lacks goals to achieve, only that it will not act upon them. It is only *as if* one has no goals to achieve. But what has death to do with wanting to act upon our goals? The reasoning

is an analogy with the typical deadline of a task. The main motivation for someone to end a certain task is because there is a deadline. Had the deadline been further in time, the motivation to complete the task would have been less, and in the case that no deadline existed, there would be no reason to perform the task. Death works as the ultimate deadline[51]. We do things because we have the *deadline* approaching us. If we had no *deadline* there was no motivation to do anything since we could always postpone whatever we set out to achieve. Furthermore, because we have the *deadline*, we are unable to do everything so choosing our path in life is a meaningful decision: we have to leave things out in the process of achieving others. If we had no *deadline*, meaningful decisions would not exist since we could eventually do everything there is to do. Here are some examples from the literature:

Overall (2003, 144) - If we were immortal, we could legitimately postpone every action forever. It would be of no consequence whether or not we did a thing now; every act might just as well be done tomorrow or the day after or a year from now or ten years hence". Nuland (1994, 87) says, "The fact that there is [now] a limited right time to do the rewarding things in our lives is what creates urgency to do them. Otherwise, we might stagnate in procrastination." Such a person, then, has no good reason to do anything at any particular point; he simply exists from day to day.

Wade (2004) - The ethicist Leon Kass, then of the University of Chicago and now the chairman of the President's Council on Bioethics, says that "to argue that human life is better without death is to argue that human life would be better without being human. The finitude of human life, in his view, "is a blessing for every individual whether he knows it or not." Kass's belief is that death gives meaning to life and that without a clear end point we would accomplish nothing—a point familiar enough to journalists, whose productivity depends on firm deadlines. Though I do not think Kass would win an election on this prodeath platform, his reservations cannot be airily dismissed.

Geddes (2004) - A philosophical objection to life extension is the worry that the longer we lived, the less we would value our time. After all, a basic economic principle is that the value of a resource tends to increase the scarcer it is.

Binstock (2004a) - Jonas, (…), meant to cast significant doubt on the anti-aging enterprise. "Perhaps," he wrote, "a nonnegotiable limit to our expected time is necessary for each of us as the incentive to number our days and make them count". (…) [Kass asserts] that our numbered days encourage a creative depth in our humanity—a depth that escaped so many of the immortal Greek gods and goddesses, whose often debauched and purposeless behavior made Plato wish to ban them from the ideal Republic. (…) The brevity of life makes it worth living; only allotted time makes time precious. We dread death, but as the existentialists write, this forces us to examine our lives. Did I achieve meaningful goals? Was my life in some sense justified?

[51] Unlike the made-up word *boredoom* that captures the essence of the previous argument, here deadline, an already existing word seems to be a perfect match.

Allen (2004) - Many people in fact do not live long enough to become weary of this life; many who do live a long life do not feel that this life cannot satisfy their aspirations. But this may well be because our life is in fact of limited duration. Because there is only a limited time, what we do have remains sweet, fascinating, and engaging.

P43A1 – Let us take for granted that the meaning of life comes from having a deadline, as the authors suggest. The further into the future we push the *deadline* (with extensions of the life span), the less of the following: value of time, meaningful decisions, and will to be active. The meaning of life fades away as we live longer lives, to the point of going to zero if we do not have death imposed on us. But if this is all true, then by reducing the amount of life one currently has, the more meaningful life becomes. Ending life at 40 will make those 40 years much more meaningful than living until 80, or 120. However, none of the authors proposing the deadline argument committed suicide at 40 (or at any other age in order to have a reduced life span and as such a more meaningful life). What gives?

P43A1A1 – There is a fundamental difference between having a more or less defined amount of life, be it 80, 160, or 1500 years, and having an undefined amount based on agency.

P43A1A1A1 – As soon as the question of immortality is on the table, every death is the result of agency. Suicide is all there is. Wanting to die in the same way as people die today is a voluntary expression of wanting to be death in a specific way and no different from an individual who wants to kill himself in another specific way. There is no difference between the cases written above: the defined amount of life that one has is the result of one's agency. See *2.4.1 – Optionality Argument*.

P43A2 – We remember people not because they died but because of what they achieved. Meaning then does not come from death but from completed goals. If we live more, we have the possibility of achieving more and thus have a more meaningful life. Such is the argument of Overall (2003, 150):

> The belief that death, or at least the prospect of death, is necessary to give meaning to human existence elevates personal extinction over personal projects in a way that ignores the real significance we attribute to human lives. Certainly, we remember outstanding human beings not because they died or even because their dying gave meaning to their life but largely because of the projects, relationships, and activities they engaged in while alive. Infinite life would seemingly provide the potential for an indefinite number of projects, all of which could come to fruition.

P43A2A1 – This answer misses the point of the argument. Even if there is more time to achieve more goals, the argument states that there is no urge to do them exactly because we live longer. And if no objective gets completed, in the extreme case of a very long life, then no meaning was achieved. Because extending life makes us lazy, so to speak, it will be impossible to

generate meaning from accomplishments. The reason we engage in "projects, relationships and activities" is because the *deadline* exists.

P43A3 – The claim that people are only motivated if they have deadlines is not universal among people. The argument is related to **P36A2**. From my experience, most of the time when people set out to achieve something they are not doing it because they have their own deaths in mind. In fact, children young enough to have no concept of death, still have motivation to pursue whatever is they set out to achieve.

P43A3A1 – That is because one did not go deep enough in exploring the implicit motivations to act. It needs not be conscious.

P43A3A1A1 – It seems that in order to settle the matter one needs empirical testing. This means subscribing to **P43A5**.

P43A3A1A2 – But if it does not need to be conscious then what reasons do we have to believe that UI this unconscious hardcoded motivator will update and become conscious? The motivation to eat high fat, high carb foods did not stop when an abundant supply of food was available. In the same way the unconscious motivator to act will still "think" we are dead prone.

P43A4 – It seems that not every activity needs this type of motivation. As long as there is one activity that does not need the *deadline* then the premise fails, i.e. an activity whose completion goes beyond the amount of life one expects to live. Candidates to this are: advancing human knowledge, pursuing moral betterment, etc. See the second quote in **P36A2**. It seems that even Kass (2004), one that opposes life extension, recognizes this objection:

> How, then, might our finitude be good for us? I offer four benefits. (…) Second, seriousness and aspiration. Could life be serious or meaningful without the limit of mortality? Is not the limit on our time the ground of our taking life seriously and living it passionately? To know and to feel that one goes around only once, and that the deadline is not out of sight, is for many people the necessary spur to the pursuit of something worthwhile. "Teach us to number our days," says the Psalmist, "that we may get a heart of wisdom." To number our days is the condition for making them count. Homer's immortals— Zeus and Hera, Apollo and Athena—for all their eternal beauty and youthfulness, live shallow and rather frivolous lives, their passions only transiently engaged, in first this and then that. They live as spectators of the mortals, who by comparison have depth, aspiration, genuine feeling, and hence a real center in their lives. Mortality makes life matter. **There may be some activities, especially in some human beings, that do not require finitude as a spur** (emphasis mine). A powerful desire for understanding can do without external proddings, let alone one related to mortality; and as there is never too much time to learn and to understand, longer, more vigorous life might be simply a boon. The best sorts of friendship, too, seem capable of indefinite growth, especially where growth is somehow tied to learning—though one may wonder whether real friendship does not depend in part on the shared perceptions of a common fate. But, in any case, I suspect that these are among the rare exceptions. For most activities, and for most of us, I think it is crucial that we recognize and feel the force of not having world enough and time.

This quote has special significance for two reasons: first, Kass undermines his own position by recognizing a fatal flaw, and second, the citations mentioning Kass in **P43** lack charity since they did not give him credit for undermining his own position.

P43A5 – This premise is an empirical claim and as such needs empirical proof. This argument is similar to **P36A1**. This counter makes the deadline argument irrelevant in pragmatic terms since it amounts to the pursuit of immortality.

P43A6 – This premise misunderstands the origin of opportunity costs. What this premise entails is that because we have OCs in our decisions, we attribute value to time, and meaning to decisions. OCs are caused by our limited time alive, hence the motivation to act upon on our desires to not waste the precious time we have left. If I only have 80 years on this planet, there is only so much I can do, and in doing X I am giving up doing Y. The flaw is in thinking that eliminating the restriction to the quantity of time we have alive, we also eliminate OCs completely. There is at least another cause of OCs, not as pronounced it is clear, that still operates UI. The world is constantly changing states with the passage of time. Each unit of time is unique in that it corresponds to a world state. So me doing X now will be tied to this unique world state and doing it tomorrow will be tied with different world state. If I do X now, I am giving up the ability to do Y with this world state.

P43A6A1 - Why does this matter? Is it that much of difference if I read a book today or tomorrow? I will have eternity.

P43A6A1A1 – Although some activities in some circumstances can do away with this consideration, others cannot. That is because they are tied to a particular world state. Here are some examples: (i) eating that slice of pizza today or in a week is relevant because it can get moldy, (ii) wanting to go to Mars today or when there is an ideal launch window that allows our spaceship to slingshot itself on the gravity of celestial objects is relevant, (iii) wanting to go ski in the summer or in the winter is relevant, (iv) wanting to enjoy that trail in the forest now or after it is destroyed for "development" or because a volcano erupted is relevant, (v) wanting to be a part of the Islamic State now or in 2 years from now is relevant, and so on.

P43A6A1A1A1 – This concern is alleviated because many features of the world are cyclical, such as the seasons, the orbit of the earth and surrounding celestial objects, etc.

P43A6A1A1A1A1 – Alleviated it may be, but it is not eliminated. Some things belong to the past. Those, when they were in the present, were unique (not cyclical) opportunities. Examples such as extinct species, extinct civilizations/cultures/languages, changes in our landscape, a specific relationship constellation, being the first to achieve something, etc. And if we are considering conjunctions of activities such as doing X while doing Y, then concerns with these

types of OCs are increased. Being the president of European Council and the current Olympic weightlifting champion is a feat that must take into account these sorts of OCs UI.

P43A7 – We could, similarly to what was suggested in **P36A5**, alter ourselves, so as to change our motivation system to not rely on the *deadline*.

P43A7A1 - But the same objections to **P36A5** apply. If we alter our psychology to forget about the deadline, what will happen to personal identity? Perhaps there is an easy case to be made that it will not be a problem, people change their mind about stuff all the time. However, I prefer not to engage in this discussion and err on the side of caution by considering the parent object not a good counter. Perhaps in a future text I will explore this question.

P43A8 – There is a large number of people that believe in eternal life and still do not suffer the effects proposed in this premise. Religious folks are a great example. See *4.1 – Dealing with PCBA: Is Immortality Desirable?*.

P*44 – This premise states that it is bad to live without the meaningfulness of having to make decisions about what to do, about valuing time and about accomplishing goals.

P*44A1 – If the decisions are meaningful because they are serious, in the sense that they will not have insignificant consequences (e.g. high OCs), then it is doubtful that this is valuable. It is a negative thing to experience stress in deciding what to do. This seems precisely what happens when we have to allocate our limited time to a number of desired goals. If one wants to be very good at playing football, one's most likely will not be very good at advancing theoretical physics, and vice-versa, because there is not enough time for both. A choice is to be made between every possible project that a current normal life can accommodate. And this, supposedly, gives meaning to our life and as such is a good thing. But one can construct plenty of cases where serious decisions have to be made and no one would consider it a good thing to have to make the decision: should you save your wife/husband from homicide, or save your children from the same fate? No one doubts that it is a serious choice. And the consequences are not insignificant, there are high OCs involved. But should we say that this decision will give meaning to one's life and that after the fact we will appreciate more our choices? It seems nuts! Clearly, people would, in most cases, not want to choose, they do not want anyone to die. The same can be thought of the choices that make our life supposedly meaningful, having to choose because our current constraints can be said to be undesirable.

P*44A1A1 – One can also frame choices as a good thing. A kid that has to choose between strawberry ice-cream or a ride in the carousel when wanting both can learn to not take choices lightly, correctly valuing one's time/resources and make the most of what one has.

P*44A1A1A1 – But the need to <not take choices lightly, correctly valuing one's time/resources and make the most of what one has> is only important because of the *deadline*. So deep down, there is a disagreement between those who believe that the *deadline* will teach us all to not be spoiled brats, and those who think it is an unwarranted source of stress and enclosure. Perhaps both effects operate simultaneously, and the net outcome is unknown. Or perhaps the net effect is different for different people (see **P43A3**). If that is the case, then this argument fails because it is only valid for some people.

P*44A1A2 - ⏚

C45 – Regarding **P43**, **P43A2** and **P43A7** fail. **P43A1** shows that no author has skin in the game, making suspiciousness warranted. **P43A4** further complicates matters as it even shows an opponent of immortality conceding. I do believe that **P43A6**, allows for the refusal of **P43**, as it shows a fundamental flaw with the argument. Furthermore **P43A8** shows empirical evidence that supports a falsification. To save the argument from it one needs to endorse **P43A5** and take notice of **P43A3**. This results in the elimination of pragmatic differences, i.e. immortality will be pursued. Summing up, **P43** can be rejected both by **P43A6**, or by the combo **P43A8**-**P43A5**-**P43A3**. I do not believe we can discard **P*44** based on **P*44A1**.

C45A1 – The argument is invalid. If there is another source of meaning besides death, then **C45** does not obtain.

C45A1A1 - P43 can be mended to state that death is the only source of meaning.

C45A1A1A1 - P43A8 offers a good objection to this change. Either the consequences of the deadline are false, or there are other sources of meaning apart from death.

Let us grant **C45**, for the sake of argument:

P46 - This is a true statement as explained in *1.2 – What is Immortality?*.

C47 – Since UI death is not eliminated, but a matter of agency, and if death is the source of meaning (**P43**) without which life is bad (**P*44**), then, given **P46**, immortality being bad is also a matter of agency. More specifically, for immortality to be bad it requires the agent not to plan his own death, i.e. to create its own *deadline*. Immortality being bad unconditionally (**C47**) does not obtain.

C47A1 – If the only outcome of having immortality is the possibility of not setting a *deadline*, then certainly it is something bad, since it is granted that living without a *deadline* is bad. Although there is the possibility that everyone chooses to set their own deadline, even if one person does not do it, then it is sufficient to consider immortality bad. In a world of several billion agents, it is highly likely that it will happen – there are plenty of cases of people acting against their better judgement (e.g. smoking, obesity, etc).

C47A1A1 – What this counter misses is that immortality brings the option of setting the *deadline* as far into the future as one wishes. This means that there is no restriction that it be our current life expectancy or life span. This can be good if the point is to maximize the meaningfulness of life. To do that the *deadline* must be set in order to achieve a perfect balance between motivation and achievements. The further into the future one sets the deadline the more achievements one has access to, but less motivation will be available. Without immortality this means eliminating a degree of freedom and thus not be as optimal at maximizing meaningfulness.

P48 – This premise states that there is nothing UI, capable of replacing the damage of immortality.

P48A1 – **P41A1** applies here without modification.

P48A2 – P36A7 although unsuccessful in the previous argument can be used here. The deadline problem can be avoided if UI, there are several deadlines. Living 100 years, and then hibernating for 100 years in succession could provide the sort of benefits of the deadline. This makes use of the flaw detected in **P43A6** – when one wakes up the world will be significantly different, enough to break the continuity to the time at the start of hibernation.

PCBA – Ceteris paribus.

C49 – Both **P48A1** and **P48A2** are opposition enough to make **C49** not obtain.

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Verdict: FAIL

This argument is full of holes. **P43A6** seems to be the principal culprit of the failure of this argument both by directly cutting the path to **C45**, and by indirectly (through **P48A2)** cutting the path to **C49**. The triad **P43A8**-**P43A5**-**P43A3** also shows problems with the argument by either pointing to empirical evidence to attempt falsification or by requiring more empirical evidence, in which case the argument is moot. **C45A1A1A1** also seems to bring additional obstacles that the argument cannot overcome (one of them being the already mentioned **P43A8**). Ditto for **C47A1A1**. And if any doubts remain **P48A1** shows that immortality is reversible.

It is no wonder that no author has put skin in the game (**P43A1**). Being consistent with their own written word is too much trouble. Curiously for the advocates of immortality the existence of the *deadline* is effectively the motivation they require to do away with it. It will measure the failure or success of their endeavour. One might ask if these people do away with the *deadline* how will they be motivated to do anything else, once they achieved their objective? I answer this question in *4.3.4 – The Ultimate Argument for Immortality (and Ethics)*.

2.4 – Arguments in Support of Immortality

2.4.1 – Optionality Argument

P50: Immortality increases the range of options.

P*51: Having more options is good.

C52 (P50+P*51+PCBA): Immortality is desirable.

P50 – To fully understand this claim I will need to present some clarifications on what it means to be immortal, or what exactly does immortality entail. It is not uncommon to find instances of confusion between, wanting to live forever, and wanting to be immortal. Although related they are not the same thing. Immortality is *having the option (i.e. ability)* to live forever, but as is with any option (or ability) its use is not necessary. Wanting to live forever requires immortality, but the converse is not true. One could want to be immortal but not want to live forever. This would be the case for those who would opt out of life at some point. Surely today people can opt out of life at any point or decide to continue on living, are they not immortal in some sense? The answer is no. While it is true that people have the option of suicide for some period of time, there will be a point in their future where the option does no longer obtain: this usually happens at around 80 years of age with an event that we call death. At this point in time there is no choice, the person just dies, regardless of her own will. This involuntary death is contrary to the concept of immortality and thus the person is said to not be immortal. A different case would be if the person had the option to continue on living but chose instead not to. This voluntary death is not contrary to the concept of immortality and the person can be said to be immortal, provided that, contrafactually, the option to remain alive would obtain indefinitely. An interesting case then occurs. Once immortality treatments are available to all who want them, everyone becomes immortal, regardless if they enrol in the treatment or not. Not enrolling in the treatment is opting out of life (i.e. suicide). Those who opt out are said to be immortal because the option to go on living existed (indefinitely). One should consider the choice of refusing to participate in immortality treatments a suicide no different from any other suicide, apart from the fact that people have different preferences to instantiate their own death: some would prefer to jump out of a bridge, others shooting a bullet to the head, and others would like senescence to gradually chip away their virility until their body is so fragile and in a constant state of suffering that they die. Refusing to go on living while having the option to do so, by refusing immortality treatments, is identical to wanting to commit suicide by letting <senescence gradually chip away their virility until their body is so fragile and in a constant

state of suffering that they die>.[52] Lange (2013) said: "Even the choice of aging 'naturally', admitting no medical or technical end-of-life interventions is an intervention, a deliberate choice in the creation of one's own autobiographical myth (Rose 2001, p. 16, cf. McAdams 1993)." UI people can only kill themselves or go on living, they cannot die against their will. Dying in the same way people die now is still possible, but it will not be imposed by nature anymore, instead it will be a result of individual agency. Summing up: when death is imposed on the individual be it through human activity (murder, war, etc) or nature (aging, virus, etc) the individual had no choice and thus it is not immortal. When no death is imposed on the individual then he is said to be immortal. Immortal individuals have the option go on living forever or opt out. Because these options are being instantiated continuously through time, a better way to describe immortality is by having the option to choose if one dies during the next hour or goes on living. The choice will be impermeable to external forces (e.g. no chance of murder). It becomes clear that immortality does give people a choice that they do not have today after a certain age, and as such **P50** is true.

P*51 – Let us suppose that there is an agent with two options: option X and option Y. Is the creation of option Z a good thing? Well if option Z is something void of value, with negative value, or bad, then the creation of option Z is not good. But it is not bad either, since the agent can still access options X and Y that it had before.[53] The agent never degrades is position no matter how bad Z turns out to be. Worst-case scenario, Z results in the agent maintaining his position without improving it, by choosing from the previously available choices. Thus the premise that having more choices is good is not always true. What is always true is that having more choices, ceteris paribus, is never bad. But, under uncertainty having more choices is likely good. That is, if we do not know what Z will bring, there is a chance that it might be better than X, and better than Y. The variation of the expected value with a marginal option is always positive under uncertainty, however how small. Perhaps an example with different language will make things clearer. Suppose we are playing a game where the player draws W balls in succession. Upon drawing each ball the player has two options: he can discard it, or keep it and discard the previously held ball[54]. Each ball has a natural number written on it. The game ends after W draws and the player then scores points equal to the number written on the ball he

[52] It is curious how some authors on the literature strongly support this forced suicide, not only for them but for others too. A forced suicide is another expression to designate an homicide.

[53] Note that when considering the addition of option C, it is not known what choice it will represent: a good one or a bad one. However at the moment of decision it will be known what choice C represents.

[54] The player will not have a ball at the beginning of the game, so when he chooses to keep his first ball he will have none to discard. This is the only exception. After that the player will always have one ball in his possession that he can trade for the newly drawn ball on each draw.

possesses. The more points the better. The balls represent choice and they start inside a bag to represent uncertainty, the numbers written on them represent the value of each option. Now, suppose that after W draws, we offer the player an additional draw. The additional draw represents the extra option. It is clear that the player should take it: worst case scenario he discards it, which represents not choosing the new option, but there is a possibility that the additional draw brings out a ball with a number higher than the one he already possesses. This represents the possibility of the new choice being better than the previously available choices. Now let us translate this to the immortality context. We currently have one choice: we will die sooner or later. With immortality we double the amount of options: we can go on living or die. However, because the choice that immortality brings is being constantly instantiated, this means that if at any moment the additional choice of going on living turns out to be worse than the choice we already had we can always change to the other option, that is, opt out of life. The only way immortality would be void of value is if everyone would want to opt out of life before they die involuntarily, since no one needs to be immortal to have that ability. That does not seem to be the case, so immortality as a choice is good. People will be better off with the choice. Overall (2003, 190) seems to agree (see quote in **P*9.1A7**).

PCBA – Ceteris paribus.

C52 - P50 obtains without doubt. However **P*51** does not obtain in its current form. Nevertheless it does obtain within the immortality context, since there are many people who still die involuntarily. Remember that for the choice to go on living be devoid of value, all people should have to have opted out of life before they die involuntarily. As such **C52** also obtains.

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Verdict: OK

Because immortality brings a new option without sacrificing existing options, then having the extra option comes risk free. Anyone can still opt out at any time, in the manner of their choosing.

Section 3 – Consequential Arguments

3.1 – Arguments Against Immortality

3.1.1 – Overpopulation Argument

P: Substantially decreasing the death rate will lead to overpopulation.

P*: Overpopulation is bad.

C: Substantially decreasing the death rate is bad.

P: Immortality will substantially decrease the death rate.

C: Immortality is bad.

P: There is nothing directly related to immortality that allows for a replacement of what is lost.

C: Immortality is not desirable.

I am sure the lack of numbering on the argument was noticed. That is on purpose. This argument is loaded, i.e. includes presuppositions. Analysing it in this form would be extremely difficult. So, I am changing my approach here. I am going to provide a framework against which we can evaluate this argument and the surrounding discussion. The goal is to bring to clarity to what is at stake when someone employs the overpopulation argument. But before I do that, here are some examples from the literature:

Hermerén (2013): Those who are optimistic in describing the future possibilities of science [life extension] and play down the possibility of adverse side effects—including (…) the problem of overpopulation that would accelerate, as well as how to feed this growing population…

Harris (2013): Many people addressing the question of life extension have assumed that such a possibility will have a disastrous effect on the world's population.

Sethe & de Magalhães (2013): The other main issue most frequently considered a social implementation objection centres on consequences for population growth (…) most concerns seem to be based on the assumption that an ever greater population leads to a world that is 'not worth living in.

Chapman (2004): In looking at the implications of these trends, some analysts believe that the cumulative impact of human activity is pushing against the limit of the Earth's life-supporting or carrying capacity, perhaps even exceeding it (Chapman et al., 2000). Many scientists fear that humanity is threatening not only the web of life on Earth but also its own survival. (…) Obviously, prolonging human life would further accelerate these problems, especially if it involved significant numbers of people. (…) The above analysis clearly underscores that increasing the human life span is not sustainable for the planet.

Binstock (2004a): Even biogerontologist Leonard Hayflick, regarded by many in the field as having laid the groundwork for contemporary research advances in molecular mechanisms of aging (Shay and Wright, 2000), sees "no value to society or to the individual in seeking to slow or stop the aging process or to achieve immortality" (Hayflick, 1994, p. 341). (…) If they [medicines to stop aging] were universally available, he fears an exacerbation

of the consequences of worldwide overpopulation, ranging "from the indiscriminate destruction of the planet to mass starvation, wars, economic inequities, and health failures" (Hayflick, 1994, p. 339; also see Hayflick, 2000).

More (2004): Those hearing the arguments for superlongevity have deployed two or three unchanging, unrelenting responses (…) The final predictable response is to conjure up the specter of overpopulation.

Wade (2004): Some people object on various grounds to extending life span (…). Many fear it would lead to an unwelcome and unmanageable increase in population.

3.1.1.1 – Understanding the Claim

What are people concerned about when they say that immortality will lead to overpopulation? They are concerned, not so much on how many people there are, but on how sustainable that amount will be. The objection made clear is <immortality is unsustainable>. The link overpopulation-sustainability arises because it is easy to picture an absurd amount of people that not only not go away (die) but keep growing (reproduce) with the concept that the planet can only provide so much. There will be a breaking point.

Let us take another look at the claim that <immortality is unsustainable>. What does sustainability mean? Sustainability means the capacity to maintain a system or process indefinitely. There is an input rate, an output rate and a low or high bound, beyond which the system or process stops. Sustainability then means that the input rate be greater that the output rate in the case of a lower bound, or the output rate be greater than the input rate in the case of a higher bound. The point is to never reach the bound or, in other words, to let the system halt. An example: let us evaluate if John's consumption is sustainable. He has an input rate: his income; an output rate: his spending; and a lower bound: equity equal to zero.[55] Now, John wants to avoid being deprived of consuming, he has needs such as food, shelter, etc., that he wants to meet. That is the reason for us to evaluate the sustainability of his consumption and the justification for having a lower bound (vs a higher bound): if his equity ever reaches zero, he is unable to consume. Sustainability, in the presence of a lower bound, means that his income must be greater than is spending. If his spending is greater than his income, then he is in unsustainable territory. This does not mean he is not able to consume – he could be using his savings – it only means that he cannot continue in that state indefinitely, because sooner or later he will reach his lower bound, i.e. have no equity. Sustainability means that John can consume a certain amount *forever*, given its current income.

[55] I am going to assume, to simplify matters, that borrowing is not available since its introduction will increase the complexity without changing the conclusion of the example.

But what is the thing that people are worried about when they claim that <immortality is not sustainable>? Sustainability of what? It is the sustainability of our planet, in an ecological sense and in relation to ourselves as humans or individuals. We want to be able to achieve what it is that people want to achieve and that requires having available specific interactions with our environment, from the air we breathe to the pollution we make. For simplicity's sake we can frame the problem as follows: our input rate is what nature can provide us, our output rate is our demands on nature; and our bound is the destruction of civilization or worse[56], making us unable to achieve what it is that people want to achieve. It is argued that actualizing immortality will be unsustainable because our demands on nature will far exceed those that it can provide, due to the sheer number of people – overpopulation.

Population is indeed related to our demands on nature (the output rate mentioned above). But how? I suggest, for the purposes of this analysis, that our demands on nature (D) are a function of three variables: Technology (T), Consumption (C), and Population (P).[57] I am not concerned about what mathematical form is the best fit for the equation, neither what proxies should we use to measure each variable. My point is to have a simple conceptual framework that allows us to think properly about what is at stake. Here is the breakdown:

- **Consumption:** This variable captures the demands of the *average person* (i.e. per capita), from their need of resources such as food, land, air, metals, water, etc., to their pollution such as biological waste, greenhouse gases, chemical waste, etc. The point is to track the average person's impact/demands on nature. The first derivative of this variable is positive. Ceteris paribus, an increase (decrease) in C will result in an increase (decrease) in D. Its value is always greater than zero since we are constantly in an exchange relation with nature.
- **Population**: This variable tracks how many persons we are dealing with. The first derivative is positive. Ceteris paribus, an increase (decrease) in P will result in an increase (decrease) in D. Its value is always greater than zero otherwise I would not have written this, and you would not be reading it. Furthermore, we can express variations in population as a function of the difference between the birth rate and the death rate. If the former is greater than the latter population

[56] I understand that this is an anthropocentric view. But for the purposes of this argument it is stricter than a non-anthropocentric view, since the latter allows for the elimination of the human species before the bound is met, in this case the destruction of our planet's ecosystem(s). For an example on this view see Linkola (1989) where the non-anthropocentric view is taken as the highest value.

[57] The original function is known as I=f(PAT), where 'I' stands for human impact and 'A' stands for affluence. I changed the name of the variables to be consistent with the rest of the text.

will increase, and vice-versa. It is therefore false when More (2004) states that "the population growth rate is determined by how many children we have, not how long we live." How long one lives determines the death rate.

- **Technology**: This variable measures how efficiently we can use what nature provides us. For the same amount of < P×C >, more technology means less demands on nature, or, for the same amount of demands on nature, more technology means more < P×C >. For example: sewage treatment plants allow us to increase the amount of sewage for the same impact or decrease the impact for the same amount of sewage; new agricultural techniques allow us to increase crop yields for the same amount of land, space exploration might allow us to gather precious minerals from asteroids and so on. The first derivative is negative, ceteris paribus an increase (decrease) in T will result in a decrease (increase) in D.

Note that the product < P×C > gives us the global demand on nature for a given technological level. It accounts for all humans.

Now, with a framework in place we can restate the overpopulation argument more clearly. The claim is the following: **It is a fact, ceteris paribus, that increasing P, will increase D**. While that claim is true, to arrive at <immortality is bad> one also needs to assume that P will increase (or that there are no options to avoid the tendency to its increase), that a ceteris paribus clause is warranted, and that increasing D is bad. I will use the expression overpopulation argument advocate (OAA) henceforth for reasons of economy.

3.1.1.2 – Counter 1: Increasing D is Not Bad

Perhaps it can be argued that increasing D is not bad. In the context of the argument, increasing D is bad if it results in an unsustainable state[58], or if it aggravates an already existing unsustainable state. Although it can be argued that increases in D within what is sustainable can be bad (or good), it does not seem to be what the OAA is claiming. The obvious clue is in using the word overpopulation. It expresses the idea of having too much, a quantity above what is sustainable. The case would have been different if the argument was that more P is bad, regardless of sustainability issues.

[58] Exceptions for temporary journeys into the unsustainability realm that can pay off in the future. For example, consider the case of using non-renewable energy to build sources of renewable energy.

The reason why having D in an unsustainable state is bad, is because the bound by which we measure sustainability is bad. It means as already suggested above <the end of civilization or worse, making us unable to achieve what it is that people want to achieve>. Allow me to expand on that. The consequences of the unsustainability of D are deleterious for various instrumental convergent goals, a concept well known from AI research. Nick Bostrom (2014, 132) defines the instrumental convergence thesis as follows:

> Several instrumental values can be identified which are convergent in the sense that their attainment would increase the chances of the agent's goal being realized for a wide range of final goals and a wide range of situations, implying that these instrumental values are likely to be pursued by a broad spectrum of situated intelligent agents.

The unsustainability of D is not bad in itself. It is bad because it negatively impacts achieving what people value, regardless of what they value. It is detrimental for the following instrumental convergent goals: self-preservation, self-improvement and resource acquisition.

It is true that tying badness to instrumental value will not encompass all final goals/ utility functions[59]. For example: if I want to destroy humanity, then having D in an unsustainable state is not bad. However, the instrumental convergence thesis encompasses a wide range of final goals/utility functions, allowing us to go as far as stating that having D in an unsustainable state will *almost certainly* be bad, because it is bad for almost all cases. I consider this reasoning convincing and so I will grant that increasing D is bad if it results in an unsustainable state, or if it aggravates an already existing unsustainable state.

The next step is to have an idea of the orders of magnitude of the rates involved (input rate and output rate mentioned above). Is it even possible to achieve an unsustainable state? Or it can be the case that unsustainability is only an issue in theoretical terms if the rates are too far apart that by the time they get close to the bound the issue at hand is a non-issue[60]. Where are we now in terms of sustainability? Using biocapacity as a proxy for what nature can provide us, and the ecological footprint as our demands on nature, the case seems bleak. According to the Global Footprint Network (n.d.), data shows we are in unsustainable territory since 1970, and in 2014 we were demanding 69% more from nature than what it can provide us. One of the most well-known consequences is anthropogenic global warming (see Benestad et. all, 2015), also known as climate change. Carbon emissions, it is main driving force, are constantly beating records (Chestney, 2018, Reuters). CO_2 is now regularly above 400ppm, when for thousands of years never rose up from 300ppm (NASA, n.d.). The Paris Agreements meant to tackle climate change are not under a good auspice (Wallace-Wells, 2018, NYMag). The

[59] See *4.3.2 – Ethics and Choice* for clarifications on the meaning of utility function.
[60] For example, ejection of mass from our planet into space (McDonald, 2012, BBC Article).

situation seems so severe that extravagant solutions such as dimming the sun are being studied (Doyle, 2018, Reuters). Other signs that we are drawing closer to our bound include, but are not exhausted by the following: UN estimates that 5B people could suffer water shortages in 2050 (Watts, 2018, The Guardian); IPBES (2018a), an intergovernmental panel composed of 129 members states, estimates that land degradation is currently affecting the well-being of 3.2B people; the same organization published four regional reports on biodiversity with conclusions such as: 28% of endemic species from Europe and Asia are threatened (2018b, 12), more than 20% of endemic species from Africa are threatened (2018c, 14), almost 25% of species in the Americas are threatened (2018d, 18), almost 25% of endemic species in Asia-Pacific are threatened (2018e, 12).[61] I could go on listing the depressive state of affairs that we are into. And it seems that what we have done so far will last us for centuries, as stated in the last IPCC report (2014, 13, 16)[62] report:

> Coastal systems and low-lying areas are at risk from sea level rise, which will continue for centuries even if the global mean temperature is stabilized. (…) Surface temperatures will remain approximately constant at elevated levels for many centuries after a complete cessation of net anthropogenic CO2 emissions.

Report after report, news after news, the conclusion that I want to make is clear. We are currently deep in unsustainable territory. Our demands on nature are above what it can provide us.

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Verdict: HIGH PROBABILITY OF FAILURE

There is no doubt that we are currently on unsustainable territory, and that that state of affairs jeopardizes some convergent instrumental goals, therefore increasing D is bad. However, there might be some very specific utility functions, that feature the destruction or demise of civilization. On those cases increasing D is not bad. For the rest of the utility functions, arguing that D might not be bad has a very high probability of failure.

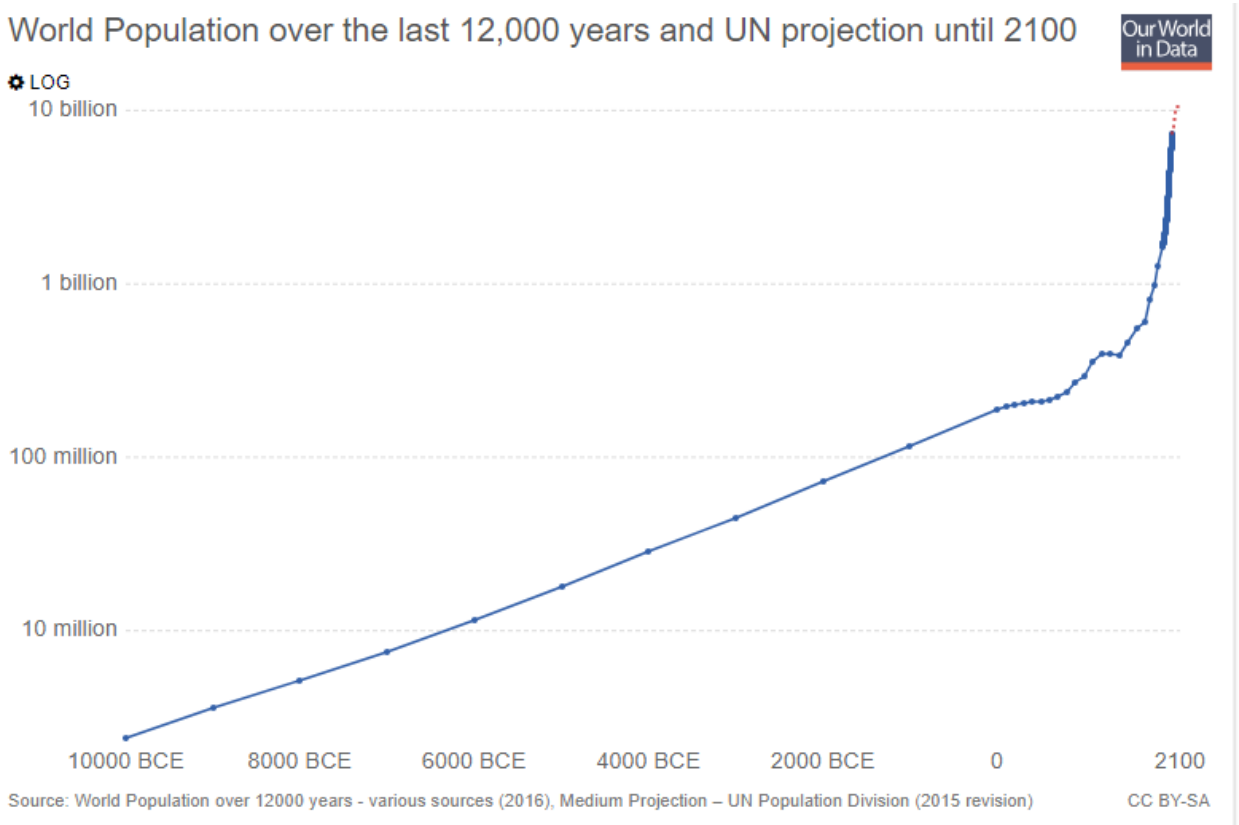
3.1.1.3 – Counter 2: The Overpopulation Taboo and Rhetoric Manoeuvres

What I will present next is a purely rhetorical counter, and although it carefully avoids the issue at hand it results in a deep assessment of the overpopulation argument, Socratic method style. If the overpopulation argument is based on a claim that too many people will

[61] It is no wonder that evermore people speak of a 6th mass extinction event.
[62] I recommend consulting this source for a detailed outlook of what consequences are expected due to our unsustainable status.

result in an unsustainable state, and if we are currently in an unsustainable state, how come now one (at least not the majority of the OAAs) is talking about the overpopulation of today's?

a) One answer can be because they are not the same thing. In the case of immortality, we are talking about a really big increase in population that results from a substantial decrease in the death rate. That is not the case today, or so it is argued. But if we observe the evolution of world population as shown in the graph below, the growth that led to our current state is vertical in a graph with the short time span of 12K years *and in a log scale*! And decreases in mortality rates were also a driver of this surge: child mortality rates[63] were reduced from 43% in 1800 down to 4.3% in 2015 (Roser, 2018a). Surely this is the kind of growth envisioned by the OAA UI. If there is a difference between now, and the state predicted by the OOA, it cannot be the evolution of population.



b) Alternatively, one can still argue that both cases (now, and UI) are not the same, but without appealing to the evolution of the population. It is argued that while UI the unsustainability is caused by overpopulation, the unsustainability we have today is caused be excessive consumption. But, as I show in *3.1.1.6 – Counter 5: How to Configure Population?*, this explanation will not do. Although it is a fact that our

[63] Defined here as the percentage of new-borns that died before their 5th birthday.

> demands on nature are at an unsustainable level, it is not a fact that decreases in D must come from a specific parameter. Stating that the problem lies in one of the parameters is a claim of value, not a claim of fact, that says something about how one pretends to achieve sustainability. After all it can also be argued that the problem of unsustainability UI is caused too by overconsumption and not overpopulation.[64] Claims of overpopulation and/or overconsumption are two ways of referring to the same thing: unsustainability.

The answer is that there is no relevant difference between our case today, and that envisaged by the OAA. This will be a common theme in my discussion of the subject and one I feel is not given due attention in the literature. People seem to think that the problem we have today is not the same thing as the state predicted by the OAA. But as long as there is room for both P and C to fluctuate (they cannot go below zero), a solution to decrease D to a sustainable level will work regardless if we are talking about today, or about the hypothetical scenario UI that the OAA present us. The equivalence exists because both cases are unsustainable. Yet no one is decrying the problems of overpopulation today. What gives?

Here is my attempt at providing an explanation, based on conversations that I had with several people about the subject. There is a taboo when it comes to muttering the word overpopulation. It seems that, in general, people shun such suggestions to the same box where they put eugenics, genocide, forced sterilization and so forth. They seem to think that from arguing about overpopulation, necessarily those things must follow. They do not seem to consider that the only way their rationale is correct is if what separates overpopulation from the supposed stated consequences is a slope, a very slippery one. There is a difference between stating that a problem exists and advocating solutions. It can be the case that no solution is better than inaction, but that is not the same thing as denying the existence of the problem. No politician speaks of overpopulation, no green activist speaks of overpopulation, the taboo is generalized.[65]

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[64] Even if we suppose that both T and C remained constant, and only P increased, stating that it is the value of P that is *too* high is still a claim of value. It requires to defend that the initial distribution between T, C and P to not have any excessive value (or deficient in the case of T). This will be expanded on *3.1.1.6 – Counter 5: How to Configure Population?*

[65] Ethics departments are not immune to this phenomenon. During this master's program I had the opportunity to present a work on overpopulation and at the mere suggestion that we might have such a problem today, my colleagues reported being "shocked" and "outraged", but unable to engage in the discussion. A professional philosopher, specialized in ethics, that was present in the room quickly instantiated Godwin's law, thinking that the name calling and the inferred guilt by association would substitute for substantiated arguments. If I knew how things really were, I absolutely would not had made a presentation on such theme. Questioning the status quo is unfavourable for those seeking top grades. I am lucky and thankful to have supervisors that provide me with the much-needed freedom to approach sensitive issues.

But if overpopulation is taboo, how come people frequently employ the overpopulation argument? People who support the overpopulation argument seem to do so through *motivated reasoning*. They already support the idea that immortality is not desirable through another argument, and in searching for reasons to further their case they come up with the overpopulation argument. And this argument provides them with a big rhetorical advantage. First, the inference that we might increase our demands on nature is easy to grasp (ceteris paribus, an increase in P results in an increase in D). Secondly, given our current state of affairs, avoiding more pressure on D seems to be an easy sell (I granted that increasing D is bad). Thirdly, and most importantly, it puts advocates of immortality into a corner. Either they have to show that there will be no overpopulation problem, which as I show in *3.1.1.4 – Counter 3: P Will Not Increase*, and *3.1.1.5 – Counter 4: Ceteris Paribus is not Warranted: T Will Compensate* is not granted, or, if they are to not concede that immortality is bad, they must deal with the taboo and suffer the consequences for the terrible act of suggesting overpopulation.[66]

If I am right in my assessment of the background reasons for the usage of the overpopulation argument[67], then the best answer is also a rhetoric manoeuvre. The strategy is to give back the hot potato of overpopulation, without engaging it directly: no denying it, and no accepting it. Instead, merely pointing out that at the moment we have a problem of unsustainability and asking those who defend the overpopulation argument how they would tackle it is the rhetorical counter I suggest. Then the relevant parallels between the unsustainability now and the case UI need to be drawn, and finally the suggestions given for tackling the unsustainability problem of today be applied to the case UI. The OAA is now the one in a corner: either admits that the proposed solution is insufficient for both cases (now and UI), or that it is good enough for both cases. Either it is conceded that there is an overpopulation problem today and UI, or that there is an overpopulation problem in neither option.

I will explore the implications for our current state, of claiming that there will be an overpopulation problem UI in *3.1.1.7 – Counter 6: Reducing D via P: The Death Rate*.

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Verdict: Unknown

Because this counter deals in rhetoric and not in substance I do not think it is suitable to offer a classification. It very much depends on the flow of the discussion and where it lands.

[66] Luckily for me, I will have no problems in taking the bait and run with it. I have no problems in conceding that there is a sustainability problem now, and ceteris paribus, it will be aggravated by immortality. I also have no problems in framing the sustainability problem in terms of overpopulation, both today and UI.

[67] If I am not, the strategy I am going to propose is still valuable as a critical thinking tool. It can result in the discovery of inadequacies in the overpopulation argument.

3.1.1.4 – Counter 3: P Will Not Increase

This counter states that human population will stabilize in the future, and as such it will not grow indefinitely. If this is the case, then the overpopulation argument might fail to obtain. Assuming UI that the death rate will decrease substantially, the fate of the birth rate will decide the overall effect of P. This argument tries to show that a similar decrease in the birth rate will occur in a way that balances the decrease in the death rate. The result is no (substantial)[68] increase in P. Reasons to support this claim are usually based on using the fertility rate as a proxy to the birth rate[69]:

1 – Fertility rates have been decreasing around the globe and are expected to continue the trend. A UN paper (2017a) titled *The End of High Fertility is Near* states that "the total fertility rate for the world fell from 5 live births per women in 1950-55 to 2.5 births in 2010-2015". Another UN report (2017b, 6) titled *World Population Prospects* states that "in 2010-2015, 46 per cent of the world's population lived in countries with a fertility level below 2.1 births per woman (…) In 2045-2050, it is expected that 69 per cent of the world's population will live in countries where women give birth to fewer than 2.1 children on average." The value of 2.1 is of importance since (UN, 2017a) "at this level of fertility, each generation of parents exactly replaces itself with an equivalent number of children who survive to adulthood, ensuring a long-term growth rate of zero."[70]

2 – An explanation for the previous point can be because there is a causal relation between the decrease in fertility rates and at least some feature of the developed world such as education, wealth, life expectancy, women empowerment, etc. (see Roser, 2018b). It follows that, as developing countries go down the same path, they will also decrease their fertility rates. A correlation from a cross section analysis is clearly shown in the *Human Development Report*

[68] Due to the lag of some effects, population can still increase. As stated in the UN report World Population Prospects (2017b,12): "In fact, continued growth of the world's population is expected at least until 2050, even if the decline of fertility would accelerate."

[69] The fertility rate (average number of births per women) is not the same thing as the birth rate (number of births per 1000 persons). However, unless there is a significant change in the relative size of men in the population, changes in fertility rates will be reflected in changes in the birth rate. On the other hand, fertility rates, when compared with the replacement fertility rate can predict the trend on population. But note that if/when babies come into the world not by birth but by "decantation" – the expression appears in Huxley's Brave New World – the fertility rate will lose its meaning since women will no longer be relevant for calculating population stabilization. Contrary to fertility rates, birth/decanting rates are not affected by this issue.

[70] This value cannot be below 2 if the sex of the baby is not controllable, since a woman needs to replace herself and has a roughly 50% chance of the baby being female. If the sex of the baby is controllable, then the woman needs to replace herself plus a share of the men population divided equally among all females. This means the replacement fertility rate will be more than 1, but never more than the value when the sex of the babies was not under control. For example, if there is 1 male per 10 females the replacement rate is never below 1.1. Fluctuations above the minimum stated values occur to compensate for deaths before the reproductive act.

(UN, 2017c, 225). Countries were tiered by their ranking on the Human Development Index (HDI) into 4 groups. Fertility rates for those groups were the following, starting from the countries with the highest HDI, for the period of 2010-2015: 1.7, 1.8, 2.7, and 5.2.

3 – Longer lives seem to be one of the mentioned features. With longer lives the urgency to have a child decreases, and, as such, women will postpone the decision to become mothers for later. UI this is taken to an extreme. There will be no pressure to have children at any particular point in time.[71] The projected increase in the female mean age of childbearing constitutes indirect evidence of this claim. From a value of 27.732 for 2010-2015 to a projected value of 29.839 in 2095-2100[72].

4 – A reason for childbearing postponement might be related with the desire to leave a legacy on earth through offspring. UI, there will not be time pressures for childbearing and the legacy that it means as Sethe and de Magalhães (2013) propose:

> *The instinct and desire to procreate is strong in many. This may be due to evolutionary reasons, but also a conscious decision to defy death by trying to perpetuate something of oneself—which indicates that such desires might be less strong in 'immortals' (Perry 2000).*

The conclusion is that population will eventually stabilize or even decrease.[73] "The end of high fertility is in sight and will arrive soon, unless several countries follow unusual pathways and maintain higher levels of fertility in future decades compared to what is expected based on historical patterns of change" (UN, 2017a). And because there is no expectation that trends will change, "later in the century, although a continued increase of the global population is considered the most likely outcome, there is roughly a 27 percent chance that the world's population could stabilize or even begin to fall sometime before 2100" (UN, 2017b, 3). Or if it does not by then, sometime latter eventually will. More (2004) used this argument citing decreases in fertility rates and concluding that "we can expect population growth to continue slowing until it reaches a stable size."

However, there are some problems with this counter:

I – Cultural differences can be underestimated. This means not every country will follow the same path of the developed countries and show decreases in fertility rates, or at least not as much. I do not think this merits much attention. Globalization will pressure such culture,

[71] Note the implicit support for the deadline argument, at least when it comes to childbearing.
[72] However the value for 1950-1955 was 29.169 followed by a decrease to 27.500 in 1995-2000. Only after this (?local) minimum is a monotonous increase observed and predicted. I did not explore reasons for this recent decrease, but one hypothesis may be because there was an increase in the share of the population that reproduces early and not because of a decrease of maternal age in individual terms.
[73] If population decreases then the argument is turned upside down, and making people live longer remains imperative if we are to avoid extinction.

if it exists, into conforming with world trends. From the tier of the highest develop countries, most exhibited fertility rates below the replacement rate including countries both from Asian background (i.e. Singapore, South Korea, Japan) and Western background (i.e. USA, UK, Germany). Those who were above replacement levels showed a decrease in the fertility rate from 2000-2005 to 2010-2015, including several Arab countries (i.e. Saudi Arabia, Qatar, Kuwait) and one from South America (Argentina). The only exception seems to be Israel, that maintained an exceptionally high fertility rate (UN, 2017c, 222).[74] Even if we concede that it is the unique culture of Israel that is maintaining a high fertility rate, it might not hold forever.[75]

II – It seems that the stabilization of population comes at the cost of increased consumption. The increased consumption is to match the feature of the developed world that made fertility rates decrease. Although P may be alleviated, the product < P×C > might not. I reckon that this a matter of quantification and is entirely possible that increases in C will not compensate the totality of the decreases in P. It is nonetheless a weakness of this counter since some increase in C is expected.

III – Lastly and more importantly. Even if we grant that P stabilizes, that alone does not guarantee that it will do so at a sustainable level. As Bergh e Rietveld (2004) state, "even if the world population stabilizes in the future, this cannot be taken as a guarantee that the population level reached will be environmentally sustainable."

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There is a slightly different argument that I want to briefly mention. It consists in the claim that even if population were to increase it would take a long time to do so. Sethe and de Magalhães (2013):

> Population changes are surprisingly slow in their response even to a dramatic life extension (Gavrilov and Gavrilova 2010). Even if a 'cure' for aging were developed tomorrow, the pressure of population whatever they may be would not amount to a marked increase for many decades. Thus, if overpopulation becomes an issue it would be well into the next century or beyond.

A different version assumes that immortality will not have a great uptake since it will only be accessible to developed nations[76], thus taking longer great increases in P (More, 2004):

> This points to another flaw in the suggestion that extended longevity will dramatically boost population growth. The fact is, superlongevity in the developed nations would have practically no global or local population impact. The lack of global impact is a consequence

[74] Fertility rates for the mentioned countries for 2010-2015: Singapore-1.2, South Korea-1.3, Japan-1.4, USA-1.9, UK-1.9, Germany-1.4. Rates for 2000-2005 and 2010-2015, respectively: Saudi Arabia-3.6-2.9, Qatar-3.0-2.1, Kuwait-2.6-2.2, Argentina-2.5-2.3, Israel-2.9-3.1

[75] From personal conversations with Jewish people, including those with a strong religious inclination, they seem to claim that their people are being subject to some sort of curse throughout history. If they are correct, then the high fertility rates of Israel should be of less concern.

[76] Concerns about inequality will be dealt with more thoroughly in *3.1.2 – Inequality Argument*.

> of the small and falling share of the global population accounted for by the developed nations.

Although this might allow us some extra time to find solutions (see *3.1.1.5 – Counter 4: Ceteris Paribus is not Warranted: T Will Compensate*), this argument, in itself, misses the point. The overpopulation argument does not require the changes in demographics to be quick, only that when they happen they be bad. Let us draw some parallels. Suppose that I install some bombs in critical facilities, but set the timer to some decades in the future. Does the value of my action change, if instead the timer was set for the next day? If the argument is that I should not explode stuff up, then that my timer is set for some decades into the future vs for tomorrow, is irrelevant. The same applies to the overpopulation argument, regardless if immortality would bring forth overpopulation in a week or in a few generations. Furthermore, the argument is permeable to the same counter made to the previous version: there is no guarantee of sustainability, even if demographic changes are slow. The version of More is even weaker since it is also a target to the following attack. Although population in developed countries are a relatively small number they are the ones doing most of the consuming, so an increase in their size will have a greater impact than an equivalent increase in other countries. For example, the UK and the US are one order of magnitude above China or India when it comes to contributions to global warming per capita. Even when calculating total contributions, the US has a value 35% greater than China and India combined, and this does not account for (Matthews et al., 2014):

> The transfer of emissions associated with the international trade of products and resources. There is an emerging body of literature which has shown that a consumption-based representation of CO2 emissions leads to a shift in the allocation of current emissions from major producer countries such as China towards major consumer countries in North America and Western Europe (Davis and Caldeira 2010, Peters et al 2011, 2012).

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Verdict: FAIL

All things considered I will not grant this counter a successful status. Point III is sufficient to destroy its credibility. It seems irresponsible to assume that population will stabilize at a sustainable level in order to dismiss overpopulation concerns, given what is at stake. If indeed population stabilizes at a sustainable level, great! But if it does not and we counted on it to not do anything else about the issue... Hope for the best, prepare for the worst. The overpopulation argument is unscathed.

3.1.1.5 – Counter 4: Ceteris Paribus is not Warranted: T Will Compensate

There seems to be a position adopted by some, which I shall refer to as Cornucopians, that believes technology alone will solve the sustainability problem. That is, we do not need to worry about overpopulation and/or overconsumption (P and/or C), because T will provide the necessary adjustments to D. Here are some justifications for this position:

1 – Technologies that directly influence D, such as negative carbon emissions technologies, can solve sustainability problems, such as the excess of greenhouse gas emissions. In fact, the majority of models used in the Paris Agreements to achieve a 2º degree global warming limit rely extensively on negative carbon emission technologies (see Anderson & Peters, 2016).

2 – Other technologies rely on space exploration to replace what is scarce on earth. Asteroid mining can substitute for scarce materials on earth, such as gold, platinum and other metals. Moon mining can restock helium-3. China is surveying the feasibility of such project (Connor, 2013, Phys.org). Countries such as the Luxembourg already have codified laws regulating this practice (Moon, 2017, Engadget).

3 – Others not content in bringing resources to earth, want to send people into space. This not only will alleviate concerns of overpopulation on our current planet, but also provide a redundancy to our species, increasing the probability to escape the great filter hypothesis, if there is one and is positioned in our future. The SpaceX project, led by Elon Musk, wants to achieve this redundancy by building a 1 million strong civilization on Mars, with the first passengers of this one-way trip scheduled to depart during the next decade (Solon, 2018, The Guarding, and SpaceX, 2017b). Overall (2003, 140) seems to consider this as the definitive option against the overpopulation argument:

> The only possible way around this problem that I can imagine would be the migration of immortal human beings to other planets, perhaps planets in other solar systems; the burden that they would pose here on earth would thus be relieved.

4 – Even more extreme is the suggestion of living within virtual reality. This suggestion implies a lot of changes compared to our state of affairs. The ones I want to focus here are those related to D. If humans were to live in capsules with feeding tubes for air, food, and other necessities, and all their senses tricked into believing they were in a virtual world, Matrix style, our value of D would most likely be reduced, since, apart from the basic necessities to provide for our body, the only extra resource we require is processing power and its accompanying hardware and energy. Almost all of C would be fulfilled by information and the bits it is composed of, i.e., virtual reality. Perhaps we can make things more economical by ditching the

body and preserving just the brain and live as brains in a vat. Or we might even dispose of the brain and upload our selves to a digital infrastructure reminiscent of the cloud we have today. The 2045 initiative is currently seeking to actualize the upload of selves (n.d.).

5 – Differently, it can be argued that in the past, authors such as Malthus and Ehrlich, predicted the demise of overpopulation and their predictions were not fulfilled. As Conly (2016, 9) states: "we have heard at least a few people cry wolf". This time is no different. We are not that good at predicting technological developments.

6 – Lastly, it can be argued that the more people there are the more chances we have at discovering world changing technologies, simply because there are more heads thinking about the problem. It is exactly because there is a large amount of people that we will be able to tackle sustainability problems. Here it is argued that the problem, overpopulation, will be in fact its own solution.

Do these reasons hold to scrutiny?

I – The first reason to believe not, is known as the Jevons Paradox. In essence it states that increases in T can have an adverse effect on C (i.e. also increasing it). The result on D is ambiguous, since the increase in C can be so much that it offsets the benefit gained with the increase in T. What happens is that as technology allows for some good to be used more efficiently its price drops as a result, and by good ol' demand law its consumption increases. For example, suppose that central heating is made more efficient by using less energy for the same heat generated. If the response of the users is to use more of it, because now heating is cheaper, then the efficiency gains of T can be cannibalized by C and even offset. The higher price elasticity of demand[77], the more T will be offset by C. If the effects of C are greater than the effects of T, then increases in T will increase the value of D. We can build examples with other resources such as water usage, pollution, etc. To be clear, this is not an argument against technological progress. It merely states that increases in T might not be enough, on their own, to decrease D, and as such need to be coupled with other measures to ensure that C does not rise. Therefore, the Jevons paradox destroys this counter by showing that we will need to act on other variables, regardless. The drawback is that the Jevons paradox is not applicable universally, it is conditioned to certain values of price elasticity of demand. However the longer the period under consideration the more elastic the demand is. When considering periods that

[77] Price elasticity of demand is a technical economic concept that captures the sensitivity of demand to price fluctuations. The more elastic the demand, the more it will react to variations in price, ceteris paribus. For example: price elasticity of demand of butter is higher than that of tobacco.

involve the development and deployment of technologies and their effects on D, this seems to be long enough to make the demand elastic enough to trigger the Jevons paradox.

II – There is no guarantee that these technologies will arrive soon enough, or even if they will arrive at all. Take for example negative carbon emissions technologies, featured in the models that underly the Paris Agreement. According to Anderson & Peters (2016) bioenergy, combined with carbon capture and storage (BECCS) "is the most prolific negative emission technology included in integrated assessment models and is widely used in emission scenarios." Perhaps because "other negative-emission technologies have not moved beyond theoretical studies or small-scale demonstrations." However they note some obstacles with BECCS: "two decades of research and pilot plants have struggled to demonstrate the technical and economic viability of power generation with CCS." So the most relied upon technology to tackle emissions is still in development while international organisms take it for granted: "many scenarios assessed by the IPCC propose its mature and large-scale rollout as soon as 2030." Not only that but

> its land-use impacts could include terrestrial species losses equivalent to, at least, a 2.8°C temperature rise, leading to difficult trade-offs between biodiversity loss and temperature rise. There is also little robust analysis of the trade-offs between large-scale deployment of BECCS (and all negative-emission technologies) and the Sustainable Development Goals (SDGs).

It seems that the technology we take for granted to input in our models might bring some major negative side effects to the point that the impact on D is unclear. They conclude:

> If the many reservations increasingly voiced about negative-emission technologies (particularly BECCS) turn out to be valid, the weakening of near-term mitigation and the failure of future negative-emission technologies will be a prelude to rapid temperature rises reminiscent of the 4°C "business as usual" pathway feared before the Paris Agreement. Negative-emission technologies are not an insurance policy, but rather an unjust and high-stakes gamble. There is a real risk they will be unable to deliver on the scale of their promise. If the emphasis on equity and risk aversion embodied in the Paris Agreement are to have traction, negative-emission technologies should not form the basis of the mitigation agenda. This is not to say that they should be abandoned). They could very reasonably be the subject of research, development, and potentially deployment.

They clearly point out the argument that I want to make here. It is irresponsible to rely on technology to solve unsustainability because it is gambling with the future of humanity. At best is an extremely irresponsible behaviour aimed at some short-term profit:

> The promise of future and cost-optimal negative-emission technologies is more politically appealing than the prospect of developing policies to deliver rapid and deep mitigation now and in postponing the need for rapid and immediate mitigation, BECCS licenses the ongoing combustion of fossil fuels while ostensibly fulfilling the Paris commitments.

This line of reasoning is not only applicable to negative emission technology but to all technologies listed above and even those yet to come. Because we are dealing with things that

are not invented yet, they are intrinsically uncertain. This means that in relying on technology to solve the issue, Cornucopians are relying on uncertainty to solve the issue. If it does not deliver on time, we are kaput. The reasonable option is to not gamble with the future of humanity but to "proceed on the premise that they [negative emission technologies] will not work at scale. The implications of failing to do otherwise are a moral hazard par excellence".

III - Lastly, I would like to address the cry wolf approach: a) in the end the wolf does appear, gambling away our future can only win so many times; b) hindsight prediction is 100% accurate, so for us it is clear to see why doomsters of the past failed to account for technological progress. But to ignore the most up to date evidence of the state of affairs just because someone had wrong predictions in the past is an invalid inference, which might carry with it disastrous consequences. No one is going around saying that we should reject modern astronomy because someone once said that the sun orbited the earth or reject modern medicine because someone once said that bloodletting was a great treatment for a variety of ailments. It is nonsense and as such we should not reject worries about overpopulation just because someone once said something that happened to not be true.

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Verdict: FAIL

More (2004) states that "even if population were to grow far outside today's highest projections, we can expect human intelligence and technology to comfortably handle the numbers." Contra More (and other Cornucopians), who seems to be experiencing a survivorship bias, relying on technology alone to achieve sustainability is utterly irresponsible given what is at stake. Its answer to the overpopulation argument is merely a <it *might* not be a concern>. This is not so great of an assurance and as such worrying about overpopulation is still warranted. If the technology comes on time, great. But if it does not, another mass extinction event will probably follow.

3.1.1.6 – Counter 5: How to Configure Population?

For a good take on the overpopulation argument we should proceed with the assumption that population will not stabilize at sustainable levels by itself, and that technology will not arrive soon enough to deal with the problem (we can assume that T is constant to neutralize its effect). We still have two variables that we can try to act upon: C and P. And there is an advantage here because we can reduce them with certainty (if we so desire), so this option is

impermeable to the accusations of uncertainty that plagued the last two counters. This offers us a guarantee that the problem of sustainability is solvable.

P and C are intrinsically connected. Their product represents our total demands on nature, for a given technological level, with C representing demands per capita and P the population that there is. But since we are not considering technology to deal with the overpopulation argument, as stated above, we can assume that D = P x C.

The first thing that we can conclude is that there is a great amount of combinations between P and C that achieve the same amount of D. This tells us that it is not so much what specific combination we are considering that matters, but the value of D that that combination produces. As long as there is room for C and/or P to fluctuate, sustainability can be achieved by reducing just C, just P, or both. From the point of view of nature it does not matter who is doing the consuming, it only matters that someone is doing it. It is irrelevant if water is used for luxury swimming pools, or to satisfy the thirst of poor people because nature does not care. Put it this way: we can have 10 persons consuming 100 each, or 100 persons consuming 10 each, or anything in between, and have the exact same D.[78] It is important to note that any increase in one variable comes at a cost of a decrease in the other, for a given D. There is an inherent trade-off between C and P. There are no free lunches.

Now, if it is a fact that a certain combination of C x P is producing a D that is unsustainable, how do we know where the problem lies? Is C or P the culprit? Or both?

The answer is simple: we do not know. The reason is because putting the blame on C and/or P is not a claim of fact but a claim of value. For each value of T, achieving a quantity of D that is sustainable is met with several combinations of C and P. In order to say that there is too much C and/or too much P it is necessary to establish an ideal configuration of the population (that is, the desired combination of P and C) to acquire a benchmark to measure the current state against. Remember the simple example: 100 people consuming 10 each, or 10 people consuming 100 each. If we choose the former and our state is the latter, then there is a

[78] We can further advance that inequality has nothing to do with sustainability, because it does not matter who is doing the consuming. We can rewrite the formula by using summation for the consumption of each individual P:
$D = C_1 \times P_1 + C_2 \times P_{2 + \ldots +} C_n \times P_n$
And because we are considering individual persons $P_i=1$, therefore:
$D = C_1 + C_2 + \ldots + C_n$
Increasing or eliminating inequality does not change D:
$D = C_1 (-X) + C_2 (+X) + \ldots + C_n$
Concerns of inequality when it comes to sustainability are misguided. Besides, I am already working with the assumption that inequality does not exist, since every unit of P has attributed to it the same C, hence $D = \sum P_i \times C$. We can also advance that the rotation of generations has nothing to with sustainability. It is irrelevant if the persons who will be on earth in 500 years' time are all different from today, or the exact same from today, or something in between. For sustainability issues it matters how many persons and what they are doing, not who they are.

problem of overconsumption. Reverse the roles (preference and current state) and an overpopulation problem arises. How to choose between the several possible configurations of the population seems to be an open question of population ethics as Sethe and de Magalhães (2013) state: "it is also not always clear why a larger population is considered morally problematic." Minsky (2004) also states that: "no popular ethical system yet, be it humanist or religion-based, has shown itself able to face the challenges that already confront us: how many people should occupy Earth? What sorts of people should they be? How should we share the available space?" (for more on population ethics see the SEP entry: The Repugnant Conclusion, the famous Derek Parfit problem, listed under Arrhenius et al.). Only when value is attributed to combinations of C and P can we clearly state that there is too much of P and/or C. This is usually not made explicit. Take for example the common green party, or environmental NGO's and their claims that we need to reduce consumption be it through less reliance on fossil fuels, or through water saving, etc., in other words, that we *need* to reduce C to achieve a sustainable value of D. Or for example when Sethe and de Magalhães (2013) claim that "if we are using finite resources in a non-sustainable manner, then this problem **needs** (emphasis mine) to be solved independently of how long people live."[79] But reducing C is not a necessary condition to reduce D, so it is false that we *need* to reduce C to achieve sustainability.[80] What people mean is that we *should* reduce C to achieve sustainability, and this claim of value has implicit a certain preference about the configuration of the population: that people are ok with the value of P, but not with the value of C. Likewise when someone employs the overpopulation argument it means that the configuration of the population should not have that much P because that results in an unacceptable low amount of C, within the bound of what is sustainable.[81] .

This counter is trying to make explicit what is obfuscated in the overpopulation argument. That there will be an overpopulation problem is because a certain configuration of the population is valued beforehand. It is this configuration that conditions the employment of the concept of overpopulation, i.e. *it is in relation to valuable population configurations that there are too many people, not in relation to D being unsustainable*. I mean, D being unsustainable is necessary but not sufficient to employ the concept of overpopulation. The

[79] How long people live directly affects the death rate and as such P.

[80] It is extremely deceitful and dishonest when people try to claim overconsumption (or overpopulation) as a fact instead of as a claim of value, as for example Pearce (2009, Yale Environment 360) does. His claims are based on inequality, something that I proved in footnote 78, as not related to sustainability. He also falsely claims that overconsumption is a *"*simple fact*"*. I repeat: a change in D can be obtained by changing just C, just P, or both. His article is the paradigm of what not to write about sustainability.

[81] Note that questioning why people are generally worried about C, but not P, in our present situation, but the inverse UI is the strategy of *3.1.1.3 – Counter 2: The Overpopulation Taboo and Rhetoric Manoeuvres*.

same applies to overconsumption. However, D being unsustainable is sufficient to apply the concept of overpopulation or the concept of overconsumption, since at least one of those must obtain. In conclusion, it is not a fact that there will be a problem of overpopulation, what there is instead, is a claim of value with an underlying assumption regarding the value of certain population configurations.

What objections can we mount to this exposition?

I – The first objection is that the configuration of the population is just half of the story. The other half concerns the means used to modify our current state (P and/or C). It might be the case that altering P (or C) is so costly that it is better to achieve D with a suboptimal configuration of the population. The complete model has to consider the value of the several configurations of population + the cost of action (or inaction). A configuration that produces D above what is sustainable will result in nefarious consequences if inaction is the strategy chosen (see *3.1.1.2 – Counter 1: Increasing D is Not Bad*). Therefore, it is most likely better that some action be taken in order to deal with P and/or C. When considering which action to take, the net effect of each action consists in the cost of pursuing said action plus the effect achieved, i.e. the configuration of the population achieved. It might be the case that the best configuration is only attainable through highly costly actions, making this strategy less appealing than alternatives who use less costly actions to achieve not so good configurations. An example: suppose a scenario where D is unsustainable, and P is above the ideal configuration. Suppose further that the only options to decrease P are genocide, and forced sterilization. People might consider these options so undesirable/costly that the they might settle in bringing D to sustainable levels through reductions in C, even though that is a less valued population configuration. In this scenario people value more not having to go through reducing P than having the perfect configuration of the population. The problem is one of optimization, balancing outcomes and means to achieve them.

In our current state of affairs, when people prefer to reduce C instead of acting on P, the reason might not be so much because they prefer a certain configuration of population, but because all the actions that decrease P are too costly, or those that are not, are not enough to decrease D to sustainable levels. Likewise, when people argue that immortality will lead to overpopulation, what they mean is that, decreasing the variable P is too costly. The OAA suggests that it is better to not pursue immortality now, than to deal with P later because dealing with P will bring more costs than rejecting immortality now. The overpopulation argument seems to be based on value claims twice over: in addition to how much certain configurations are valued, it also takes into account the value of options to decrease P and/or C.

I consider that the addition of considerations regarding the importance of the actions we take not so much an objection, but something that adds up to the model previously exposed. We have to take into account how much are we spending (how costly are the actions) and how much are we getting back (what configuration will be arrived at) when deciding how to act.

II - We can go even further and claim that people do not care about population configurations at all. When presented with an unsustainable amount of D, they will just evaluate the options they have to bring D down to sustainable levels and choose accordingly. This does not seem to require saying anything about preferred configurations of the population.

I do not think this objection obtains, because C seems to be evaluated primarily by its state, i.e. the value that it has, and not by the cost of change. Let us bring examples to the table and clearly separate evaluations of population configurations and the evaluation of actions to change C and/or P.

P - When considering P, people seem to care not so much about how many people there are since they can go about their lives irrespectively of how many persons there are in the other side of the world or in other galaxies. However, people generally respond negatively, for example, to genocides as a means to bring P down. Here they are not so much concerned that there will be fewer people, but about the way used to achieve fewer people. That is, if the world never had those extra people, if they had never existed, no one would seem to mind, in the same way that today people do not seem to mind about the googolplexes of persons that could have been but were not.[82] The value of P in the configuration of the population seems to not be of much importance. But the means used to vary P are.

C – When considering reductions to C, the opposite seems to happen. People are not so much triggered by a law or regulation concerning what people can(not) consume, or even direct cuts to income. What they are worried about is their new level of consumption. If it is reduced too much, people might find that state undesirable. For example if C were to reduce everyone's income by 50%, or forbid planes, cars, and boats from operating, the concern is not because there is a law, or the enforcement of such law. That is, people do not seem to care about how that new state of affairs (with reduced C) came into being (law, war, natural disaster, etc). They care about what it means to be in that state. This is in stark contrast with what happens in P.

[82] I am not talking only about abortions, but also about permutations of events that could have resulted in additional people. e.g. a couple could have had an additional child if they forgot to use a condom, or the case where a female failed to be raped because it was not attractive enough.

Now, if people value C for its state, due to the trade-off between C and P, they will automatically need to value a configuration of the population. Because an increase or decrease of C means a corresponding inverse movement in P. Perhaps we can phrase the issue directly as a trade-off:

- How much C is one willing to give up for a marginal increase in P (an extra person)?
- How much C is one willing to receive for a marginal decrease in P?
- How much P is one willing to decrease to increase C to a certain level?
- How much P is one willing to increase to decrease C to a certain level?

If one dreams of a future where everyone will live a life of luxury with an extremely abundant quantity of goods and services to consume (from top notch education and justice systems, to yachts and private planes), then this implies a relatively low value of P. If one dreams of a given amount of consumption for every person on the planet, then this necessarily implies a certain amount of P, above which D is unsustainable. If people have goals and they require C to achieve those goals, then they are implicitly stating an upper limit of P. The configuration of the population cannot be ignored, so I will consider this objection as discarded.

III – A third strategy tries to negate the claim that for a given value of D that is unsustainable we cannot allocate blame to C and/or P. There seems to be an exception. If there is one variable that cannot decrease further (neither C or P can be zero nor less) then we can certainly attribute blame to the other variable. But these are the extreme cases where there is only one person (P=1) or people are consuming the bare minimum that it is possible for them to remain alive (C=minimum). This is certainly not the case today since there is plenty of room for both P and C to decrease. Is this the case when people talk about the overpopulation argument? There might be a version of it, let us call it the extreme version, that postulates a state of affairs where there is an absurd amount of people to the point that they are *dying of hunger, or suffocation, or … while consuming the bare minimum to survive.* That is no doubt a case of overpopulation as a fact. However, I believe that the overpopulation argument is not employed that way. The normal version (in opposition to the extreme version) of the overpopulation argument gives some leeway to consumption and is triggered once quality of life, or C, dips below a certain level. And because C is considered too low, that can only mean that there is too much of P. But C being too low is not the same as being the minimum it can be. If we are talking about mere survival, that is, the minimum of C, then we are talking about a scenario of hunger, thirst, disease, etc. in quantities that do not kill, but allow for survival, where no good or service can be afforded, and the only thing an individual can look forward is to be alive the next day. On the other hand, the normal version would obtain for any quantity of C above that: picture the same scenario but add in some clothes, perhaps 50 more Kcal a

day, and some water for basic hygiene. Now C has room to decrease. I believe the normal version of the overpopulation argument would obtain long before we reach such a dire situation. Once people believe their lives are miserable, or not worth living, or that they cannot achieve what is that they want to achieve, the overpopulation argument is actualized – C is too low (but not at the minimum), therefore P is too high. It can also be argued that in reality this extreme version would never materialize because humans would lose the ability to reproduce long before C reaches its minimum and thus automatically stabilize P.

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Verdict (Normal Version): WEAK SUCCESS

Verdict (Extreme Version): FAIL

When it comes to the normal version, it seems to be the case that there are implicit assumptions about the configuration of the population that must be made explicit, since the concept of overpopulation relies on them to be applied. This was the primary goal of the counter and it was successful. But this seems to not be enough to overcome the overpopulation argument since it just deletes the property of <being an enthymeme>. Once a configuration is defined, the argument, although dependent on that configuration, can resume. And each configuration can be defended with ⏚[83]. Furthermore even if it is conceded that a claim of overpopulation depends on a certain configuration of the population and not on D (for the same D there are several configurations), restating the problem by substituting overpopulation with sustainability can make it not conditioned on a specific configuration of the population, but only on the value of D (the unsustainability of D is sufficient for overpopulation or overconsumption). This requires dropping the claims of overpopulation and adopting a looser stance on the configurations of the population by stating that doing something to combat unsustainability is likely better than doing nothing, without going into specifics (e.g. claiming overpopulation).

This counter does no good to a sustainability-based argument, but it makes the overpopulation argument conditional on configurations of the population. As such, I grant it a weak success status. Moreover, it seems that the argument is strongly dependent on which options are available to decrease P. If there are low cost options then it might be the case that adjustments to D can be made through P instead of C, making the overpopulation argument fail. Such options will be explored in the next two counters.

[83] Using ⏚ as a line of defence is discussed in *4.2.2 – ⏚ and the Burden of Proof*.

When it comes to the extreme version, its scenario seems to be unrealizable (which can be sufficient for its dismissal). Unlike with the normal version, the claim that there are implicit assumptions about the configuration of the population does not hold. Overpopulation becomes a fact, not a claim of value. As such the main objective of this counter fails. We can also see that, as with the normal version, this version is also dependent on which options exist to decrease P. More likely is that this is not the correct interpretation of the overpopulation argument since it assumes an extremely farfetched and specific scenario that is highly improbable.

3.1.1.7 – Counter 6: Reducing D via P: The Death Rate

This counter tries to present options to reduce P. If these options are available and are acceptable then the overpopulation concern is transformed into a solved problem. Note that in pursuing this strategy this counter does not deny that P will increase if nothing is done. Instead it starts by recognizing the overpopulation argument, and then finding solutions to avoid the dire consequences of unsustainability. In this sense the overpopulation argument cannot be dismissed, but it also does not accomplish its goal of rejecting immortality, it serves as a remainder of problems that need addressing.

I – If we are creating a problem (increasing P) where it existed none, surely that is enough grounds to reject immortality. Better than having to solve a problem, is to not have the problem in the first place.

I.A1 – It is simply not true that immortality creates the problem. With or without immortality a problem of unsustainability exists already and has to be dealt with. It is entirely possible that the concerns of overpopulation will obtain (if they have not already) even if immortality is not achieved. If the sustainability problem is dealt with now (i.e. not UI), there is no reason to believe the same solution cannot be still in place UI. However, it can be argued that not pursuing immortality is part of the solution. I will expand below on what it means to negate immortality as a solution to the sustainability problem. Miller (2004) resumes this point:

> It should be pointed out that the current alarming population crisis and depletion of nonrenewable resources has come about without the slightest aid from biogerontologists, who have not yet discovered anything that actually improves public health or prevents disease. It follows inexorably that placing obstacles in the path of aging research will not provide the key to resolving the population crunch.

I.A2 - The inference is not correct because it fails to adequately compare the state after the problem with the state before the problem. It is true that with a ceteris paribus clause, having

no problems is better than having problems, but without the clause this is uncertain. More (2004) presents an example:

> Opposing extended life because, eventually, it might add to existing problems would be an ethically irresponsible response. Suppose you are a doctor faced with a child suffering from pneumonia. Would you refuse to cure the child because she would then be well enough to run around and step on the toes of others?

Here is another example: the mandatory use of seatbelt increased the number of injuries per accident. That is a true statement. Using seatbelts created problems where there were none since there are now more injured people per accident. But everyone regards the use of the seatbelt as a good overall measure. What is going on? Simple, the new injured people are those who avoided death. Failing to adequately compare the states of affairs, both before and after the problem arrived, is a methodological error. I will expand below on how this applies to immortality.

Having the new problem seems to be better than not having it, and no one is advocating that the new injured people be dealt with by retiring seatbelt usage. In the same way, advances on curing heart diseases caused an increase in Alzheimer's patients, but no one is advocating dealing with Alzheimer's by outlawing cardiology. But immortality is no more and no less than a medicine that allows people to live longer in a healthy state in the same way that seatbelts and heart medicine do. Suppose that immortality comes in a pill that must be taken every few years[84]. People take the pill and the capability meaning of aging disappears (no cancer, no Parkinson's, no osteoporosis, etc). There is no difference between going under surgery to treat a potentially lethal condition now that allows the subject to live more years in a healthy state and taking the immortality pill one time UI. Immortality *is* all the surgeries, treatments and medicines that we take and make us live longer and healthy (the pill is a mere abstraction of these)[85]. Harry (2013) also agrees: "We are then unlikely ever to face the question: Should we make people immortal, 'yes', or 'no'? We may rather be called upon to decide whether we should treat a particular disease when we know an effective treatment will extend lifespan." In this sense using the rejection of immortality as a way to achieve sustainability is no different than rejecting medical treatment today, in the hopes that people die quicker: no antibiotics, no vaccines, no surgeries, etc. Allow me to make my point clearer. Suppose that instead of

[84] The SENS project is not that far off, since the basic premise is to let aging happen, but constantly repair the body to the point that aging becomes negligible. From their own site (SENS, n.d.): "Our mission to develop rejuvenation biotechnologies is based on the notion that it may be possible to apply the principles of regenerative medicine to the cellular and molecular damage of aging. In short, we think it ought to be possible to engineer solutions to age-related disease that stave off pathology indefinitely – such that, like the rockfish, lobster, and hydra – we are able to get old without becoming sick or frail. "

[85] Although if the benefits of heart surgery could in the future be reduced to a pill, that is, substitute the need of heart treatment with a pill, then the analogy of immortality with a pill will be more than a mere abstraction.

immortality we were talking about developing antibiotics for the first time and someone came up with the overpopulation argument claiming that <we should not pursue this line of research because it will lead to people living longer, decreasing the death rate, and thus aggravate the sustainability issue. It will also increase the incidence of new diseases and bring with it a lot of new problems.> Conclusion: we should not have pursued antibiotic research, and we should stop its use immediately. There is no way to support antibiotic usage (or any other medicine) today and at the same time refuse immortality without being incoherent, if the reason is overpopulation. However, people can accept antibiotic usage and at the same time recognize the new issues that arose and deal with the them without the need to outlaw antibiotics, in the same way that people can accept immortality, recognize the issues that will arise and deal with them accordingly without the need to refuse immortality. As More (2004) puts it: "The superlongevity advocate would want to help find solutions to any population issues. But dying is not a responsible or healthy way to solve anything."

Let us make clearer what dismissing immortality with the overpopulation argument entails. UI the death rate is supposed to go down. This aggravates the sustainability problem via increases in P. A solution is to make the death rate go up again. One option is mass murder.[86] It can be achieved directly through engineering diseases and indirectly through war. This seems the sort of option that the OAA would find unacceptable and use to defend the undesirability of immortality. But is it? Let us frame it another way. Suppose mass murder is committed by depriving people of water and/or food and letting them die by starvation. We can draw a parallel between that case and one where people are denied available medical treatment which results in their death, the common feature being denying something that would result in people's involuntary death. The problem of the death rate going down caused by immortality is solved by negating medical treatment, that is, we do not let the problem arise in the first place. But negating immortality is the same thing as negating medical treatment and as such refusing immortality is the same as intentionally killing people through the denial of medical treatment. Such actions are mass murder and is mass murder indeed that is needed to drive death rates back up. More (2004) and Sethe and de Magalhães (2013), respectively, agree:

> If we take seriously the idea of limiting life span so as to control population, why not be more proactive about it? Why not drastically reduce access to currently commonplace medical treatments? Why not execute anyone reaching the age of seventy?"
>
> "If one decided that the vision of a crowed planet is too terrible to permit, what type of intervention should be adopted? Would we decline to invest in medical innovation? Withhold its use? Encourage suicide or sanction killings?"

[86] Note that this is not genocide, in technical terms. It is irrelevant if we target people of a particular group, or of all groups, for the purpose of decreasing P. It is best to assume that individuals are selected at random.

This turns the overpopulation argument upside down. If killing people is acceptable, then overpopulation is no longer a concern (and immortality is not actualized). If killing people is not acceptable then immortality cannot be refused. Some people perhaps would like to claim a difference between letting someone die and actively killing them.[87] But the only difference that exists is that those who claim that there is a difference do not understand the concept of opportunity cost when compared to those who do claim that there is no difference. Inaction is an option on the same level as the others. It is irrelevant if my choice involves: pulling a gun's trigger, or walking straight while not wetting my clothes by jumping into a lake, or rejecting medical treatment when feasible[88], if it causes someone to not survive. As Harris (2013) states:

> When we save a life, by whatever means, we simply postpone death. Life saving is just death postponement. This is a truth from which it follows that life-extending therapies are, and must always be, life-saving therapies and must share whatever priority life saving has in our morality and in our social values. (…) To fail to do so when we can would make us responsible for the resulting death (this claim is defended in detail in Harris 1987, 1980).

The OAAs must be ready to understand the full scope of their claims. The implications of denying people medical treatment applies to our situation today. Should we do it so that people die quicker and alleviate population/sustainability concerns? Our current death rate also suffered a sharp decrease mainly due to decreases in child mortality rates (Roser, 2018a). Should we bring child mortality rates back up again as a solution to our sustainability problem now in the same way that the OAA wants to do UI?

Some authors do indeed state that people should be left to die after an arbitrary number of years. This allows them to accept modern medicine up to a point and refuse everything that comes after, including immortality. In Binstock (2004b) and Overall (2003, 38) respectively:

> In his book Setting Limits: Medical Goals in an Aging Society, Callahan (1987) draws on both his philosophical and social analyses to urge that life-extending health care be categorically denied in the United States to anyone who has achieved an age of about 80 (which he posits as a proxy for the end of a natural life span).
>
> Callahan (1996, 442) refers to the late seventies or early eighties as constituting a "natural life span." He concludes that society should not use its common resources to extend life, for "the present average life expectancy in the developed countries has proved perfectly adequate for most people to live a full life and for those countries to flourish economically and intellectually".

[87] Note that if letting someone die is still unacceptable, then the previous exposition still obtains. We only need to substitute the expression "killing" by the expression "letting people die". What matters for the argument is that the expression used be considered something unacceptable.

[88] Sometimes medical treatments are too expensive, so they are not provided. If this is the case the discussion moves to research that aims at reducing the cost of treatment. Should we refuse that research if it means people will die in the future because of our decision?

But the justification cannot be because we have a certain natural lifespan as we have seen in *2.3.1.2 – Human Nature Version*. Even if we grant ⏚ as a line of defence, an explanation to impose such view on others (i.e. not allowing immortality to go through therefore letting everyone die at an arbitrary age) is lacking. Let us think for a moment on what that means. A person goes to the hospital and the first thing done is to collect information about her age, if under a certain value what caused her to go to the hospital gets treated, but if her age is above a certain value then she will have to suffer the consequences even if that means death and the treatment is cheap and readily available.

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Verdict: WEAK SUCCESS

The goal of this counter was to make clear what it means defending the overpopulation argument. The overpopulation argument is allowed to reject immortality because it implicitly supports letting people to die against their will. It seems to not be the case suggested in *3.1.1.6 – Counter 5: How to Configure Population?* where the overpopulation argument obtains because there are no acceptable ways to reduce P. Instead it obtains because there are, and in bringing the death rates back up immortality never materializes. It remains to be explained why any support for modern medicine, safety policies and even laws against murder, emanate from the OAA. Here is Miller (2004) showing the *reductio ad absurdum*:

> Perhaps there are some who, after sober and deliberate contemplation, feel that our Malthusian ills are best addressed by strategies that constrain the productive life span of healthy adults rather than by controlling the supply of new people. Were I a member of such a group, I'd suggest that it devote its energies to removing seat belts from automobiles, insulin and antibiotics from the pharmacies, and anti-smoking campaigns from the schools, because compared to these interventions, picking on biogerontologists has at this point a pretty low yield.

I consider this a weak success because, while it will most likely fetch some inconsistencies in the world view of the OAA, it does not necessarily destroy the overpopulation argument. The OAA can either recognize the inadequacy of their argument, or alternatively, double down and reject a lot of things that allows us to live longer and healthy (medicine, security laws, safety features, etc). Accepting half of medicine to reject another half (immortality) is also in need of explanation, and so the same formula can be applied: they can see the inadequacy of their argument or come up with an explanation, yet unknown to me, of their view.

3.1.1.8 – Counter 7: Reducing D via P (and C): The Birth Rate

What are our options regarding the decrease of C and/or P? Perhaps if one lays out some it becomes clear that they are not all strongly undesirable.

As stated in the previous counter, if we are doing something in relation to C and/or P is because we recognize that we might have a problem (and we do) or we expect one to happen (we also do). The overpopulation argument reminds us of that: if nothing is done then it will obtain.

The first thing I want to make clear is that it is not enough to act just on P or just on C, because efforts to reduce one parameter can be cannibalized by increases in the other. The sustainability problem is only effectively solved when there are defined limits to both P and C. If there is a correlation between an increase in C and a decrease in the fertility rate as suggested in *3.1.1.4 – Counter 3: P Will Not Increase*, then a decrease in C might originate an increase in P. On the other hand, a decrease in P can cause a Jevons-Paradox like effect and increase C. Acting on both parameters does not mean that both have to decrease necessarily, only that limits are imposed. It all depends on the chosen configuration of the population. And a limit set does not mean a limit met. I remember when I was younger TELCOs offering SMS's subject to a limit of 1500 per week. It was really hard for the limit to be reached, but nevertheless it was there to safeguard the integrity of the network. In the same way limits regarding C and P could be seen as safeguards.

Let us start by approaching C. When we decrease C what we are doing is quite simply making people poorer overall. Off course that when decreasing C, the cuts should start at the low hanging fruit, and those are things that do not affect substantially what is that people value. For example, when someone says to turn the faucet off when brushing our teeth, the effort required is not that much, and the foregone goods (water running from the faucet) are also not that impactful on our lives. But the things where it is easy to cut on are limited in scope and soon we will be dealing with sensitive matters. That is the case when, for example, people advocate not eating as much meat (Pimentel and Pimentel, 2003)[89] and instead substituting it by eating crickets (UN, 2013). Perhaps someone values eating meat so much that they prefer further adjustments to D to be made through P, instead of C. It is quite difficult to state which consumption is necessary and which consumption is superfluous. It requires imposing two

[89] Curiously at the end of the article the authors claim that "the major threat to future survival and to US natural resources is rapid population growth (…) These vital resources will have to be divided among ever greater numbers of people." This constitutes another piece of support for the equivalence between our problem today and the problem UI because both can be framed in overpopulation terms. The citation also underlines the trade-off between C and P.

claims of value on others: the first concerning the value of the good that is to be rationed or forbidden, and the second concerning a certain configuration of the population. I was always flabbergasted when, during the ethics class of the master's program that resulted in this project, everyone but me advocated fervently that we ought to reduce consumption because it is superfluous. And everyone knew exactly what was to be considered superfluous. Talk about arrogance. But who is to say what is superfluous and what is not?

When it comes to implement decreases in C there are several strategies:

a) Awareness campaigns and educational efforts seem to be the least intrusive while still influencing people's behaviour. An example is recycling campaigns that incentivize people to recycle and thus reduce the amount of pollution made. The drawback is that this might not be enough since it depends on the voluntary will of the individual.

b) Incentives, prizes and other benefits could be given to those who fulfilled certain requirements. However, those prizes should be things that do not increase D, otherwise the suggestion is moot (e.g. fiscal incentives allow people consume more). Simple things like priority when in line to state services are an example of a suitable incentive. The China Social Credit System, despite its scariness, offers a good framework for the implementation of this measure.

c) Next down the line are taxes and quotas. They can achieve rationing with a hard limit: we are already seeing this, for example, when the EU declares fishing quotas or when some products get special taxation (e.g. diesel and gasoline). The drawback is that it exacerbates whatever inequality problems might exist, since it makes access to those goods even more difficult for low income groups. Licences, marketable rights and pricing externalities are also options to reduce consumption, particularly pollution.

d) Extending the previous item further, there is the option to forbid the consumption of certain items. And taking it a step further means destroying production capabilities.

e) Some measures can be complemented with fines and sanctions, or even criminalized.

f) There is also the option of cutting on income and/or credit. If people do not have the money, they will not use it for consumption. In fact, every measure to limit or decrease C can be framed in terms of losing purchasing power (remember that decreasing C is making people poorer on average).[90] This has the advantage of not imposing value judgements over what kinds of consumption are necessary and what kinds are superfluous. Loss of purchasing power

[90] I always find it interesting to ask those who strongly advocate reducing consumption if they are ok with a ~59% pay cut. This is based on the data presented in *3.1.1.2 – Counter 1: Increasing D*, stating that D is 69% above the sustainable level. If not, perhaps they ought to consider reductions to P.

through nominal income cuts are much more resisted by the layman than through other means such as inflation or exchange rates.

When it comes to C, the issues seem to be not so much on how it is implemented, but on what things it is implemented on. Note that something similar was supposed on *3.1.1.6 – Counter 5: How to Configure Population?*, that issues arise not so much regarding how C is reduced, but how much C is left after the reduction. With this discussion we can further specify that not only the quantity matters, but also the quality.

Let us turn our focus on P. Unlike C, and as already noted in *3.1.1.6 – Counter 5: How to Configure Population?*, in general people seem to have no issue with the level that P has in a certain configuration of the population (apart from the implications of setting a level for C). So, what are some of our options if we want to limit or decrease P? As stated in *3.1.1.2 – Counter 1: Increasing D*, the variations in P can be further decomposed as the difference between the birth rate death rate. In other words any variation in P must come from the death rate and/or the birth rate. Controlling P via death rates is explored in *3.1.1.7 – Counter 6: Reducing D via P: The Death Rate*. Any measure that purports to increase the death rate is counter to the idea of immortality[91], since UI people die because they want to, not because they have to. If we look closer at what are the necessary conditions for P to increase, we see that death is not one of them. It is possible to eradicate death and P still not increase. The only necessary condition is that new people be brought to life: reproduction. It is impossible to increase P without births, even if the death rate went to zero. Therefore controlling reproduction seems to be an adequate target. So, what are our options to decrease or limit the birth rate?

a) One of them is forced sterilization.[92] However this measure seems to be one those that are unacceptable for the OAA.

b) Access to contraceptives or facilitated access (e.g. subsidies) to contraceptives in conjunction with sexual education. Conly (2016, 107, 109) shares "education about the climate change is becoming widespread, and education about the effects of population could be easily included. (…) The more we know about contraception, so that we may control the effects of sex, the better." It is easier to allow people to have sexual relations and prevent pregnancy than to try that people not have sexual relations because "*life, uh, finds a way"*. More (2004) also suggests this measure: "If we want to reduce births, we might voluntarily fund programs to

[91] It is true that we could envision campaigns advocating suicide. But the problem is that such measure does not guarantee that sustainability is achieved since it relies on voluntary action. In fact, it is expected not to work forever because of what is stated in **P1A1A1A1**.

[92] Note that this is not negative eugenics, in technical terms. It is irrelevant if we target people only of a certain group, or of all groups, for the purposes of decreasing P. It is best to assume that individuals are selected at random.

provide contraceptives and family planning to couples in poorer countries." And Conly (2016, 115, 117) further adds that:[93]

> it is estimated that 215 to 220 million women globally have an unmet need for contraception – that is, there are that many women who would like to plan their pregnancies and have smaller families, but who cannot because they have no access to contraception. (…) It has been estimated that eliminating unwanted pregnancies through contraception would give us a population by 2100 that is three billion fewer than if we do not eliminate unwanted pregnancies and continue our present practices as usual.

c) Women empowerment, economic development and other factors already mentioned in *3.1.1.4 – Counter 3: P Will Not Increase* can contribute to decrease P, although as stated before this might not be enough. More (2004) also supports this measure: "Women should also be encouraged to join the modern world by gaining the ability to pursue vocations other than child-raising."

d) Economic incentives can be used. At the moment most fiscal systems favour increases in P. For example, the municipality where I am writing this from, Sever do Vouga, is giving a lump sum of 500€ per birth, and the main opposition leader of the country I am writing this from, Portugal, is promising subsidies totalling 10 000€ per newborn. [94] Income tax also discriminates if a child is involved. If P is to be reduced at least these incentives (or discriminations) should go away. More (2004) seems to agree:

> Many of the same people who have decried population growth have supported policies guaranteed to boost childbirths. (…). If we want to encourage people to have more children, we should make it cheaper for them to do so. If we want to discourage fertility, or at least refrain from pushing it up, we should stop subsidizing it.

Ideally, the subsidies should not only stop but be reverted to benefit those without children, e.g. childlessness subsidies, subsidies for voluntary sterilization, subsidized abortions, or alternatively taxes for those who have children. Any policy of this type must also consider the well-being of the child. Conly (2016, 119) tells us that

> the childless already subsidize those who have children through shared costs for schools and public services in general. It seems reasonable that rather than childless people having an extra tax burden relative to others, they should have less of a burden. And in addition to simple fairness, the tax break (for the childless, or for those who have only one child) could encourage people to have fewer children.

[93] Upon consulting the reference provided by Conly (Corey and Brook, 2014) for the 3B figure, I concluded that the number is a misguided inference on the part of Conly. The study merely replicated the rate of unwanted pregnancies but did not compensate for cases were a wanted pregnancy would happen had the unwanted pregnancy not occurred. 3B is an overestimation. Nevertheless I still believe the real number to be significant.
[94] For comparison, at the time of writing the minimum wage before taxes was at 8120€ (12 months = 677€ per month).

However, one must be aware of pundits who will use this to advocate a libertarian agenda, not understanding the concept of externality[95] (except when it comes to security and defence) and thus believing the free market to be our lord and saviour. Here is an example by More (2004):

> Subsidies include free education (free to the parents, not to the tax-payers), free child health care, and additional welfare payments to women for each child they bear. If parents must personally bear the costs of having children, rather than everyone else paying, people will tend to have just the number of children for whom they can assume financial responsibility. (…) Most effective at spurring the positive changes are markets – price signals creating incentives for moves in the right direction.

Although it is true that contributions to the childrearing made by everyone (even childless persons) through taxation pay for services that the child can use, such as the health services and the educational system, such services provide positive externalities. Letting the free market make the resource allocation will result in suboptimal quantities of these services.

e) Quotas for reproductive rights can be achieved by a licencing system. Hugh LaFolette (2010) presents arguments for a parenting licencing system. According to him, parenting is a *potentially* harmful activity, both for the children and for society, and as such it should be regulated[96]. He says that 80% of incarcerated criminals were abused as a child. Having to prove that one is capable of rearing children is not an infringement in anyone's rights in the same way that a driving licence is not an infringement on anyone's right to drive, or a certification for the practice of medicine is an infringement in the right of anyone to be a physician. And licencing criteria already exist and are demanded in the case of adopted children. It is surprising why biological children are not held to the same standards considering that Lafolette claims that adopted children are five times less likely to suffer parental abuse.

f) Direct quotas can also be implemented. Conly (2016), for example, advocates for one-child policy. She starts her book by stating that: "I am going to argue here that we do not have a right to more than one biological child." Conly (2016, 46) argues that reproductive rights are not unlimited: "the right to food is not the right to caviar and champagne, the right to education is not the right to go to the best university but to an adequate education, and any right to pass one's genes is met by one child." She also argues that (2016, 75) "having children is not essential to the rational agency that makes us persons" and cites Amartya Sen (2016, 89): "Despite the importance of reproductive rights, if their exercise were to generate disasters such

[95] An externality is a cost or benefit that affects a third party. For example pollution made by companies imposes health burdens on society, a negative externality. They are not captured by the market system, unless regulated. Thus a negative externality if left to market forces will result in overproduction, while a positive externality will result in underproduction. For example if we internalize the negative externality of pollution companies will tend to pollute less.

[96] The parallel with driving is immediate. Driving is also a potentially harmful activity and as such it is regulated by requiring a licence as proof of competence.

as massive misery and hunger, then we would have to question whether they deserve full protection." Even the European Convention on Human Rights (ECHR) has exceptions, as Conly (2016, 79) shows:

> The ECHR provides a right to respect for one's "private and family life", but then goes on to say, "There shall be no interference by a public authority with the exercise of this right except … in the interest of national security, public safety or the economic well-being of the community, for the prevention of disorder and crime, for the protection of health or morals, or for the protection of the rights and freedoms of others.

The right to reproduce is not an individual action. Every child that is born creates a burden for everyone else by decreasing C. It also has the potential to make D unsustainable, so it checks several boxes of the exception provided in the ECHR. As Conly (2016, 230) concludes: "we need to realize that having children is not a private matter anymore."

g) Perhaps a more interesting idea is that of a market for reproductive rights or birth credits. It would work along the following lines: everyone is entitled by birth to one (or more/less, adjusted according to some sustainability criteria) birth credit. A birth credit gives the right to have one child. The market system allows for the exchange of these credits (perhaps in pieces of 1/100). If someone does not want to have children, they can sell their birth credit and increase their C with the proceedings. Alternatively, if someone wants to have a child and has no birth credits they must acquire some. There is no limit to the number of children a person can have, provided that it can acquire enough birth credits. The birth credit, when used, passes onto the children who will be the new owner. The great advantage of this system is that it allows consequences to be tied to personal choice, and that translates into fairness. It is unfair to those who do not want to have children to bear the burden of reduction in their consumption (in addition to the institutionalized discrimination referred above), so that others have the privilege of childbearing. Increasing P must reduce C, if D is to be equal. I remember hearing a pregnant woman during an ethics seminar stating vigorously that we ought to reduce our consumption. She wanted to have the cake and eat it too! Why should I have to reduce my consumption if it is her that is having the child? Does she not realize the amount of D that her child, that she caused, will bring forth? With this system there is a transfer of C from those who want extra children to those who want none, compensating the dilution of C that everyone suffers caused by increases in P. Although this system works with our current death rate, supposing that the death rate goes to nearly zero UI, will make this system stale (which is not a problem given the amount of time that immortals have), i.e. the default credits per person at birth will be extremely low as to not increase P[97].

[97] There might be leeway with the increase in T. This is discussed in the next section.

h) If P is to remain constant UI, and the death rate goes to zero[98], an option is imposing a trade-off between immortality and reproduction. As Sethe and de Magalhães (2013) point out: "some suggest a scheme where those who have become 'immortalized' could agree not to reproduce (Harris 2000)."[99] Those who decide to have children will stop immortality treatments some time after having the child. This is no different than the situation we have today where people have children and after a few decades they die. The difference is for those who do not want to have children since they will have the option to be alive forever (see *2.4.1 – Optionality*). This guarantees a constant population and effectively solves the problem posited by the OAA in a satisfactory manner. Those who want to have children will not be worse off in comparison with today, and those who do not will have a new option: immortality. It can be argued that this suffers from the same issue pointed out in *3.1.1.7 – Counter 6: Reducing D via P: The Death Rate* where available medical treatment is being denied, in this case to those who have children. Although it is true that medical treatment will be denied to those who have children, there is a very important difference: agency. On one case medical treatment is being denied against the will of the individual, and in the other is being denied because the individual consented by deciding to have a child. Voluntary death is allowed under immortality.

There are two more concerns that I want to dismiss when it comes to regulating P. The first is how should the enforcement of these measures be done without putting a burden on the child? Well, in no different way than if a pregnant woman or her partner, or a recent mom or her partner, or… committed any other crime or infraction. Having a child does not equate to a get out of jail free card, neither to the ability to dismiss the payment of fines, taxes and so forth. The second is an argument that states than no individual child is the cause of unsustainability. Conly (2016, 96) answers swiftly:

> When it comes to overpopulation, it is a joint enterprise. No one set of parents is wrecking the environment all by themselves (…) If I and my nine cousins all plot to poison Grandma, we cannot avoid responsibility by each giving her only 1/10th of a lethal dose. Even though each of us can truly say that his dose alone would not have killed her, we are responsible for her death, and no one would dispute this.

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Verdict: SUCCESS

I do believe there is a satisfactory solution to tackle the overpopulation concerns that does not involve mass murder, forced sterilization, negative eugenics and other projects deemed unacceptable by a large majority of people of the developed world. It requires acting

[98] The best case scenario for the overpopulation argument to obtain.
[99] The authors add that "one could regard this arrangement as troubling where it might lead to social stagnation." Their concerns will be explored in section *3.1.3 – Stagnation Argument*.

on both C and P. Acting on C does not seem problematic as I have discussed. When it comes to acting on P the simple solution of offering a trade-off between reproduction and immortality is successful. The reason for my evaluation is that no one will be in a worse position than today: those who do want children will be, at least, in the same scenario as today, while those who do not will have an extra option. Even if one eventually wants children, it could be after many years of immortality have been enjoyed beforehand. Or even if one wants children in the same fashion as today it will still benefit from a perfect compression of morbidity UI. Thus everyone becomes better off UI, even under the strictest of assumptions (death rate equal to zero and no changes in T).

3.1.1.9 – Concluding Remarks

The overpopulation argument should be taken seriously, since it has a strong foundation: increasing P, ceteris paribus, will increase D, and immortality is expected to increase P via death rate reduction. Against this concern I presented the following counters:

1 – Increasing D is not bad – HIGH PROBABILITY OF FAILURE

2 – Rhetoric counter - UNKNOWN

3 – P will not increase – FAILURE

4 – T will compensate - FAILURE

5 – Configuration of the population – WEAK SUCCESS

6 – Reducing P via death rates – WEAK SUCCESS

7 – Reducing P (and C) via birth rates – SUCCESS

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There is no doubt that we are currently in unsustainable territory. Anything that aggravates this state compromises even further our ability to achieve what it is that people want to achieve. As Overall states (2003, 135):

> If immortals remained young in physiological terms, they might reproduce forever, thus exacerbating indefinitely the resource burden that they already constitute. A culture of immortals could simply permit the population to increase "with the certain consequence that the general life support system would fail (…) simply letting the population increase seems to be an implausible choice for an immortal population, who of necessity would have to eschew any short-term points of view. Unrestricted population growth would be self-defeating: no one or almost no one would survive.

The reason counter 1 does not obtain a complete failure is because there might be utility functions that value the destruction of society or of our planet, or something similar. But because increasing D when already in an unsustainability state is deleterious to various

instrumental convergent goals, we can safely say that it is most likely bad, i.e. an unsustainable state will be detrimental for the large majority of goals that people have.

Counters 3 and 4, are clear failures. They rely on population to stop growing by itself or increases in resource use efficiency via technological progress, respectively. Note that I am not advocating against these outcomes. If they happen the OAA has its concerns dealt with. The problem is exactly because we do not know if they will happen. Or even if they do, as is expected, we do not know if they will happen in time (T increases) or at suitable level (P stabilization). It is the highest gamble humanity can make. Not only that but the mere act of using these counters can be self-deceiving if they create some sort of bystander effect. Given the disastrous consequences of throwing ecosystems out of balance people should proceed with the assumption that the suggestions of counters 2 and 3 will not work and put in place extra policies. If, in the future, P does stabilize at sustainable levels, and/or T continues to increase at a great rate to put us at a sustainable level, then and only then should we relax our precautionary measures. Meanwhile counters 3 and 4 can only offer so much: either immortality is postponed until sustainability is achieved, or if immortality is not postponed additional measures should be taken to deal with the overpopulation problem (counters 6 and/or 7). The conclusion is that both these counters (3 and 4), at the moment, do not alleviate the overpopulation concern.

Counter 2 consists in a rhetorical strategy since there is suspicion that the OAA is also employing one. By making an equivalence between our case today and that UI, the strategy tries to show that the solutions we apply now will also be valid UI. Since we are not UI today and have a problem of sustainability, the solution must not include cancelling immortality because there is nothing to cancel yet. Whatever the chosen solution is to tackle the problems of the present, it is likely that it will be available UI.

The equivalence between the present and the scenario UI is explored in counter 5. The goal of this counter is to make clear hidden assumptions regarding the overpopulation argument, namely that there is an implicit assumption about the configuration of the population. This assumption is the anchor of the claim of overpopulation. But what is usually and falsely argued, is that overpopulation is anchored in a sustainability claim. Unsustainability is necessary but not sufficient for overpopulation. Counter 5 was graded as a weak success because it showed that the overpopulation is a conditional argument. It is conditioned to value claims about the configuration of the population. However, even after it is brought to light that the overpopulation argument relies on a claim of value masquerading as fact, that in itself is not enough to do away with the sustainability problem. If there is no overpopulation problem,

then certainly there is one of overconsumption. All we need to know is that we are currently in unsustainable territory and immortality has the potential to aggravate the situation. Therefore although overpopulation claims require more justification, sustainability claims do not. Hence the attribution of a weak success.

Counters 6 and 7 adopt a different strategy. They do not rely on uncertainty, like counters 3 and 4. They are the precautionary measures that we should be taking to not rely on counters 3 and 4. In counter 6 the main mechanism of adjustment is through the death rate, while in counter 7 the main mechanism of adjustment is the birth rate (and C).

Counter 6 offers a solution to sustainability by increasing the death rate and one way of doing it is not pursuing immortality. But this opens a pandora box, since if killing people (or in another language, letting people die) is acceptable to solve overpopulation by denying them immortality (or in another language, medical treatment), then it will follow that other measures that allow people to die quicker will be useful tools too to achieve sustainability: from eliminating modern medicine, to safety features in devices we use (i.e. seatbelt), or even security. By outlawing the access to these goods we achieve the same effect that the OAA wants when it advocates against the pursuit of immortality. Afterall (More, 2004) "extending the human life span would worsen the problem no more than would improving automobile safety or worker safety or reducing violent crime". So the OAA cannot claim that it is trying to avoid overpopulation because there will be no acceptable means of reducing it. By the very nature of the overpopulation argument it implicitly states that there are, i.e. letting people die by refusing medical treatment. Some authors do indeed see this problem with the overpopulation argument (Sethe and de Magalhães, 2013; and Overall, 2003, 136, 54; respectively):

> Relying on death is not a very creative way to tackle such [sustainability] problems (More 2004).
>
> It might be argued that the social costs incurred by the potential absence of death for part or all of a population would necessitate desperate measures, including ultimately the imposition of limits on the right to continue living. according to Woods, is to set "some definite upper limit on the duration of one's right to live. (…) I do not find it self-evident that we must let people die for the sake of alleviating overpopulation.

I granted a weak success status to counter 6 since it will most likely require more thought by the OAA. Advocating mass murder is not an easy task.

Counter 7 seems to be the way to go. Note that I defend that both C and P be regulated. As such I present several measures to regulate C. And when it comes to P, regulating births seems, to me, much more tractable than mass murder. More (2004) seems to share the same feeling claiming that "if we want to slow population growth, we should focus on reducing

births, not on raising or maintaining deaths." Overall (2003, 138) also seems to agree: "I cannot see why the putative rights of merely possible beings should trump the actual rights of already-existing beings. Nor is it clear why the right to reproduce would trump the right to go on living."

I present several alternatives for regulating births, from quotas to licencing systems. However Overall (2003, 138) seems to not be convinced because

> it would be better to argue against the outlawing of reproduction on the basis I mentioned earlier of the loss, occasioned by the immortality of some individuals, to existing people, who would no longer possess an exercisable right to reproduce and would no longer benefit from the arrival of and experience of being with new human beings.

But at the same time she says and concludes (138, 140, 153):

> But even if reproduction ought not to be outlawed, it is hard to see that the adoption of the alternative, limiting the amount of time that people are permitted to live, is justified. (…) The potential population burdens and resource costs of immortality, themselves possibly infinite in nature, may be sufficient to rule immortality out as in any way a tenable goal for a society. (…) The resource limits of the planet provide a definitive argument against making immortality a tenable social goal.

Overall, not wanting to regulate P, decided to refuse immortality. Not only that is clearly misguided, it also does not solve the problem of unsustainability, since P can continue to increase and cannibalize any gains of C and T. Overall prefers to let people die against their will than to limit births. The position of Overall is more striking when it is discovered she had access to the solution I provide and chose to ignore it (135):

> Harris (2000, 59) remarks that "society might be tempted to offer people life-prolonging therapies only on condition that they did not reproduce, except perhaps posthumously, or that they agreed if they did reproduce to forfeit their right to subsequent therapies.

This is the solution responsible for the successful status of the counter 7. It does not infringe on the rights of others as Overall claims, since an individual's decision to become immortal would not take away reproductive rights of those that did not choose to become immortal. And those who choose to reproduce would be in no worse position than today's. Most likely they will also benefit. Worst case scenario they will benefit of a perfect compression of morbidity, but perhaps they decide to live immortal lives for several millennia before deciding to produce offspring. And that is under the assumption that T is static, because if it is not, people could have children and continue to enjoy immortality.

Off course that T will not be static, it is just that my analysis was made under the strictest of assumptions. And it is clear that even working with the strictest assumptions of the overpopulation argument (death equal to zero, and T does not increase), there is still an option.

In a more realistic scenario as T changes, increases in P and/or C will become possible.[100] Lastly, immortality is reversible, so we can always resort to denying treatment if things get murky, bringing people back to the mortal realm, or making them hibernate until T catches up.

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Overall Verdict: FAIL (with caveats)

I do not think the overpopulation argument is enough to reject immortality. However, unlike other arguments, the overpopulation argument requires us to take a pro-active stance in order to regulate P and C. Although many alternatives are available to achieve control over P and/or C, the trade-off between reproduction and immortality provides a definitive answer where no one is worse off than today's. Nevertheless, I want to re-emphasize that the limits (to P and C) are not fixed. If, for example, increases in T give us some slack between what we demand from the universe and what it can provide then the trade-off reproduction and immortality might be alleviated since there will be room for extra persons (or consumption).

3.1.2 – Inequality Argument

P*53: Increasing inequality is bad.

P54: Immortality will increase inequality.

C55 (P*53+P54): Immortality is bad.

P56: The badness of eliminating involuntary death cannot be mitigated by direct replacement.[101]

C57 (C55+P56+PCBA): Immortality is not desirable.

P*53: This premise states that inequality is bad. The key here is the word inequality. It seems that using the concept without at least saying something about what it is, is a recipe for confusion. Immortality will surely trigger many kinds of inequalities but only some of them will have the property of being bad (e.g. the lifespan of immortals will be unequal to individuals that lived in the past in the same sense that today our lives are longer than the average individual during the middle ages – this being bad is at least questionable given current western values). This premise requires *specific* kinds of inequalities to obtain. Not every inequality will do. And perhaps there are even different inequality arguments each corresponding to a different kind of

[100] But not without limit, since, for each value of T there is a limit to how much D we can have. Therefore, we should never do away with limits on both P and C, they merely require to be readjusted constantly. Each increment in T produces some leeway in D to be allocated to either C or P. The configuration of the population is still important.

[101] See footnote 45.

inequality. I will not evaluate all of them here. Instead I will tackle the general kind of inequality that I believe it is present in the arguments found in the literature. To do that I will have to assume a few things about the kind of inequality in consideration. (1) The first assumption is that for inequality to be bad it must have to be about something that is desired, that individuals, through their own agency, want. Suppose that person A has access to double the amount of rocks that person B has, for the same amount of resources (time, money, energy, goodwill, etc). If no one cares about rocks, then this inequality seems to be irrelevant for moral considerations. There seems to be no reason to worry about an unequal distribution of something that no one cares about. (2) The second assumption considers some limitations to the first assumption. Note that the first assumption is a necessary condition, not a sufficient one. Something must be desired for the relevant inequality to obtain, but that in itself is not sufficient. This second assumption shows cases were the first assumptions obtains but the relevant kind of inequality does not. If, given the scarcity of resources, individuals choose to spend their allotted part on different activities then the inequality that results from it seems to be not worthy of moral consideration. Here is an example: suppose that every resource was divided according to the justest principle, whatever that may be. Suppose further that person W spends their resources on acquiring X, and person Z on acquiring Y, through their own agency because it is their preferences. If W had more resources, it would acquire Y next but given the scarcity inherent in the universe, that was not possible without moving to a less just distribution (remember that the resources that W had were the result of the justest distribution possible). Then we have a case where W still desires Y but cannot acquire it. Because W desires X more, all resources W commanded were spent on acquiring X, leaving none to acquire Y. W had the opportunity to acquire Y, but it chose instead to acquire X. The resulting state is that while W has no quantity of Y, Z has plenty of it, so there is inequality. This seems to be off limits to the kind of inequality under consideration. Simply put, if I chose to have a red car, and my neighbour chose to have a blue one, and if I knew I could either have the red one or the blue one (because of the inherent scarcity of the universe under a just distribution of resources), then it seems that me claiming having no blue car while my neighbour has one (because I chose the red one) is bad, is more a case of me being spoiled and unable to deal with scarcity and choice, than it is some case of inequality being morally bad. I had *the opportunity* to have the blue car, but I chose instead to have it red. Having the blue car means sacrificing having the red one. Having one blue car and one red one means moving to a less just distribution since I

will have more resources available than it is fair. This seems the sort of consideration that Overall (2003, 196-7), a paradigmatic inequality-worried author, makes when she states that:[102]

> If people want to live longer, they have to be willing to take steps to make it happen and not rely on medical engineering to ensure their longevity (…) The hope of living a longer life appears to require the sacrifice of immediate gratification from smoking, excessive alcohol consumption, dangerous driving, and inactivity. Not everyone may want to make this sacrifice, if that is what it is, but people need to know that genuine choices have to be made and what their outcomes are likely to be.

(3) A third assumption is that the moral importance (badness) of inequality is greater as we move from luxury goods to basic goods. Basic goods are those which are considered fundamental to the individual and are usually considered agency enablers.[103] Consider, for the sake of argument, the outdated Maslow pyramid as a framework for this assumption. Inequality at the top of the pyramid does not trigger the same badness as inequality at the base of the pyramid. It seems that people would consider someone to not have access to basic food and housing while others do, and while there are enough resources to provide for those who do not, to be morally suspect. On the other hand, if the inequality is about eating caviar every day, or about having an expensive art collection, the worries about the moral cost of inequality seem to be less dire, or perhaps even non-existent.[104]

Let us then apply these assumptions to immortality. To proceed with the inequality argument, immortality must be something people attribute value to (assumption 1). The inequality argument will leave out inequalities created by the agency of the individual. People through their own choices might sacrifice immortality to obtain something else (assumption 2). As already stated immortality allows for voluntary death, so choosing an alternative use of the resources that could have been employed in obtaining immortality is a voluntary choice to die (see **P43A1A1A1**). And lastly, the inequality argument gets stronger as one considers immortality (or what it entails) closer to a fundamental good (assumption 3). The strongest possible interpretation considers immortality the most fundamental good. When it comes to

[102] She later states that it is undesirable to remove "all comfort and convenience". However it remains a fact that if life extension requires some resource (and most likely it will), no matter how just the initial distribution of resources is, some trade-off will be unavoidable, and people will have to make choices.

[103] Here I do not want to enter into the debate about the specifics of these basic goods. That is, the debate between the Rawlsian primary goods, the capability approach of Nussbaum and Sen, or whatever alternative other philosophers may fancy. The assumption only requires that there is a group of goods which seem to have a higher degree of sensitivity to the link between inequality and badness.

[104] I do consider the possibility that inequality is applied to the lowest *unmet* level of the pyramid. In this sense once food and basic housing necessities are met to every individual, the inequality worries will jump to the next level and those will be the new intense issues. There might be a point where the inequality in the ability to eat caviar every day will indeed be seen with great concern, in the same sense as we today might see the lack of education to children as a concern while a few centuries ago it was not. When it comes to the assumption in consideration, I only require that at a particular point in time there is indeed a group of things that are ranked higher in the list of inequality concerns.

specimens of this argument in the literature, it is common to find dramatic approaches. Perhaps inspired by the Gattaca argument[105], these authors envision two different classes/species of humans inhabiting side to side. The division is created because one group was left behind not being able to acquire immortality.

Post (2004): An early anti-posthumanist, Oxford's Lewis wrote The Abolition of Man in 1944 (Lewis, 1944/1966). Lewis defended a natural law tradition: what is good, and we should live within our God-given limits (…) He cautioned against a world in which one class of enhanced human beings would dominate and oppress the other. We might ask, then, if those freed from the decline of aging would become the superior and elite humans, while those who age would be deemed inferior. (…) Will we see, on the one hand, a world of wealthy youthful people living radically extended lives and enjoying the world's longest beach parties and, on the other hand, the frail poor subjected to the natural ravages of aging, looked down upon as an inferior subspecies?

Harris (2013): A feature of life-extending treatments, which seldom has been thought through, is the fact that as treatments become available we will face the prospect of parallel populations, of 'mortals', and 'immortals', existing alongside one another (Silver 1999).

Kass (2004): Other critics worry that technology's gift of long or immortal life will not be granted to everyone, especially if, as is likely, the treatments turn out to be expensive. Would it not be the ultimate injustice if only some people could afford a deathless existence, if the world were divided not only into rich and poor but into mortal and immortal?

P*53A1: The first counter can be aimed directly at assumption 1. If it is argued that immortality lacks any sort of value, then inequality is a non-problem. Ehni (2013) identifies this argument:

> Regarding the goods and not the distribution itself, (…) [an] argument could be that these goods are not relevant from the perspective of justice, as they represent no important gains. (…) it could be argued that the achievement of a happy and fulfilling life does not depend on its length beyond a certain period of time. Seen from this perspective, living past the current life expectancy would not be a substantial gain, and therefore it would not matter if some could not afford it (…) Daniel Callahan has used his concept of a "natural lifespan" in this way, which he has put forward against lifespan extension (Callahan 1977).

P*53A1A1 – What follows will not be an objection to the parent object, but a note regarding the use of it. Note that **P*53A1**, instead of recognizing the inequality problem, states that it does not even exist. There is no inequality with the property of bad, because the first assumption about inequality does not obtain. As such one cannot argue that immortality is void of value and, *simultaneously,* worry about its distribution among people (inequality). But, despite how incoherent this position is, there are still cases in the literature employing this misguided strategy, perhaps thinking that by collecting a great amount of arguments against immortality,

[105] The name of this argument is a reference to a movie of the same name (referenced under DeVito et al. in the reference list) where society is divided between valids and invalids according to each individual's genetic material. Valids were genetically curated/enhanced (designer babies as we call them today) while invalids were left to nature's lottery.

their case is made stronger, never minding the emergent incompatibilities. An example can be found on in Binstock (2004a):

> Even biogerontologist Leonard Hayflick, regarded by many in the field as having laid the groundwork for contemporary research advances in molecular mechanisms of aging (Shay and Wright, 2000), sees "no value to society or to the individual in seeking to slow or stop the aging process or to achieve immortality" (Hayflick, 1994, p. 341). Among his concerns are that issues of distributional justice will arise if access to life-extending technologies were limited. To whom would they be available and on what terms.

Either immortality has some value and worrying about its distribution is warranted, or it has no value and it does not matter who has access to it. If someone desires to have both, combining <worrying about its distribution is warranted> with <it has no value>, I am afraid what must be given away is logical soundness.

P*53A1A2 – Arguing that immortality has no value seems to be quite unlikely and perhaps even false. Such position has to deal at least with the three pro immortality arguments presented here: *2.4.1 – Optionality*, *3.2.1 – Life as a Pre-Condition Argument*, and *3.2.2 – Ability to do More and/or Different*. It is easy to produce cases where having the option to live longer periods of time seems valuable. For example, the ability to travel to far away star systems and live in them, and the ability to learn multiple sciences/trades/crafts/skills, or all of them.[106] A different way of creating examples can be, instead of fetching examples that go into the future, performing a similar exercise but going from the past to the present. Should we say that for someone living in ancient Egypt there was no value in living all the way until today, witnessing history unfold in real time? Is it devoid of value, for that person, living in the present? Many historians, anthropologists and archaeologists would like to have such an opportunity. And if we conceive periods of time much greater than 3000 years, we can add geologists, evolutionary biologists and astronomers to that group. Thus Ehni (2013) asks:

> Would all reasonable people really choose in the same way? Many people are willing to make substantial sacrifices to reach a very old age, e.g. undergoing caloric restriction.

P*53A1A2A1 – ⏚

P*53A1A3 – Arguing that immortality has no value depends on what argument is used to support the claim. Such an argument will be an argument against immortality, and from its conclusion it can be derived that ‘Immortality has no value’. As such, this counter, by itself, does not offer anything substantive – it only points out that the claim that immortality has no value is a shell of some other argument and not the argument in itself. The reasons why immortality has no value are what should be under analysis. The natural lifespan argument,

[106] Note that this is valid even if boredoom obtains. See **P39A1**.

which I have dealt with in *2.3.1.2 – Human Nature Version* is an example (see the quote of Ehni in **P*53A1**). It is statistically improbable that anyone has nailed down what the natural lifespan is, if there is one.

P*53A1A4 – Ehni (2013) also offers a possible answer:

> Contemporary theories of justice do not focus on well-being or fulfilment but rather on the opportunities to achieve them. Ascetic people, such as monks, could forego certain opportunities because they believe they are irrelevant for them. However, what is important is that they have these opportunities in the first place.

P*53A1A4A1 – It seems that what Ehni is stating is that for some people immortality can have value, and as such he is already accepting assumption 1 of my framework. Then he applies assumption 2: some people according to their preferences can forego immortality. So he concludes that what is important is to have the choice. But when someone claims that immortality has no value *in the context of the desirability of immortality* it should not be taken as the expression of a personal preference, since that says nothing about the general desirability of what is under consideration. Someone can say that there is no value in homosexual marriage for himself but at the same time recognize that there is some value in its legal recognition, that its inequality concerns are warranted. Having the choice is important because for some people there is value in choosing the option. But if the issue is about something that lacks value for everyone[107] then does it really matter if anyone has the same opportunity to attain it? A further clarification can be made. When someone says that immortality has no value, I take it to mean <immortality has no positive net value>. So the question can be restated: if the issue is about something that has no positive net value then does it really matter if anyone has the same opportunity to attain it? Suppose that suffering is something that has no positive net value. Is there a concern that, *all else equal*, person X has double the *opportunities* to attain suffering than person Y? Someone could say that person X ought to not have that many opportunities in order to eliminate such inequality, but this destroys the claim that "what is important is that they have these opportunities in the first place." Then should we increase person's Y opportunities of suffering to eliminate inequality? Or perhaps the better solution, as I suggest (assumption 1), is that inequality concerns are unwarranted when what is under consideration has no value. If this is the case, as I believe that it is, then Ehni answer misses the point. He does not tackle the claim that immortality has no value. He assumes it has, at least for someone, which allows him to defend that what is important is having the choice. The choice being the important bit is argued for because it allows to perfectly distribute the good: those who want it

[107] This still allows room to both objective and subjective conceptions of value.

can choose it, and those who do not can chose not to have it.[108] But if something has no value to everyone, then having the choice seems irrelevant.

P*53A2 – Another counter is targeted at assumption 2. The move is to argue that whatever inequalities would result UI do not have the property of bad because they are direct consequences of trade-offs. That is, people, through their choices, choose to allocate the resources needed for immortality treatments in the satisfaction of other preferences. It is only fair that they do not get to have the cake and eat it too (just as me having both a blue car and a red car was not possible without being unfair). It is not that people do not have the option to become immortal – they do. They just choose not to, by spending the resources under their control elsewhere. Perhaps for some it is more important to go to space, have a garage full of cars, a packet with always refilling cigarettes, or travelling, instead of being immortal. But this argument goes deeper. We can frame these trade-offs more generally, for example, by identifying a trade-off between non-working hours and income; between instant gratification or delayed benefits, etc. As such, inequality concerns are unwarranted because they result solely from the choices made through individual agency. As Ehni (2013), states:

> The distribution itself is just because it results from a principle of justice, merit. The (…) argument could be considered to be a libertarian one. Being able to afford these technologies and medical interventions and benefit from them would just be another well-deserved reward and incentive for social and economic success and a rational and disciplined lifestyle.

P*53A2A1 – This argument seems extremely naïve since it assumes some kind of perfectly equal starting point for individuals. The reason for this seems straightforward. The starting point does not hinge on agency, but instead on lottery. As such, fairness seems to require an equal starting point for everyone, since there seems to be no available criteria to justify different starting points. This is so because there is no information about the individual before its own starting point, and no individual, as far as we know, has yet exercised any agency since it will only exist at a later time[109]. By starting point I mean the moment an individual starts to exist[110]. For some the starting point is a slum with a single mother and a diseased body while luckier individuals might receive great health and affluent caring parents. The question is not that every starting point is unique. It seems it cannot be otherwise. The question is if the differences in

[108] If there was no choice and some people desired the good while others did not, then some of them would inevitably be forced to endure an unwanted state of affairs.

[109] I say, as far as we know, because it is entirely possible that scenarios such as karma, or us being a simulation inside a pay to win MMORPG be true. In that case a criteria for different starting points is available.

[110] Not being an expert in psychology and biology, I will not pronounce myself over when a bunch of cells becomes an individual agent. I recognize the question might be more complicated than that. Perhaps spermatozoa can be described as an agent. It is not, however, the kind of individual agent people consider when discussing the morally relevant inequalities that result from immortality.

the various starting points impact the distribution of resources. In other words, if the argument envisioned in in the parent object can still hold given the differences in the starting points. And it seems the differences in the starting points that nature's lottery determined do indeed influence the range of options available to individuals. According to Reeves and Sawhill (2014) social mobility in the United States[111]

> suffers from a high degree of intergenerational income "stickiness," especially at the top and the bottom of the income distribution children born to families at the bottom of the income distribution (i.e., whose parents' income falls in the bottom quintile) have a 36 percent probability of remaining stuck there in adulthood—far more than the 'ideal' 20 percent. Likewise, children on the opposite end of the spectrum have a 30 percent chance of remaining in the highest income quintile. There is more than a two-fold difference in the odds of a child born in the top quintile remaining in the top income quintiles (the 'comfortable middle class'), compared to one born in the bottom quintile (56% versus 23%).

Note that if starting points did not matter and merit was the only cause of inequalities, then the probability of an individual (regardless of whom their parents might be) ending up in any one quintile would be 20%. Instead we find that different starting points yield biased outcomes. Another study pointed that there seems to be no trend in recent years regarding the values measured for social mobility indicators, which coupled with increased (economic) inequality has aggravated the impact of different starting points, (Chetty et al., 2014):

> We find that all of these rank-based measures of intergenerational mobility have not changed significantly over time. For example, the probability that a child reaches the top fifth of the income distribution given parents in the bottom fifth of the income distribution is 8.4% for children born in 1971, compared with 9.0% for those born in 1986. Children born to the highest-income families in 1984 were 74.5 percentage points more likely to attend college than those from the lowest-income families. The corresponding gap for children born in 1993 is 69.2 percentage points, suggesting that if anything intergenerational mobility may have increased slightly in recent cohorts. Moreover, intergenerational mobility is fairly stable over time in each of the nine census divisions of the U.S. even though they have very different levels of mobility. Although rank-based measures of mobility remained stable, income inequality increased over time in our sample, consistent with prior work. Hence, the consequences of the "birth lottery" – the parents to whom a child is born – are larger today than in the past.

Given the evidence it seems reasonable that some people might not be able to afford immortality treatments for no fault of their own. Ehni (2013) seems to agree with this answer:

> Serious doubts can be raised as to whether this is based on correct assumptions. Responsibility for bad health choices and outcomes play a major role in this line of argument. But, research on influences that date back to early phases of life and on social determinants of health points to the limitations of personal responsibility in this field.

P*53A3 - This counter argues that the kind of inequality under consideration is ambiguous when it relates to time-periods. It seems that proponents of this argument have in mind a

[111] The US were chosen because data is more readily available. Furthermore there is a great probability that this country will be at the forefront of actualizing immortality treatments, so discussing the situation there for the purposes of inequality seems advantageous.

specific *duration* under which inequality obtains in order for the property of bad to also obtain. This means that for any kind of conceived inequality that has the property of badness, if we reduce the time period during which it obtains, there is a point where the property of badness goes away. Let us look at the following case. There is a line of persons waiting to receive a certain good Z (assume all of them want the good, or have a claim, or a right, etc). Let us designate each person by Y_i where i=place in line. Assume it takes an X amount of time to deliver the good to the person in front of the line, before proceeding to the next person. It is clear that there is an amount of time X where Y_i has the good Z and Y_{i+2} does not, or in other words inequality obtains. The issue is the following: what is the value of X, above which, inequality receives the property of bad? If X=30seconds is **P*53** relevant? What about X=5years? Suppose that a pill that cures diabetes, cancer, heart issues, and mental diseases in one sitting is developed and is the good Z – this seems a good candidate for **P*53** to clearly obtain.[112] If X=1 second, then it is almost certainly impossible to avoid inequality because it seems extremely hard to synchronize to the second, planet wide, the action of swallowing the pill. What about if X=1 day? In that case, what would need to happen would be a concentrated effort to have a world pill day. Because it would be impossible to deliver the pill to everyone on the same day, this means some people would need to hang on to the pill until the due date. If they take the pill before the arranged date, they will force X to be greater than one day, and consequently create morally bad inequality. This raises some questions: suppose two persons are suffering with some disease that can be cured with our magic pill. One has already received the pill, but another is waiting another week until it gets it, as per usual with international deliveries. Does it make sense for that person to wait for everyone else to also receive the pill before taking it? It does not seem so. Once a person has received the pill, it makes no difference to those who did not receive it yet, if they[113] consume it. Withholding taking the pill will not make others receive theirs faster. This case is curious, because it seems on one hand that inequality is good: it does not make sense to deliberately prolong unwanted and unnecessary suffering by withholding the consumption of the pill, but on the other hand X>1 day is territory of morally bad inequality according to model's assumptions. What if instead we define the limit as X=1 month. Perhaps we avoid the issues of the previous example, since there will be no problem regarding delivery methods[114]. But most likely there will be a bottleneck in the

[112] If the reader does not consider any health treatment as something that would warrant inequality concerns then another good can be used for this counter, be it justice, security, defence, etc.
[113] <They> refers to those who already have the pill.
[114] Assume we can get to the ISS and similar locations in time. Once we develop civilizations on celestial bodies like the moon and mars, X=1month might be too short.

production stage. 1 month seems too short to be able to produce and deliver pills for everyone. Again, some pills will need to be withhold in warehouses, or in people's houses, so that the time between the first consumption of the pill and the last is no more than one month. The same issue appears. Now let us transit from thought experiment to real world. What if the pill is extremely expensive in the beginning, so that for morally relevant inequality to not obtain X needs to be at least a few years? Immortality treatments are not that different from the case of the magic pill offered above, instead they are indeed a better version of it. It seems that either X has a value big enough for inequality to not be a concern, or X is defined as a value low enough for inequality to obtain. In the second case (even when the best efforts of humanity are applied) to avoid inequality we would need to force some people to endure suffering so that everyone could access the medicine within the time period defined by X, that is, we would have to force some people to not engage with immortality treatments, despite the fact that this will create unnecessary suffering. Some authors do indeed use this argument to counter inequality, for example Sethe and de Magalhães (2013) and Harris (2013), respectively:

> While the argument is usually put more eloquently (Pijnenburg and Leget 2007), it seems subject to distillation into the statement: 'Healthcare in rich countries should not advance until the poorer countries have caught up'. Not only does this argument neglect the considerable burden of age-associated diseases already threatening to crush poor country economies (Smith and Mensah 2003), the underlying ideology would call for the cessation of any number of activities other than those directly aimed at improving life expectancy in poor nations (which are, it has been argued, not predominantly scientific but political barriers).
>
> If immortality or increased life expectancy is a good, it is doubtful ethics to deny palpable goods to some people because we cannot provide them for all. (…) There will always be circumstances in which we cannot prevent harm or do good to everyone, but surely no one thinks that this affords us a reason to decline to prevent harm to anyone in particular. If twins suffer from cancer and one is incurable and the other not, we do not conclude that we should not treat the curable cancer because this would in some sense be unjust to the incurable twin. We do not refuse kidney transplants to some patients unless and until we can provide them for all with renal failure.

P*53A3A1 – Perhaps one could relax the inequality argument and defend that it is not so much inequality that is the problem, it is how the limited goods are distributed that matters. With this move inequality per se stops being the issue, and concerns shift to which people will have access to immortality and why. The criteria that will create the inequality is what matters, not that inequality exists. Some authors seem to have a quarry with the ability to pay as a mechanism to allocate immortality treatments, e.g. Post (2004) and Ehni (2013), respectively:

> The future will be complicated by the libertarian and entrepreneurial interests that would make such enhancement available according to one's ability to pay.
>
> In a first step, an analysis of new interventions into aging from a perspective of justice could hold that access to these interventions will create benefits or goods that will be distributed in an unequal way across society, presumably according to the socio-economic status of its members.

P*53A3A1A1 – It does not seem that defending **P*53A3** implies defending a specific criterion for allocation of goods that are not available to all, i.e., where inequality obtains. Certainly it does not require that allocation be made through the ability to pay, aka, the market system. Although the market is useful in a great deal of instances it is not in all of them. No doubt the market is perhaps the most powerful tool we have to allocate resources[115], but it is not perfect, and some situations require different tools. Usually in these cases people feel strongly about some ethical properties of what is under consideration, enough that society regulates how much the market can allocate these goods. One could say that societies have a long history of setting the boundaries of the market. For example, no matter one's ability to pay, owning another person is not allowed (according to the law) – what once was a marketable good is no longer. Another example concerns owning firearms. In many countries ability to pay is not enough, one also needs to obtain the adequate licencing. The right to vote in a democracy is another example. The number of votes each person has is one, regardless of the ability to pay. Waiting lines are another system of allocating scarce resources that do not follow market mechanisms. Every example provided is an instance of setting the boundaries of the market. There is no reason to suppose that if immortality is a good that people feel ethically strong about, it will not be regulated in some sort. This view does not contradict **P*53A3**. On the contrary, both Sethe and de Magalhães (2013), and Harris (2013), respectively, support it:

> In transplantation medicine, for example, the availability of organs is a very real factor of life extension: Those lucky enough to be allotted an organ, survive much longer. Generally, society has been able to agree on laws that regulate the allocation of these special resources. We have not chosen to destroy all organs as they become available in order to preserve equality in despair. Similarly, if life extension treatments would turn out to be irrevocably scarce, this must not mean that only the ability to pay will be decisive. (…) Treatment could be allotted randomly (Broome 1984), as a social reward (Vance 1956), according to imminent need (Harris 1987), within a general utilitarian framework (Miller and Sethe 2005), or even as "affirmative prolongevitism" (Overall 2003). There is no intrinsic reason why such arrangements must be morally flawed if instituted in a society that can agree on an equitable system of apportionment
>
> We do, however, have a clear ethical responsibility to ensure that the question of which of those who could benefit receives the treatment should be decided according to some just principle of distribution (…) The solution, however, is certainly not to say that we will outlaw transplantation unless and until equitable distribution on some agreed principles can be guaranteed. The introduction of any new complex and/or expensive technology raises these problems (…) The principle requires that strenuous and realistic efforts be made to provide the benefits of the technology justly and as widely as possible, not that the benefits be denied because of the impossibility of ensuring adequate justice of provision.

There are 3 points I would like to make before finishing this thread. (1) If the problem of immortality is how to allocate it, then it seems that immortality is already considered a good

[115] As of today, it seems this is true. It might not be in the future, when artificial intelligence processes the information carried by price signalling more efficiently than the market system, thus solving the great issue of central planning.

extremely important and desirable, so much so that market allocation seems to be too crude. In this case, as the authors above state, it does not make any sense outlawing or postponing immortality. That would be a worse state of affairs[116] than allocating it via the market system. Instead, regulation seems to be the way to go, combining the good of immortality with a distribution deemed just. (2) A second point concerns rewards to innovation. If the allocation system does not provide rewards for innovation, society risks signalling inventors to not pursue innovative projects, which may put us in a worse off situation in the long run. The market allocation system with the usual addition of intellectual property laws ensures inventors are rewarded through temporary exclusive profit. If another system is to be put in place to allocate immortality treatments, inventors should continue to be rewarded. For example: a market system modified with a price ceiling law might ensure that in the short term a particular innovation spreads to a wide section of the population (thus decreasing inequality), but at the same time signals inventors to not invest so much in providing new inventions (because the reward is smaller), jeopardizing innovations in the future. Such concern is shared by Garber and Goldman (2004):

> The net effect is that, at least until the innovations become available at low cost, they will go unused by some Americans who might benefit from them. Yet policies intended to reduce the prices of innovations have the potential to discourage the introduction of the innovations at all. The challenge for policy will be to encourage the rapid development and widespread dissemination of medical innovation; uneven rates of diffusion may be an unavoidable price of rapid technological innovation in health care.

Different allocation systems are presented and discussed in the analysis of **P54**. (3) Lastly, some suggested allocation systems present in the literature seem to have an implicit racist and misandrous feeling to them. I am a white male for no fault of my own, and I would consider it to be extremely unfair if an allocation system would exclude me based on those properties. Such case seems to be implicitly defended by Overall (2003) by what she calls affirmative prolongevitism:

> p.22 - I advocate a stance that I call affirmative prolongevitism, which takes a life-course approach to the social support of elderly people and entails the adoption of social policies directed toward increasing average life expectancy and compressing morbidity, particularly for those groups, such as native people, black people, and poor people, who have not so far benefited, or benefited enough, from the sort of increased longevity enjoyed by members of more privileged white cohorts.
>
> p.200 - A specific prolongevist focus on persons who have been disadvantaged would mandate both the promotion of increased research into conditions and diseases that affect women and the deliberate inclusion of women in investigations of medications and

[116] Garber and Goldman (2004): "While new treatments may seem expensive in nominal dollars, they often lower the quality-adjusted price of health care. A novel treatment for a previously untreatable disease provides the extreme example. This treatment makes available at a certain cost a health improvement that was previously unavailable at any price. Essentially, it has reduced what was previously an infinite price to something that, while expensive, is affordable to some."

> treatments that have previously been confined to men (Nelson and Nelson 1996, 359). It would also include the direction of research, enhanced health care, and health promotion to populations of native people, people of color, queer people (including sex workers), and poor people of any race or sexual orientation. These research targets would help to compensate for the history of disparities between the provision of treatments and research that benefit middle-class white men and both the medical treatment of members of oppressed groups and the research into conditions that affect them, and it would ensure that disadvantaged persons begin to receive the medical care they need.

It is curious that Overall, considers women to be the disadvantaged group in the quote above, since she states that women have a higher life expectancy:

> p.200 - The particular focus, at least in the short run, of measures to increase average life expectancy must be on members of groups that historically have been disadvantaged and that currently have low life expectancy.
>
> p.61 - Plenty of evidence indicates that women are both more likely than men to need extended care late in life (because women live longer).
>
> p.111 - Policy of reducing access for elderly people to high-technology medicine will disproportionately affect women because women live longer and also suffer more chronic diseases and disabilities.

Fortunately, she seems to notice the cognitive dissonance before it is too late.

> p.201 - This policy prescription for special attention to disadvantaged groups raises the interesting question of whether the lower life expectancy of men should be regarded as a problem and hence as a potential focus for affirmative prolongevitism. If men do indeed suffer an "inherent" disadvantage, it is morally objectionable to disadvantage them further by refusing to compensate for it. But men's relatively low life expectancy is not just "natural," for it is substantially shaped by social practices.
>
> p.204 - On the one hand I am critical of health-care policies that favor men's physical needs and men's diseases to the exclusion or neglect of women's physical needs and diseases. But on the other hand I argue that by investigating the influence of gender prescriptions and deliberately altering them, where appropriate, through education and changing parenting practices, a social policy of affirmative prolongevitism can legitimately encompass increases to men's life expectancy.

Overall was quick to prioritize women in her allocation system, but has doubts about doing the same for men, even when according to her own criteria men should have priority.[117] At other times she seems to defend a system that does not discriminate by race and/or sex:

> p.200 - I am advocating a qualified prolongevitism—one that will genuinely be for all. As a general principle, support for increased longevity should not be limited by gender, socioeconomic class, sexual orientation, race, or ability.

Since it is not clear what exactly is Overall proposing, and that at times her work seems to punish people like myself, who for no fault of my own am a white male, I urge caution about defending such a system. To her credit, another property that people are for no fault of their own – to be of a certain age – is well argued against being a criterion for an allocation system of immortality.

[117] I think that classifies as a microaggression.

P*53A4 – This counter tries to show that some cases of morally relevant inequality are caused by unwarranted expectations. Unequal access to immortality treatments is such a case.[118] What do I mean by unwarranted expectations? I mean that people have unrealistic concepts regarding product development. Let us use an example. Suppose some scientist discovers some kind of novel technique and decides to test it on herself. Let us assume she developed a new type of prosthesis that she uses to walk around instead of being bound to a wheel chair. At that moment in time she is the only person using this technology and so there is inequality when it comes to having access to it. The scientist tests and uses the prosthesis so that she can develop it further. But at this point in the process of product development, the inequalities caused by the scientist having access to the technology while the general Joe in a wheelchair does not, seem to offer no problem, morally speaking. After all, the product is not fully developed yet and thus not available to the public. The same seems to happen when some new medicine goes through the trial phase. There will be a selected few who will have access to a certain medicine while the general public does not. Again, this inequality seems to not be morally relevant because people recognize that human trials are a part of product development that needs to be done before the general public can access the drug. The conclusion seems to be that if the inequalities are found while the product is being developed, they lose their moral significance. So, this counter tries to argue that early adopters of some technology are in fact part of product development. They are financing the producers to be able to develop cheaper ways of manufacturing the product and thus reach a wider audience. When mobile phones were first introduced they were available at an exorbitant price. Those few who bought them were in fact financing the development of better and cheaper products so that the population at large could access the benefits of the technology. They were not only consumers, but more importantly developers themselves, contributing with the resources needed to decrease manufacturing costs. If these people had not bought the mobile phones (and in doing so financially support the industry), then probably we would not have had them today. Another example is space travel to Mars. SpaceX is currently developing the technology and its CEO Elon Musk recognizes that the first trips will be fairly expensive, but after that the price can decrease to 200K$ and perhaps even dip below 100K$ (SpaceX, 2017a). Access to immortality treatments works in the same vein. The first treatments, that only a few persons are able to acquire, are expensive in order for the producer be able to finance the development of cheaper (and better) manufacturing techniques. The

[118] Using the same language as in **P*53A3** this means the value of X beyond which morally relevant inequality obtains is unreasonably low.

inequality that appears when immortality treatments first come to market, should be no different, morally speaking, from those inequalities that appear in drug test trials or in the case of the scientist's prothesis. The early adopters are taking an active role in the development of the product. The unwarranted expectation is to consider these early adopters, who pay a lot of money for the novel and expensive immortality treatments, to be on the same footing as the normal consumers. If we consider early adopters as developers, then immortality treatments being expensive in the beginning and causing inequality is morally insignificant – it is a part of product development that needs to be done before the general public accesses the treatment. The options are either to have the product with inequalities in the beginning or have no product at all. The option of having a cheap product from the let go does not exist and having that expectation is unwarranted.

P*53A4A1 – A change can be made to accommodate warranted expectations regarding product development when using the inequality argument. The move is arguing that many people want to be early adopters but cannot. In this case it is argued that the distribution of money, which allows those who wish, to become early adopters, has the property of being morally bad.

P*53A4A1A1 – Again we see the same issues regarding the distribution of immortality treatments that were pointed out in **P*53A3A1** and answered in **P*53A3A1A1**. However an important note can be made. Afterall it seems that it is not immortality that is causing the relevant inequalities to obtain. They seem to be positioned at a societal level. By that I mean: i) it is not as if not pursuing immortality will end the morally relevant inequalities and ii) solving the morally relevant inequalities outside of the immortality context, makes the inequality argument in the context of immortality moot – this is discussed in **P54A5**.

P54 – This claim states that the event of immortality being actualized will increase inequality. The meaning of the word inequality as used in this argument is explored in **P*53**. For inequality to obtain it suffices to say that the treatments that constitute immortality will need some scarce resource in order to be enjoyed by some individual. The most common is money[119]. Thus, immortality will be confined only to those well-off. Because in this scenario there is only one group that benefits from the treatment, inequality will obtain, in this case inequality in accessing healthcare. Moreover, the group that benefits from the treatment is said to be already at the good end of (economic) inequality, thus immortality will not be seen as compensating existing inequalities, instead it will aggravate them. The reason immortality might be accessible only to those with a higher ability to pay can be because the treatments will be expensive, just

[119] The case for time is presented in **P54A1A1**.

as is usual the case with any other state of the art extensive medical treatment. Sethe and de Magalhães (2013) state that "while it is difficult to foresee the costs of a hypothetical cure for aging, it has been assumed that such treatments will be expensive." The argument seems to be straight forward: immortality will be an expensive treatment and therefore increase (existing)[120] inequalities by widening the health/longevity gap since those with a higher ability to pay already live longer. Curiously this argument is, to an extent, exclusive with the overpopulation argument since the assumptions about the uptake rate of immortality treatments go in opposite directions. Here are some examples of this premise from the literature:

Post (2004): Another leading anti-posthumanist, Francis Fukuyama, has also served as a member of President Bush's Council on Bioethics (…) He argues powerfully that the anti-aging technologies of the future will disrupt all the delicate demographic balances between the young and the old, and exacerbate the gap between the haves and the have nots.

Hermerén (2013): Not everyone will benefit from interventions in order to prevent, slow down or reverse the biological aging process (…) these interventions, if and when they are available, will improve the situation of the best off.

Ehni (2013): Scepticism about whether everybody will benefit from the longevity dividend in the same way or even how widespread such benefits will in fact be seems to be appropriate. (…) . Limited access to new interventions into aging and limited potential to contribute to the longevity dividend or enjoy its benefits could increase already existing inequalities in healthy life expectancy. At the same time, the situation of those best off is likely to further improve.

Harris (2013): One thing we do know is that the technology required to produce such results will be expensive. For existing people with multiple interventions probably required, the costs will be substantial. (…) Even in technologically advanced countries therefore, 'immortality', or increased life expectancy is likely to be confined to a minority of the population.

P54A1 – As with many other technologies, the expensive price of immortality treatments is expected to go down. Off course how long that will take is uncertain and its relevance is tied to the value of X discussed in **P*53A3**. To put things into perspective, an average worker from the US needed to work 260 hours in 1895 to buy a bicycle but only 7,2 in 1997, for a dozen of oranges the values were 2 hours and 6 minutes respectively, and for a Steinway piano the values were 2400 and 1107,6 respectively (Figueiredo et al., 2008, 21). A more recent comparison concerns computers, once very expensive are now ubiquitous and several orders of magnitude more powerful (e.g. Sanders & Bostrom, 2008, Appendix B). For a mere 5$ today a whole computer can be bought with more computing power than supercomputers of the past.[121]

[120] Pinxten (2013): "Social factors, such as the educational level, creates longevity gaps of up to 7 years."

[121] The Raspberry Pi Zero (RPz), with its launch price of 5$, had the same CPU as the Raspberry Pi 1 (RP1), but slightly overclocked, from 700Mhz to 1Ghz. Using FLOPS as a unit of comparison, and an overclocked RP1 to

Genome sequencing, a process most likely necessary for immortality treatments, also seems to be following the same pattern, with costs decreasing greatly as time marches forward. A full genome costed ~100M$ to be sequenced in 2001, but only ~1K$ in 2017 (Wetterstrand, n.d.). There is no reason to suppose that immortality treatments will not follow the general pattern of decreasing cost (and thus price) as time passes. Sethe and de Magalhães (2013) seem to follow this line of reasoning:

> Moreover, it could be suggested that even if curing aging is initially expensive, its universal desirability will help to recoup costs of investment relatively quickly, allow for low profit margins, create political and competition pressure to drive prices down, facilitate e.g. mass production and service infrastructures etc. as has happened in similar cases (Lucke et al. 2009).

Thus, the premise that immortality treatments are expensive, for inequality to obtain, seems to be a temporary issue, which in the context of immortal beings is insignificant.

P54A1A1 – This reason can be countered by appealing to other resource that is not money in order to make the same argument. For example, it can be argued that immortality treatments will require time and thus put poor people at a disadvantage. Such is argued by Ehni (2013):

> If the price of these new technologies fall, as is predicted for whole personal genome scans, it remains that such regular visits and extensive consultations on personal habits and lifestyle choices are time-consuming and therefore also a medical service that could be costly for the less well-off.

P54A1A1A1 – It is possible that in the same way price is expected to decrease, engineering the streamlining of immortality treatments so they are evermore less of a hassle in our lives is also expected, thus bringing time costs down. For example, nanorobots could autonomously take care of whatever process needs to be done to actualize immortality treatments. de Magalhães (2004) states:

> A man-made molecular assembler capable of building molecule-scale machines to guide specific chemical reactions would allow the construction of devices with atomic precision capable of a myriad of functions. In theory, nanostructures can be built to drive chemical reactions capable of reversing aging by reversing chemical reactions and damage that occur as we age.

For more discussion on nanobots see Freitas (2004).

P54A1A1A2 – It seems that the argument is upside down. Those who have a high income will have the higher opportunity costs for every minute spent receiving the treatment.

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equivalent RPz clock speeds as a proxy for RPz performance we obtain a value of ~60MFLOPS (Rpi Performance, eLinux Wiki, n.d.). For comparison a supercomputer from the 70's, the CDC 7600, had a performance of roughly 36MFLOPS with a price tag of 5.1M$ (Computer History Museum, n.d.) which I believe referred to current prices. In today's prices that would be more than 25M$ (I used GDP deflators for the US economy to actualize the price). MFLOPS per dollar increased approximately 500 000 000 %.

P54A1A1A2A1 – If the claim is given its due charity it will mean that either the time it takes for immortality treatments is so much and/or poor people have it so bad, that enrolling in such a treatment will have extremely high OCs, such as not being able to satisfy basic necessities (food, housing, …) because of the foregone income.

P54A1A1A2A1A1 – This is the typical case where borrowing serves its purpose. See **P54A2**.

P54A1A1A2A1A2 – It can also be argued that other solutions that deal with inequality simpliciter will also solve this case. See **P54A5**.

P54A2 – This counter deals with the case where the service is provided via some intellectual property mechanism. The expensive prices due to monopoly power will only be available during the patent term, usually a period of 20 years. Even during the patent term, if the pricing is high enough it can create incentives for competitors to enter the market with alternative treatments. For example, the ongoing kerfuffle over the Cas9[122] patent (e.g. Cohen, 2018, for the US and Servick, 2018, for the EU) shows how important and potentially profitable CRISPR technology will be in the future. This technology will most likely play a cornerstone role in immortality treatments. The interest in the technology has provided the correct incentives for innovators to seek alternatives. An example is the Mad7[123] enzyme by the company Inscripta (Inscripta, n.d.). This further strengthens the claim that treatments will become affordable with the passage of time and thus inequality only obtains temporarily. As Garber and Goldman (2004) say:

> The well-off and the well-insured will be the first to benefit from the new technologies. As time passes after the introduction of the technologies, other forces will moderate prices. The introduction of effective substitutes will promote competition and, potentially, lower prices. Monopoly pricing will end when patents expire. As the technologies mature, the challenge of finding appropriate financing will diminish.

Furthermore some have called into question the benefits of the patent system itself (e.g. The Economist, 2015) and some economists, like Stiglitz, propose alternative systems. For example, a prize system as a reward to inventors (Stiglitz, 2007), instead of the temporary monopoly that results from the patent. He states that "the type of prize system I have in mind would rely on competitive markets to lower prices and make the fruits of the knowledge available as widely as possible." Alternative systems to the current patent system have the potential to greatly weaken **P54.** Lastly, even if we get intellectual property laws out of the equation, some economists such as Schumpeter, still see monopolies as an expected side effect

[122] A famous enzyme associated with the CRISPR system used to edit DNA.
[123] An alternative to Cas9. There is another known alternative to Cas9, by the name Cpf1.

of innovation, and as such are not inherently bad. Such monopolies are temporary and cease once competition gets ahold of the innovation.

P54A3 – A different strategy for arguing against **P54** can be made by appealing to borrowing. In this case this counter does not rely on trying to show that the treatments will not be expensive sometime down the line like the previous two counters, but that even if they are forever expensive people less well-off can still have an opportunity to afford them. To understand this, we must see through the point of view of a lender. Suppose a cure for all cancers is discovered and is very expensive. Is there any incentive to finance this treatment to individuals, if the treatment is expensive? Most likely not. Curing cancer will yield only 3 more years of life expectancy[124], according to Miller (2004):

> In 1985, for example, the typical 50-year-old American woman could look forward to another 32 years of life, with a mean age at death of about 82 years. The elimination of all forms of cancer - that is, the hypothetical adjustment of cancer mortality risks to zero at all ages above 50 - would increase this woman's life expectancy by only 2.7 years, with death expected, on average, at about age 85. In fact, complete elimination of all deaths due to cancer, heart diseases, stroke, and diabetes would produce a mean life span of about 96 years, or a change in mean age of death of only 17% (i.e., from 82 to 96 years).

Three years will be gained within a context of frailty and advanced senescence. With this in mind any financier will hardly see a chance of getting paid back. The borrower will only live a few more years in a not so productive state likely to be incapable of generating the necessary income.[125] As such there is no incentive to finance these treatments. But when it comes to immortality things are different. First, we are talking about living with (or above) the peak capacity of current human beings as noted in *1.3 – Illness and Frailty*, senescence and frailty would not obtain. And secondly, we are considering extending the lifespan various orders of magnitude, not just a few years. There is no reason that any accumulated debt from those not so well off will not be paid back, no matter how bad their situation is today. Worst case scenario we could see someone having to work for several centuries or millennia to pay back all debt from immortality treatments which is not a problem in the grand scheme of things. It will still amount to an insignificant number of years when considering that the individual has the ability to live forever.

P54A4 – Another way that may make **P54** not obtain is the option of state intervention. This can mean, for example, providing immortality treatments through public funding. The

[124] On another discussion (see **P54A4A1A2.4**) this is used to argue that research on specific diseases has a very low yield on health when compared to research on the aging process itself. Curing cancer (or any other late life diseases) will only mean that another complication will fill its place sooner than later. Curing aging does not have this issue.

[125] I am assuming there is insufficient wealth saved, since the case under consideration is for those less well-off.

treatments will be provided by the national health system or through an equivalent system such as state provided health insurance.

P54A4A1 – One objection is based on countering the third assumption made in **P*53**. In this case immortality can still provide value, but it is considered a luxury and/or not urgent. As such it is not suited for being publicly provided. For example, Ehni (2013):

> [An] argument could be based on the assumption that these goods could have some relevance, but not a very high priority (…). From this perspective, access to new interventions into aging may be of importance but of less importance than other aspects of healthcare.

The argument can be divided in two steps. The first step claims that immortality is not even close to a fundamental good, so concerns of inequality *per se* are not very important. The second part is what really gives strength to the argument. Because immortality is not that important, then every resource invested in its endeavour bears a high opportunity cost (also see *4.2.1 – Opportunity Costs: How much desirable?*). In other words, why should the state finance this immortality thing when there are far more important and urgent options available? Many times when someone employs the inequality argument, they mean this particular version that incorporates opportunity costs. Chapman (2004) provides a paradigmatic example of the argument:

> Problems of distributive justice typically arise under conditions of scarcity and competition when resources are insufficient and/or trade-offs are required. The development and dissemination of prospective technologies to reduce the effects of aging or extend the life span would raise such justice issues. (…) If such efforts are financed with public funds to ensure proper regulatory oversight, the resources invested will most likely come at the expense of other social investments, including research to produce other types of medical innovations (…) Would a major public investment in these efforts be wise, fair, or equitable from a societal perspective? Therapeutic needs should be the primary criterion for public investments. The human aging process is not a disease or a serious health problem that requires elimination. Efforts to engineer longer life cannot be justified as a potential contribution to improving health status or relieving suffering. Instead such initiatives would be akin to other types of prospective enhancements, that is, non-disease-related interventions intended to improve normal human characteristics. (…) Investing in new and very expensive high technologies for enhancement interventions while people in our own country lack access to basic health care and millions of people die prematurely of preventable diseases in poor countries would be yet another step toward moral bankruptcy.

P54A4A1A1 – This object is not an answer to **P54A4A1**, but a note regarding the application of the argument to the private sector. The result would be an extremely radical claim. Engaging in <behaviour X, considered not important> bears a great opportunity cost due to <state of affairs Y>. Almost every behaviour can be classified as the behaviour X: going to the cinema, enjoying a hobby, playing games, having a fancy dinner, etc., because these resources can instead be used to change state of affairs Y: people dying of hunger or preventable diseases to use the example Chapman provided. This argument brings into question what exactly private

property and agency mean. I will not engage this argument here. Instead section *4.3.4 – The Ultimate Argument for Immortality (and Ethics)* will provide enough information to deduce my answer to such claims.

P54A4A1A2.1 – The obvious counter is to show that investments in immortality, regardless if one considers it a cure for a disease (aging) or an enhancement, are not exclusive with other aspects of healthcare, and they might even prove to be a better solution. The mistake made is in the first part of the argument (see **P54A4A1**), thinking that immortality is something superfluous and not close to a fundamental good. If this fails, then the second part of the argument related to trade-offs does not obtain. So the question is <how much should immortality be valued?> Not wanting to go off on a discussion about what constitutes value[126], I will take it as granted that healthcare and health treatments provide some value since these seem to be the main candidates presented as a trade-off to immortality in **P54A4A1**. Then I will try to show that immortality is another aspect of healthcare and thus should provide an amount of value equivalent to those aspects of healthcare authors identified as trade-offs. In some cases, immortality treatments can be numerically identical to those under traditional healthcare (e.g. a cure for cancer). Here are three reasons why immortality does not have the sort of trade-offs the mentioned in the parent object.

P54A4A1A2.2 – The first is related to the capability meaning of aging: being immortal implies being in a forever healthy state. Immortality has at least the same value that having a healthy condition has, since it implies that all diseases that affect people be cured, from cancer, to diabetes. This alone shows that it makes no sense to say that immortality will have opportunity costs regarding curing those diseases. In addition to that, immortality also provides people with peak physical and mental capacity allowing 90-year-olds of today to be no different than a 25-year-old. They could be competitive in the same marathon and look both forward to earn a Nobel prize (or several). Being immortal implies being in this nearly perfect health state, being able to perform tasks that require mental and/or physical acuity without age related complications. There seems to be a universal consensus that if senescence can be postponed, it should, and that amounts to a great deal of justification of why people go to the hospital. If health is not a luxury, the same applies to immortality and so Chapman is wrong when he states that "efforts to engineer longer life cannot be justified as a potential contribution to improving health status or relieving suffering."

[126] I will touch on this in *4.2.1 – Opportunity Costs: How much desirable?*.

P54A4A1A2.3 – The second candidate is related with the chronological meaning of aging. In this sense immortality implies having the ability to live forever. As long as people want to do things, they need to be alive if they want to achieve them[127]. In short, the bigger opportunity cost seems to be if immortality is not pursued, since the trade-off will be letting people die against their will. In the same vein that people at 30 years old today procure health treatments for lethal maladies to live a few more decades, people at 100-years-old in the future might do same to live out a few more centuries.

P54A4A1A2.4 – A third aspect of immortality concerns healthcare costs in the long run. For what follows consider only age-related diseases[128]. Curing any one disease only increases life expectancy for a few years before other disease takes its place. Immortality tries to tackle all diseases at once, by targeting the underlying cause, the aging process itself. I guess an analogy can be made with a roof. One approach tries to fix every hole as they come along, and the other tries to improve the structure of the roof so it does not have any more holes appearing. On this analogy Chapman's argument could be described as: if we invest resources on improving the structure of the roof, and thus solving the hole problem once and for all, then we will not have resources to fix some particular holes that exist now. In the future Chapman's might still be dealing with the hole problem, while going the other route would yield no such outcome. This means that it might actually be cheaper, in the long run, to invest in immortality than go about curing each disease one by one, even if in the short run it turns out to be more expensive.

P54A4A1A2.4A1.1 – Some authors take issue with this argument. For example Capitaine and Pennings (2013):

> A more recent proposal (see, for example, Micans 2005; Dorshkind et al. 2009; Olshansky et al. 2006) is to invest more in biogerontology. The idea is that such research will enable us to tackle age-related diseases simultaneously, thereby ensuring that the elderly enjoy an increased healthspan (i.e. that they enjoy an increase in the number of years spent in a disease-free state). This, in turn, it is believed, will reduce the pressure on the healthcare system. (…) To date, this argument has received no attention, which is surprising given the highly recognised need for cost containment in healthcare

In their paper they present 4 counters to the claim that there will be cost reduction in the health sector by using life extending technologies. I will analyse here 3 of those arguments. The fourth is the overpopulation argument that I have already discussed.

[127] I understand that someone might say that perhaps there is still the possibility of the person remaining, along with its agency, after what we call death. However, what happens after death is unknown, while before death we have an idea of how things are supposed to work. If someone continues to insist that people do not need to be alive to achieve things I might suggest they go about collecting empirical evidence, and if their agency allows, to report back. This is explored in *3.2.1 – Life as a Pre-Condition Argument.*

[128] Immortality would also require tackling non age related diseases, but his argument is made using only age related ones. Curing aging will likely increase the average strength of people's immune systems and as such have an impact on non-age related diseases, but this is not enough to tackle all non-age-related maladies.

P54A4A1A2.4A1.2 – Their first argument is as follows:

> Proponents of the cost containment argument support their reasoning by reference to the ability of anti-aging interventions to prolong healthspan. However, what is required for financial gains to be conceivable is not so much increases in healthspan as absolute reductions in frailspan (i.e. the period of age-related frailty).

So they conclude that merely increasing healthspan will not do the trick.

P54A4A1A2.4A1.2A1 – Their claim is false and easily demonstrable. I understand frailspan as the difference between lifespan and healthspan. It is not frailspan in absolute terms that matters but in relative terms, that is, in % of the lifespan. Frailspan can even increase in absolute terms and healthcare costs go down. Suppose the average person has 100 years of lifespan and a 20-year frail span. Some changes allowed for the average person to have a life span of 1000 years and a frail span of 50 years. The frailspan increased, but, assuming a constant real cost per year of frailspan per person, the cost per person per year decreased substantially. On a constant lifespan, increasing the healthspan must necessarily decrease the frailspan. The only way the concerns of the authors are actualized is the case where Y = ZX, where Y represents the relative increase in frailspan, X represents the relative increase in healthspan, and Z is a constant greater than one. In other words increases in the lifespan more than proportionately increase the frailspan. However, biogerontology research seems to posit the opposite (see the quotes by de Magalhães at the end of *1.3 – Illness and Frailty*).

P54A4A1A2.4A1.2A2 – The concept of immortality excludes the existence of a frailspan, except when so is desired by the person (agency allowance). As such the argument the authors put forward does not work for immortality.

P54A4A1A2.4A1.3 – The second argument presented by Capitaine and Pennings (2013) is:

> The prospect of considerable savings presupposes a sizeable amount of people using life extending, anti-aging technologies. However, this is, as we argue below, a problematic presupposition. The little available research concerning community attitudes towards life extending technologies points towards a rather low uptake rate.

P54A4A1A2.4A1.3A1 – The results of the studies (see *4.1 – Dealing with PCBA: Is Immortality Desirable?*) seem off when compared to what happens in reality. Do more than half of cancer patients refuse their treatment because it is a life extending technology? What about those who need urgent blood transfusions, or surgery? Do more than half of the people in that situation refuse treatment just because the treatment for them is a life extending technology? Perhaps when the people that participated in the study are put in a real-life situation their attitude changes, or perhaps the study considered immortality with senescence.

P54A4A1A2.4A1.3A1A1 – I do not find these reasons convincing. The evidence provided by study is better than any opinion on the matter. Notwithstanding potential mistakes, if people answer they will not partake in immortality treatments we should not assume otherwise.

P54A4A1A2.4A1.3A2 – A different argument could be related with the boundaries of the public health system. If a patient voluntarily refuses a treatment for a condition, after being informed of the consequences of his decision, and then consequently starts suffering from said condition as a consequence of not receiving the treatment, should the state have the responsibility to pay more than the value of the initial treatment? Say someone refuses to take a vaccine (e.g. influenza vaccine), and then ends up with the disease. Should the state pay the treatment of that person fully, or only a value equivalent to the cost of the vaccine, and the remainder supported by the patient? If someone refuses immortality and then starts getting all sorts of diseases such as cancer, should the state pay those treatments fully? Note that I am not suggesting the state refuse the treatment, I am only suggesting the state charge for the services that were in excess of what was needed. Should not persons bear responsibility for their choices when fully informed of the consequences? If this line of thinking is followed, then the rate of uptake of immortality being low would not destroy savings of the system. If this line of thinking is not followed then the system seems to be unfair for those who put their best efforts in remaining healthy, often at the expense of some pleasurable activity.

P54A4A1A2.4A1.3A3 – This object is a note regarding the low uptake approach, and should not be considered a counter. Suppose the anti-vax movement gains traction and the uptake rate of vaccines decreases. As a consequence, diseases for which people refused vaccination start to increase their incidence rate. This means that the savings that vaccines created is being chipped away by the anti-vaxers each time they go to the hospital to get cured of that particular disease.[129] This in itself does not seem to be enough to stop providing vaccines to the public.

P54A4A1A2.4A1.3A4 – Lastly it can be argued that the argument in the parent object only obtains temporarily due to **P1A1A1A1**.

P54A4A1A2.4A1.4 – The third argument put forward by Capitaine and Pennings (2013) is:

> Past spending trends, however, suggest that population aging, by itself, has been only a minor driver of the annual growth in healthcare expenditures. (…) Medical technology is the prime determinant of the increase in healthcare costs. New technologies and the intensified use of old ones are responsible for about 50 % of the annual growth in health spending (Callahan 2009). Thus, it seems that life extension, by relying on technology, would be part of the problem, rather than the solution, when it comes to keeping healthcare costs in check.

[129] I assume the cost of vaccination is insignificant compared to a full treatment.

P54A4A1A2.4A1.4A1 – First, this argument completely ignores all effects from the expansion of the healthspan. The compression of morbidity model provides the tools to understand why. If people only increase their life expectancy a few years, but medical costs increase greatly, then that is enough for the argument of the parent object to obtain. However, it completely ignores the changes that such investment yielded in the *quality* of life of the patients, i.e. improvements in healthspan. Average people at 70 years old could have completely different health statuses after the introduction of the so-called expensive technologies. The problem is that this makes both situations, after and before the implementation of the expensive technologies, incomparable. Immortality not only requires removing involuntary barriers to the lifespan, but also, and perhaps more importantly, to the healthspan. When someone claims that curing aging directly is less expensive than the one disease at a time approach, the assumption implied is that expensive is to be understood in relative terms[130] and not in absolute terms. If there are increases in the healthspan, then that should be accounted for when considering claims regarding how expensive a strategy is. For example, if there are two options: (X) 10 units at price 100, and (Y) 100 units at price 750; Y is more expensive in absolute terms, but less expensive in relative terms (price per unit). The mistake that the authors make is to just account for the change in price from 100 to 750 (which represent increasing cost of technology use), ignoring the change from 10 to 100 (which represents added benefits to the healthspan).

P54A4A1A2.4A1.4A2 – Another reason authors might reach their conclusion is because the current strategy of solving senescence is the one disease at a time model. This suffers from extreme decreasing marginal returns, since once one disease is solved another immediately fills its place. Evermore expensive technology is required to gain a smaller fraction of lifespan. But proponents of tackling aging directly are arguing for a different approach. In other words, the authors are saying: <with our current strategy we verify that X happens>. This is an irrelevant observation to judge the claim that with a different strategy, Y would happen instead of X. The authors should not have drawn inferences from the current strategy to the new strategy, since the whole point of changing strategies is to change the underlying assumptions about how things are going to work out.

P54A4A1A3 – A different approach from arguing that immortality will provide healthcare cost reductions (see the thread starting in **P54A4A1A2.4**) is to take an overall view of the economy. This argument works even if there is an increase in healthcare costs. What needs to be accounted for are other benefits, such as increased productivity, increased tax revenue, etc, that

[130] Having a better return for the same investment, or the same return for a smaller investment.

come with immortality. If after accounting all effects there is a net positive value, then investing in immortality is a sound public investment, much like education is. At the societal level it will have positive externalities, and at the individual level it will provide important agency enabling tools (knowledge in the case of education, health in the case of immortality). It seems highly likely that immortality will have a large net positive value from the point of view of state finances. For one the expenses associated with the growing up period of childhood and adolescence will be diluted when considering longer lifespans. Thus, the costs of providing education and other services for this group will have a higher return on investment. Secondly, if people are at the peak of their physical and mental capacity because they do not age we could expect gains of productivity. And lastly there will be an effect on retirement. Perhaps the whole concept will radically change, since if people do not age they will never be in the fragile state typical of the older people of today. They will be able to maintain their independence and provide for themselves all their lives which will ease pressures on pay as you go social security systems, freeing up resources that could be used elsewhere. This argument seems even stronger because immortality is not a required threshold for the benefits to be realized. As the healthspan increases a proportionate part of the listed benefits will be actualized. It is easy to picture that a society with a short lifespan and low overall health will benefit from increases in overall health and lifespan. The case still stands even after removing the qualifiers "short" and "low". Sethe and de Magalhães (2013) seem to defend this line of thinking:

> Any economic cost calculation also needs to take account of the economic benefit. Curing aging and extending healthy lifespan would be profitable for nations. Historically, the economic value of increased longevity from 1970–2000 was estimated at $3.2 trillion per year for the US alone through increased productivity and significantly decreased healthcare costs, with economic gains from future health improvements also estimated to be large (Murphy and Topel 2006). In fact, effective anti-aging interventions are likely required to avert significant economic burdens associated with the current demographic situation (Aaron and Schwartz 2004).

P54A5 – Lastly, there are some options that structurally eliminate most forms of relevant inequalities. An example of such strategies is the Universal Basic Income (UBI) or the Negative Income Tax (NTI)[131]. Although the idea of an UBI/NIT has gained popularity recently due to advances in automation (e.g. CGP Grey, 2014), a social welfare program based around it has

[131] UBI is a term usually employed by left leaning individuals and organizations while NTI is the term of choice of right leaning individuals and organizations. Both proposals are *pragmatically* equivalent – this can be shown by plotting a graph with gross income in one axis (let us say the x axis), and net income (after state transfers: taxes and subsidies) on the other (let us say the y axis). Plotting a line that results from an UBI can also be obtained through a NTI and vice-versa, by adjusting income tax rates. The main idea of an UBI/NTI is to make the graph line be above y=x for low values of x – to represent a positive net transfer from the state to the individual. A second idea is that transfers are liquid (e.g. they are not in food stamp form, but in cash). A third idea is that such systems are created in such a way that avoid the current welfare traps (UBI has a psychological advantage here).

other potential benefits (for a general overview see e.g. Arnold, 2018). Under this scenario the less well-off could still be provided with enough funds to afford immortality treatments. Although one could consider this argument as a specific instance of the more broader state intervention argument made in **P54A4** there is a fundamental difference. While in **P54A4** the measures were focused on showing that the inequality that stemmed from immortality treatments does not need to obtain, here it is argued that if the underlying inequalities are solved, then **P50** is false. Inequality is not something intrinsically caused by immortality, as noted in **P*53A4A1A1**. Immortality treatments only have the potential to increase whatever inequalities already exist (even if only temporarily). In other words immortality does not create new sources of inequality. If everyone has access to immortality treatments no inequality is actualized. This leads to the conclusion that immortality creating inequality is exclusively dependent on the state of affairs before immortality is actualized and not on immortality itself. Thus, changing that state of affairs, for example through an UBI/NTI program can destroy **P50.**

C55 – It seems both premises, **P*53** and **P54**, fail. **P*53A2** fails to destroy **P*53**, since it is not supported by empirical evidence. **P*53A1** does not fare any better, as stated in **P*53A1A3** it needs more substance. However **P*53A3** (and **P*53A4**, via **P*53A4A1A1**) presents good counters to **P*53**, since several alternatives to the ability to pay are discussed in **P54**. When it comes to **P54**, I present five plausible reasons showing inequality needs not occur: **P54A1** states than inequalities will be temporary under market mechanisms, **P54A2** deals with intellectual property, **P54A3** shows that borrowing will be available, **P54A4** explores the possibility of publicly funding immortality treatments, and lastly **P54A5** suggest a strategy to deal with inequalities at the root of the problem.

P56 - This premise states that there is nothing capable of replacing what was in place in the older state of affairs (not UI) that did not allow the badness of immortality to be actualized.

P56A1 – As stated before (e.g. **P48A1**), immortality is reversible.

PCBA – Ceteris paribus.

C57 - **P56A1** allows for the dismissal of **P56**, so **C57** does not obtain.

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Verdict: FAIL

Overall, inequality concerns seem to not be directed at immortality as a technology, but solely at whom shall have priority. The question about its desirability is already answered: it needs to be desirable, otherwise there would be no inequality concerns to speak of. In the end the best solution is to be able to develop immortality as fast as possible in order to minimize whatever inequalities one can conceive of. The solution is not to ditch immortality development

efforts. The same can be said of a cure to any disease, e.g. cancer. One would want cancer cures to be developed as fast as possible, so they become affordable to all quickly, instead of ditching efforts to cure cancer because it will cause inequality. With immortality, which is a cure for all diseases, the same happens. As such, worrying about inequality when it comes to immortality should come attached to an anti-anti-immortality position. The less obstacles to its development the less inequalities it will cause.

3.1.3 – Stagnation Argument

P58: Eliminating involuntary death will lead to stagnation.

P*59: Stagnation is bad.

C60 (P58+P*59): Eliminating involuntary death is bad.

P61: Immortality eliminates involuntary death.

C62 (C60+P61): Immortality is bad.

P63: The badness of eliminating involuntary death cannot be mitigated by direct replacement.[132]

C64 (C62+P63+PCBA): Immortality is not desirable.

This argument is different from the boredom argument, because it is possible to achieve stagnation without boredoom. Boredoom without stagnation also seems possible depending on what we allow to enter the definition of boredoom.

P58: This argument tries to show that if people do not die, then society will have trouble with coming up with new and fresh ideas, challenging the status quo and innovate on all spheres of life, from technology to morality. Perhaps the most well-known expression of this argument is the famous quote from Max Planck, for example in Sethe and de Magalhães (2013):

> Still, those who have spent a 'lifetime' developing a theory, following a creed, or hating an enemy are presumably less likely to change their mind than those younger and less encumbered by their past. As Max Plank suggests "A new scientific truth does not triumph by convincing its opponents and making them see the light, but rather because its opponents eventually die, and a new generation grows up that is familiar with the idea from the beginning" (Planck 1950).

Or for short: science advances one funeral at a time. The argument takes this rationale and expands it to other spheres of life beyond the scientific ones. Society would, in the end, crystalize. For example, we see this in Overall (2003,50): "Callahan (1998, 131) expresses it: The coming and going of the generations creates genetic and cultural vigor in human life." And

[132] See footnote 45.

in Vincent (2013) [133]: "Immortalist technology would undermine a human cultural process—the succession of generations – and hence compassion and social solidarity."

P58A1 – An easy objection is to tie our inability to adapt, change, and learn in old age, when compared to young people, to the ageing process itself. Since UI aging would not happen, then the worries about stagnation would also not obtain. There seems to be empirical evidence about this, meaning this argument should not be taken seriously. As Sethe and de Magalhães state:

> There are good reasons to believe that some—if not the majority—of our decreasing ability to learn and adapt as we age is an artefact of brain aging (Lockett 2010) and may thus be subject to remedy of anti-aging treatments (Lynch 2011).

Even if it is not directly related to the ageing process that does not mean it cannot be solved. We can enhance ourselves to overcome these issues.

P58A2 – A second objection argues that the problem is not so much grounded on individuals but on their connections – network science has a say on the matter. For what follows see Case (2018). If our social connections are a certain way, they can lead to groupthink which will result in stagnation. Complex contagion of ideas requires that a critical mass of adopters be reached before it expands, and a highly connected network might not allow that to happen. On the other hand, if groups live in isolation ideas cannot spread either. There must be the right amount of bonding within groups and bridging between groups to avoid both isolation and groupthink. Small world networks seem to be the sweet spot. The problem of stagnation seems to be aggravated by reductions in the death rate, since death provides an external force for networks to change. Without death they will crystalize leading to stagnation. Or will they? Death does not seem necessary to avoid stagnation – we only need to require that networks be a certain way and/or that they do not stabilize. This can be achieved by incentivizing (and as last resort mandating) people to form the right type of networks. For example, internet filter bubbles seem to be something that do not help stopping stagnation, since they can lead to groupthink via the illusion of the majority. Immortality needs not to result in stagnation therefore **P58** does not hold.

P58A3 – When we look at the empirical evidence to support Planck's claim we see that there seems to be a positive effect of death on the advancement of science (Azoulay et al., 2015):

[133] Although I will not discuss these two claims here at length (that immortality would undermine compassion and social solidarity), Vincent seems to be committing fallacious reasoning. The argument he presents is simplified in the following form: P1: Individualism → Immortality. P2: Individualism → ~ (Compassion or Social Solidarity). C: Immortality → ~ (Compassion or Social Solidarity). Even granting P1 and P2 (which are doubtful), C does not follow because P1 is not bidirectional: there might causes to immortality other than individualism, or not-individualist persons can also be immortal. (Geddes, 2004): "Immortality as a fundamental moral imperative need not be interpreted in a purely egotist sense."

> Consistent with previous research, the flow of articles by collaborators into affected fields decreases precipitously after the death of a star scientist (relative to control fields). In contrast, we find that the flow of articles by non-collaborators increases by 8% on average. (…) In particular, this increase in contributions by outsiders appears to tackle the mainstream questions within the field but by leveraging newer ideas that arise in other domains. This intellectual arbitrage is quite successful—the new articles represent substantial contributions, at least as measured by long-run citation impact. (…) The loss of an elite scientist central to the field appears to signal to those on the outside that the cost/benefit calculations on the avant-garde ideas they might bring to the table has changed, thus encouraging them to engage.

Are we doomed to not have this engagement in UI? The problem seems to be twofold: no new persons to bring ideas onto the table, and no death of old persons to leave space for new ideas. However, an obvious solution looms around. UI people would have multiple careers. This will not only create room for new ideas, when people leave their fields of expertise, but also contribute to new ideas in the new field that people choose to pursue. The rate of innovation and progress will be greater not lower, since UI we will be able to afford people with expertise in several different fields and allow them to bring all this knowledge together to tackle the complicated questions of the moment. UI people will have careers that span, for example, from 20 years to 70 years and then change to another area of study, bringing with them their knowledge and know-how. At some point all immortals will be polymaths. And this needs not be confined to scientific research. The same principles can be applied to all kinds of jobs, and even to morality – if people change their principles in order to try new ones.[134] The problem of stagnation is just a problem of lack of creativity on the part of those who advocate it. The solution is quite accessible, only requiring turnover of occupations at some point in time. Sethe and de Magalhães (2013) state that "similar considerations have inspired legislators to limit the term any one individual can spend in a position of power." Ultimately, actively leaving people to die against their will as a result of not actualizing immortality, seems to be, at minimum, an ethically questionable to solution to stagnation, since alternatives are available. As Sethe and de Magalhães (2013) put it: "to rely on death as a driver of change is to take a very resigned view about our moral responsibility and capacity."

P*59 – Here it is argued that stagnation is bad. Most arguments found in the literature usually argue that stagnation is bad indirectly. I mean that authors argue that not having new generations to replace new ones is bad. The rotation of generations is an argument in itself, and I will only touch on it briefly in **P*59A2**. Here I will consider the rotation of generations

[134] Some people might argue that changing moral values is not the same thing as changing jobs. Well, not with that attitude, clearly. On a more serious note: people can live in different cultures, in different jurisdictions, in different communities and these experiences will allow them to gradually update their moral values, instead of fixing them in place, as stagnation suggests.

argument insofar as the badness tied to stopping this process is linked to stagnation. In other words, the authors cited here seem to argue that stopping the rotation of generations is bad because it results in stagnation and thus I infer that stagnation is considered bad. There might be reasons, other than stagnation, to support the rotation of generations argument.[135] Some examples of the stagnation argument in the literature:

Harry (2013) [136]: Should we assume the necessity for, or desirability of, the creation of future generations? (…) The second set of reasons has to do with the advantages of fresh people, fresh ideas, and the possibility of continued human development. If these reasons are powerful, and I believe they are, and if the generational turnover proved too slow for regeneration of youth and ideas (…), we might face a future in which the fairest and the most ethical course might be to contemplate a sort of 'generational cleansing'.

Overall (2003, 53): Nuland writes, "There is vanity in all this, and it demeans us. At the very least, it brings us no honor. Far from being irreplaceable, we should be replaced. *Fantasies of staying the hand of mortality are incompatible with the best interests of our species and the continuity of humankind's progress.* More directly, they are incompatible with the best interests of our very own children" (1994, 86, his emphasis).

Others, perhaps as a strategy to drive away thoughtful critique, write in a cryptic manner, perhaps inspired by new age gibberish (Kass, 2004):

> For the desire to prolong youthfulness is not only a childish desire to eat one's life and keep it; it is also an expression of a childish and narcissistic wish incompatible with devotion to posterity. (…) It seeks an endless present, isolated from anything truly eternal, and severed from any true continuity with past and future. It is in principle hostile to children, because children, those who come after, are those who will take one's place; they are life's answer to mortality, and their presence in one's house is a constant reminder that one no longer belongs to the frontier generation. One cannot pursue agelessness for oneself and remain faithful to the spirit and meaning of perpetuation.

P*59A1 – Is it that bad that society evolves at a slower pace? UI time seems to be of a lesser concern. The same amount of progress can be achieved at a lower rate, given enough time, something that immortals would have in abundance. It seems that our current paradigm is being wrongly used UI to drive the conclusion that a slower rate of progress is bad. Besides it is not a stretch to suppose that for millennia our ancestors lived in what we can call stagnated societies, where, from the point of view of the individual and its lifespan, there was essentially no progress to technology and social practices.[137] Should we consider all those societies of the past bad because today our rate of change is greater?

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[135] Certainly those pertaining to it being natural, normal, or the case until now, will suffer from much the same critiques as those made in *2.3.1 – Death is Normal/Natural Argument*, mutatis mutandis. Those pertaining to making room for new people are dealt with in footnote 78.

[136] The author later clarifies the use of <generational cleansing>: "for the record, I think it would be unjustifiable, and therefore it is difficult to see how we could resist death-postponing therapies."

[137] Off course some progress had to happen, but it was distributed throughout a long period of time. The result is an extremely slow rate of progress. We can infer this from the rate of technological change. When it comes to social costumes and practices we can only guess. Still it does not seem to be a stretch to suppose that social norms and practices were static from the point of view of the average human.

P*59A1A1 – ⏚

P*59A2 – The claim that appears in Nuland (cited by Overall) and in Kass that immortality is hostile to children seems to be unwarranted. (1) I do not seem to follow why any individual who becomes immortal starts hating children. And if many individuals become immortal I also do not seem to follow why their position on children will be negatively impacted. If anything children being rarer per unit of time will only increase their value, and the corresponding attention and care given to them. But there seems to be other ways to interpret the claims that immortality will be hostile to children. (2) Perhaps they are claiming that people, by existing, are stealing the room for children to exist. But in that case, those who kill themselves at 25 love children more than those that die at 90. The more you live, the more you are hostile to children, so the best way to minimize hostility against children is to kill yourself after you stop being a child. This seems an absurd claim and neither of those authors followed through with a relatively early suicide so they either do not care about being hostile to children (perhaps because it is not that important), or their claim is not to be interpreted this way. (3) A third way of interpreting the claim might be because children will be the future persons that will inhabit the planet. By living forever we are taking away from them. On this claim, children mean the potential persons that are yet born. There are some problems with this interpretation. It seems that people that do not exist and never yet existed are being given some kind of status that allows one to be hostile against them: this seems nonsense. How can one be hostile to something that does not exist? The answer can be because these non-existent persons will exist in the future – so we are locking our hostility not on non-existent beings but on real future beings. However, this does not seem right. There seems to be a confusion with what the following expressions refer to: <unborn persons>, and <persons who will inhabit the earth in the future>. While in our current state of affairs these are co-extensive, if future is to be defined as 150 years or more, they need not be UI. Immortals can still care about the <persons who will inhabit the earth in the future>. It is just that these persons do not need to be children anymore. These persons can be the immortals themselves. In fact, immortals will have a stronger connection to the <persons who will inhabit the earth in the future> than current persons, whose connection is only through offspring or to some other connection to humanity as a whole. Those who believe today that they will become immortal see a bigger threat on any humanity level existential risk (e.g. climate change) than others, because it will affect them directly and not some distant person that does not yet exist. None of the three interpretations presented offers a reasonable claim to suppose that immortals will be hostile to children by virtue of their immortality.

C60 – Although **P*59A1** questions **P*59**, it seems to not be enough to dismiss it, and **P*59A2** was to address a tangential point. However I do consider that **P58** can be discarded. **P58A3**, the strongest of the objections, offers a satisfactory solution. In fact a solution our society already uses in occupations where stagnation is deemed undesirable. Only a lack of creativity allows the stagnation argument to hold. **P58A1** and **P58A2**, are both based on theories, medical and social respectively, that seem to have solid ground to be the case UI. If so, under **P58A1** the problem of stagnation would not exist or be extremely alleviated, and under **P58A2** measures at the network level to not allow stagnation to sink in would also solve the problem or at least alleviate its effects.

P61 – This premise is true according to *1.2 – What is Immortality?*

C62 – Given **C60** and **P61**, **C62** obtains.

P63 – This premise states that there is nothing capable of replacing what was in place in the older state of affairs (not UI) that did not allow the badness of immortality to be actualized.

P63A1 – As stated before (e.g. **P56A1)**, immortality is reversible.

PCBA – Ceteris paribus.

C64 – **P63A1** allows for the dismissal of **P63**, so **C64** does not obtain.

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Verdict: FAIL

The whole argument fails because **P58** does not seem to provide a good foundation. If the possibility of stagnation is real, it can be easily mitigated. The argument is no more important than someone arguing that accelerating a car will inevitably lead to an accident simply because it did not consider that the car can steer and/or brake, and thus does not need to go straight forever. As such **C60** fails. And as a backup **P63** also provides a last line of defence against the argument.

3.2 – Arguments in Support of Immortality

3.2.1 – Life as a Pre-Condition Argument

P65: Immortality guarantees the ability to be alive.

P66: Being alive is sufficient for the capacity for agency.

P*67: Having the capacity for agency is necessary to do good.

C68 (P65+P66+P*67): Immortality guarantees the ability to do good.

The argument is simpler than it looks. Overall (2003, 184) and Ehni (2003), respectively summed it up neatly:

> It is rational to want a longer life because life itself is the precondition for all else that we might want.
>
> Time as such could be considered a necessary precondition for activities and achievements and thus be a relevant aspect beyond mere physical or mental capabilities or resources

I decided to divide the argument in those particular premises to highlight two counters.

P65 – There is no controversy here. Immortality eliminates all involuntary death, so it allows the individual to live for as long as desired.

P66 – This premise requires two clarifications. The first is regarding the agency that is usually approached by theories of justice. It seems weird that by the act of merely being alive one is granted agency. Certainly, many would like to argue that it is not so, for example if one is a slave, suffers from lock-in-syndrome, or finds oneself in the lowest economic class of society. I do not want to dispute such statements. Instead I want to use agency with a slightly different meaning and that is the reason for the expression <capacity for agency>. Being alive is to be interpreted in contrast to not being alive. We know that human beings (that are alive), can display agency, but we do not know if after death such capacity exists. Alive beings that do not have agency in the sense used by theories of justice, still retain the capacity for agency even though it is not being instantiated at that moment, much like gravity is operating even though the pencil that I am holding is not falling into the center of mass of the earth. It is *as if* agency is the default mode of alive humans but can be opposed by external forces and what remains is just the capacity for agency. Contrast this state of affairs with the state of affairs of someone who died. It is a mystery if the capacity for agency is retained after death. In this sense being alive is sufficient to have the capacity for agency, while the same cannot be said regarding the state of not being alive (or after-death, or after life). The second clarification is in regard to the use of agency within the free will - determinism debate. That debate is largely irrelevant for what I am proposing here. Agency is not to be associated with free will but instead with agents, and agents can be deterministic. For example, a thermostat can be described as an agent and at the same time be described without free will. As long as there are inputs, goals and an action space, there is an agent. This framework will be developed in *4.3 – Two Birds, One Stone*.

P66A1 – The obvious counter is then to argue that capacity for agency still obtains after death. This makes the value of immortality insignificant, since it does not matter if one is alive or not for the purposes of having the capacity for agency.

P66A1A1 – The counter does not work because **P66** claims only sufficiency, not necessity. Claiming necessity would require arguing that the capacity for agency is lost after death, but we have no idea if that is the case. By only claiming sufficiency, it might be the case that after

death there is a capacity for agency (or not), but that does not detract the fact that while alive there is indeed a capacity for agency. The strength of the argument comes from the uncertainty that clouds the afterlife. While alive we have capacity for agency, after death we do not have a clue, so it is still the case that being alive is superior from a risk management perspective, if one wants to have capacity for agency.

P*67 – What this premise really means is that to accomplish anything one must have the capacity for agency. Say someone wants to enjoy hiking in the nearby mountains. If the capacity for agency does not exist it seems to be impossible to do so. Because it is uncertain that this capacity exists after death, it is uncertain that hiking in the mountains is a possibility. Behaving morally or doing good, whatever that is, seems to require capacity for agency. For example if good is serving some god's will, one needs to be able the decide and act according to what behaviour this task requires. The same can be said of saving lives, ending poverty, planning terrorist attacks, procreation, etc. It seems that no matter the conception of good, capacity for agency is required. A rock does not seem to be capable of achieving anything because it lacks capacity for agency.[138]

C68 – The argument seems to obtain without problems. If we die it is uncertain that we will be able to achieve anything, including whatever is considered good. Therefore immortality, by doing away with involuntary death provides full control of how much humans can achieve. Being alive seems a pre-requisite (in the sense of a guarantee) for anything else.

C68A1 - There is one exception, and that is if the concept of good requires suicide. If the best possible state of affairs is that we all commit suicide, then it seems that the argument does not obtain. More precisely, capacity for agency is necessary to carry out with the suicide, but then this means that immortality is unnecessary for achieving good. People just need to kill themselves before immortality treatments are needed.

C68A1A1 – The conclusion of the argument is that immortality guarantees the ability to do good, not that it is required to do good. If indeed the concept of good involves something akin to mass suicide, then immortality, although useless, does not provide any barrier to its achievement. However, if the concept of good does not involve voluntary death prior to immortality treatments are needed to prolong life, then immortality is useful to achieve whatever good is.[139]

[138] I exclude the case where rocks do indeed have capacity for agency, but an external force is acting upon them with the result of producing a state of affairs that looks like rocks do not have capacity for agency.

[139] It seems unclear what the concept of good is. This is not to be understood as a defence that no concept of good can be the correct one. What I mean is just that no particular concept of good is likely to be the correct one. An analogy might help clarify things. If there is a box with 100 balls numbered from 1 to 100, it is unlikely that a ball

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Verdict: OK with one caveat

The argument works. Being alive seems to be required to achieve whatever desires, goals, or behaviours one might have planned, including those deemed ethical. However if what is good requires suicide, then this argument does not provide support to immortality.

3.2.2 – Ability to do More and/or Different Argument

P69: Immortality allows being alive for longer periods of time.

P70: Living for longer periods of time allows access to more and/or different activities.

P*71: Having access to more and/or different activities is good.

C72 (P69+P70+P*71): Immortality is good.

Note that this argument builds on what was already developed by the *2.4.1 – Optionality Argument*, but explores what these new options can contain. This makes this argument about something not intrinsic to immortality. Instead it is now a consequential argument.

P69: This is a true premise because immortality provides control over death, thus allowing the individual to live for as long as it is desired.

P70: This is also a true premise. Living longer is having access to more units of time to allocate. These extra units of time increase the overall time one has available to allocate throughout their life (see also Urban, 2014). There are two different reasons in support of this premise. (1) The most obvious states that we will be able to access activities that we already have access to but for some reason or another never got around to participate in them. As Overall (2004) puts it: "An increased life span gives human beings the chance for activities and experiences that they would not otherwise have enjoyed." Some examples can be the ability to read every book published until now, to visit every place where a medieval battle occurred, to get dozens of PhDs[140], to build a large family, and so on. Because our current state only grants us a limited life expectancy, even if people would like to participate in a great deal of activities, they can only do so much. With immortality they would be able to overcome the current limits to lifespan and participate in every desired activity. (2) The less obvious argument is that we will be able to access new activities that we could not before due to current lifespans being too short. It is hard to imagine what can be considered an example, since these activities would be

with the specific number X is drawn in any one draw: the probability is just 1%. But that does not mean that no ball is going to be drawn. This will be developed further in *4.3.2 – Ethics and Choice*.

[140] This option attracts me greatly. (Upon reading this a professional academic told me I must be out of my mind).

different from what we are used to. My attempt at providing examples: traveling to other star systems, selective breeding of long lived trees or even creating novel animal species, having non-hierarchical genealogical trees[141], and so on. Perhaps the experience of having lived 1000y would be something of note, in the same way that people who have lived 60y seem to have something that those who are only in their 30's have not.

P*71: Whatever the concept of good involves it seems that being able to do more of the same activities represent an improvement on one's overall position (but see **C68A1**). And having the option to do different activities might as well increase our efficacy in doing good things, whatever good is. Geddes (2004) seems to agree with the argument:

> Time is no ordinary commodity! A person with more time can plan further into the future. They have more choices available to them in the present because some of the things a person could do in the present would only pay off over the longer-term. A person with more choices has, by definition, more freedom, and has an increased range of goals to choose from. Thus the longer a person has to live, the greater the potential value of each moment.

C72 – **P69** and **P70** are true premises. **P*71** seems to be relevant to most conceptions of good, the only exception being **C68A1**. But because what is good seems to not be clear (this will be developed further in *4.3.2 – Ethics and Choice*), then access to more and/or different activities increase the options that are available to achieve what is good. Thus **C72** seems to obtain.

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Verdict: OK with one caveat

This is related to the previous two arguments presented in support of immortality: *2.4.1 – Optionality Argument* and *3.2.1 – Life as a Pre-Condition Argument*. Having the option to continue go on living being constantly instantiated allows one to do more and/or different activities. And to do more and/or different requires being alive in the first place. This argument brings to the table what was missing from the previous two: uses for immortality. The caveat is **C68A1**.

[141] Consider that subject X and Y produce offspring and at the same time X is a 10^{th} degree lineal descendent of Y. Although a similar arrangement is already possible with our current lifespan, the variability in the genetic material to allow for this procreation to be without complications is not there.

Section 4 – Conclusion

4.1 – Dealing with PCBA: Is Immortality Desirable?

Now, finally comes the time to answer the important question. Is immortality desirable? So far, I only discussed one argument at a time. Now is the moment to aggregate their effects. To get an overall picture of immortality both pros and cons need to be considered, i.e. it is time for the cost-benefit analysis. The arguments presented in this project and their verdicts are listed in the table below.

Argument	Position	Verdict
2.3.1.1 – Normal Version	Against	FAIL
2.3.1.2 – Human Nature Version	Against	FAIL
2.3.1.3 – God Version	Against	FAIL
2.3.1.4 – Artificial Version	Against	FAIL
2.3.1.5 – Function Version	Against	FAIL
2.3.2 – Boredoom Argument	Against	FAIL
2.3.3 – Deadline Argument	Against	FAIL
3.1.1 – Overpopulation Argument	Against	FAIL (with caveats)
3.1.2 – Inequality Argument	Against	FAIL
3.1.3 – Stagnation Argument	Against	FAIL
2.4.1 – Optionality Argument	Pro	OK
3.2.1 – Life as a Pre-Condition Argument	Pro	OK (with caveats)
3.2.2 – Ability to do More and/or Different Argument	Pro	OK (with caveats)

From the table above it becomes clear that arguments against immortality fail, while arguments in favour of immortality do mostly ok. With this information the answer is clear, immortality is desirable.

An immediate objection might be raised against this conclusion, and that is that I did not consider all arguments available. That is a true statement. The reason they were not included was already alluded to in the very beginning. It would be an insurmountable task given the time allotted for the development of this project. However, from my readings of the literature the arguments that were not included do not fare any better and thus would not change the conclusion. All arguments that I have found against immortality fail, while arguments pro immortality fail most of the time, the exception being the ones I have decided to include here.

Another question the reader might have is about the uneven distribution between pro

immortality arguments and arguments against immortality. It was intentional. Despite the conclusion that immortality is desirable the general opinion of the public is the opposite.

A study in 2007 in Capitain and Pennings (2013): Interesting results have also emerged from a study conducted by Lang et al. (2007) Participants were randomly assigned to one of 3 conditions. Whereas those in the first condition were informed that research on aging offered hopeful prospects with respect to the physical, mental, and psychological fitness in old age, participants in the second condition were told the opposite. The control group received no information concerning research on aging. Participants in each group were asked which age they would like to reach. Surprisingly, the answers did not vary significantly across the 3 conditions. In each of the 3 conditions, the average desired lifetime was approximately 86 years—well below the current maximum lifespan. Fewer than 10 % of the respondents wanted to live to 120 or beyond.

A study in 2011 (ibid.): In a recent study (Partridge et al. 2011), for instance, only 35 % of the respondents answered affirmatively when asked whether they would use a life extending technology.

Another study in 2011 in Vincent (2013): In response to the question: "How old would you like to be when you die?" posed in a 2011 UK national survey by ComRes only 15 % replied that they would like to live for ever. Men in the survey were slightly more likely to tick the 'live for ever box' (17 % as opposed to 13 % for women). Or to put it another way, offered the chance to indicate a preference for of living for ever, 85 % of respondents chose not to. There was a systematic relationship to class with those with high status occupations less likely to want to live for ever. A further finding was related to age, where there was a progressive relationship, the older the respondent the less likely they were to indicate they wished to live for ever.

More recently a study from the Pew Research Center (2013), inquired US citizens about their thoughts on life extension. The results are telling.

- 51% say treatments that extend life by decades would be bad for society, compared with only 41% that say they would be good for society.
- When the participants were asked if they personally wanted the treatment, 56% said they would not want, compared with only 38% stating they would want.[142]
- The median age people say they want to live to is 90 years. Only 4% of participants state they would like to live more than 120 years.
- Being older, having more education, having more income, or knowing less about life extension therapies was correlated with an unfavourable view of life extension therapies, in line with the previous mentioned study. Curiously, people who believed in the afterlife were more likely to state that life extension treatments would be good than those who did not.

[142] This is closely related to participants' views on the moral status of such treatments: 71% of those who want the treatments believe the treatment would be good for society, and 83% of those who do not want the treatments stated the treatments would be bad for society.

It is now easier to see that my choice of focusing on arguments against immortality, by featuring them in greater numbers, is an attempt to address the misguided public opinion on the matter. E.g., a more recent study from the Pew Research Center (2016) revealed that more than 50% of those who attributed moral value to <gene editing in babies that reduce the risk of serious diseases> considered the practice morally unacceptable. The justification presented was a version of the Normal/Natural argument in 65% of the cases. By providing information about the weaknesses of the most common arguments against immortality, I hope to help people re-evaluate their positions. I share much of the same frustrations of Overall (2003, 187):

> More generally, however, it is fair to say that in both historical and contemporary times, and despite protestations to the contrary (e.g., Callahan 1995, 24), there have been more suspicion and criticism of prolongevitism than attempts to argue in its support. Contemporary biomedical ethicists are inclined to castigate both the desire of some people to cling to life and the desperate attempts by some of the relatives of dying people to prolong their lives. Lawyers, sometimes unintentionally abetted by members of the Roman Catholic clergy, urge people to make living wills in which they reject "heroic measures" when seriously ill. And as Momeyer points out, there is a pervasive accompanying tendency to romanticize death through concepts such as "death with dignity," "natural death" (1988, 15), and "meaningful death" (Hardwig 1997a, 40–42). It is puzzling, and perhaps even a reason for cultural suspicion, to find apologism so popular and prolongevitism nearly universally rejected by ethicists, physicians, and intellectuals who speak out in public on end-of-life issues.

4.2 – Two Problems with the Conclusion

There are two issues with the conclusion. More precisely, one directly related with the pragmatic application of the conclusion and another related to how the analysis of the arguments was executed.

4.2.1 – Opportunity Costs: How much desirable?

First, I would like to discuss the link between immortality being desirable and its pragmatic realization. Just because something is desirable, i.e. is good, it does not mean that it ought to be acted upon. Although this might sound counterintuitive the reason is simple: opportunity costs. In other words, there might be other things also considered desirable that are competing for the same resources: time, money, space, etc. If one wants to argue that immortality should be acted upon it is not enough to show that it is desirable. It needs to be shown that it is more desirable than the best alternative use of the resources that it requires (see footnote 35). For example, suppose that the use of available resources results in a trade-off between two desirable things (one of them being immortality). Which of them should one pursue? To answer that we must know the answer to the question of how much desirable

immortality is in relation to alternatives. And to know how much desirable immortality is in relation to alternatives we must have some idea of the desirability of said alternatives. Such a task would be impossible if we try to list and evaluate every possibility, since they are countless. However, by grouping alternatives in big chunks according to some common properties we can make progress. In other words one needs a normative ethical system to provide a source of value. This should not come as a surprise since exercises in applied ethics require the assumption of some normative ethical system. Which leads me to the second point I want to make.

4.2.2 – ⸸ and the Burden of Proof

Throughout the discussion of the arguments I tried not to assume any normative ethical system. I argued against intrinsic arguments by discovering contradictions, discussing assumptions about facts, by showing that immortality is reversible and so on. I argued against consequential arguments by employing instrumental concepts of value, showing that the consequences are not necessary, that mitigation solutions might be pursued, and so on. However sometimes that was not possible, sometimes the disagreement was really about values. At those times I used the symbol ⸸ to put an end to the thread and proceed with the maximum amount of charity to the argument in question.

In section *2.2 – Notes of Interest* I defined the ⸸ symbol to mean <incredulity, disgustingness, the number of supporters/contrarians, is not enough to dismiss a claim of value, since other cultures, individuals, or systems of value could accommodate what is being argued against>. That allowed me to escape the discussion of normative ethical systems, with an answer that could be summed up with <well, you could be wrong>.[143] But that created another problem. Whenever some statement about value was claimed, it could be defended against any critique by exploiting charity through the use of ⸸ without limit. For example:

> A: Killing children is good.
> B: No it is not because <insert some value disagreement>.
> A: ⸸

This would inevitably lead to a situation of first come first served. Whoever claims things first gets the best defence by exploiting charity:

> B: Killing children is bad.
> A: No it is not because <insert some value disagreement>.
> B: ⸸

[143] I believe that being able to show that arguments have flaws and at the same not engaging in value discussions was beneficial if the goal is to change people's minds. This means that the points I made obtain regardless of the normative ethical system the person who employs the arguments has.

What is missing here is that the burden of proof is not being employed and is instead being substituted by a duty of charitable interpretation, so much so, that the initial claimant is not required to engage in value discussions. That seems to be an unpardonable flaw in a project that is purported to be an ethical analysis. After all what is ethics for if not for discussions of value? The reason I did not employ the burden of proof and tried to come up with a justification for some normative ethical system is because I think no justification is known. We do not know of anything in the universe that could empirically justify a claim of value, at least not at the moment. We also do not know of any mathematical proofs that can justify a claim of value. And claims of instrumentality when it comes to value are not much of a help either because something is instrumentally good/bad only in relation to some predetermined value. I remember in a conversation with a peer in my first year of formal education in philosophy[144] where he said something along those lines: "when people are arguing about normative ethics, their disagreements stem from different starting positions". I agree with him. Disagreements about values are ultimately disagreements about assumptions, and there seems to be no criteria to prefer between them that does not appeal to further values:

A: Killing women is bad because killing is bad.
B: Killing women is good because killing is good.
A: You are wrong because killing is bad.
B: No, you are wrong because killing is good.
A: Why do you say killing is good?
B: Well… [thinks a little] … I assume it is.[145] What is your justification then?
A: I also assume it is wrong.

Described this way normative ethical discussions are mere exercises in stubbornness, which quickly descend into sophisticated insults, screaming competitions and implicit appeals to mob mentality. If any progress is to be made in a normative ethical disagreement then it must be by clearly define the meaning of moral statements, and what is special about them (if anything). In other words, a meta-ethical position must be explicit before any engagement in a discussion about normative values occurs. This will be my starting point to present what I like to call the ultimate argument for immortality (UAI).

4.3 – Two Birds, One Stone

I will now present the UAI, but first two considerations about what follows:

[144] Which was one year ago.
[145] Note that appealing to something to justify a normative position on killing does not solve the issue, it just moves the goalposts. Now a justification is required for what was appealed to.

(1) With the UAI I attempt to solve the two identified issues with the conclusion. The first issue will be solved by arguing that the process of actualizing immortality is one of the few desirable behaviours. The second issue is dealt with by appealing to a skeptical meta-ethics that entails a temporary normative ethical system.
(2) The UAI should not be considered in its final form. Instead, the UAI should be seen as the next step of the project started with this work.[146]

4.3.1 – The Necessity of Choice

The first step of the UAI is the beginning. Although that sentence looks like a tautology, it is not easy to decide were the beginning is when what is under consideration is thinking about the world. The beginning is, in my sincere opinion, choice. Choice is to be understood as different possibilities of resource allocation. For example, the choice between using a barrel of oil to produce plastic or to produce car fuel. By resources I do not mean solely physical resources, but also other things that are scarce, like time. In fact, time is a crucial resource to understand choice. Every activity has a time cost, that is, it takes an X amount of time to execute it. And time is in constant consumption, one cannot accumulate it or stop its consumption as one can with money. Time is always being spent at the rate of one second per second[147]. The only thing we can do with time is it to allocate it. Allocating enough time to an activity allows us its execution. Put more simply, I can *choose* how to allocate the next minute[148] between several options/alternatives. After that minute has passed, that amount of time is spent and I cannot recoup that resource anymore. I can, however, choose how to allocate the next minute.

More clearly, there are two properties that support the idea that choice should be considered the beginning:

(1) Property of completeness – Say that I want to watch a movie at home and go to the bar to amuse myself observing people getting intoxicated. Perhaps I can do both, I watch the movie and then go out. But I cannot do both with the same resources. For a particular unit of time I can either allocate it to watch the movie or to go out. These activities are exclusive when considering the allocation of a particular unit

[146] I believe a full PhD program can be dedicated to exploring, developing and refining the UAI.
[147] One can imagine the analogue with money. Someone is given 10€ per minute, every minute, but the catch is that the money cannot be accumulated. At the start of the next minute the balance resets to 10€. People can only choose how to allocate that money, and they must do it in small chunks. Buying a car would require multiple payments, in the same sense that a master's program requires the allocation of great deal of units of time.
[148] The unit of time is not of importance. One could think as small or as big chunks one desires, according to what convenience dictates.

of time. Choosing to allocate the next unit of time to watching a movie requires that I forego using it to go out. There is a trade-off, an opportunity cost, something that I will need to give up for every allocation of time. Let us describe a choice as the option of allocating time (or other resource) to either X or Y[149]. If we make Y =~X, we arrive at the property of completeness. For each unit of time one can allocate it to either X or ~X. Doing both is not possible because they are mutually exclusive and they both require the *same* unit of time. *The property of completeness guarantees that, for the allocation of each unit of time, there will always be a choice*, i.e. alternative uses (or in other words options), because it will be impossible to act upon every option. Choosing requires a selection of which option is going to be acted upon and which options are going to not be acted upon.

(2) Property of necessity – *The property of necessity guarantees that one of the options will be acted upon*, i.e. choice is necessary. That stems from the fact that X and ~X are complementary exhaustive plus the fact that time is being constantly spent. Suppose that I can decide to go to the cinema or not, and not contempt with the universe I refuse to make a choice. The universe does not seem to care since it will continue to provide me with units of time to allocate regardless if I want to *actively* allocate them. I cannot refuse to choose, since either X or ~X will be actualized. I will either go to the cinema or not. What I can do instead is to put my hands in front of my eyes and say that I am invisible, or in other words, not engage my agency in the choice, thus letting the unit of time be allocated to whatever option. Usually it results in a status quo maintenance. If I was at home when I refused to engage my agency in the choice I will most likely remain at home. If I was at the movies and I decided the same, I would most likely remain at the movies. Refusing to engage is also a choice, no different than throwing a coin to make a decision.

From these two properties I can conclude that choice always obtains for any resource, and some option will be acted upon. Thus the problem of choosing between X and Y is the correct starting point. To see this let us assume another starting point, e.g. the problem of what are moral judgements, or the problem of what is the curvature of space, or the problem of the existence of souls, etc. Any of these supposed starting points requires that a choice had been made to select them as starting points instead of an alternative. However, no such choice exists

[149] In reality there are certainly more than two options. I will however only use examples and demonstrations with two options since they are enough to make my point. I suggest that the second option be the best alternative option, as that is the default approach when calculating opportunity costs.

when we consider the problem of choice as the starting point, because we cannot refuse choice (property of necessity). In other words what differentiates the problem of choice as a starting point from an alternative is that it does not result from a previous choice, it is just how the world is. Any other claimed starting point requires that the problem of choice be solved in order to allow for the selection of that supposed starting point. This only reinforces the problem of choice as the starting point, since it predates any other claimed starting point. Thus the problem of choosing between X and Y is the first problem that needs to be solved.

Perhaps someone might say I am assuming too much about time. In fact I am not required to take a stance on many philosophical issues about time to uphold that the problem of choice has the properties I argued for. I only need the concept of opportunity costs, which are a fundamental concept regarding choice, and that time is passing in a fixed direction as if there is an arrow of time. Even considering relativity laws or timeconsciousness scaling, the problem of choice still stands. It matters not that time passes at different speeds for different agents, it is still in constant consumption from their point of view. I will concede that I am wrong if someone can eliminate opportunity costs, or stop time or revert its direction.[150]

4.3.2 – Ethics and Choice

In this section I suggest how one can engage with the problem of choosing between X and Y. It seems that at least 3 components are required to be able to select one option. This tri-partite framework is inspired by the concept of an agent in the economic sense, and also by the work of Bratman (1987). To make matters simpler I will use the word agent to refer to the entity making the choice. Let us start with an example of a choice being made to see how the three components interact with each other.

An agent wants to go to Rome as fast as possible (1). He recognizes that there are several paths in different directions, each with a certain length and difficult of travel (2). He then employs the Djikstra's algorithm to choose which of the alternative paths he is going to pursue to achieve the goal (3). The agent solved the problem of choosing between X and Y. Allow me to dive down on each of the 3 components:

(1) – The Utility Function: This represents the goals the agent wants to achieve. This is a crucial component, because without it, it becomes impossible to solve the problem of choice. There is an instance of such a case in the famous novel of L. Carrol (1865), Alice's Adventures in Wonderland:

[150] That would also be cause for excitement! Afterall, that seems to be a better version of immortality.

> Alice asked the Cheshire Cat, who was sitting in a tree, "What road do I take?"
> The cat asked, "Where do you want to go?"
> "I do not know," Alice answered.
> "Then," said the cat, "it really does not matter, does it?"

Because Alice lacks a goal[151] she cannot solve the problem of choice. It seems that no option is more relevant that the other and she will be indefinitely indifferent to take a path. The universe however does not care and continues to provide Alice with time to allocate, but Alice does not know what to do with it.

People have several goals (or desires) in their daily lives that they use to solve the problem of choice. However, the relevant goals here are those that are not a means to a further goal. Someone can decide to go with path X instead of path Y because they want to go to work. They want to go to work because they want money. And they want money to buy a house. They want the house… The goals we are interested here are those that will be at the end of the chain, since all others can be derived from those. To designate that I employ the term <utility function> instead of merely the word goals. The concept of a utility function was borrowed from the fields of economics and artificial intelligence and it represents a function that attributes value to world states. In other words, we input a world state and it produces a value. The utility function of an agent thus shows us what world states are valued and which are not. By definition the agent wants to maximize his utility function, that is, to bring about those world states which are more valuable.

(2) – Information: This component includes all the options and facts about the options the agent has access to. It is related to beliefs, but not quite the same thing. In the example, it corresponds to the knowledge of the several paths and their characteristics. Without this component the agent does not know that options exist at all and will behave as if there is no choice to be made. Most of the time the agent works with imperfect information (there is a degree of uncertainty), when performing the choice, and this explains why sometimes agents fail to achieve their goals. In our example this could mean the agent underestimated the travel difficulty of some paths, or that he believed Rome to be in Africa.

(3) – The Selection Criteria: The third component provides the link between the previous two components. Both the utility function and the information the agent has enter as inputs in a process that outputs one option to be acted upon. This process that I call selection criteria[152] is *instrumental* to maximize the utility function. The most effective selection criteria

[151] This might not be completely true since she seems to have the goal of not remaining where she is. I believe, this detail notwithstanding, the example to still be enough to make my case.
[152] Other names can be used to denote this component: heuristics, decision, intention, action, algorithms, rules, criteria, etc

would be one that considers every option against the utility function and selects the best one, that is, the one which provides world states with the highest value according to the utility function.[153] However, once we consider that the selection criteria process also needs units of time to run, it might be beneficial for the agent to sacrifice some effectiveness to gain some efficiency. After all, time is a scarce resource [see **P43A6**], and the agent wants to maximize its utility function over several choice problems, not just over one of them. Although this might be an interesting discussion involving concepts such as rationality, I will not enter into details about this component (see Miguens (2004), for a discussion on the matter).

Summing up, the agent chooses between X and Y, using a (3) *selection criteria* that accounts for the (2) *information* that he has about the options (and the world), with the goal of maximizing his (1) *utility function*.

Before I proceed I need to address an issue related with free will and determinism. Perhaps someone might think that I am taking a position on that discussion, but that is not the case. As I briefly stated in **P66**, a thermostat also faces the problem of choice and by most accounts it does not have free will. A thermostat has a utility function (it values world states that contain room temperature close to X temperature more than those who are further away from that temperature), it has information about the current room temperature (most likely a thermometer) and it has a selection criteria in the form of software that allows it to maximize its utility function considering the information that it has. A thermostat is, for all intents and purposes of the framework that I presented, an agent. The problem is perhaps with my use of words such as <choice> and <options> that seem to imply some sort of free-will. But they can also be used in the sense that a chess computer program makes choices about what moves it will make. The problem is that the available language seems to imply free-will, and it is very difficult to find a substitute language to describe what I call the choice problem with a neutral tone regarding the free-will - determinism debate.

Let us now (finally) bring ethics into the picture. What is the meaning of a moral claim, an ethical judgement, an ought statement, a value proposition, sentences which attribute the property of good or bad to something? They mean that whatever world state is described should have a certain value in the utility function of the agent. Stating that X is bad, or that one ought not to do X, means that the utility function of the agent, ceteris paribus, should value those behaviours below others that do not have the property of bad, or below those that do not have descriptions of the kind <ought not to do that>. Utility functions can not only accommodate

[153] This is usually more complex since it includes forward planning and other considerations.

system of value, e.g. a hedonist's utility function values world states which contain pleasure higher than those who do not; but also accommodate normative ethical systems[154], e.g. virtue ethics can be described as <the utility function of the agent should mimic the utility function of the virtuous agent>.

Moral claims are extremely imprecise and vague descriptions about utility functions. One notices that moral claims as currently conceived are not much of a help for the agent. What about two different things that have the property of bad? Is one of them worse? If so in what ratio? And is the marginal value of them constant, or does it follow a certain shape?[155] What about an option that involves a mix of ought to's and ought not to's? Progress in moral discussion would advance greatly if the language of utility functions was used instead, in conjunction with mathematical formulas, since it would make moral claims precise, greatly improving today's unclear moral language.

Now, perhaps someone might object by claiming that the meaning of the normative judgements or claims of value is nothing of the sort I suggest, that it has nothing to do with utility functions. I do not wish to disagree. The issue that I am solving is the problem of choice, not the nature of moral claims. I intend to start from the beginning not from the middle[156]. The main reason I made a meta-ethical claim regarding the meaning of normative statements is because the language of moral judgements seems adequate to talk about what utility functions should contain, without the need to reinvent the wheel. If someone objects to my meta-ethical claim about the meaning of normative statements, then I ask for an alternative language to speak about utility functions and move on. I am not territorial about languages and will use whatever is available to refer to what I intend.

4.3.3 – Recursive Issues?

A curious effect happens with this framework. It seems that the agent also suffers from the problem of choice when it comes to choosing between alternatives in each component: utility function, information, and selection criteria. This can create recursive problems.

How to choose between different *selection criteria*? This is a choice problem inside a choice problem, and there is no reason to stop there. The problem seems to be a never-ending recursion. Fortunately, there is an objective criterion to choose between alternative *selection*

[154] Henceforth I will not make a distinction between systems of value and normative ethical systems. They are both captured by the utility function and a distinction would provide unnecessary complexity.
[155] Shape of a mathematical function, e.g. an <S> shaped function, a log function, etc.
[156] The burden of proof to justify why start on the problem of <what are moral claims> would be a concern to those people since they are required to have already solved the problem of choice.

criteria, and that is the maximization of the utility function.[157] One chooses the selection criteria in an instrumental way, since the goal of the agent is the maximization of the utility function. At least when it comes to this component the recursion problem does not exist.

What about information? According to which criteria should one accept information about the world? An extremely similar question, that perhaps has a co-extensive answer is <according to which criteria should one form/accept a belief about something?>. Perhaps some might suggest that our beliefs ought to be aimed at truth[158], but I digress. Here I defend what Kelly (2003) calls <epistemic rationality as instrumental rationality>. The author argues against the concept, but I found the arguments he presented not convincing in the slightest. I will not explore them here. I suggest that one should believe something, in the sense to be used as information in the problem of choice, if it is instrumentally useful. In other words, if it works to help the agent maximize its utility function then that proposition should be believed over another that does not fare so good in utility function maximization. And this obtains even if the propositions to be believed are known to be false. I have this position largely due to the influence of a famous text by Milton Friedman (1953) where he claims:

> The relevant question to ask about the "assumptions" of a theory is not whether they are descriptively "realistic," for they never are, but whether they are sufficiently good approximations for the purpose in hand. And this question can be answered only by seeing whether the theory works, which means whether it yields sufficiently accurate predictions.

What Friedman calls a theory working, I call information being instrumentally useful to the principle at hand, that is, yielding accurate predictions regarding the properties of the options in order to maximize the utility function. A clarification must be made - I am not talking about wishful thinking. One might want to get rich but believing that one will hit the lottery is not a good strategy to maximize the utility function. I also do not go as far as Friedman in suggesting that "to be important, therefore, a hypothesis must be descriptively false in its assumptions." If the information is true, then we know it will be instrumentally useful in the sense that it will yield accurate predictions, but if the information is false that does not mean it will yield bad predictions – it can yield the same predictions as true information. Friedman exemplifies:

> Consider the density of leaves around a tree. I suggest the hypothesis that the leaves are positioned as if each leaf deliberately sought to maximize the amount of sunlight it receives, given the position of its neighbours, as if it knew the physical laws determining the amount of sunlight that would be received in various positions and could move rapidly or instantaneously from any one position to any other desired and unoccupied position. Now some of the more obvious implications of this hypothesis are clearly consistent with

[157] An alternative to the selection criteria that maximizes the utility function could be a selection criteria that chose the first option that goes through the "mind" of the agent.
[158] For the sake of argument assume that a proposition is true if it corresponds to how the world is.

> experience: for example, leaves are in general denser on the south than on the north side of trees but, as the hypothesis implies, less so or not at all on the northern slope of a hill or when the south side of the trees is shaded in some other way. Is the hypothesis rendered unacceptable or invalid because, so far as we know, leaves do not "deliberate" or consciously "seek," have not been to school and learned the relevant laws of science or the mathematics required to calculate the "optimum" position, and cannot move from position to position? Clearly, none of these contradictions of the hypothesis is vitally relevant; the phenomena involved are not within the "class of phenomena the hypothesis is designed to explain"; the hypothesis does not assert that leaves do these things but only that their density is the same as if they did. Despite the apparent falsity of the "assumptions" of the hypothesis, it has great plausibility because of the conformity of its implications with observation."

We see that the recursion problem does not seem to affect information since there is an objective criterion to choose between several alternatives. The better the information works, i.e., how helpful is in achieving the maximization of the utility function, the higher it gets in the pecking order of belief. One should always choose the information that works better, i.e. the most instrumentally useful. This means that I have no problem accepting things known to be false, like the example of Friedman, or things that are deemed invalid, like induction, as long as they work. I also have no problem with incoherent or contradictory beliefs if they represent the best information in two or more distinct problems of choice (e.g. in one choice the statement <X is white> is inputted and in another choice <X is not white> is inputted).

I avoided the problems of recursion in two of the components by defining their choice in terms of the third component: the utility function. One should choose the selection criteria that maximizes the utility function. The same applies to information. However, the same solution is off limits to the utility function itself. The following is nonsense: <choose the utility function that maximizes the utility function>. So there seems to be a problem. How to choose between utility functions? If this is another problem of choice, then it will descend into a recursion with no end. If we choose a utility function then whatever criteria we used to choose is the true utility function, and the same problem applies – what are the criteria to choose a criteria to choose between utility functions?

People generally have no problem in coming up with a utility function (even if implicit), and many philosophers also seem to have no problem coming up with utility functions. I suspect that no one, given the current state of knowledge, has achieved a solution to this problem. In the end every normative ethical system relies on some assumption that cannot be justified further. I believe all moral claims from golden rules, to human rights, to justice issues, to divine commands to be unjustified. None have sway. I also do not find justified the claim that we will never improve our state of knowledge regarding a criterion to choose between utility functions. It is entirely possible that in the future, a satisfactory solution will be found that is able to deal with the problem of choosing a utility function and thus solve ethics. Frankly,

we do not know much in the grand scheme of things. We do not know what conscience is, we do not know what 95% of the matter in the universe is, and of the 5% that we know of, baryonic matter, a non-insignificant part is unaccounted for.[159] We know so little about how the universe works that we do not even have a unified theory of physics. There is no shame in admitting that we also do not know how to choose utility functions without either presupposing the problem of choice is solved or delving into unbridled recursion. People who believe they have the right utility function are just fooling themselves, in the same way a lottery ticket buyer is.[160] The odds are stacked against them both. To be sure, I am not a relativist. Although both me and the relativist believe every utility function to be in equal footing the difference is that I believe, contrary to the relativist, that they are all unjustified given our current state of knowledge. I also believe the relativist to be unjustified in holding his position.

The problem with not knowing what utility function to choose is that we cannot refuse choice. I will be forced to have a utility function regardless if I want it or not. On the one hand I do not know what utility function to choose, and on the other I am forced to choose one. I like to think of this as the hard problem of ethics.

4.3.4 – The Ultimate Argument for Immortality (and Ethics)

My proposal to the hard problem of ethics will result in the UAI.

(1) Let us suppose that there is only one true set of compatible moral statements, i.e. there is one true utility function, because that is how the world is. If that is the case, then there is no hard problem of ethics – we just choose that utility function and move on with it. Truth provides the criteria to choose between utility functions. With this we can now solve every problem of choice. Now let us suppose that this is the case, but we have not discovered the relevant knowledge to understand which utility function is the true one. In that case we should look to improve our knowledge in order to gain access to the true utility function, and then start using it to solve the problem of choice.

[159] The current hypothesis is that it is spread over the interstellar medium.

[160] Society at large seems, to my surprise, to think differently. Both philosophers and laymen alike take things for granted. Most notably in our present culture some things seem not to require justification as they are "obvious". One example is that people ought to be happy. Another is that each individual has legitimacy to define its utility function. I find these claims completely unjustified. But unjustified they may be, people still cling to them. I had the opportunity to attend four different classes by invited speakers on the topic of recognition. In each class I asked the speaker what the justification for human rights is, because the need for recognition stemmed from an assumption of this kind. Three of them looked at me bamboozled as if I had committed some sort of sin by asking, and the fourth who took the question seriously scrambled to find an answer. To clarify I find most human rights instrumentally useful to most utility functions, including the ones that involve the UAI, but that is about it. There is nothing special about them and no special reason for their upholding.

(2) Suppose however that all utility functions are false as the error theory suggests. The error theory does not solve the hard problem of ethics, since people are still forced to choose a utility function and no criterion has been provided. What the error theory suggests is that truth is not the criterion that allows us to choose between utility functions. This also applies if there are multiple true utility functions, or if utility functions do not have truth values. If there is an alternative criterion to truth, then, to solve the hard problem of ethics we need to know what this alternative criterion is, apply it and choose the corresponding utility function.

(3) But what if there is no such criterion that allows the hard problem of ethics to be solved? There might still be a criterion that eliminates some options, but that does not allow us to single out one utility function. In that case it is useful to know what that criterion is to avoid picking a utility function that does not fulfil it. However, if, after applying all available criteria *and we know that no other exists*, there are at least two utility functions to choose from, I still consider the hard problem of ethics to be solved. Although there are still two or more utility functions with no way of choosing between them, choosing one of them offers no problem, because we know that no additional criteria to choose between them exists. This encompasses the case where no criteria to choose between utility functions exists. On those cases, we must increase our knowledge until we know that no (further) criteria exists and then pick one of the (remaining) utility function(s).

(4) A last scenario occurs when the criteria to choose between utility functions, or the knowledge that no further criteria exists, are unknowable. In that case it is futile to attempt to get knowledge about the criteria to choose between utility functions.

Our current state of affairs is characterized by not knowing which of the above scenarios (1), (2), (3), or (4) is the case and at the same time characterized by having to deal with the hard problem of ethics. Again, I do not find any moral claim or meta-ethical claim to have a status higher than a proposal or of a hypothesis. Some might end up being the case, but at the present none seems to present rigorous evidence to be taken more seriously. Adopting any utility function because one believes it to be correct is unjustified. Our best bet to solve the hard problem of ethics is to search for criteria to choose between utility functions. Once we find everything there is to find about such criteria the problem is solved. And this is where the ingenious part kicks in. We can build a temporary utility function that aims to solve the hard problem of ethics. This temporary utility function is characterized by valuing world states that bring about discoveries about criteria to choose between utility functions – it is a suspension of judgment until we know better. It is temporary because once those criteria are discovered, the correct utility function replaces it. And it solves the hard problem of ethics because it

provides a temporary criterion to choose between utility functions, and thus allocate time. The possibility that these criteria are unknowable does not change this. The choice is between a possibility of solving the hard problem of ethics (by adopting the temporary utility function) or a certainty that it will remain unsolved.[161]

The first step of the UAI is to adopt the temporary utility function, in the hopes of finding out the relevant criteria that allows us to choose between utility functions. In the face of how little we know about stuff, as mentioned earlier, it seems only arrogant to posit that we will never be able to discover anything more than the hypotheses (i.e. ethical theories) that we have today. In any case, ethicists should rejoice, since the temporary utility function attributes the highest value to what they do – uncover criteria that allows us to choose between utility functions. Everything else is just a means to allow ethicists to work as effectively and efficiently as possible.

I am not suggesting that everyone be a professional ethicist. After all people must eat, travel, perform scientific discoveries to inform ethicists, etc. A person should evaluate what kind of contribute might better increase the chances of maximizing the temporary utility function. Perhaps someone is a good cook and in allocating their units of time to cook to other people they will be contributing to the maximization of the temporary utility function, or perhaps they are a good engineer and their skills will be better suited to that type of task. The role of each agent in society is a mere question of optimization, and people ought to make choices that maximize the temporary utility function.[162]

But, and there seems to be always a but, something is not right. Intuitively the best way to go about maximizing the temporary utility function is to perform ethics research, in order to uncover criteria that allows us to choose between utility functions. I disagree that such strategy is the way to go. The reasoning is simple. Let us suppose that in the midst of maximizing the temporary utility function an ethicist in their 30's becomes sick. She goes to the doctor and is confronted with the following choice: either cease ethics research for a month to receive a

[161] Perhaps certainty is too strong a word. Unexpected might be better suited, since even if we do not adopt the temporary utility function, some alien might descend on earth and share the solution to the hard problem of ethics. Such cases are, however, unwarranted and the information they are based on does not seem to yield good predictions. That is, they will not fare well against alternative information when evaluated by their instrumentality. They are nothing more than wishful thinking. If we want to achieve something, the best way is trying to get it, not hoping that some god serves it to us on a silver platter.

[162] The language might be confusing because each agent has the same utility function (the temporary one). To put it clearly *each agent has its own utility function*. There is not an overarching utility function that everyone is working towards. Each agent will consider the behaviour of others exogenous up to a point and adapt to it. Even if one is a good cook, but there is an extreme need of corporate managers, perhaps the utility function will be maximized by performing that role. Individual agents are also subject to *path dependence* (economic concept).

medical treatment to cure the disease, or alternatively continue business as usual and allow the disease to kill her in less than a year. It seems that the disease is a barrier to the maximization of the temporary utility function, and the best course of action is to rest for a month and then resume activity for a few more decades[163]. Refusing the treatment and continuing business as usual does not yield as good an outcome. After all it is way more likely that the ethicist achieves the maximization of her temporary utility function in a few decades than in less than a year. If we know something about the hard problem of ethics is that it is not easy to crack, and humans have been trying for millennia. If this example is clear it comes as no surprise that the current great single obstacle in the way of any of us maximizing the temporary utility function is death. It is highly unlikely that we will solve the hard problem of ethics before death knocks on our door. Thus, the priority should be on dealing with death in order to increase the chances of achieving the goals of the temporary utility function. Immortality embodies the removal of the barrier of death, in the same way that the medical treatment of our ethicist removes her disease[164].

Whereas the practice of ethics research in the context of the temporary utility function is the only moral behaviour, the same does not hold while death is not within out control. In the face of death, ethics research becomes an irrational[165] behaviour due to the opportunity costs that it produces. Ethicists, like everyone else, maximize the temporary utility function by helping to solve death not by churning out hypothesis about the hard problem of ethics. Only once death is solved, i.e. immortality is actualized, should ethicists go back to their work, because at that moment it will be the single most important behaviour. Ethics research is not the only irrational behaviour we currently face but is used here as an example. A more concerning issue are those who act in immoral ways, that is, against the temporary utility function, such as many authors cited in the previous sections by advocating against immortality. The only reason people do not choose according to the temporary utility function is if they have an unjustified one or if they never thought about this issue seriously.

[163] This is according to the current models of life expectancy, and thus ignores any potential radical technological development in life extension.
[164] Which, contrafactually, would have also resulted in her death. In both cases death is being removed to allow the continuation of life for the maximization of the utility function.
[165] It's not immoral because it does not go against the temporary utility function, but it is not maximizing it either, hence the qualifier irrational. There are better strategies to go about it.

In more pragmatic terms the two most urgent issues that I have identified and need a solution are: climate change[166] and aging. [167] Using resources elsewhere without being a means to provide solutions to these goals is most likely immoral and unjustified, or irrational.[168]

Climate change - Although climate denial is on the rise (Worth, 2018, EurekAlert!), there is an unequivocal scientific consensus on the matter (Cook et al., 2016) and the tiny fraction of papers who do not endorse anthropogenic global warming seem to be riddled with flaws (Benestad et al., 2015). People seem to talk the talk (e.g. Paris accords), but not so much walk the walk. Scientists are constantly warning us that we are unknowingly getting ever closer to a point of no return, where the consequences of climate change will linger for millennia, water levels will rise between 10 to 60 meters (sic!) (Steffen et al., 2018), and massive loss of biodiversity will occur (see IPBAS reports). Worst case scenario the planet can become inhospitable to human life, and the time window for meaningful action is closing. Less worse scenarios will still cause serious disruption to our ability to maximize the temporary utility function. Generally, people recognize there is a problem, recognize that we need to change our habits of consumption, but are sometimes over reliant on technological progress and refuse to engage in serious discussion about population control.

Aging – Curing aging is one obvious step in dealing with death. It would solve a myriad of complications and causes of death. However, contrary to climate change there is not even a consensus that death is a problem, and thus many reject cures for aging and life extension therapies. Make no mistake, authors that argue against immortality commit the most damaging of immoral behaviours, and they must be stopped, because we only have so much time to make progress on the prolongation of life.

The UAI is now fully exposed. Immortality is something we must do to buy time in order to discover how to choose between utility functions, or in other words, to discover (instead of hypothesizing) what things are bad, if any, and what things are good, if any.

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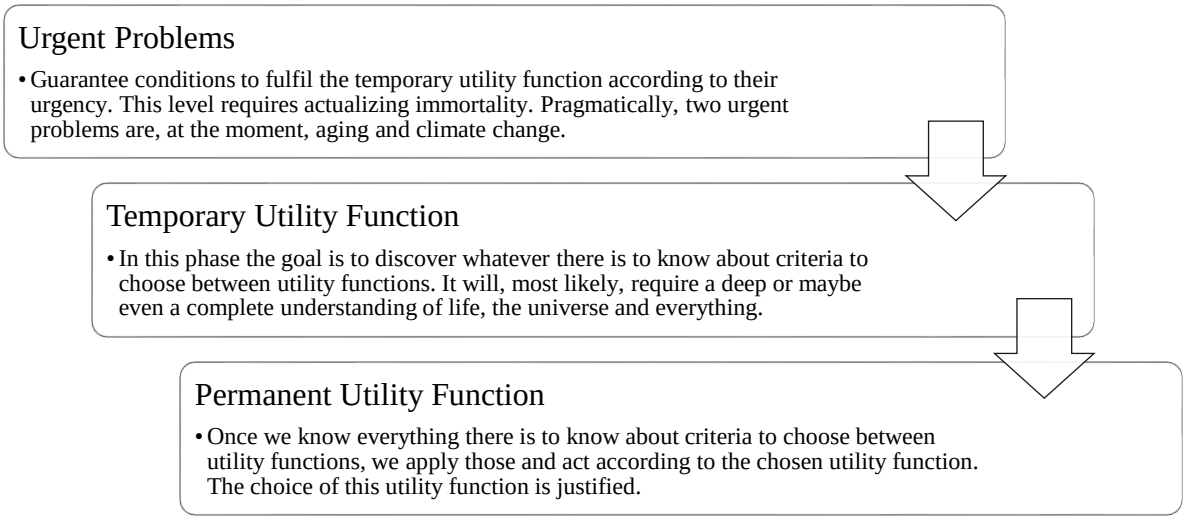
[166] This is the reason of my differentiated approach to the overpopulation argument. By using free flowing text instead of the object based structure used in other arguments, I was able to present a framework to think about the issue.

[167] These two have a character of urgency due to the time windows we have for action, around 20y for the first and up to 60y for the second. Down the list there are other existential risks that we will need to tackle, both at a species level (e.g. superbugs, rogue asteroids, world wars) and at an individual level (e.g. deadly viruses, murders).

[168] I am prepared to defend extravagant positions such as: resources spent on animal rights, *at the moment*, are an immoral behaviour. It might not be once we solve the hard problem of ethics, or if investing in animal rights provides a good return on investment in the maximization of the temporary utility function.



4.3.5 – The Instrumentality of Egoism

One immediate objection to the UAI framework is that the death of the individual is not a barrier to the achievement of the temporary utility function. People can sacrifice (i.e. die) for the benefit of others. As long as there are humans, or other beings capable of pursuing a temporary utility function, we are safe. On this view, perhaps climate change would continue to be a concern, and the project of colonizing Mars to create a redundant civilization would also be high on the list. Immortality would, most likely, never be a priority. At its core, this view sees humanity as a whole unit that is fulfilling a single temporary utility function, and thus a specific individual or a group of individuals are not required to continue to exist. Ethics research would again be at the top of priorities as to maximize the temporary utility function and once a particular ethicist died there was nothing to worry about because there would be others. Humanity as a whole would continue to operate.

There is one big problem with this view, and that is solipsism. Allow me to clarify.

Right: attitude Down: what is the case	Selfish	Non-Selfish
Solipsism is true	W	X
Solipsism is not true	Y	Z

Let us consider the 4 scenarios above. The non-selfish scenarios represent the view that immortality is not a priority since humanity could continue to maximize the temporary utility

function after any one individual died. The selfish scenarios represent the view of the UAI, i.e. that immortality is a priority and that one's death is not acceptable because each agent has its own utility function. Solipsism means that I am the only individual in existence and others are mere fixtures of my mind – if I die everyone else also dies, because my mind encompasses the whole world. Let us break down the scenarios, but note that I will adopt a personal view, since it could not be otherwise when we add solipsism to the mix.

Scenario W – In scenario W there is no problem, I can continue to maximize my temporary utility function.

Scenario X – Scenario X is a complete disaster. There will be no guarantee that after my death, whatever that is left can continue to maximize the temporary utility function (see *3.2.1 – Life as a Pre-Condition Argument)*. This scenario has an extremely low value, due to its uncertainty.

Scenario Y – Under this scenario there is also no problem. However, this scenario will be less efficient than scenario Z. It will require that not only we guarantee that humanity exists, but also that I exist.

Scenario Z – Under this scenario there is no problem with my own death.

We clearly see that a non-selfish attitude is a high stakes gamble. It gambles on a lot of uncertainty (Scenario X), for a mere pay-off of some efficiency (Scenario Y vs Scenario Z). From an instrumental perspective a selfish perspective is superior to a non-selfish perspective, thus UAI still obtains. Not only is important that the existence of humanity be safeguarded, but I also require that my existence be safeguarded.

4.3.6 – Concluding Remarks

Let us recall the two issues that the UAI was proposed to resolve. The first was about opportunity costs. Immortality seems desirable, but by how much? According to the UAI immortality is one of the most, if not the most desirable thing at the time of writing, because death is the most urgent problem to solve. The second issue was related to the burden of proof, how to justify that something is good, bad, or something else? That something is valuable or not? The answer is simple: we do not know, but we ought to if we are to solve the hard problem of ethics. In the meantime, immortality is the necessary step for us to be able to investigate, learn about the world and ultimately conclude about what utility function to adopt. The temporary utility function is the only justified utility function at the moment since its justification can be traced to a feature of the world: the necessity of choice.

Arguing in this way to support immortality seems to be original. I have not found any argument in the literature that supported immortality because we do not know enough about the world. The closer that I have found was Geddes (2004), that argued:

> Since a truly immortal person would live an infinite time, it seems that immortality is in a sense an infinite good. It would be a reasonable conjecture then, that the quest for immortality is the ultimate moral imperative. Let us call this idea 'immortalist morality'. The idea is that we base the whole of ethics on 'affirmation of life'. Why not make immortalist morality the entire foundation of our value systems?

But, the resemblances stop there. There are radical differences between Geddes' proposal and mine. He seems to presuppose that we know what good and/or bad is, which I disagree, and then sees immortality as a means to actualize moral behaviour:

> The critical point is a person's awareness that they have a future. People are more likely to be moral when they understand they will have to face the consequences of their actions in the future. It follows that the further into the future one plans for, the more moral one's behavior should become. People that live a short time do not have to experience the future consequences of all their actions. Longer lives should reduce the tension between the individual and society (…) In the real-world kindness to strangers is only really to one's advantage over the long run. In fact, morality would only be perfectly logical if we lived forever. People have to stick around long enough to reap all of the consequences of their actions. When humans act morally they are in a sense acting as if they are immortal!

Although it is an interesting take on immortality it is an argument that I reject for the simple reason that whatever he presented to us as the starting point of his moral claims is an unjustified assumption. He seems to recognize this when he says that "any theory of morality has to begin somewhere". My suggestion is that we start from the beginning, i.e. the problem of choice.

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As I have mentioned in the introductory section, I consider this work to be more than a mere thought experience. I hope it will help guide policy towards the most urgent problem we face today, and that is death, according to the temporary utility function (the only I believe to be justified at the moment). I also hope that it will provide the reader with tools to start engaging in discussions among friends and peers about the subject. We are currently in a race against time, and our success in actualizing immortality depends on how seriously, we as a society, recognize and tackle the problem. We will either eliminate death or death will eliminate us.

I was taught in economics that people respond to incentives (Mankiw, N. G., and Taylor, M. P., 2006, 7). With that in mind there is one last reason to help convince the reader to join the fight against death. If you have read thus far I invite you to be present at my 1000th birthday to be celebrated on Mars. This is a binding promise on my part. Details to be announced!

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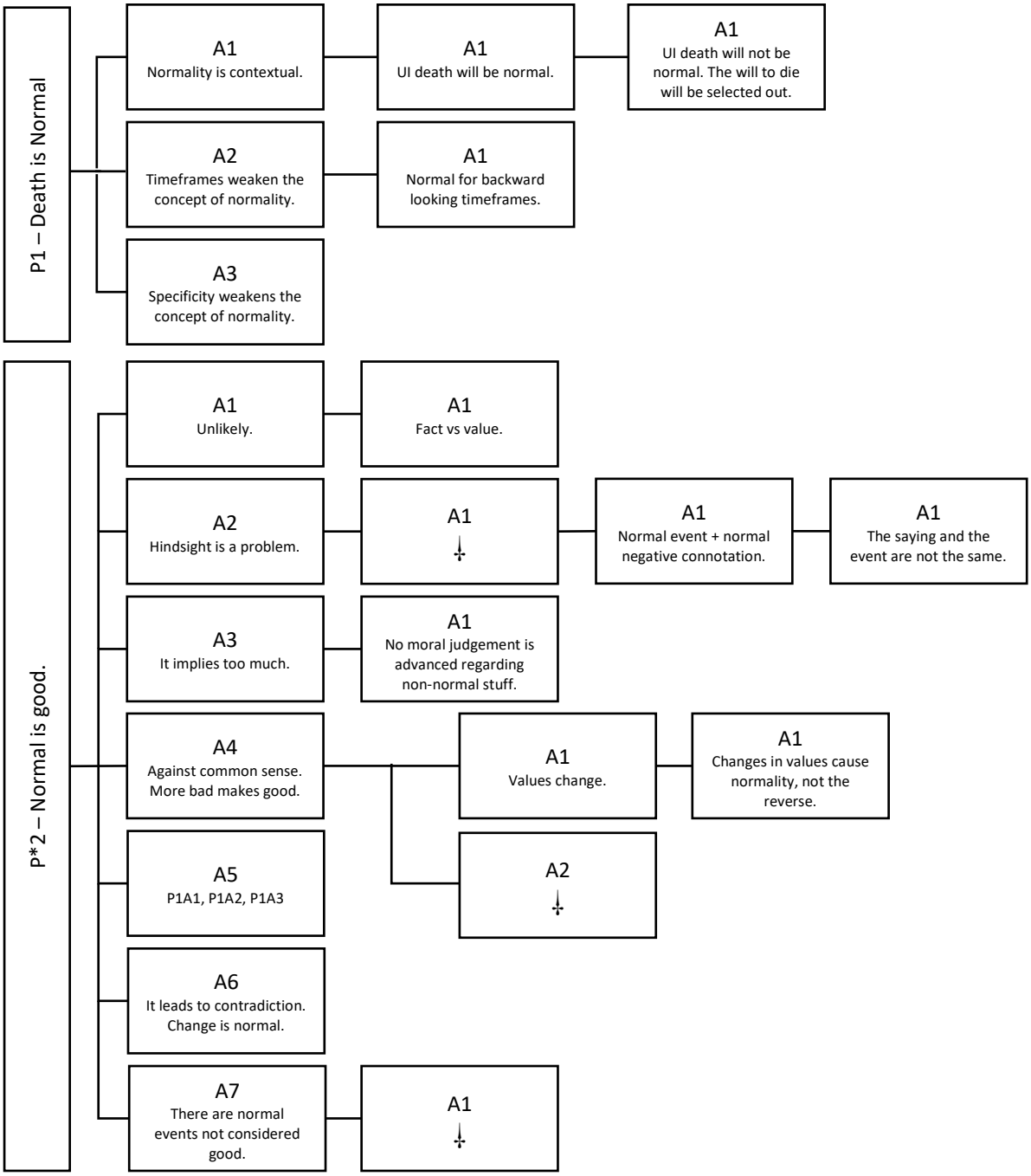
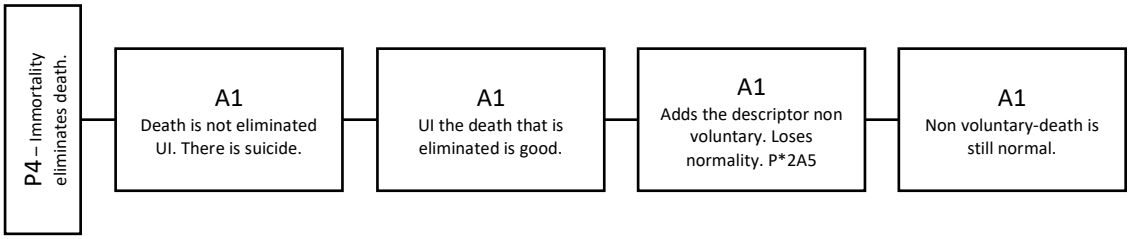
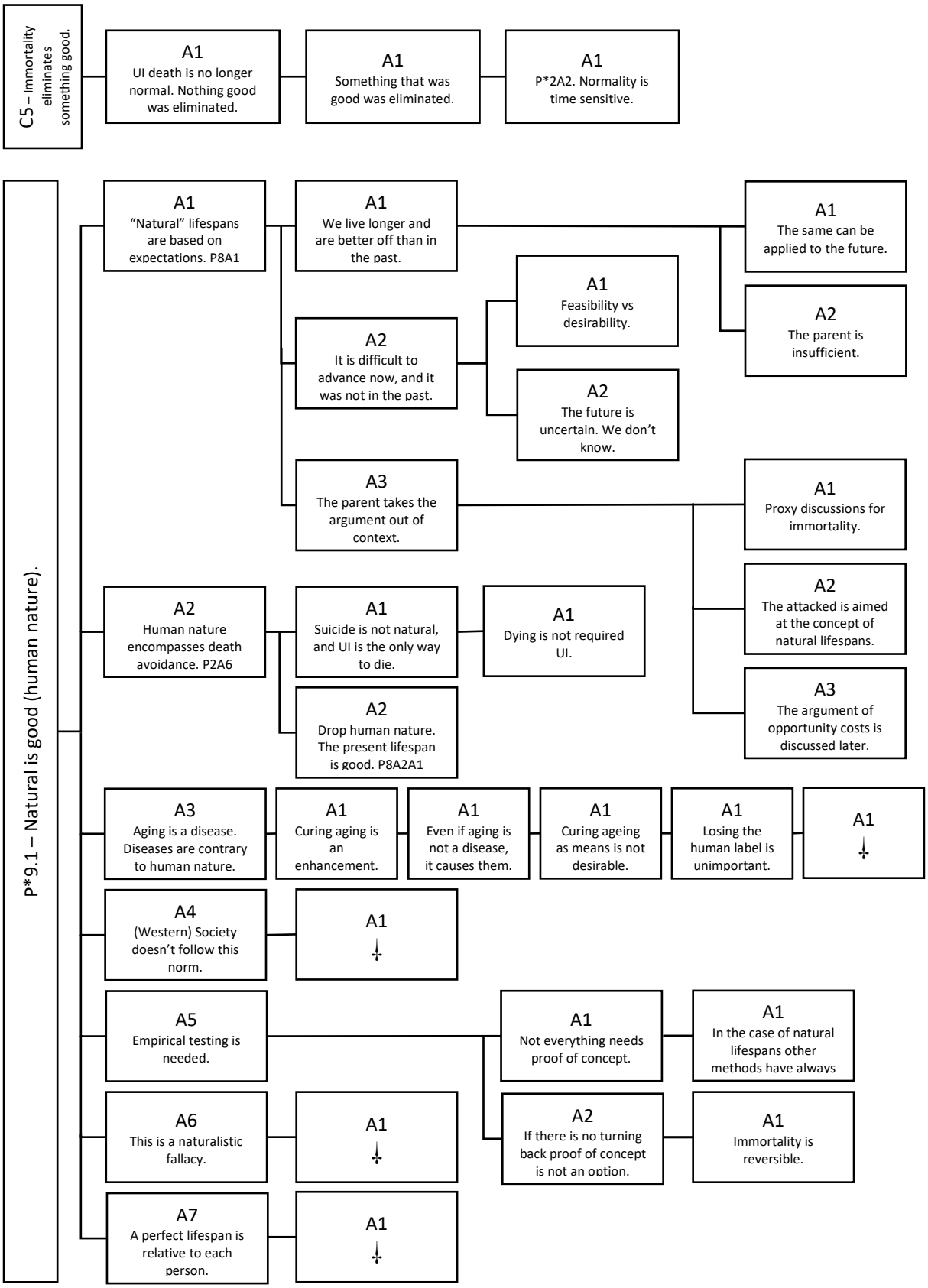
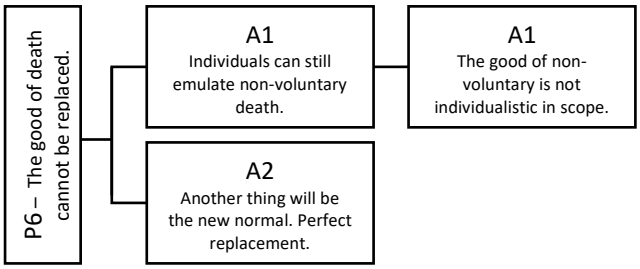
Section 6 – Appendix



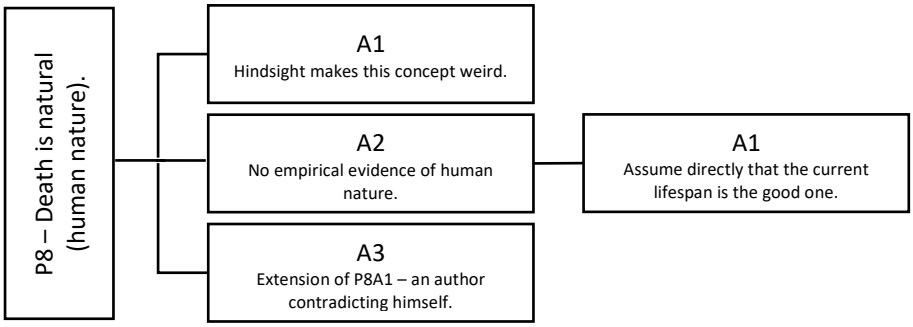
C3 – Death is good.

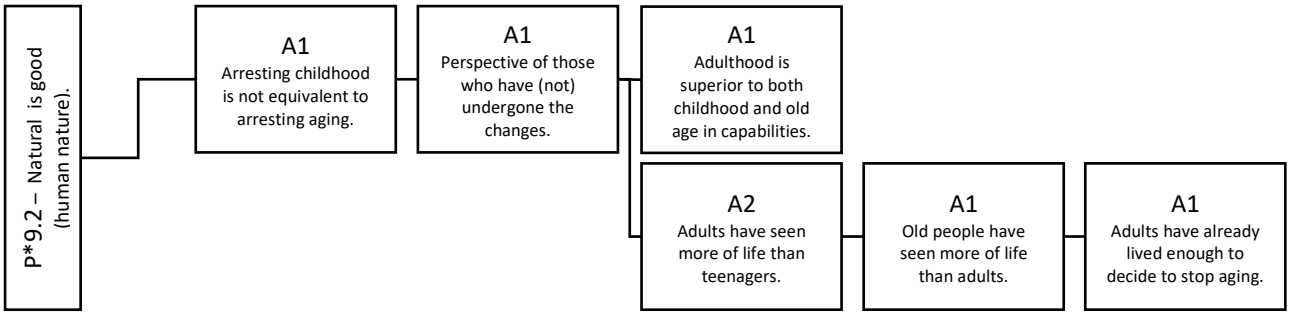



C5 – Immortality eliminates something good.
A1
UI death is no longer normal. Nothing good was eliminated.
A1
Something that was good was eliminated.
A1
P*2A2. Normality is time sensitive.
P*9.1 – Natural is good (human nature).
A1
"Natural" lifespans are based on expectations. P8A1
A1
We live longer and are better off than in the past.
A1
The same can be applied to the future.
A2
The parent is insufficient.
A2
It is difficult to advance now, and it was not in the past.
A1
Feasibility vs desirability.
A2
The future is uncertain. We don't know.
A3
The parent takes the argument out of context.
A1
Proxy discussions for immortality.
A2
The attacked is aimed at the concept of natural lifespans.
A3
The argument of opportunity costs is discussed later.
A2
Human nature encompasses death avoidance. P2A6
A1
Suicide is not natural, and UI is the only way to die.
A1
Dying is not required UI.
A2
Drop human nature. The present lifespan is good. P8A2A1
A3
Aging is a disease. Diseases are contrary to human nature.
A1
Curing aging is an enhancement.
A1
Even if aging is not a disease, it causes them.
A1
Curing ageing as means is not desirable.
A1
Losing the human label is unimportant.
A1
A4
(Western) Society doesn't follow this norm.
A1
A5
Empirical testing is needed.
A1
Not everything needs proof of concept.
A1
In the case of natural lifespans other methods have always
A6
This is a naturalistic fallacy.
A1
A2
If there is no turning back proof of concept is not an option.
A1
Immortality is reversible.
A7
A perfect lifespan is relative to each person.
A1

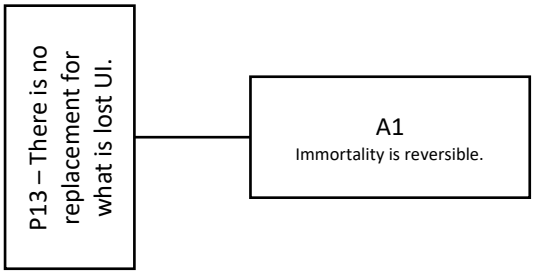


C7 – Immortality is not desirable.

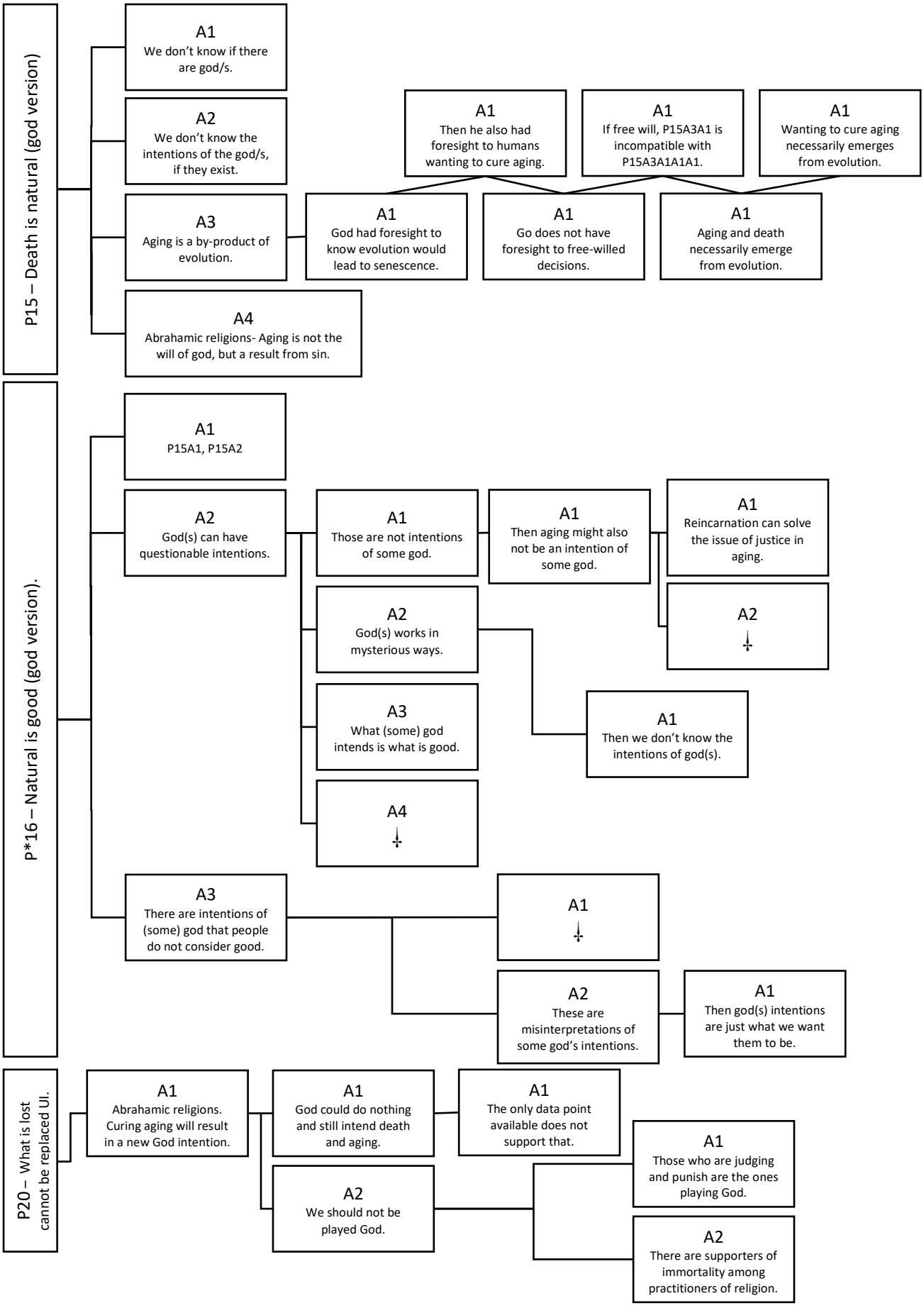




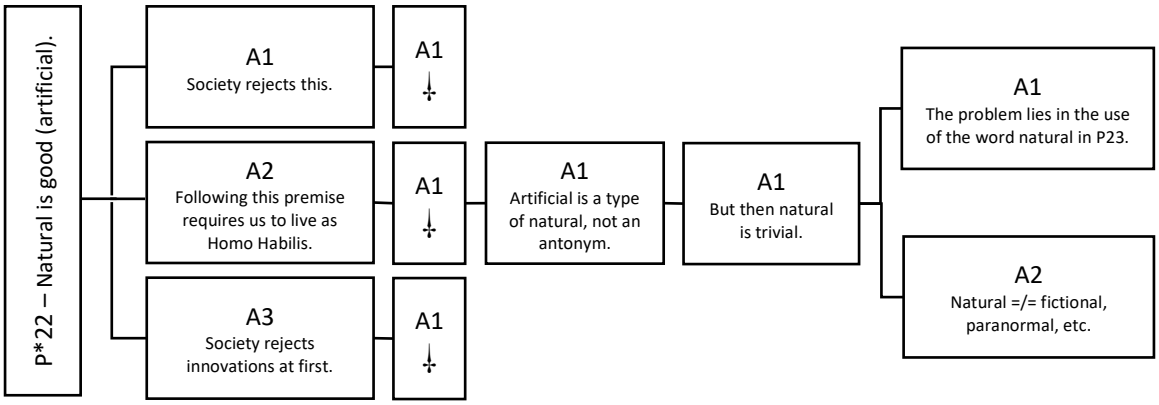
C10 – Non-voluntary death is good (and eliminating is bad).
P11 – Immortality eliminates involuntary death.
C12 – Immortality eliminates something good (and creates something bad).

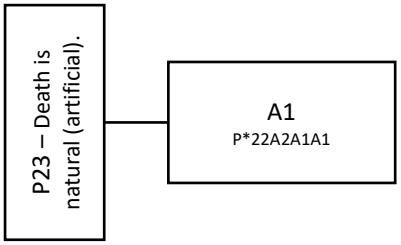


C14 – Immortality is not desirable.
C17 – Involuntary death is good.
P18 – Immortality eliminates involuntary death.
C19 – Immortality eliminates something good.

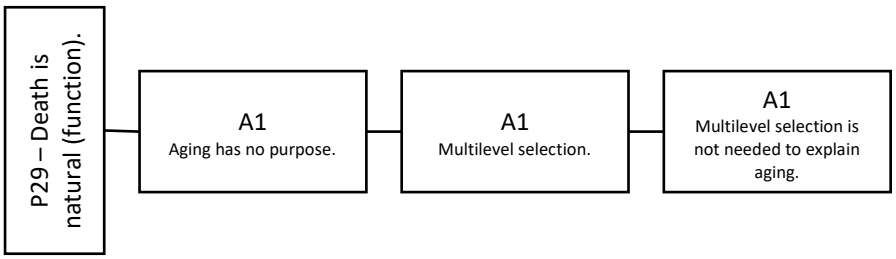

P15 – Death is natural (god version)
A1
We don't know if there are god/s.
A2
We don't know the intentions of the god/s, if they exist.
A3
Aging is a by-product of evolution.
A1
God had foresight to know evolution would lead to senescence.
A1
Then he also had foresight to humans wanting to cure aging.
A1
Go does not have foresight to free-willed decisions.
A1
If free will, P15A3A1 is incompatible with P15A3A1A1A1.
A1
Aging and death necessarily emerge from evolution.
A1
Wanting to cure aging necessarily emerges from evolution.
A4
Abrahamic religions- Aging is not the will of god, but a result from sin.
P*16 – Natural is good (god version).
A1
P15A1, P15A2
A2
God(s) can have questionable intentions.
A1
Those are not intentions of some god.
A1
Then aging might also not be an intention of some god.
A1
Reincarnation can solve the issue of justice in aging.
A2
A2
God(s) works in mysterious ways.
A1
Then we don't know the intentions of god(s).
A3
What (some) god intends is what is good.
A4
A3
There are intentions of (some) god that people do not consider good.
A1
A2
These are misinterpretations of some god's intentions.
A1
Then god(s) intentions are just what we want them to be.
P20 – What is lost cannot be replaced UI.
A1
Abrahamic religions. Curing aging will result in a new God intention.
A1
God could do nothing and still intend death and aging.
A1
The only data point available does not support that.
A2
We should not be played God.
A1
Those who are judging and punish are the ones playing God.
A2
There are supporters of immortality among practitioners of religion.

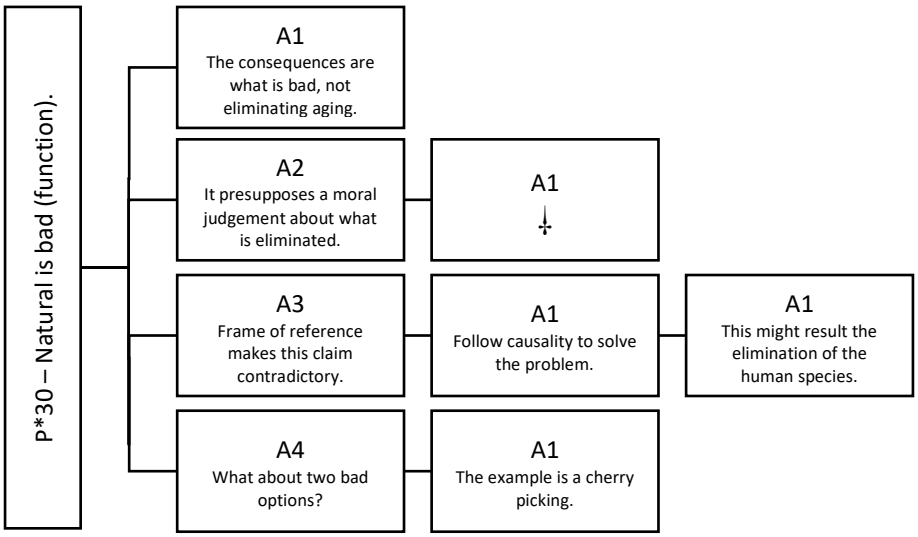
C21 – Immortality is not desirable.



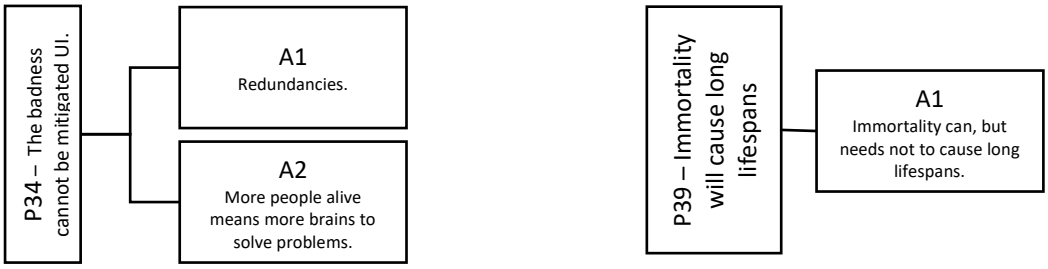


C24 – Death is good (and eliminating it is bad).
P25 – Immortality eliminates death as we know it.
C26 – Immortality eliminates something good (and creates something bad).
P27 – The good that death provides cannot be replaced by something equivalent or better.
C28 – Immortality is not desirable.

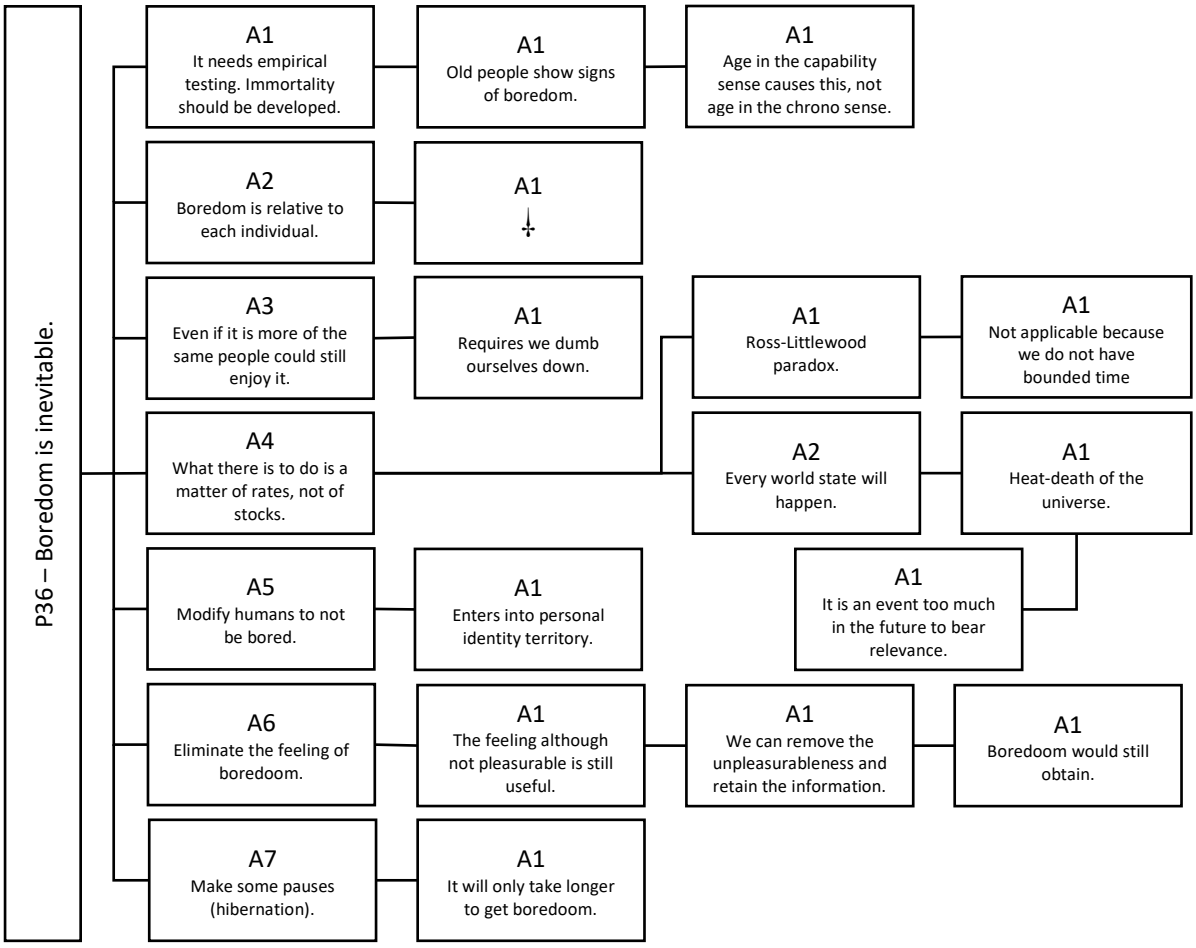


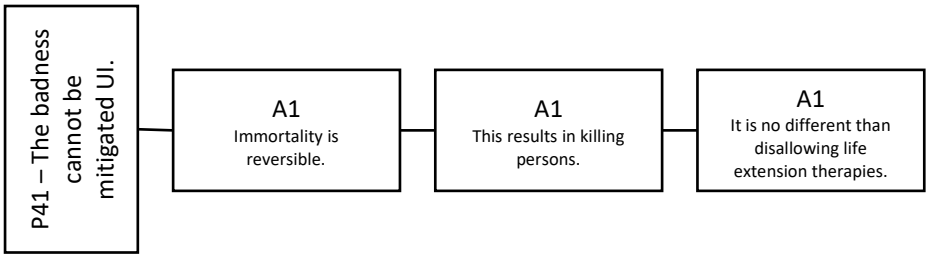


C31 – Eliminating involuntary death is bad.
P32 – Immortality eliminates involuntary death.
C33 – Immortality instantiates something bad.

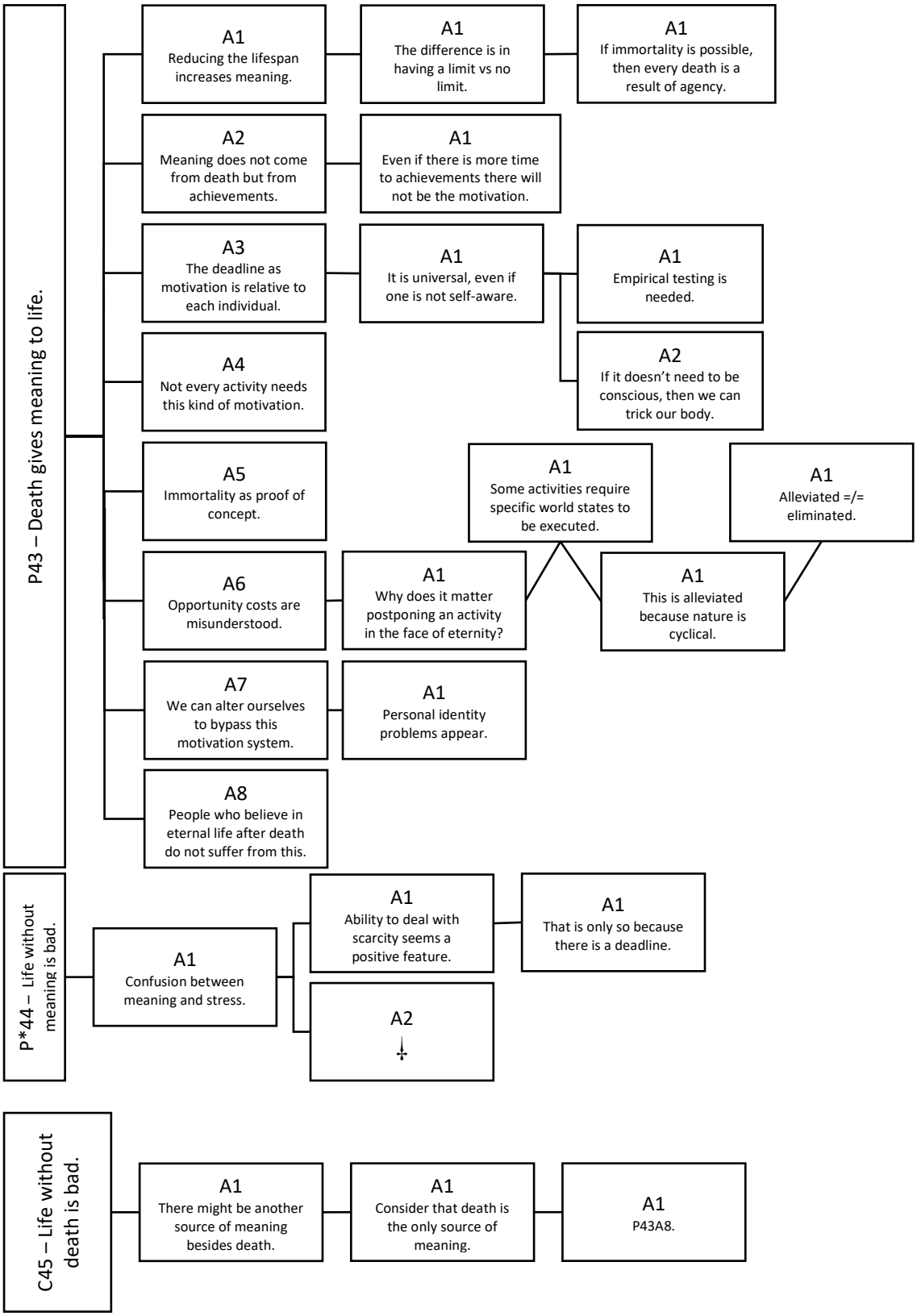


C35 – Immortality is not desirable.
P*37 – Boredom is bad.
C38 – A long enough life will inevitably be bad.
C40 – Immortality is bad.

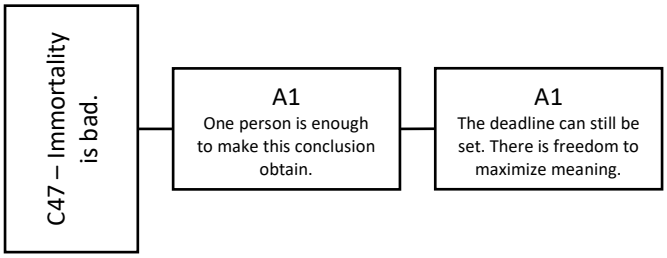


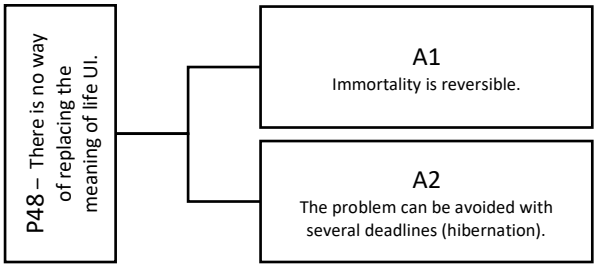


C42 – Immortality is not desirable.

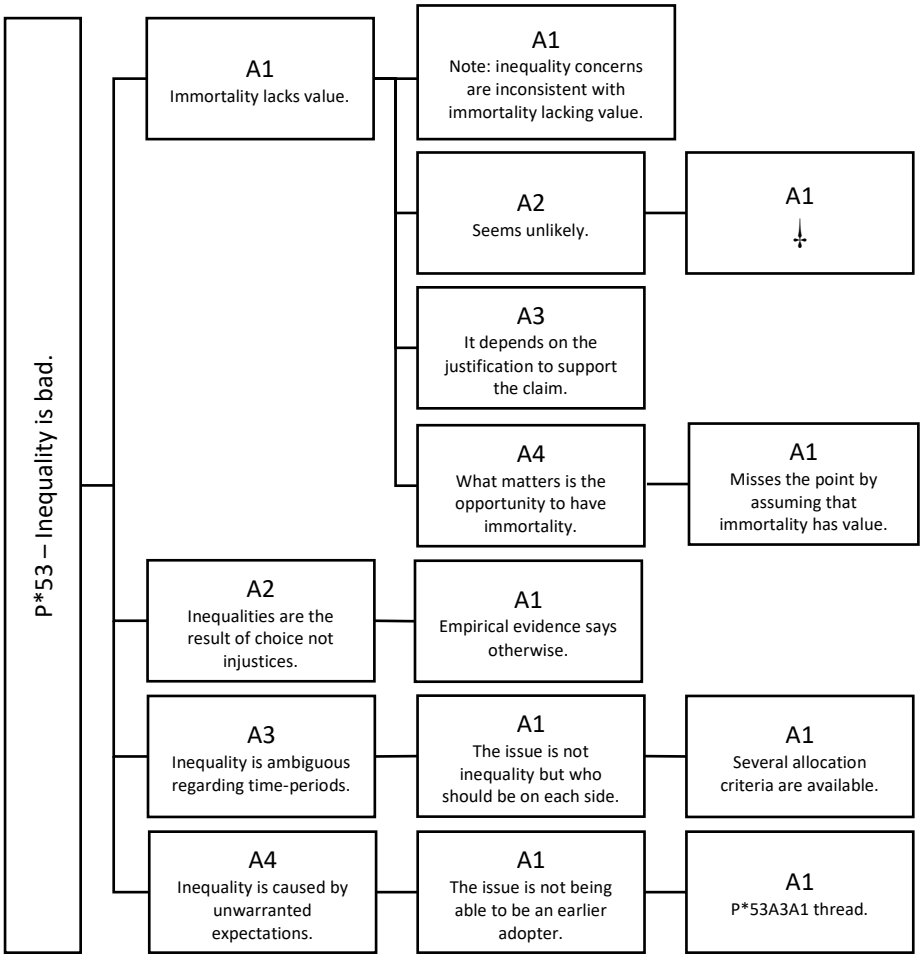


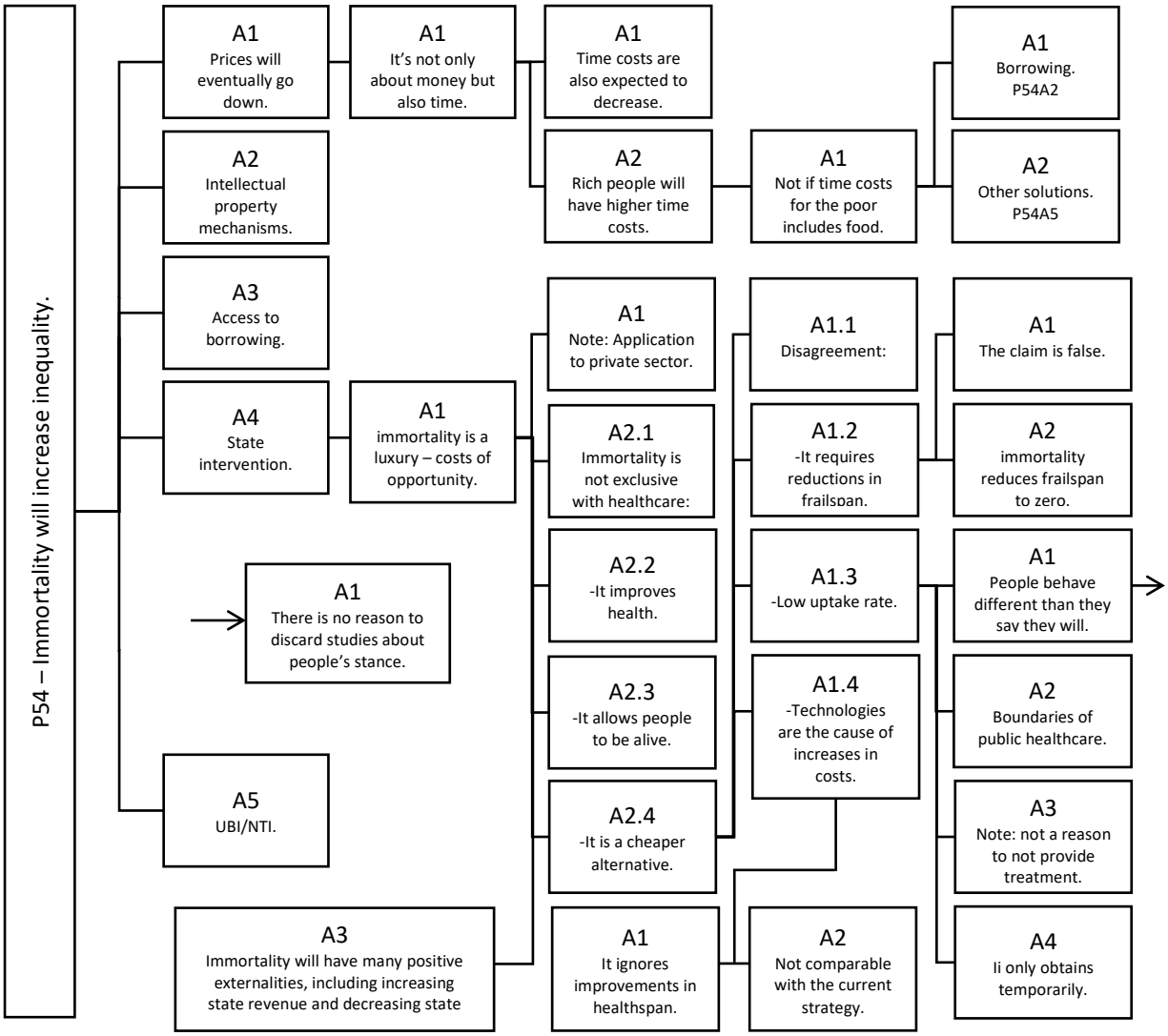
P46 - Immortality eliminates involuntary death.



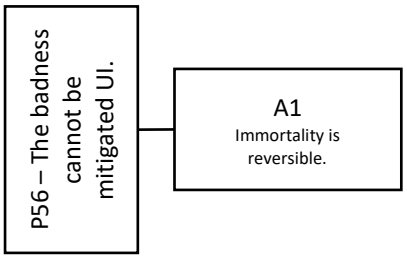


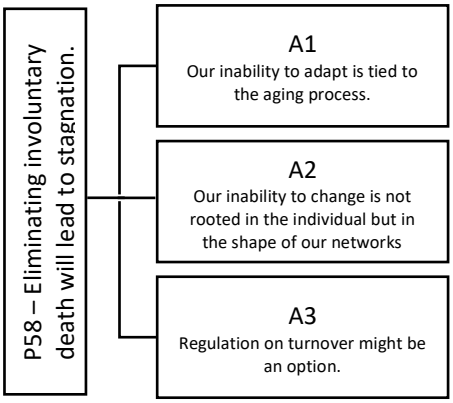
C49 – Immortality is not desirable.
P50 – Immortality increases the range of options
P*51 – Having more options is good.
C52 – Immortality is desirable.



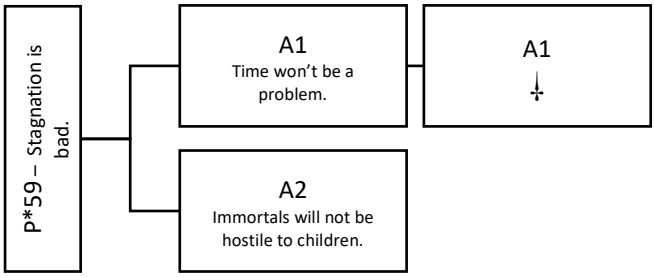


C55 – Immortality is bad.

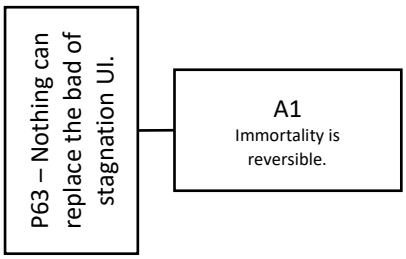




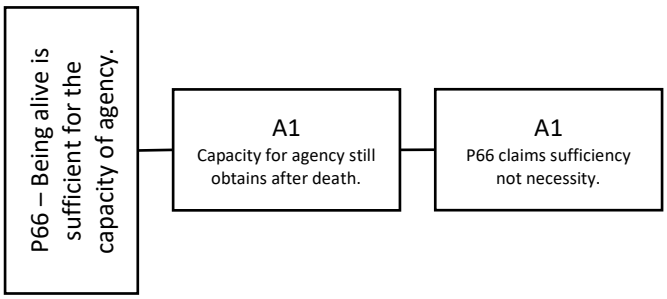
C57 – Immortality is not desirable.



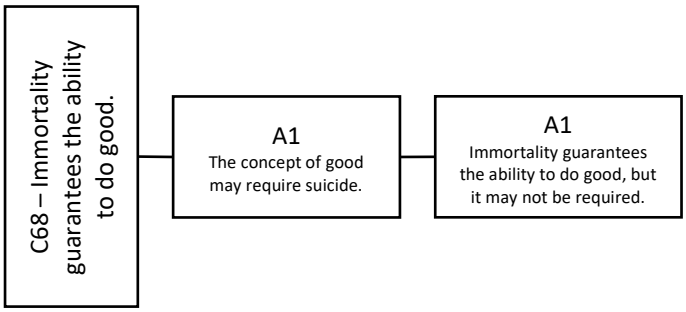
C60 – Eliminating involuntary death is bad.
P61 – Immortality eliminates involuntary death.
C62 – Immortality is bad.



C64 – Immortality is not desirable
P65 – Immortality guarantees the ability to be alive.



P*67 – Having the capacity for agency is necessary to do good.



P69 – Immortality allows being alive for longer periods of time.
P70 – Living for longer periods of time allows access to more and/or different activities.
P*71 – Having access to more and/or different activities is good.
C72 – Immortality is good.