

**Future Development as Freedom: The Capability Approach,
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in Global Justice**

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FUTURE DEVELOPMENT AS FREEDOM: THE CAPABILITY APPROACH, IRRATIONAL INTUITIONS, AND THE ROLE OF EMERGING TECHNOLOGIES IN GLOBAL JUSTICE

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Abstract

This essay uses the “capability approach” to evaluate emerging technologies. It argues that the proper application of the capability approach can deflate misguided moral intuitions and ensure the ethical use of key emerging technologies. First, an outline is given of the ways in which the capability approach can be uniquely helpful in normative assessment. Two key examples of emerging technologies are then provided, and this normative framework is applied to their possible use in advancing development and global justice. It is concluded that the right application of the capability approach can provide a rational yet dynamic ethical evaluation of emerging technologies to increase human well-being.

Keywords: global justice, capability approach, development, moral intuitions, emerging technology.

1. Introduction

Amartya Sen’s book *Development as Freedom* articulates a clear case for global development centered on the “capability approach”. In this essay, I want to use this theoretical framework to evaluate emerging technologies and respond to related irrational moral intuitions. I will argue that the proper application of the capability approach can deflate these misguided moral intuitions and ensure the ethical use of key emerging technologies on a global scale.

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First, I will briefly highlight the ways in which the capability approach can be uniquely helpful in the normative assessment of moral intuitions in relation to emerging technologies. Then I will give two key examples of emerging technologies – Artificial Intelligence and genetic technology – and apply this normative framework to their possible use in advancing development and global justice. I will conclude that the right application of the capability approach can provide a rational yet dynamic normative evaluation of the application of emerging technologies.

While I ultimately have more sympathy for Martha Nussbaum's formulation of the capability approach, let me briefly outline the approach's origin in the work of Sen in order to indicate its roots as a unique method of evaluating moral intuitions. The capability approach is part of Sen's larger project on the nature of justice. In this project, he argues, against John Rawls, that resources cannot be the sole ground for a theory of justice based on fairness (Sen 2009). The primary critique is that focusing on resources first and foremost leaves out the central consideration of differing capabilities for individuals, which will affect their ability to use resources to attain their vision of the good life. For example, a disabled individual will need more resources to pursue various basic goods than others. Instead of a premade rational social contract behind a "Veil of Ignorance" between those equally able, Sen is in favor of a more dynamic and concrete consideration of what individuals can actually do or be in their own particular social and political context. These 'doings' or 'beings' are called "functionings", and the genuine possibility of realizing these functionings is called a "capability" (Sen 2009, 249-281). Sen has applied this approach to his work on development, and it was formulated in contrast to "narrower views of development, such as identifying development with the growth of gross national product, or with the rise in personal incomes, or with industrialization, or with technological advance, or with social modernization" (Sen 1999, 3). The heart of the approach is the claim that development must bring individuals genuine freedoms. This does not exclude monetary resources, but often will come in the form of many other considerations of capability, such as social, educational, psychological, etc. Sen's application of this theory to development was directly influential in forming the UN's concept of development, and the

current United Nation's Sustainable Development Goals continue to draw from Sen's approach as they are focused on increasing capability rather than mere resource distribution (Hulme 2007, 7).

If we turn to applying this framework to emerging technologies we see that the ongoing question in each situation must be: how will this new technology give human beings a greater capability to freely be who they want to be and accomplish their various life goals? Sen has acknowledged that the approach has roots in the thought of Aristotle (Sen 1999, 24). So, while the language is different from Sen's, we could also ask: will this new technology increase genuine human flourishing for the individuals that make up communities (Sen 1999, 281-298)?² This Aristotelian interpretation of the capabilities approach has been taken up by Nussbaum (2011). While Sen was hesitant to define exactly what the specific normative elements of his view were beyond realizing human capabilities that were decided by rational beings in ongoing discourse with one another, Nussbaum has given a more exact picture of the capabilities that she thinks must be realized for genuine global justice.³

My own interpretation of the capabilities approach has more in common with Nussbaum's neo-Aristotelian perspective. Specifically, Nussbaum argues that the core normative basis for the capabilities approach is a mutual recognition of human dignity. I argue that the foundation should be the mutual recognition of free personhood and the failure to recognize oneself or others as free persons is fundamentally immoral. I have elsewhere published on the complexity of this moral foundation, including the "relativism" problem, but on this view, human dignity is a later socially guaranteed implication of this initial

² It should be noted that on Sen's view, also quite similar to Aristotle's, benefiting the individual in this way will directly benefit the community or common good. So, while Sen does not consider himself a communitarian, he makes a special point to emphasize that his capability approach is not reductively individualistic.

³ Her version of the theory is usually given the title "capabilities approach" rather than Sen's "capability approach" as Nussbaum has a well-known specific list of capabilities and Sen does not. Since I am, in general, more favorable to Nussbaum's version of the theory, I tend to use "capabilities" in this essay.

mutual recognition (Hudson 2015, 195-206)⁴. Seeking to guarantee the freedoms of human persons based on such recognition is the project of expanding capabilities, and this in turn leads to *justice* – defined here as making the world as it should be.

Let me make a few points about this view in relation to other theoretical frameworks. First, I argue that the capabilities approach functions well within the often used framework of quality-adjusted life years (QALYs) (Cookson 2005, 817)⁵. The QALY assessment can be construed as an application of the capability approach since it pays close attention to functionings – the free beings and doings of individuals. Second, as both Sen and Nussbaum have argued, the capabilities approach has some advantages when compared to some forms of utilitarianism, capturing better the previously mentioned question of exactly what capabilities a person might have before utility maximizing resource distribution, as well as why certain rights and freedoms would be valuable, even if they would somehow hinder the happiness of the majority. Finally, because of its normative foundations, the capabilities approach can respond to social conditioning wherein people might self-report as ‘happy’ or having a high-utility quality of life, but be completely wrong in their subjective self-assessment – as in the case, for instance, of a woman who reports happiness while in an abusive relationship with her husband. All of this said, Nussbaum claims, rightly it seems to me, that there is a consequentialist element to the capabilities approach (Nussbaum 2011, 95)⁶. For example, insofar as the capabilities approach looks at outcomes, we can say that we ought to do those things which will have as a consequence the outcome of creating

⁴ Here I give a more detailed account of how I think mutual recognition of free personhood is in an important sense ‘pre-social’ and hence the foundation of human rights, and later socially enshrined human dignity.

⁵ As Richard Cookson argues, if the QALY is “suitably re-interpreted, it can account for (i) non-separability between health and non-health components of value; and suitably modified it can also account for (ii) process attributes of care, which may have a direct effect on non-health functionings such as comfort and dignity, and (iii) sub-group diversity in the value of the same health functionings”.

⁶ She writes that in a sense we could even call the capabilities approach a “political, nonwelfarist consequentialism”.

and expanding capabilities. In sum, instead of arguing that we should evaluate these emerging technologies on the basis of how much they increase global wealth, on the capabilities approach one tries to argue that we should morally evaluate the technologies on how much they are likely to increase the genuine quality of life (capabilities), which may or may not track other evaluative rubrics like household GDP increase from the technologies, usual utilitarian rubrics, etc.

Finally, by way of framing, I argue that a moral intuition by itself has no normative value of any kind. My thought is that moral intuitions are based primarily⁷ on social conditioning, and hence they can be right or wrong depending on the conditioning. I argue that this includes not only common moral intuitions, but also the moral intuitions used by, for example, philosophers to frame their arguments. It should be noted that this claim sets aside for the moment whether or not there is such a thing as a conscience and rather asserts that if such a thing exists, it seems clear social conditioning can cover over any possible intuitions it might provide. For example, 100 years ago in Europe an abortion would have seemed intuitively morally wrong whereas now the situation is reversed such that the majority think of an abortion as intuitively morally acceptable. Hence, the *de facto* state of affairs is one where a moral intuition is a product of socialization, and can be morally correct or incorrect. The analysis of intuitions, then, should not be by way of using further moral intuitions, but rather by rational analysis.

That said, I am not claiming that the intuitions I will be discussing are based on no reasoning at all. Sometimes they seem to be informed a kind of social reasoning that the individual has rather unreflectively accepted. Other times by moral intuition I have in mind a set of inferences which then have a conclusion which “just seems intuitive”. There are also a set of fundamental moral intuitions like “it is better that the human race exist rather than not” as well as fundamental intuitions of reason such as the laws of logic, both of which I *do not* have in mind when using the term “intuition” in this essay.

⁷ For some possible biologically based exceptions, see my discussion of the “yuck factor” later on in this essay.

2. Emerging Artificial Intelligence Technology

In order to see why this version of the capabilities approach is especially helpful in evaluating emerging technologies, let me take the example of Artificial Intelligence (AI)⁸. It is also a good place to start in addressing irrational moral intuitions, as AI is surrounded by irrational moral evaluation. In the general public, there is the idea that AI will lead to robots taking our jobs, trying to take over the world, and enslaving humanity. This moral intuition can be phrased in the following way: “Developing advanced forms of AI seems intuitively morally repugnant to me because I think that the likelihood of such technologies for dramatically reducing human capabilities is high” (Sofge 2010)⁹. Why, then, on the capabilities approach do I think this intuition is mistaken? Primarily because it is mistaken about the likelihood of AI reducing human capabilities. In this way, the capabilities approach can provide a fact-based normative evaluation of such intuitions, showing that, as I will claim, AI will most likely lead to a dramatic increase in human capabilities, thereby increasing global justice¹⁰. Let me focus first on making this pro-AI case using the capabilities approach.

⁸ The term “Artificial Intelligence” here is understood to refer generally to machines performing cognitive tasks usually associated with human beings including: problem solving, planning, creativity, learning, language processing, and what is usually called general intelligence. This last refers to the as of yet unreached goal of machines obtaining human level intelligence and ability.

⁹ Erik Sofge gives a summary of such media and an analysis of how they have shaped popular intuitions about AI as potentially negative. It should be noted that here I primarily have in mind as a target the more popular intuition of the general public that AI will be bad for human beings. This is perhaps typified by a series of movies giving a negative portrayal of AI and intelligent robots over the course of many years. More nuanced well-reasoned concerns about AI, such as those raised in the recent book *Superintelligence: Paths, Dangers, Strategies* (2014) by Nick Bostrom, are not here addressed.

¹⁰ Or take the example of the irrational moral intuition on the part of the religious extremist that they must kill or sacrifice their own life for a vision of a “higher cause” of some kind. But why, really, do we think their moral intuitions are mistaken in such cases? It is because we do not think that such actions will lead to greater human capabilities in this life or in an afterlife. It will not actually contribute to human flourishing in any way.

As I write, the UN has just concluded an international summit on this topic, with renowned experts from all over the world proposing ways to use and develop AI for a more just world. The aim of the summit correctly summarizes the actual facts about the likely increase in human capabilities for all people: “AI innovation will also be central to the achievement of the United Nations’ Sustainable Development Goals (SDGs) and will help solve humanity’s grand challenges... The Summit aims to accelerate and advance the development and democratization of AI solutions that can address specific global challenges related to poverty, hunger, health, education, the environment, and others” (UN 2017). Exactly how will AI help dramatically increase human capabilities around the world?

First of all, it is deeply significant that advanced AI by definition as a super intelligence will be better at invention than a singular human intelligence. Further, if the AI is designed to improve itself and learn, it can improve on its inventions as it goes. Hence, as Nick Bostrom has argued, AI could quickly invent better technologies in essential areas like medical technology, sustainable technology, information technology, nanotechnology, and communication technology (Bostrom 2009). Additionally, it could devise plans for implementing all of these, and even help with how to most equitably distribute them. In fact, general planning might end up being one of the most advantageous aspects of AI, insofar as all human progress rest on large-scale super complex development like that in, for example, the UN SDGs. So, we can see why the UN believes that the SDGs can be better met with the ethical use of AI. First and foremost, AIs of various kinds should be able to help with all of the SDGs insofar as they can apply their planning and general intelligence to the challenges to achieving each SDG.

However, AI is especially well-suited to help with SDG 4, “Quality Education”. For example, the AI called IBM Watson is already in classrooms using its adaptive and personalizing abilities to continually tailor each lesson to the individual student. This technology, combined with the greater proliferation of cellphones even in the developing world, could easily lead to a cellphone based version of such AI teachers.

Also, AI is in a special place to address various aspects of SDG 8, “Decent Work and Economic Growth”. For example, Bostrom has

argued that advanced machine labor, in the form of AI controlled robots of various kinds, could actually make human work unnecessary. At first, this might sound like a bad scenario where the machines take all of our jobs. However, Bostrom points out that in another scenario it might simply mean that all capital is generated without humans. There would be no need for any human to work for resources, and if such machines also helped sustainable environmentally friendly development, then every human could have an overabundance of assets of all kinds (Bostrom 2014, 159-184). So, the important point is to emphasize that AI has the real potential to *powerfully address* SDG 8, but we also see that in the somewhat more distant future AI could make any concerns of work and economic scarcity a *non-issue*.

It should be noted that, of course, this more utopian vision is quite theoretical, and as such it should not be taken as strong proof that AI will not be misused. Rather, as the UN itself rightly points out, emerging AI technologies are *currently* being used to increase human capacities in all the areas mentioned including work and economic growth. Hence, my claim is merely that there is no strong reason to think that the future trend will be necessarily negative as some claim is intuitively obvious.

That said, this does not free us from a related concern, namely, if the trend is toward depending on machines for increasing our capabilities, does this mean that in an important sense they are no longer actually human capabilities *qua* human? It is a fascinating question: at what point does extending one's capacities end in making one no longer human? This, in turn, leads us to an even more radical but serious concern that in the future AI will replace or eliminate human beings. Because of the tremendous power of this technology, I think this is a genuine concern worth taking seriously, however, for our purposes, we can again elide such concerns as for the hard-to-know farther future and simply claim that there is no strong reason to think that relying, roughly, 'more' on AI in the future will have any morally negative effect on the human race and in fact, if things continue on the current trend, AI might play a central role in vastly improving the quality of life for all humans.

Finally, AI is already having a profound impact on health, and will more and more directly address SDG 3, "Good Health and Well-being". Once again, IBM Watson is currently leading the way. Watson has been

‘trained’ to analyze medical information and propose treatment avenues. One dramatic recent success story came when doctors at the University of Tokyo were not able to identify the right treatment for a leukemia cancer patient. The Doctors then plugged “the patient’s genetic information into Watson’s program for answers... The supercomputer sifted through 20 million cancer research papers, and came up with the proper diagnosis within 10 minutes, suggesting a new treatment that has since been more effective” (Ng 2016). As with the proposed use of Watson for education on cellphones now widely available in developing nations, so too Watson could soon be a handheld doctor, helping provide medical advice in places where having an in-person doctor is impossible for reasons of poverty. These, then, are some of the profound ways in which AI will most likely provide a greatly increased set of human capabilities for everyone, thereby leading to a more just world.

This last example of how AI could impact SDG 4 is a nice segue into a discussion of gene therapy in light of the fact that another way AI may end up helping humanity is by increasing our knowledge of the human genome which could, for instance, help provide cures for diseases. Let me turn to addressing how the capabilities approach can both respond to irrational intuitions in this area of research and help normatively evaluate its ethical potential.

3. Emerging Genetic Technology

In a similar way, the capabilities approach can help us normatively evaluate other key emerging technologies like gene therapy and enhancement¹¹. First, let us again analyze some of the irrational moral intuitions surrounding this topic. Genetic technology has possibly given rise to more irrational moral intuitions, especially in the popular mind,

¹¹ In this essay, I will not give a close analysis of the therapy/enhancement distinction within the literature. My own view, however, is that this distinction is not a clear black and white line and many enhancements would be therapeutic. For example, enhancing mental capacity could combat cognitive decline and diseases like Alzheimer’s, enhancing the muscular system could combat injury and heart disease, etc.

than any other new technology. For this reason, it is hard to pick a limited set of salient irrational intuitions, but let us address the following three: inequality, playing God, and the “yuck factor”.

The first moral intuition asserts that any gene therapies and enhancements would be distributed unequally, and so we should be opposed to any tampering with the human genome. This objection is more often leveled at proposed genetic ‘enhancements’, but is also sometime grouped in with gene therapies for diseases as a part of a concern about unequal healthcare in general. So, in simplified form, the intuition is that emerging genetic technologies will only increase the capabilities of some limited set of people, while unfairly reducing the capabilities of the majority of those less well-off (Sandel 2009, 85-100).¹²

The simplest response to this inequality intuition is that if a society could equally and fairly distribute genetic cures and enhancements there would be no genetic “second class” issue at all (Buchanan 2011, 243-280)¹³. The concern with social equality is, quite clearly, a separate issue from the ethical question of gene therapy and enhancement. How this technology would potentially impact society for the better and how society should distribute the use of such technologies are distinct philosophical concerns. In fact, in an important sense distributing these genetic therapies and enhancements could likely lead to more equality of human opportunity. Providing these cures and enhancements at birth, distributed to the greatest degree possible to all, would actually give more people more equal capabilities at the start of their lives (Allhoff 2008, 10-26).¹⁴

Further, as soon as enhancements, such as genetically improved immune systems, are given to all people, they will cease to be

¹² In addition to some portion of the general public, philosophers like Michael Sandel are concerned that genetic enhancements would perpetuate, if not exacerbate, social inequality.

¹³ This chapter of Buchanan’s book contains a more extensive example of this reply to the inequality objection.

¹⁴ Fritz Allhoff makes a similar argument from the standpoint of Rawls. In *A Theory of Justice*, Rawls actually points out that if it were possible to give everyone genetic improvements safely and distributed to all, then this would be consistent with his Veil of Ignorance and the just distribution of natural primary goods (an impossibility in his own day and hence only briefly considered in in §17 of his book).

‘enhancements’ *per se* and just be an equally universal increase in human capabilities – in this case a dramatic increase in human health capability (Kamm 2011, 108)¹⁵. The primary source of this irrational moral intuition appears to be a conflation of how these technologies would be distributed and the current existing limitations of the US healthcare system. A secondary source seems to be sensational media coverage and movies like *GATTACA*, which portrays a deeply dystopian future of two unequal genetic classes. But, as I have argued, with the capabilities approach we can see such inequality is not a likely outcome. Instead, genetic technology can, and already is, being used to help people live more equal and capable lives.

The next intuition is that any modification of the human genome would be “playing God”, which is thought to be a hubristic violation of human ability bound to have bad consequences (Sandel 2009)¹⁶. This objection is often given with a non-theistic version that claims a kind of “wisdom of nature” such that any changes to what nature has wrought by evolution would surely lead to some destruction of the optimal functioning of human beings (Sandel 2009, 82)¹⁷. In both cases the intuition roughly says we must not change what has been ‘designed’ for optimal functioning – by God or by natural selection – lest our capabilities be irreparably changed for the worse.

But, again, this intuition is simply not based on the facts, and is out of touch with a central teaching of most major world religions, namely, that we should increase our health and well-being even with

¹⁵ Here, Franses Kamm makes a similar point about the possibility of enhancing the immune system.

¹⁶ For one well known form of this argument, see Michael Sandel’s discussion of the necessity of remaining open to the “unbidden” of the divine and rejecting the “promethean drive to mastery” of genetics in *The Case Against Perfection*. See *e.g.* pages 85 and 93 for Sandel’s mention of God and various religious frameworks that could support his concerns about genetic technologies, and see chapter five for his religiously informed reflections on, among other things, being open to the mysterious unbidden in having children.

¹⁷ In Sandel’s approving commentary on Habermas’ objections he writes: “To think of ourselves as free, we must be able to ascribe our origins ‘to a beginning which eludes human disposal,’ a beginning that arises from ‘something-like God or nature-that is not at the disposal of some other person’”.

technologies such as medicine, medical machines, organ replacements, etc. Very few religions teach that medical modifications to the human body for curing disease and increasing well-being are inherently bad, and so we should ask, what is so different about gene therapy or therapeutic enhancements that increase human capabilities? Many major religions teach that the soul is the center of human nature and identity, so it is hard to see why changing the human genome would be a violation of fundamental human nature any more than changing other aspects of our body for medical purposes.

Take healthcare for example. The goal of modern healthcare is to use medical knowledge to engineer health in the patient. This can be through dozens of methods, but the goal is always the same: use the best methods and technologies to bring the human organism to a state of health. Again, without some theory as to why the human genome would be especially “sacred” and “inviolable,” it remains a mystery why using genetic engineering to bring about health is different in kind from using any other medical means as we do in healthcare. For instance, what is the difference in kind from using a gene therapy to repair a faulty heart and using a heart transplant? In the one technique genetically modified stem cells could be used to permanently repair the tissue, whereas in the other a whole new organ is needed (Bilgimol, 2015, 1118-1126; Kirkton 2008, 85-88). As this example shows, the claim that the use of gene therapy in such a case would somehow be “playing God”, while an invasive heart transplant would not, is irrational.

As for the “wisdom of nature” or “nature as master engineer” intuition, we should point out that nature has not ‘designed’ us for maximal enjoyment of capabilities, but only for a narrow set of capabilities that relate to survival and do not include central human values like the desire to not suffer (Buchanan 2011, 6-27)¹⁸. For both of

¹⁸ Allen Buchanan and Russell Powell have convincingly argued that unguided genetic modification (UGM) by way of natural selection is actually profoundly opposed to central human values and aspirations which could be much better addressed by intentional genetic modification (IGM). It is clear from an observation of nature that the “master engineer analogy” (MEA) often used in defense of the “wisdom of nature” is mistaken and many biological structures and functions could be improved in themselves and in accord with human values.

these intuitions, what appears to underlie them is a kind of status quo bias, namely, that the way things are must somehow be the best. But we see that if expanding human capabilities is our guide, then embracing certain forms of genetic technology would be a rational and moral change from the status quo of disease and disability.

Finally, there is a related intuition that any such modifications are simply ‘revolting’, we would be creating genetically modified human beings, GM people – and this is morally repugnant on its face. This is one form of what has been called the “yuck factor” or an argument from intuitive moral repugnance. But, as Julian Savulescu has argued, while some forms of moral revulsion can have a somewhat rational biological basis, such as the disgust at incest thought to stem from the instinctual realization that such unions can cause genetic defects, often such intuitions are simply irrational cultural artifacts with no basis in rational morality at all (Savulescu 2012, 1-9).

For example, the argument that ‘GM humans’ would be intuitively repugnant, is as irrational as the old idea that children born of in vitro fertilization (IVF) would be somehow less than human. What is at work in this example and others like it are the bad epistemic credentials of emotions of disgust in general. As David Pizzaro has pointed out, it appears that emotions of disgust can be innate biological phenomena, and products of socialization, or some combination of the two. One example he mentions are the changing attitudes toward certain sexual practices once seen as disgusting, which are now seen as normal (Pizzaro 2015, 109-125). One inference from this research would be that since disgust from biology can be wrong, and disgust from socialization can be clearly mistaken, it follows that disgust emotions are unreliable as an epistemic basis for rational moral judgment.

A possible origin of this particular irrational moral intuition might be an association of genetically modified humans with the negative press given to genetically modified foods. But if one looks into the facts there is no support for any rational revulsion toward GM foods. They continue to provide improvements in human health, food accessibility, and nutrition all over the world (Nicolia *et al.* 2014, 77-88). Rather, “genetically modified humans” is a phrase that irrationally distracts from the excellent work already being done to cure dozens of diseases

with gene therapy, which greatly increase the capabilities of those who have received them. What capabilities exactly are being potentially diminished or shut off by the pervasive influence of such irrational intuitions? To answer this question, let us again turn to the UN sustainability goals.

First, as articulated in SDG 10, “Reduce Inequality”, the ethical application of genetic technology redistributed as much as possible would lead to both a radical reduction in unequal life starting points, and a clear rise in human capability by enhancing fundamental aspects of our nature – such as disease resistance.

Second, perhaps the SDG gene technology would advance the most would be SDG 3, “Good Health and Well-being”. One example that could greatly contribute to this SDG is a new gene editing technique called CRISPR-Cas9 that is one of the most promising technologies for gene therapy and enhancements. CRISPR-Cas9 allows scientists to not only remove faulty pieces of genetic information, but with extreme precision to replace this with new, improved genetic information. It can be compared to a genetic equivalent of the Microsoft Word search and replace feature (Jinek *et al.* 2012, 816-21). If combined with the knowledge of exactly what causes the many inheritable genetic diseases and disabilities, this technique has the potential to cure these infirmities altogether.

Surely a contribution to SDG 3 would be finding a cure for cancer, and here again genetic technology is one of the best candidates. There is the possibility of using gene therapy to improve the body’s capacity to repair mutated or broken DNA, caused by heredity or environmental factors. While the body usually does an excellent job in repairing these errors, in old age this error repair mechanism begins to falter, leading to cancer. The challenge is to engineer a genetic modification which can permanently improve this DNA repair function so that cancer becomes impossible.

That said, it is true that the greater number of human diseases are not genetically inheritable. However, if genetic therapy could strengthen the immune system so that it were impossible to catch malaria or similar diseases, we could greatly increase the global quality of life and advance global justice. Already, scientists are working to engineer the human genome to become immune to diseases (University of Notre Dame 2012, 576-579). Hence, we see that there is the possibility to address, at a deep

level, the SDG goal of global health by gene therapy and forms of enhancement like disease resistance.

However, one immediate objection to applying both of these emerging technologies is: “How will this help the world’s poor? Surely we need malaria nets not universally distributed super AI and enhanced immune systems? The mentioned SDG capabilities are best attained by more inexpensive and realistic means.” This is a fair point. At least one might be concerned that my recommendations for applying these technologies globally will only be realistic in the distant future. But I do not think this needs to be the case. So, I want to conclude with a proposal for how these kinds of emerging technologies could be implemented faster with greater benefit for the least well-off.

My proposal would be based off of the design of the Health Impact Fund (HIF) (Pogge 2012). The HIF is a plan to create a pool of money which would provide a market-based solution for the development and distribution of medicines for the poor. The idea of such a fund was developed by Thomas Pogge, and the concept is supported by well-known thinkers like Amartya Sen, Peter Singer, and Onora O’Neill. Its central goal is to use the funds to incentivize development and research of new medicines that might have an especially large impact on global health. The cost of developing new medicines is high and often companies deem it financially impossible to recover the cost by selling widely in poor nations which cannot afford to pay higher prices. By being a part of the fund, a company agrees to sell their product at a non-profit level to such countries, but in return they are compensated by the fund and retain all patents and other rights. The goal is to use this price reduction to make the medicines more available to the poor, yet retain the incentive on the part of companies to invent and profit from new products.

I would like to propose something similar to the HIF for emerging technologies. While the UN is already invested in innovation as a part of SDG 9, “Industry, Innovation, and Infrastructure”, and some private funds are attempting to incentivize the application of technological innovation for the less well-off,¹⁹ a specific, well-funded, “Emerging

¹⁹ For example, the musician Bono has spearheaded a new global impact fund called “Rise” which incorporates an incentive structure for developing and

Technology Impact Fund" (ETIF) would help realize sooner the goal of universal availability for these emerging technologies and the increased capabilities that they could provide to the least well-off (Papaioannou 2011, 321-338).²⁰

Instead of allocating funds on the basis of an assessment of the "health impact" in terms of QALYs like the HIF, the ETIF could use the SDGs as a guide and assess the "development impact" also on the basis of the QALY modified to include a capabilities approach. Like the HIF, there would have to be forms of analytical analysis that provide the difference in QALYs between those who would have a particular technology, and the same group if they did not have access. Those companies offering the most impactful technologies would get the most money from the fund. For example, if all registered new technologies are thought to save 10 million QALYs, then a technology that saved 1 million QALYs in a given year would get 10 percent of the total pool of money in the fund. The impact of each registered product would be monitored each year, and in this way the annual payments from the fund would create a competitive incentive toward greater and greater impact for development and the increase of human capabilities.

Also like the HIF, the ETIF would take into account the major expenses involved in developing these new technologies and by the

implementing new technology for the sake of advancing the UN SDGs: "The Rise Fund will focus on investments in seven sectors in which independent research has shown that impact is both achievable and measurable in quantitative terms: education, energy, food and agriculture, financial services, growth infrastructure, healthcare, and technology, media, & telecommunications...This innovative methodology aligns The Rise Fund's objectives with the Sustainable Development Goals and pioneers evidence-based impact investing." From front page description of the fund: <http://therisefund.com>. The main differences between this fund and the one I propose would be: first, scale as the Rise fund is 'only' 2 billion dollars' – not much in global development terms. Second, my proposed ETIF would, of course, focus solely on emerging technologies.

²⁰ This article by Theo Papaioannou gives a clear statement of the connection between emerging technology and global justice. The article rightly argues in favor of public action against possible unjust current Intellectual Property Rights (IPR) regimes, and Papaioannou even argues that we must provide alternative incentives for successful generation and application of new knowledge. However, he does not mention a model like the proposed ETIF given here.

above outlined monetary distribution method it would ensure that the company is well compensated while striking a deal with the company to sell their product at a non-profit level to poor countries. If successful, the ETIF would increase the development of emerging technologies while ensuring they are widely distributed to the least well-off around the world.

4. Conclusion

In the beginning of Sen's book *Development as Freedom*, he writes: "Development can be seen, it is argued here, as a process of expanding the real freedoms people enjoy" (Sen 1999, 3). In this essay I have argued that a central aspect of the process of expanding free human capabilities is the ethical implementation of emerging technologies. More than other areas of ethical inquiry, emerging technologies tend to give rise to irrational moral intuitions, and I have argued that the capabilities approach can help rationally, objectively, put these aside and re-focus our attention on the task of thinking how future human development should ethically unfold.

I have used two key technological examples, and the UN's SDGs to fill in my account. In my own view, these two emerging technologies of AI and genetics have the most potential for improving the well-being and genuine flourishing of humanity. The SDGs provide a well-thought-out framework for exactly what kinds of capabilities we might want to expand and in what way. The result of my SDG examples in relation to AI and genetics is that not only could these two emerging technologies help us realize the capabilities embodied in the SDGs more effectively, but looking to the future they could help us solve the next set of development goals that come after the given 2030 SDGs deadline. This will be especially true if something like the proposed ETIF is embraced and funded. The right way to think about development is in a long-term framework, and I think the capabilities approach can help guide us out of destructive intuitions holding us back, and into a future of greater global justice.

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