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| Cover Image | *The Precipice* Toby Ord  Hachette Books |

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# *148 notes/highlights*

*Created by Damiel T.*  – Last synced September 15, 2020

## *PART ONE: THE STAKES*

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| |  |  |  | | --- | --- | --- | |  | *But it follows that while our choices can lock things in, closing off possibilities, they can’t open up new ones.*  August 15, 2020 | [47](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA47.w.0.0.0.2.0.2) | |

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| |  |  |  | | --- | --- | --- | |  | *There are many utterly terrible outcomes that do not count as existential catastrophes. One way this could happen is if there were no single precipitous event, but a multitude of smaller failures. This is because I take on the usual sense of catastrophe as a single, decisive event, rather than any combination of events that is bad in sum.*  August 15, 2020 | [49](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA49.w.0.0.0.2.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *Alternatively, there might be a single catastrophe, but one that leaves open some way for humanity to eventually recover. From our own vantage, looking out to the next few generations, this may appear equally bleak. But a thousand years hence it may be considered just one of several dark episodes in the human story. A true existential catastrophe must by its very nature be the decisive moment of human history—the point where we failed.*  August 15, 2020 | [49](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA49.w.0.0.0.3) | |

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| |  |  |  | | --- | --- | --- | |  | *Both wars kill billions of humans; but the second war kills humanity. Both wars destroy our present; but the second war destroys our future.*  August 15, 2020 | [53](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA53.w.0.0.0.3) | |

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| |  |  |  | | --- | --- | --- | |  | *The procession of generations that extends onwards from our present leads far, far beyond the line of our sight, and, compared with these stretches of human time, which exceed the whole history of the earth up to now, our brief civilized moment is almost infinitesimal. Yet we threaten, in the name of our transient aims and fallible convictions, to foreclose it all. If our species does destroy itself, it will be a death in the cradle—a case of infant mortality.*  August 15, 2020 | [53](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA53.w.0.0.0.4.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *If our species does destroy itself, it will be a death in the cradle—a case of infant mortality.*  August 15, 2020 | [54](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA54) | |

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| |  |  |  | | --- | --- | --- | |  | *prudence*  August 17, 2020 | [63](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA63.w.0.0.0.2) | |

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| |  |  |  | | --- | --- | --- | |  | *While it is difficult to precisely measure global spending on existential risk, we can state with confidence that humanity spends more on ice cream every year than on ensuring that the technologies we develop do not destroy us.*  August 18, 2020 | [68](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA68.w.0.0.0.2.0.2) | |

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| |  |  |  | | --- | --- | --- | |  | *When air quality is improved, the benefit doesn’t go to a particular individual, but is shared by everyone in the community. And when I benefit from cleaner air, that doesn’t diminish the benefit you get from it. Things with these two properties are called public goods and markets have trouble supplying them.*  August 18, 2020 | [69](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA69.w.0.0.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *Protection from existential risk is a public good: protection would benefit us all and my protection doesn’t come at the expense of yours. So we’d expect existential risk to be neglected by the market.*  August 18, 2020 | [69](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA69.w.0.0.0.2) | |

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| |  |  |  | | --- | --- | --- | |  | *but it contains less than 1 percent of all the people alive today. If it acts alone on an existential risk, it bears the full cost of the policy, yet only reaps a hundredth of the benefit. In other words, even if it had a well-informed government acting in the longterm interests of its citizens, it would undervalue work on existential risk by a factor of 100. Similarly, Russia would undervalue it by a factor of 50, the United States by a factor of 20, and even China would undervalue it by a factor of five. Since such a large proportion of the benefits spill out to other countries, each nation is tempted to free-ride on the efforts of others, and some of the work that would benefit us all won’t get done. The same effect that causes this undersupply of protection causes an oversupply of risk. Since only 1 percent of the damages of existential catastrophe are borne by the people of the United Kingdom, their government is incentivized to neglect the downsides of risk-inducing policies by this same factor of 100. (The situation is even worse if individuals or small groups become able to pose existential risks.)*  August 18, 2020 | [69](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA69.w.0.0.0.3) | |

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| |  |  |  | | --- | --- | --- | |  | *The beneficiaries are not merely global, but intergenerational—all the people who would ever live. Protection from existential risk is an intergenerational global public good . So even the entire population of the globe acting in concert could be expected to undervalue existential risks by a very large factor, leaving them greatly neglected.*  August 18, 2020 | [70](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA70.w.0.0.0.2) | |

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| |  |  |  | | --- | --- | --- | |  | *leaving no key constituency to take ownership of the issue.*  August 18, 2020 | [71](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA71) | |

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| |  |  |  | | --- | --- | --- | |  | *When I have raised the topic of existential risk with senior politicians and civil servants, I have encountered a common reaction: genuine deep concern paired with a feeling that addressing the greatest risks facing humanity was “above my pay grade,”*  August 18, 2020 | [71](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA71.w.0.0.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *But this history shows that existential risk is capable of rousing major global concern, from the elite to the grass roots.*  August 18, 2020 | [74](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA74.w.0.0.0.1) | |

## *PART TWO: THE RISKS*

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| |  |  |  | | --- | --- | --- | |  | *We look at risks that threaten not regional collapse, or endurable hardship, but the final undoing of the human enterprise.*  August 19, 2020 | [77](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA77.w.0.0.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *Taking this trajectory information into account, the probability of an Earth-impact in the next hundred years falls to about one in 120,000 for asteroids between one and ten kilometers, and about one in 150 million for those above ten kilometers. 17 These probabilities are immensely reassuring. While there is still real risk, it has been studied in great detail and shown to be vanishingly low. It is a famous risk, but a small one. If humanity were to go extinct in the next century, it would almost certainly be from something other than an asteroid or comet impact.*  August 19, 2020 | [81](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA81.w.0.0.0.2.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *While uncertainties remain, the overall story here is one of humanity having its act together. It was just 12 years from the first scientific realization of the risk of global catastrophe to the point where government started taking it seriously. And now, 28 years later, almost all the large asteroids have been tracked.*  August 19, 2020 | [82](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA82.w.0.0.0.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *A willingness to think seriously about imprecise probabilities of unprecedented events is crucial to grappling with risks to humanity’s future.*  August 19, 2020 | [84](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA84) | |

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| |  |  |  | | --- | --- | --- | |  | *There is very little known about how to prevent or delay an impending supereruption.*  August 19, 2020 | [85](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA85.w.0.0.0.3) | |

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| |  |  |  | | --- | --- | --- | |  | *For now, our best approach to the threat of supereruptions lies in preparing to mitigate the damage, through building up non-perishable food reserves or developing emergency food production techniques.*  August 19, 2020 | [85](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA85.w.0.0.0.4.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *And most importantly, the probability of a civilization-threatening catastrophe in the next century is estimated to be about 100 times that of asteroids and comets combined. So supervolcanic eruptions appear to be the greater risk, and in greater need of additional attention.*  August 19, 2020 | [86](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA86.w.0.0.0.2) | |

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| |  |  |  | | --- | --- | --- | |  | *Much more research is needed on the climatic effects of supervolcanic eruptions to see which sizes might pose a real risk to humanity.*  Интересно, как геология может быть перспективной наукой для помощи человечеству  August 20, 2020 | [87](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA87.w.0.0.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *A supernova or gamma ray burst close to our Solar System could have catastrophic effects. While the gamma rays and cosmic rays themselves won’t reach the Earth’s surface, the reactions they trigger in our atmosphere may pose a threat. The most important is probably the production of nitrogen oxides that would alter the Earth’s climate and dramatically erode the ozone layer. This last effect is thought to be the most deadly, leaving us much more exposed to UV radiation for a period of years.*  August 20, 2020 | [88](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA88.w.0.0.0.2.0.2) | |

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| |  |  |  | | --- | --- | --- | |  | *These probabilities are very small—they look to be at least 20 times smaller than those of similarly sized catastrophes from asteroids and comets and at least 3,000 times smaller than those from supervolcanic eruptions.*  August 20, 2020 | [89](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA89.w.0.0.0.2.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *It is striking how recently many of these risks were discovered. Magnetic field reversal was discovered in 1906. Proof that Earth had been hit by a large asteroid or comet first emerged in 1960. And we had no idea gamma ray bursts even existed until 1969. For almost our entire history we have been subject to risks to which we were completely oblivious.*  August 20, 2020 | [91](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA91.w.0.0.0.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *The likely incompleteness of our knowledge is a major problem for any attempt to understand the scale of natural risk by cataloging known threats.*  August 20, 2020 | [91](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA91.w.0.0.0.2) | |

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| |  |  |  | | --- | --- | --- | |  | *The fossil record is our richest source of information about how long species like us survived, and so about the total extinction risk they faced.*  August 20, 2020 | [91](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA91.w.0.0.0.4) | |

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| |  |  |  | | --- | --- | --- | |  | *The human race’s prospects of survival were considerably better when we were defenceless against tigers than they are today, when we have become defenceless against ourselves. —Arnold Toynbee*  August 21, 2020 | [98](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA98) | |

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| |  |  |  | | --- | --- | --- | |  | *While they couldn’t prove it was safe to all the physicists’ satisfaction, they eventually decided to move on to other topics.*  August 21, 2020 | [100](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA100.w.0.0.0.1.0.2) | |

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| |  |  |  | | --- | --- | --- | |  | *Despite the report concluding that “the complexity of the argument and the absence of satisfactory experimental foundation makes further work on the subject highly desirable,” it was taken by the leadership at Los Alamos to be the final word on the matter.*  August 21, 2020 | [100](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA100.w.0.0.0.2.0.2) | |

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| |  |  |  | | --- | --- | --- | |  | *The bomb’s designers didn’t know whether or not igniting the atmosphere was physically possible, so at that stage it was still epistemically possible. While it turned out that there was no objective risk, there was a serious subjective risk that their bomb might destroy humanity.*  August 21, 2020 | [101](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA101.w.0.0.0.1.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *Our destructive potential had grown so high that for the first time the question of whether we might destroy all of humanity needed to be asked—and answered. So I date the beginning of the Precipice (our age of heightened risk) to 11:29 a.m. (UTC) on July 16, 1945: the precise moment of the Trinity test.*  August 21, 2020 | [101](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA101.w.0.0.0.2) | |

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| |  |  |  | | --- | --- | --- | |  | *It is not clear whether even a single elected representative was told about the potential risk. 14 The scientists and military appear to have assumed full responsibility for an act that threatened all life on Earth. Was this a responsibility that was theirs to assume?*  August 21, 2020 | [102](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA102.w.0.0.0.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *Back at the time of the Berkeley meeting, many of the scientists were deeply afraid that Hitler might get there first and hold the world to nuclear ransom. But by the time of the Trinity test, Hitler was dead and Europe liberated. Japan was in retreat and there was no concern about losing the war. The risk was taken for the same reasons that the bombs would be dropped in Japan a month later: to shorten the war, to avoid loss of life in an invasion, to achieve more favorable surrender terms, and to warn the Soviet Union about America’s new-found might. These are not strong reasons for unilaterally risking the future of humanity.*  August 21, 2020 | [102](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA102.w.0.0.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *When the bomb exploded, it released far more energy than anticipated. Instead of six megatons they got 15—a thousand times the energy of the Hiroshima bomb, and the biggest explosion America would ever produce.*  August 21, 2020 | [103](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA103) | |

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| |  |  |  | | --- | --- | --- | |  | *Of the two major thermonuclear calculations made that summer in Berkeley, they got one right and one wrong.*  August 21, 2020 | [103](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA103.w.0.0.0.1.0.2) | |

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| |  |  |  | | --- | --- | --- | |  | *The screens had been showing a realistic simulation of a Soviet attack from a military exercise that had mistakenly been sent to the live computer system.*  August 22, 2020 | [105](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA105.w.0.0.0.2) | |

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| |  |  |  | | --- | --- | --- | |  | *The false alarm turned out to be caused by sunlight glinting off clouds, which looked to the Soviet satellite system like the flashes of launching rockets.*  August 22, 2020 | [106](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA106) | |

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| |  |  |  | | --- | --- | --- | |  | *The false alarm had been caused by the launch of a Norwegian scientific rocket to study the northern lights. Russia had been notified, but word hadn’t reached the radar operators.*  August 22, 2020 | [106](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA106.w.0.0.0.3) | |

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| |  |  |  | | --- | --- | --- | |  | *But we now know this would require ten times as many weapons as we currently possess.*  Заражение всей земли радиацией - анла1кли  August 22, 2020 | [106](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA106.w.0.0.0.4.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *For all that, nuclear winter appears unlikely to lead to our extinction. No current researchers on nuclear winter are on record saying that it would and many have explicitly said that it is unlikely.*  August 22, 2020 | [108](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA108.w.0.0.0.3) | |

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| |  |  |  | | --- | --- | --- | |  | *most of the risk posed by nuclear weapons in the coming decades may come from this possibility of new escalations*  August 22, 2020 | [111](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA111.w.0.0.0.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *So how should we think about the risk from runaway or moist greenhouse effects? The situation is akin to that of igniting the atmosphere, in that it is probably physically impossible for our actions to produce the catastrophe—but we aren’t sure.*  August 22, 2020 | [114](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA114.w.0.0.0.3) | |

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| |  |  |  | | --- | --- | --- | |  | *And neither has been incorporated into the main IPCC (Intergovernmental Panel on Climate Change) warming estimates, so any warming would come on top of the warming we are currently bracing for.*  August 22, 2020 | [115](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA115.w.0.0.0.4) | |

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| |  |  |  | | --- | --- | --- | |  | *Even at such extreme levels of warming, it is difficult to see exactly how climate change could do so. Major effects of climate change include reduced agricultural yields, sea level rises, water scarcity, increased tropical diseases, ocean acidification and the collapse of the Gulf Stream. While extremely important when assessing the overall risks of climate change, none of these threaten extinction or irrevocable collapse.*  August 22, 2020 | [120](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA120) | |

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| |  |  |  | | --- | --- | --- | |  | *So the most important known effect of climate change from the perspective of direct existential risk is probably the most obvious: heat stress.*  August 22, 2020 | [121](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA121.w.0.0.0.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *However, our present task is identifying existential risks to humanity and it is hard to see how any realistic level of heat stress could pose such a risk.*  August 22, 2020 | [121](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA121.w.0.0.0.4) | |

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| |  |  |  | | --- | --- | --- | |  | *A central problem with geoengineering is that the cure may be worse than the disease. For the very scale of what it is attempting to achieve could create a risk of massive unintended consequences over the entire Earth’s surface, possibly posing a greater existential risk than climate change itself.*  August 22, 2020 | [123](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA123.w.0.0.0.2) | |

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| |  |  |  | | --- | --- | --- | |  | *“Most of the people who are going to die in the greatest cataclysm in the history of man have already been born.”*  August 23, 2020 | [124](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA124) | |

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| |  |  |  | | --- | --- | --- | |  | *In 1950, the average number of children born to each woman was 5.05. It is now just 2.47—not so far above the replacement rate of 2.1 children per woman.*  August 23, 2020 | [125](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA125.w.0.0.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *One category of concern is resource depletion. People have suggested that humanity is running short of fossil fuels, phosphorous, topsoil, fresh water and certain metals. 102 However, these forms of resource scarcity don’t appear to pose any direct risk of destroying our potential.*  August 23, 2020 | [126](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA126.w.0.0.0.3) | |

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| |  |  |  | | --- | --- | --- | |  | *recent review found that even if honeybees were completely lost—and all other pollinators too—this would only create a 3 to 8 percent reduction in global crop production.*  August 23, 2020 | [128](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA128.w.0.0.0.3.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *Perhaps most importantly, we have public health bodies to facilitate global communication and coordination in the face of new outbreaks.*  August 24, 2020 | [136](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA136) | |

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| |  |  |  | | --- | --- | --- | |  | *It is highly unlikely that in any particular case the enhanced pathogens would escape into the wild. But just how unlikely? Unfortunately, we don’t have good data, due to a lack of transparency about incident and escape rates.*  August 24, 2020 | [138](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA138.w.0.0.0.4.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *But even the patchy evidence we do have includes enough confirmed cases to see that the rates of escape are worryingly high*  August 24, 2020 | [139](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA139.w.0.0.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *power law distributions have a “heavy tail” of increasingly large events, where there can often be events at entirely different scales, with some being thousands, or millions, of times bigger than others. Deaths from war and terror appear to follow power laws with especially heavy tails, such that the majority of the deaths happen in the few biggest events. For instance, warfare deaths in the last hundred years are dominated by the two World Wars, and most US fatalities from terrorism occurred in the September 11 attacks. 45 When events follow a distribution like this, the average size of events until now systematically under-represents the expected size of events to come, even if the underlying risk stays the same.*  August 24, 2020 | [142](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA142.w.0.0.0.2.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *cede*  August 25, 2020 | [152](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA152.w.0.0.0.4) | |

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| |  |  |  | | --- | --- | --- | |  | *Skeptics of the above picture sometimes quip that it relies on an AI system that is smart enough to take control of the world, yet too stupid to recognize that this isn’t what we want. 96 But that misunderstands the scenario. For in fact this sketch of AI motivation explicitly acknowledges that the system will work out that its goals are misaligned with ours—that is what would motivate it toward deceit and conflict and wresting control.*  August 25, 2020 | [155](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA155.w.0.0.0.2.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *History already involves examples of individuals with human-level intelligence (Hitler, Stalin, Genghis Khan) scaling up from the power of an individual to a substantial fraction of all global power, as an instrumental goal to achieving what they want.*  August 25, 2020 | [157](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA157.w.0.0.0.3) | |

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| |  |  |  | | --- | --- | --- | |  | *Such an outcome needn’t involve the extinction of humanity. But it could easily be an existential catastrophe nonetheless. Humanity would have permanently ceded its control over the future. Our future would be at the mercy of how a small number of people set up the computer system that took over.*  August 25, 2020 | [158](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA158) | |

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| |  |  |  | | --- | --- | --- | |  | *The case for existential risk from AI is clearly speculative. Indeed, it is the most speculative case for a major risk in this book. Yet a speculative case that there is a large risk can be more important than a robust case for a very low-probability risk, such as that posed by asteroids.*  August 25, 2020 | [159](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA159) | |

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| |  |  |  | | --- | --- | --- | |  | *half the respondents estimated that the probability of the longterm impact of AGI being “extremely bad (e.g., human extinction)” was at least 5 percent. 111 I find this last point particularly remarkable—in how many other fields would the typical leading researcher think there is a one in twenty chance the field’s ultimate goal would be extremely bad for humanity?*  August 25, 2020 | [161](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA161.w.0.0.0.2.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *if even a small proportion of researchers don’t believe in the dangers (or welcome a world with machines in control), they will be the ones who take the final steps. This is an instance of the unilateralist’s curse*  August 25, 2020 | [162](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA162.w.0.0.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *Losing our potential means getting locked into a bad set of futures. We can categorize existential catastrophes by looking at which aspects of our future get locked in. This could be a world without humans (extinction) or a world without civilization (unrecoverable collapse). But it could also take the form of an unrecoverable dystopia —a world with civilization intact, but locked into a terrible form, with little or no value.*  August 28, 2020 | [163](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA163.w.0.0.0.2) | |

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| |  |  |  | | --- | --- | --- | |  | *We can divide the unrecoverable dystopias we might face into three types, on the basis of whether they are desired by the people who live in them. There are possibilities where the people don’t want that world, yet the structure of society makes it almost impossible for them to coordinate to change it. There are possibilities where the people do want that world, yet they are misguided and the world falls far short of what they could have achieved. And in between there are possibilities where only a small group wants that world but enforces it against the wishes of the rest.*  August 28, 2020 | [164](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA164) | |

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| |  |  |  | | --- | --- | --- | |  | *For example, a dystopian society that lasted all the way until humanity was destroyed by external forces would be an existential catastrophe. However, if a dystopian outcome does not have this property, if it leaves open all our chances for success once it ends—it is a dark age in our story, but not a true existential catastrophe.*  August 28, 2020 | [165](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA165) | |

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| |  |  |  | | --- | --- | --- | |  | *The extra-terrestrial risk that looms largest in popular culture is conflict with a spacefaring alien civilization. While it is very difficult to definitively rule this out, it is widely regarded to be extremely unlikely (though becoming more plausible over the extreme long term).*  Интересно, что после публикации книги не только случилась пандемия, но и показали нло  August 28, 2020 | [170](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA170.w.0.0.0.4.0.3) | |

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| |  |  |  | | --- | --- | --- | |  | *But perhaps more public discussion should be had before we engage in active SETI (sending powerful signals to attract the attention of distant aliens). And even passive SETI (listening for their messages) could hold dangers, as the message could be designed to entrap us.*  Интересная идея для рассказа о космическом спаме  August 28, 2020 | [171](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA171.w.0.0.0.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *Even if we restrict our attention to engineered pandemics, I think there is more existential risk than in all risks of the last two chapters combined, and those risks were already sufficient to make safeguarding humanity a central priority of our time.*  August 28, 2020 | [172](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA172.w.0.0.0.3) | |

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| |  |  |  | | --- | --- | --- | |  | *we may have a chance of stumbling across something that offers the destructive power of the atomic bomb or a deadly pandemic, but which turns out to be easy to produce from everyday materials. Discovering even one such technology might be enough to make the continued existence of human civilization impossible.*  Вспоминается рассказ пратчетта the long earth  August 31, 2020 | [173](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA173.w.0.0.0.2.0.1) | |

## *PART THREE: THE PATH FORWARD*

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| |  |  |  | | --- | --- | --- | |  | *In order for our time to be uniquely safe, we must have lowered natural risk by more than we have raised anthropogenic risk. But as we saw in Chapter 3, despite the sheer number of natural threats, their combined probability must have always been extremely low (or species like ours couldn’t last as long as they do). The realistic estimates for the natural existential risk per century ranged from one in 1,000,000 to one in 2,000. So there just isn’t much risk there for our technologies to reduce.*  August 31, 2020 | [176](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA176.w.0.0.0.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *Existential catastrophe via : Asteroid or comet impact Chance within next 100 years : ∼ 1 in 1,000,000 Existential catastrophe via : Supervolcanic eruption Chance within next 100 years : ∼ 1 in 10,000 Existential catastrophe via : Stellar explosion Chance within next 100 years : ∼ 1 in 1,000,000,000 Existential catastrophe via : Total natural risk Chance within next 100 years : ∼ 1 in 10,000 Existential catastrophe via : Nuclear war Chance within next 100 years : ∼ 1 in 1,000 Existential catastrophe via : Climate change Chance within next 100 years : ∼ 1 in 1,000 Existential catastrophe via : Other environmental damage Chance within next 100 years : ∼ 1 in 1,000 Existential catastrophe via : “Naturally” arising pandemics Chance within next 100 years : ∼ 1 in 10,000 Existential catastrophe via : Engineered pandemics Chance within next 100 years : ∼ 1 in 30 Existential catastrophe via : Unaligned artificial intelligence Chance within next 100 years : ∼ 1 in 10 Existential catastrophe via : Unforeseen anthropogenic risks Chance within next 100 years : ∼ 1 in 30 Existential catastrophe via : Other anthropogenic risks Chance within next 100 years : ∼ 1 in 50 Existential catastrophe via : Total anthropogenic risk Chance within next 100 years : ∼ 1 in 6 Existential catastrophe via : Total existential risk Chance within next 100 years : ∼ 1 in 6*  August 31, 2020 | [177](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA177) | |

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| |  |  |  | | --- | --- | --- | |  | *My best estimates for the chance of an existential catastrophe from each of these sources occurring at some point in the next 100 years (when the catastrophe has delayed effects, like climate change, I’m talking about the point of no return coming within 100 years).*  August 31, 2020 | [177](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA177.w.0.0.0.4.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *I estimate anthropogenic risks to be more than 1,000 times more likely than natural risks.*  August 31, 2020 | [178](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA178.w.0.0.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *And within anthropogenic risks, I estimate the risks from future technologies to be roughly 100 times larger than those of existing ones, giving a substantial escalation in risk from Chapter 3 to 4 to 5.*  August 31, 2020 | [178](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA178.w.0.0.0.1.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *In my view, the greatest risk to humanity’s potential in the next hundred years comes from unaligned artificial intelligence*  August 31, 2020 | [178](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA178.w.0.0.0.3) | |

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| |  |  |  | | --- | --- | --- | |  | *five big risks: those around nuclear war, climate change, other environmental damage, engineered pandemics and unaligned AI. While I see the final two as especially important, I think they all pose at least a one in 1,000 risk of destroying humanity’s potential this century, and so all warrant major global efforts on the grounds of their contribution to existential risk (in addition to the other compelling reasons).*  August 31, 2020 | [179](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA179.w.0.0.0.3) | |

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| |  |  |  | | --- | --- | --- | |  | *Overall, I think the chance of an existential catastrophe striking humanity in the next hundred years is about one in six. This is not a small statistical probability that we must diligently bear in mind, like the chance of dying in a car crash, but something that could readily occur, like the roll of a die, or Russian roulette. This is a lot of risk, but our situation is far from hopeless. It implies a five in six chance that humanity successfully makes it through the next hundred years with our longterm potential intact. So while I think there are risks that should be central global priorities (say, those with a one in 1,000 chance or greater), I am not saying that this century will be our last.*  August 31, 2020 | [179](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA179.w.0.0.0.4) | |

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| |  |  |  | | --- | --- | --- | |  | *I’d say there is something like a one in two chance that humanity avoids every existential catastrophe and eventually fulfills its potential: achieving something close to the best future open to us.*  August 31, 2020 | [180](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA180.w.0.0.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *I think about a third of the existential risk over our entire future lies in this century.*  August 31, 2020 | [180](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA180.w.0.0.0.2.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *The numbers therefore represent my actual best guesses of the chance the threats materialize, taking our responses into account.*  August 31, 2020 | [180](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA180.w.0.0.0.4.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *Perhaps one could say that we were heading toward Russian roulette with two bullets in the gun, but that I think we will remove one of these before it’s time to pull the trigger. And there might just be time to remove the last one too, if we really try.*  August 31, 2020 | [181](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA181) | |

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| |  |  |  | | --- | --- | --- | |  | *So perhaps the headline number should not be the amount of risk I expect to remain, about one in six, but two in six—the difference in existential risk between a lackluster effort by humanity and a heroic one.*  August 31, 2020 | [181](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA181) | |

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| |  |  |  | | --- | --- | --- | |  | *Even completely objective, precise and accurate estimates would merely measure how large the different risks are, saying nothing about how tractable they are, nor how neglected. The raw probabilities are thus insufficient for determining which risks should get the most attention, or what kind of attention they should receive.*  August 31, 2020 | [181](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA181.w.0.0.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *Many of the things we commonly think of as social goods may turn out to also be existential security factors. Things such as education, peace or prosperity may help protect us. And many social ills may be existential risk factors. In other words, there may be explanations grounded in existential risk for pursuing familiar, common-sense agendas. But I want to stress that this is a dangerous observation. For it risks a slide into complacency, where we substitute our goal of securing our future with other goals that may be only loosely related. Just because existential risk declines as some other goal is pursued doesn’t mean that the other goal is the most effective way to secure our future.*  September 1, 2020 | [190](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA190.w.0.0.0.3) | |

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| |  |  |  | | --- | --- | --- | |  | *diminishing returns: resources typically make a bigger difference when fewer resources have been spent so far.*  September 1, 2020 | [192](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA192.w.0.0.0.3) | |

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| |  |  |  | | --- | --- | --- | |  | *power law distribution, where catastrophes become substantially more rare as they get larger. This means that we are more likely to get hit by a pandemic or asteroid killing a hundredth of all people before one killing a tenth, and more likely to be hit by one killing a tenth of all people before one that kills almost everyone.*  September 1, 2020 | [194](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA194.w.0.0.0.3) | |

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| |  |  |  | | --- | --- | --- | |  | *In short, early action is higher leverage, but more easily wasted. It has more power, but less accuracy. If we do act far in advance of a threat, we should do so in ways that take advantage of this leverage, while being robust to near-sightedness.*  September 6, 2020 | [196](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA196.w.0.0.0.4) | |

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| |  |  |  | | --- | --- | --- | |  | *considering neglectedness. In our current situation there are trillions of dollars per year flowing to broad interventions such as education, but less than a ten-thousandth this much going to targeted existential risk interventions.*  September 6, 2020 | [197](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA197.w.0.0.0.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *But there will be serious diminishing returns as investment is scaled up, and it may well be that even if the world were solely interested in reducing existential risk, the total budget for targeted interventions should never exceed that for broad interventions.*  September 6, 2020 | [197](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA197.w.0.0.0.3.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *We need to take responsibility for our future. Those of us alive right now are the only people who can fight against the present dangers; the only people who can build the communities, norms and institutions that will safeguard our future. Whether we are remembered as the generation who turned the corner to a bright and secure future, or not remembered at all, comes down to whether we rise to meet these challenges.*  September 6, 2020 | [198](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA198.w.0.0.0.3) | |

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| |  |  |  | | --- | --- | --- | |  | *tentative*  September 2, 2020 | [199](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA199.w.0.0.0.2) | |

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| |  |  |  | | --- | --- | --- | |  | *Catastrophes of this scale are unprecedented throughout our long history. This creates severe challenges for our attempts to understand, predict and prevent these disasters. And what’s more, these challenges will always be with us, for existential risks are necessarily unprecedented . By the time we have a precedent, it is too late—we’ve lost our future.*  September 2, 2020 | [205](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA205.w.0.0.0.4.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *So if a disaster does occur, it is much more likely to be because there was an estimation mistake and the real risk was higher, rather than because a one in a trillion event occurred.*  September 2, 2020 | [210](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA210) | |

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| |  |  |  | | --- | --- | --- | |  | *While nations occasionally act for the greater interest of all humankind, this is the exception rather than the rule.*  September 7, 2020 | [211](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA211.w.0.0.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *For example, the Biological Weapons Convention could be brought into line with the Chemical Weapons Convention: taking its budget from $1.4 million up to $80 million, granting it the power to investigate suspected breaches, and increasing its staff from a mere four people to a level more appropriate for its role.*  Бюджет всего 1.4 миллиона и четыре человека!  September 7, 2020 | [214](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA214.w.0.0.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *We’ve seen how humanity is akin to an adolescent, with rapidly developing physical abilities, lagging wisdom and self-control, little thought for its longterm future and an unhealthy appetite for risk. When it comes to our own children, we design our societies to deliberately stage their access to risky technologies: for example, preventing them from driving a car until they reach an appropriate age and pass a qualifying test. One could imagine applying a similar approach to humanity. Not relinquishing areas of technology, but accepting that in some cases we aren’t ready for them until we meet a given standard. For example, no nuclear technologies until we’ve had a hundred years without a major war. Unfortunately, there is a major challenge. Unlike the case with our own children, there are no wise adults to decide these rules. Humanity would have to lay down the rules to govern itself . And those who lack wisdom usually lack the ability to see this; those who lack patience are unlikely to delay gratification until they acquire it.*  September 8, 2020 | [218](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA218.w.0.0.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *that the length of human survival so far puts a tight bound on the natural risk;*  September 8, 2020 | [223](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA223.w.0.0.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *Despair is a self-fulfilling prophecy.*  September 8, 2020 | [225](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA225.w.0.0.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *For example, scientists expect the brightening of the Sun to also slow the Earth’s plate tectonics, dampening volcanic activity. Life as we know it requires such activity; volcanoes lift essential carbon dioxide into our atmosphere. We currently have too much carbon dioxide, but we need small amounts for plants to photosynthesize.*  September 9, 2020 | [233](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA233.w.0.0.0.3) | |

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| |  |  |  | | --- | --- | --- | |  | *While there is some notable skepticism of interstellar travel, a closer inspection shows that it is directed either at our near-term capabilities or at our achieving the kind of effortless space travel depicted in films like Star Wars or Star Trek , where individuals routinely travel between the stars in relative comfort. I share this skepticism. But the expansion of humanity’s potential doesn’t require anything like that. It requires only that if we could survive long enough, and strive hard enough, then we could eventually travel to a nearby star and establish enough of a foothold to create a new flourishing society from which we could venture further.*  September 9, 2020 | [241](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA241.w.0.0.0.3) | |

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| |  |  |  | | --- | --- | --- | |  | *Consider, for example, how little we know of how ultraviolet light looks to a finch; of how echolocation feels to a bat, or a dolphin; of the way that a red fox, or a homing pigeon, experiences the Earth’s magnetic field. Such uncharted experiences exist in minds much less sophisticated than our own. What experiences, possibly of immense value, could be accessible, then, to minds much greater? Mice know very little of music, art or humor. Toward what experiences are we as mice? What beauties are we blind to?*  September 10, 2020 | [250](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA250.w.0.0.0.2) | |

## *Appendices*

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| |  |  |  | | --- | --- | --- | |  | *rapacity*  September 10, 2020 | [265](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA265.w.0.0.0.3) | |

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| |  |  |  | | --- | --- | --- | |  | *A B-47 bomber accidentally dropped a nuclear bomb over South Carolina, landing in someone’s garden and destroying their house. Fortunately, its atomic warhead was still in the plane.*  September 12, 2020 | [276](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA276.w.0.0.0.3.0.1) | |

## *Notes*

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| |  |  |  | | --- | --- | --- | |  | *“technology changes exponentially, but social, economic, and legal systems change incrementally.”*  August 14, 2020 | [350](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA350.w.0.0.0.3.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *yield*  August 17, 2020 | [364](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA364.w.0.0.0.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *Moreover, they would be extremely difficult to deflect as we would have less than a year from first detection (at around the orbit of Jupiter) to the time of impact*  About comets  August 19, 2020 | [373](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA373.w.0.0.0.3) | |

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| |  |  |  | | --- | --- | --- | |  | *the possibility kept being rediscovered by younger scientists and that the leadership at Los Alamos had to keep “batting it down,” telling them that it had been taken care of.*  August 21, 2020 | [386](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA386.w.0.0.0.3.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *We are living in a very different world since the explosion of the A-bomb. We have no way of knowing what the results will be, but there is the danger that much of our present civilization will come to an end… It might be advisable to select the printed material that would preserve the record of our civilization for the one we can hope will follow, microfilming it and making perhaps 10 copies and burying those in different places throughout the country. In that way we could ensure against the destruction that resulted from the fall of the Roman Empire.”*  August 21, 2020 | [387](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA387.w.0.0.0.2) | |

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| |  |  |  | | --- | --- | --- | |  | *prepared a rough plan for microfilming the most important 500,000 volumes, or a total of 250 million pages. But in the end they did not pursue this, reasoning both that its becoming public would cause significant panic, and that written records would probably survive in the libraries of university towns that would not suffer direct hits from atomic weapons.*  Есть ли сейчас такие запасы, что с ними?  August 21, 2020 | [387](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA387.w.0.0.0.4) | |

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| |  |  |  | | --- | --- | --- | |  | *If a group cares deeply about the accuracy of their own internal work, they can set up a “red team” of researchers tasked with proving the work wrong. This team should be given ample time, until they overcome their initial loyalties to the work so far, beginning to hope it is wrong rather than right. They also should be given ample resources, praise and incentives for finding flaws.*  Очень интересно. Применим ли этот метод в других областях, не научных?  August 21, 2020 | [388](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA388.w.0.0.0.1.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *One of the best methods for eliciting someone’s subjective probability for an event is to offer a series of small bets and see how extreme the odds need to be before they take them.*  August 21, 2020 | [388](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA388.w.0.0.0.3.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *What emerges from these past records is evidence for rapid community turnover, migrations, development of novel ecosystems and thresholds from one stable ecosystem state to another, but there is very little evidence for broad-scale extinctions due to a warming world.*  August 22, 2020 | [401](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA401.w.0.0.0.4) | |

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| |  |  |  | | --- | --- | --- | |  | *our inability to rule out that the biggest mass extinction was caused by rapid warming, are ultimately bad news.*  August 22, 2020 | [402](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA402.w.0.0.0.3) | |

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| |  |  |  | | --- | --- | --- | |  | *This is a shockingly high estimate. The only other community of researchers I can imagine who may have estimated such a high probability of their work leading to catastrophically bad outcomes for humanity are the atomic scientists in the lead-up to the bomb. And yet I’m grateful to the researchers for their frank honesty about this.*  5 процентов шанс, что исследования приведут к концу человечества  August 25, 2020 | [431](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA431.w.0.0.0.2.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *My estimate of one in 10,000 per century is equivalent to a life expectancy of 1 million years.*  August 31, 2020 | [442](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA442.w.0.0.0.3.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *There is also a question of cost-effectiveness. Space settlement does not look to me to be one of the most cost-effective ways to reduce risk over this century. As a simple example, building similar sustainable colonies in remote parts of the Earth (Antarctica, under the sea…) would be much cheaper and would protect against many of the same risks.*  September 2, 2020 | [461](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA461.w.0.0.0.3) | |

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| |  |  |  | | --- | --- | --- | |  | *Depending on the details of how we define existential catastrophes, it may be possible to suffer two of them. For example, suppose that we lost 99% of our potential in an existential catastrophe. As I don’t require complete destruction of our potential in order to count as an existential risk, this would count. In the years that follow, it may still make sense to preserve the remaining 1% of our potential from further catastrophes. If our potential were truly vast to begin with, this 1% remaining may also be vast compared to the issues of the day that usually concern us, and the case for focusing on preserving our remaining potential may still be very strong.*  September 2, 2020 | [462](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA462.w.0.0.0.0.1) | |

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| |  |  |  | | --- | --- | --- | |  | *For example, at the time of writing there have only been two published studies on the climate effects of full-scale nuclear war since the Cold War ended in 1991 (Robock, Oman & Stenchikov, 2007; and Coupe et al., 2019), and no detailed study of its agricultural effects since 1986 (Harwell & Hutchinson, 1986).*  September 8, 2020 | [471](http://play.google.com/books/reader?printsec=frontcover&output=reader&id=Q-ALKAAAAEAJ&source=books-notes-export&pg=GBS.PA471.w.0.0.0.1.0.1) | |