

# Our World in the Multiverse - A Compendium of Viewpoints and Speculations

James Mc Laughlin

West Chester University, PA

[Web page of James Mc Laughlin](#)

*jmclaughlin2@wcupa.edu*

# Overview

- 1 Our Present Universe According to Science
- 2 The Future of Humans, I The Great Filter
- 3 The Future of Humans, II Potential Human-Caused Disasters
- 4 The Future of Humans, III Potential Natural Disasters
- 5 The Future of Humans, IV Assuming We get past Potential Human-caused and Natural Disasters
- 6 Some Snapshots/Speculation About the Future History of the Earth and Universe
- 7 Does The Observable Universe Lie Inside Something Bigger?
- 8 Philosophical Speculation About the Universe
- 9 Is The Physical Universe just a cross-section of something even larger - ideas from religion
- 10 Personality Traits Might Prevent an Evolving Intelligent Species Getting Past "The Great Filter"
- 11 Education and Life, the Universe and Everything
- 12 Image Licensing Information

# Disclaimers

This presentation will be about topics in which I am not an expert, so while I strive for accuracy, there will inevitably be errors.

I will assume general unfamiliarity with many topics, which may mean that the level will be too elementary for some.

In addition, there is no certainty in many areas, many different opinions and much speculation.

# Our Universe According to Science

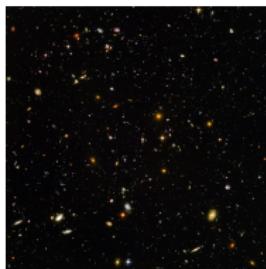
Our Universe according to Science

# How Big is the Universe?

- ① Roughly speaking there are as many stars in the Universe as grains of sand in a pile of sand that would cover the United States (East Coast to West Coast, Canada to Mexico) to a depth of 60 miles.  
Somewhere in this pile of sand would be the grain of sand corresponding to our sun.
- ② Next, imagine expanding this pile of sand until the distance until the distance between each grain and each of its neighbours was around 50 miles.
- ③ Finally, do a further expansion, both the distances between grains and the grains themselves, until each grain was a million miles across.
- ④ Of course stars are not of uniform size, nor distributed uniformly throughout the Universe.

There are galaxies of stars, clusters and super-clusters of galaxies, and also great starless voids.

# How Big is the Universe?



Hubble Ultra Deep Field, an image of a small segment of space in constellation Fornax (click on the image to open the video)

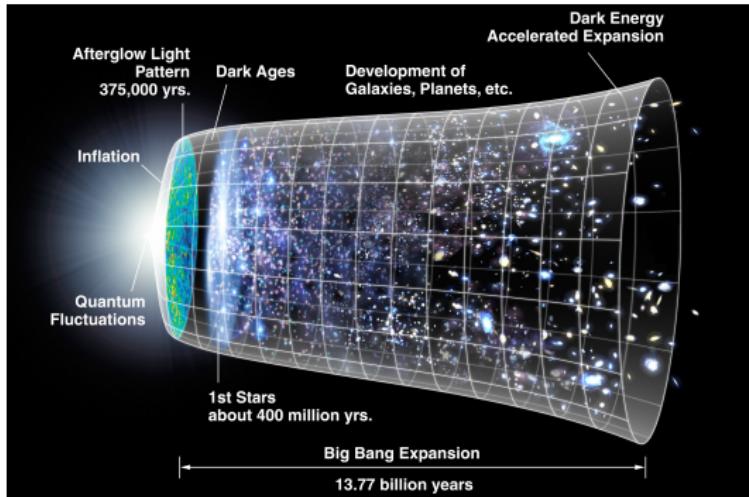
([cc Constellation Fornax](#))

[NASA - Hubble Space Telescope - Legacy Field Zoom Out](#)

([cc Hubble Zoom Out](#))

“The deep-sky mosaic, created from nearly 7,500 individual exposures, provides a wide portrait of the distant universe, containing 265,000 galaxies that stretch back through 13.3 billion years of time to just 500 million years after the big bang.”

# How Old is the Universe?

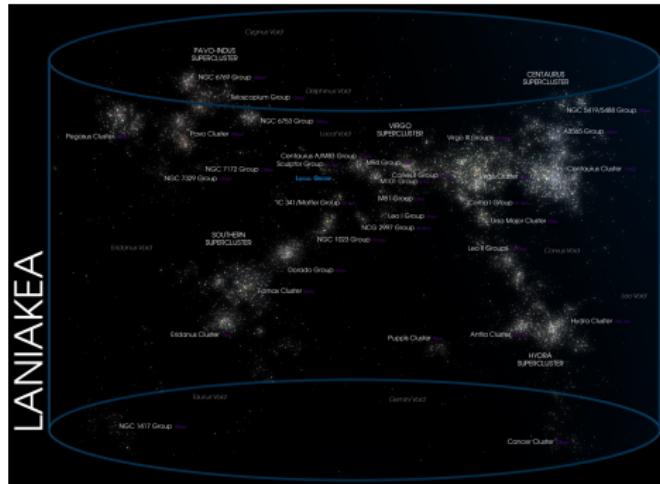


A representation of the evolution of the universe over 13.77 billion years.

(cc) Big Bang

- 1 It is estimated by science that the Universe is around 13.8 billion years old, having expanded from a singularity in “The Big Bang” .

# Laniakea Supercluster



The Local Group's location within the Virgo Supercluster as part of the larger Laniakea Supercluster. (cc Laniakea)

- ② Our galaxy started forming shortly after the Big Bang, with a recent idea being that it merged with another galaxy around 11 billion years ago.

# Formation of the Earth and Solar System



- ➊ The Solar System, including our Earth, formed  $\sim 4.6$  billion years ago. “...began ... with the gravitational collapse of a small part of a giant molecular cloud. Most of the collapsing mass collected in the center, forming the Sun, while the rest flattened into a protoplanetary disk out of which the planets, moons, asteroids, and other small Solar System bodies formed.”

(cc) Solar System)

# Formation of the Moon



- ④ Formation of the Moon after the early Earth impacted with a Mars-sized planet around 4.5 billion years ago. (cc Moon)

# Formation of the Earth's Crust



Artistic impression of the surface of the hot super-Earth Gliese 486 b, an exo-planet 26.4 light-years away in the constellation Virgo. The surface of the early Earth was likely very similar.

- ⑤ The early Earth was likely covered in magma oceans, which solidified into a crust as they cooled. [\(cc Magma Oceans\)](#)

# Formation of the Earth's Oceans



Artistic impression of the surface of the Earth, after the crust had mostly cooled.

- ⑥ Water released from rocky material began to collect to form the oceans a little over 3.8 billion years ago. (cc Early Oceans)

# Appearance of the First Primitive Lifeforms



**Stromatolites** are layered sedimentary formations that are created mainly by photosynthetic microorganisms. These microorganisms produce adhesive compounds that cement sand and other rocky materials to form mineral "microbial mats".

- 7 The earliest primitive life forms probably appeared sometime around 3.8 billion years ago (the earliest definite forms are stromatolites found in 3.48 billion-year-old chert from Western Australia).  
The last universal common ancestor (LUCA) of all life forms on Earth existed sometime between 3.5- and 3.8 billion years ago.  
(cc) [Stromatolites](#))

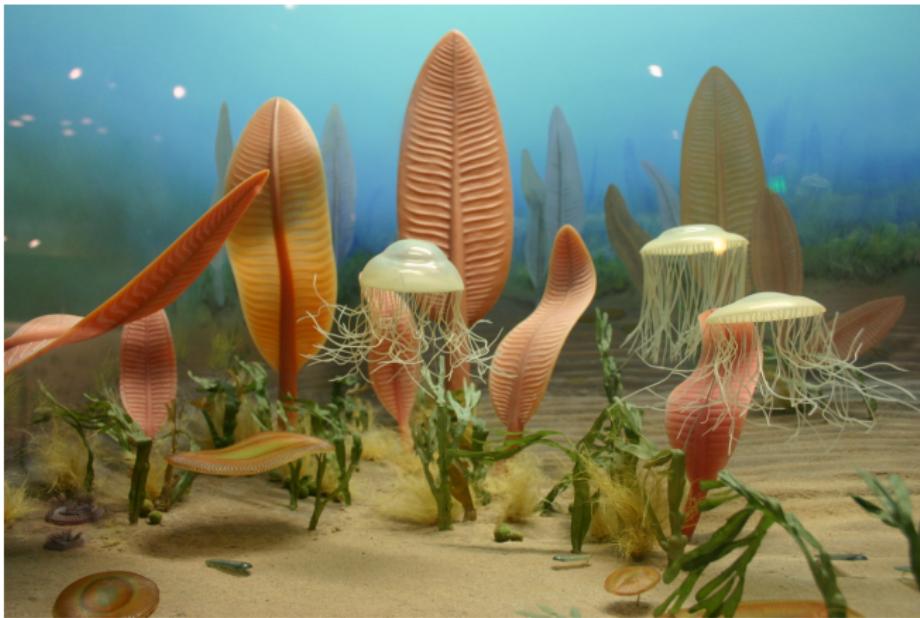
# Plants Moving from the Sea to Land



Artistic depiction of early Devonian (~400 million years ago) land-flora.

- ⑧ Land plants evolved from fresh-water algae, perhaps around 850 million years ago, with many features of plants today, such as roots and leaves having appeared by ~390 million years ago. (cc Devonian)

# First multicellular animals in the seas 550 million years ago



Diorama of Ediacarian sealife.

- ➊ Development of first multicellular animals in the seas between 580- and 530 million years ago. (cc Ediacaran)

# The Evolution of Fish



Reconstruction from the late Devonian period,  $\sim$  383 - 372 million years ago.

- ⑩ Early sharks and various other kinds of fish evolved between 420 and 360 million years ago. (cc Fish)

# Recreation of a Pennsylvanian forest floor (323-299 Ma)



Recreation of a Pennsylvanian forest floor during the “Pennsylvanian” period (323-299 Ma)

- From around 360 million years onwards, the Earth began to take on its present form (covered in vegetation, insects on land, sharks in the oceans,...).  
(cc Forest)

# Dinosaurs and Mammals I



Painting of a late Jurassic (201 - 145 Ma) Scene on one of the large island in the Lower Saxony basin in northern Germany.

- ② The first dinosaurs and earliest mammals both appeared around 225 million years ago.

(cc) Dinosaurs and Mammals I)

# Dinosaurs and Mammals II

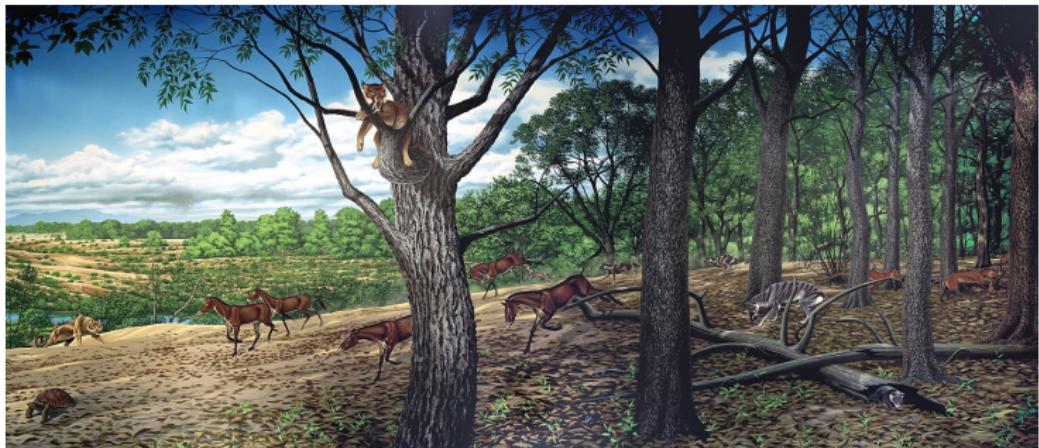


Recreation of a scene from Southern Britain during the Early Cretaceous (145 - 113 Ma).

- ➊ Dinosaurs were the dominant land vertebrates until their extinction  $\sim$  66 million years ago, with mammals occupying a much more restricted niche during this time.

(cc) Dinosaurs and Mammals II)

# The Age of Mammals



Mural depicting the landscape, environment, plants, and animals known from Oregon, about 30 million years ago.

- ⑯ Around 66 million years ago the dinosaurs became extinct and mammals became the dominant group. (cc Mammals)

# Ancient Hominids



Image depicting an ape from Europe, ~7 million years ago, possibly the last common ancestor of chimps and humans.

- ⑯ The chimpanzee–human last common ancestor existed sometime between 4 and 7 million years ago. (cc Hominids)

# Early Humans

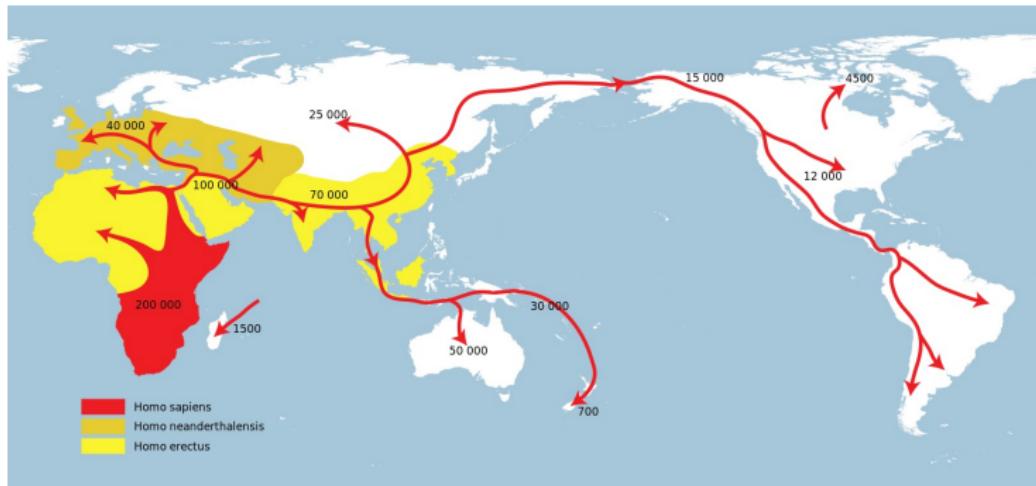


Reconstruction of early *Homo sapiens* from Morocco  $\sim$  315000 years ago.

(cc) Early Humans

- 16 Anatomically modern humans lived in various places in Africa between 300,000- and 100,000 years ago.

# Human Migrations out of Africa



There were several migrations of early humans out of Africa, possibly beginning as early as 270,000 years ago.

17 The ancestors of modern humans living outside Africa mostly migrated out of Africa between 70,000 - 50,000 years ago. (cc Migrations)

# Behavioral modernity



16,000-year-old cave painting from Lascaux cave in France

From [Wikipedia](#): “Most scholars agree that modern human behavior can be characterized by abstract thinking, planning depth, symbolic behavior (e.g., art, ornamentation), music and dance, exploitation of large game, and blade technology, among others. ... These human universal patterns include cumulative cultural adaptation, social norms, language, and extensive help and cooperation beyond close kin.”

(From Wikipedia [Creative Commons](#), more description [here](#))

- ⑧ Behavioral modernity developed in modern humans between 50,000- and 25,000 years ago. (cc Behavioral modernity)

# Human Transformation of the Earth's Surface During the Past 10000 Years

- 19 Over the last 10,000 years humans transformed the surface of the Earth into what it is today.



(cc Modern World I)



(cc Modern World II)

# The Future of Humans, I The Great Filter

The Future of Humans, I The Great Filter

# The Future of Humans - The Great Filter I

Since life is so tenacious and adaptable (can exist in thermal springs, in a lake a mile below the ice in Antarctica, very dry deserts, near radioactive decay, very pressures such as deep in the oceans), the Universe is likely to be teeming with life.

Intelligent life has likely evolved countless times on different planets throughout the Universe, so why have we not encountered any technologically advanced alien civilizations? (The Fermi Paradox)?

**The Great Filter:** Given the scarcity of advanced technological civilizations, and the estimate that intelligent species have reached a level comparable to present-day humans have evolved a vast number of times throughout the Universe during it's history, there must be some kind of impediment that prevents an intelligent species evolving beyond a certain level and a complex technological civilization developing past a certain level.

# The Future of Humans - The Great Filter II

## The Great Filter

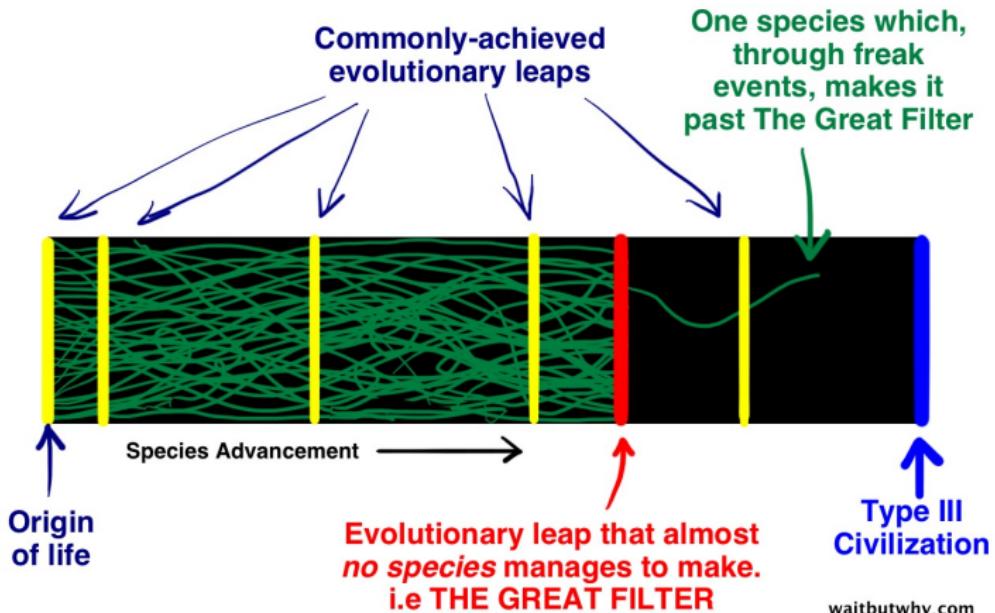


Figure: Image initially appeared on this [Wait But Why](http://waitbutwhy.com) page in May 2014.

# The Future of Humans - The Great Filter III

If there is any validity to The Great Filter concept, where does this "impediment" lie in the history of humans?

- ‘ - Are we already past this impediment, and it is plain sailing to spread out in to space and colonize first our own galaxy, and then nearby galaxies?
- Does this impediment, that we will have to find our way past, still lie some distance into our future?
- are we being confronted with this impediment at present, and have been confronted with it for some recent years?
- did we encounter this impediment already, but did not recognize it and did not overcome it, and are already a “failed” species?

# The Future of Humans, II Potential Human-Caused Disasters

The Future of Humans, II Potential Human-Caused Disasters

# Human-Caused Disasters - AI takeover

There are various ways that human actions, or inactions, might prevent humans getting past "The Great Filter".

## ① AI takeover



Figure: Symbol of [Skynet](#), the fictional artificial general superintelligence system from the Terminator series. (cc [AI Takeove](#))

From [Wikipedia](#): "An AI takeover is a hypothetical scenario in which artificial intelligence (AI) becomes the dominant form of intelligence on Earth, as computer programs or robots effectively take control of the planet away from the human species."

# Biotechnology risk

## ② Biotechnology risk



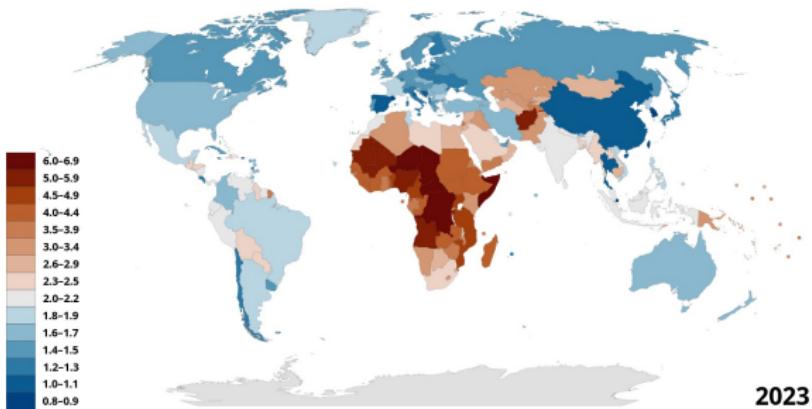
United States airman wearing an M-17 nuclear, biological, and chemical warfare mask and hood. (cc [Biotechnology risk](#))

From [Wikipedia](#): “Biotechnology risk is a form of existential risk from biological sources, such as genetically engineered biological agents. The release of such high-consequence pathogens could be

- deliberate (in the form of bioterrorism or biological weapons)
- accidental, or
- a naturally occurring event.”

# Population Decline

## ③ Population decline



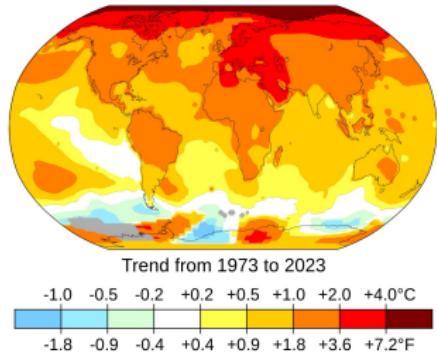
Total Fertility Rate Map by Country. ([cc Population Decline](#))

From [Wikipedia](#): “Population decline, also known as depopulation, is a reduction in a human population size. ... Long-term projections indicate that the growth rate of the human population of this planet will continue to slow and that before the end of the 21st century, it will reach zero.”

# Climate Change

## ④ Climate change

Temperature change over the past 50 years



Surface air temperature change over the past 50 years (cc Population Decline)

Rapid environmental change in mountains, coral reefs, and the Arctic is forcing many species to relocate or become extinct.

Even if efforts to minimise future warming are successful, some effects will continue for centuries.

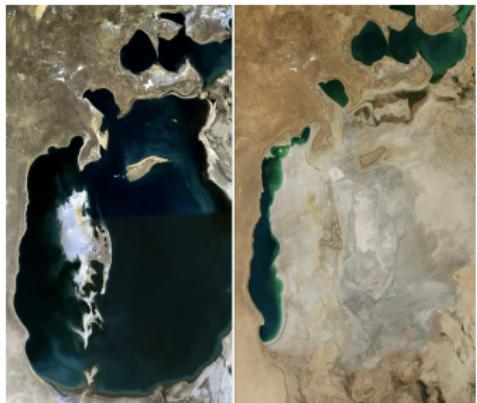
These include ocean heating, ocean acidification and sea level rise."

From [Wikipedia](#): "Climate change has an increasing impact on the environment. Deserts are expanding, while heat waves and wildfires are becoming more common. Amplified warming in the Arctic has contributed to melting permafrost, glacial retreat and sea ice loss.

Higher temperatures are also causing more intense storms, droughts, and other weather extremes.

# Ecosystem collapse

## ⑤ Ecosystem collapse (world crop failure, deforestation, resource exhaustion)



A comparison of the Aral Sea in 1989 (left) and 2014 (right).  
(cc [Ecosystem collapse](#))

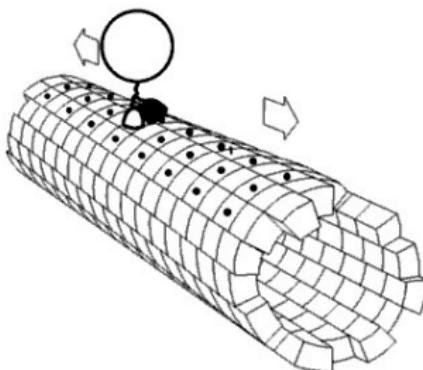
“More are likely to occur without a change in course, since estimates show that 87% of oceans and 77% of the land surface have been altered by humanity, with 30% of global land area is degraded and a global decline in ecosystem resilience.”

From [Wikipedia](#): “Today, the ongoing Holocene extinction is caused primarily by human impact on the environment, and the greatest biodiversity loss so far had been due to habitat degradation and fragmentation, which eventually destroys entire ecosystems if left unchecked.”

There have been multiple notable examples of such an ecosystem collapse in the recent past, such as the collapse of the Atlantic northwest cod fishery.”

# Nanotechnology impacts (Grey Goo)

## ⑥ Nanotechnology impacts (Grey Goo)



Remark: A usable image of grey goo was not found - this image from the Wikipedia [Nanorobotics](#) page. (cc Grey goo)

From [Wikipedia](#): “ Gray goo (also spelled as grey goo) is a hypothetical global catastrophic scenario involving molecular nanotechnology in which out-of-control self-replicating machines consume all biomass (and perhaps also everything else) on Earth while building many more of themselves, a scenario that has been called ecophagy (the literal consumption of the ecosystem).”

# Nuclear holocaust

## 7 Nuclear holocaust



Nuclear weapon test Bravo (yield 15 Mt) on Bikini Atoll. (© [Nuclear holocaust](#))

From [Wikipedia](#): “A nuclear holocaust, also known as a nuclear apocalypse, nuclear annihilation, nuclear armageddon, or atomic holocaust, is a theoretical scenario where the mass detonation of nuclear weapons causes globally widespread destruction and radioactive fallout. Such a scenario envisages large parts of the Earth becoming uninhabitable due to the effects of nuclear warfare, potentially causing the collapse of civilization and, in the worst case, extinction of humanity and/or termination of most biological life on Earth.”

# The Future of Humans, III Potential Natural Disasters

## The Future of Humans, III Potential Natural Disasters

# What Kind of Natural Disasters Might Befall Humans?

Even if humans evolve sufficiently to get past “The Great Filter”, some other natural catastrophe might happen, such as:

- ① Asteroid impact



Illustration of an impact event.

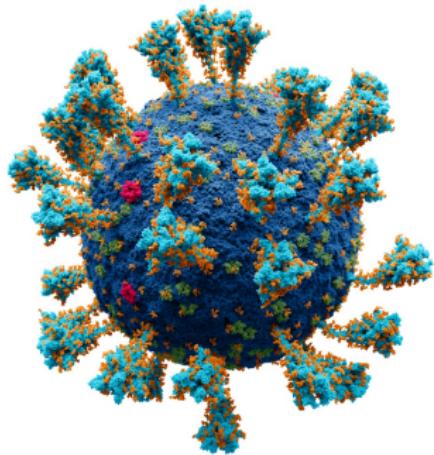
([cc](#) Asteroid impact)

From [Wikipedia](#): “In April 2018, the B612 Foundation reported: “It’s 100 percent certain we’ll be hit [by a devastating asteroid], but we’re not 100 percent certain when.”

Also in 2018, physicist Stephen Hawking considered in his final book *Brief Answers to the Big Questions* that an asteroid collision was the biggest threat to the planet.”

# Deadly Pandemic

- ② deadly pandemic (including bacteria/viruses released from melting permafrost)



Scientifically accurate atomic model of the external structure of the Severe Acute Respiratory Syndrome CoronaVirus 2 (SARS-CoV-2)  
([@ Deadly Pandemic](#))

From [Wikipedia](#): "In a press conference on 28 December 2020, Mike Ryan, head of the WHO Emergencies Program, and other officials said the current COVID-19 pandemic is "not necessarily the big one" and "the next pandemic may be more severe.\*\*\*"

# Large Scale Volcanism

## ③ large scale volcanism



Sabancaya volcano erupting, Peru in 2017. (cc) [Large Scale Volcanism](#))

From [Wikipedia](#): “Large-volume supervolcanic eruptions are also often associated with large igneous provinces, which can cover huge areas with lava and volcanic ash.

These can cause long-lasting climate change (such as the triggering of a small ice age) and threaten species with extinction.”

# Return of the Ice Age/"Snowball Earth"

- ④ return of the ice age/"snowball earth"



Artist's rendition of a fully-frozen Snowball Earth with no remaining liquid surface water.  
(© Snowball Earth)

From [Wikipedia, Snowball Earth](#): "The Snowball Earth is a geohistorical hypothesis that proposes during one or more of Earth's icehouse climates, the planet's surface became entirely or nearly entirely frozen with no liquid oceanic or surface water exposed to the atmosphere. "

From [Wikipedia, Future Earth](#): "Earth is passing through an ice age known as the quaternary glaciation, and is presently in the Holocene interglacial period. This period would normally be expected to end in about 25,000 years. However, the increased rate at which humans release carbon dioxide into the atmosphere may delay the onset of the next glacial period until at least 50,000-130,000 years from now."

# Planetary or Interstellar Collision

- ⑤ planetary or interstellar collision



From [NASA](#): "This artist's concept illustrates a catastrophic collision between two rocky exoplanets, turning both into dusty debris."

(cc [Planetary Collision](#))

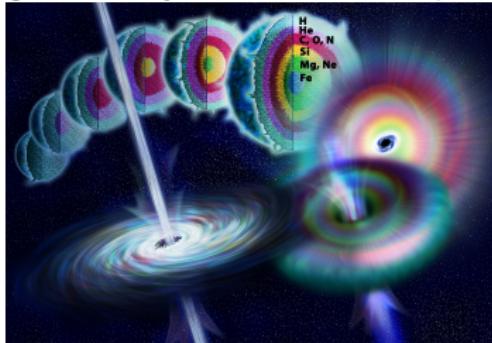
From [Wikipedia](#): "Collision with or a near miss by a large object from outside the Solar System could also be catastrophic to life on Earth."

If Mercury or a rogue planet of similar size were to collide with Earth, all life on Earth could be obliterated entirely: an asteroid 15 km wide is believed to have caused the extinction of the non-avian dinosaurs, whereas Mercury is 4,879 km in diameter.

The destabilization of Mercury's orbit is unlikely in the foreseeable future."

# Gamma-ray burst from a Super Nova

## ⑥ gamma-ray burst from a super nova



Drawing of a massive star collapsing to form a black hole.

(cc [Gamma Ray Burst](#))

From [Wikipedia](#): “Under certain circumstances, these events are thought to produce massive bursts of gamma radiation emanating outward from the axis of rotation of the star.

If such an event were to occur oriented towards the Earth, the massive amounts of gamma radiation could significantly affect the Earth’s atmosphere and pose an existential threat to all life.

Such a gamma-ray burst may have been the cause of the Ordovician–Silurian extinction events.

This scenario is unlikely in the foreseeable future.”

# Extraterrestrial Invasion

- ⑦ extraterrestrial invasion



Alien tripod illustration by Alvim Corréa, from the 1906 French edition of H.G. Wells' "War of the Worlds".  
(cc) Extraterrestrial Invasion)

From [Wikipedia](#): "Intelligent extraterrestrial life, if it exists, could invade Earth, either to exterminate and supplant human life, enslave it under a colonial system, exploit the planet's resources, or destroy it altogether."

Although the existence of sentient alien life has never been conclusively proven, scientists such as Carl Sagan have posited it to be very likely.

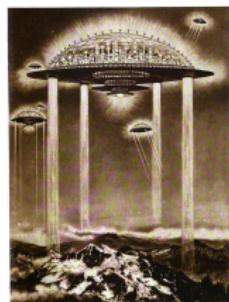
Scientists consider such a scenario technically possible, but unlikely."

# The Future of Humans, IV Assuming We get past Potential Human-caused and Natural Disasters

The Future of Humans, IV Assuming We get past Potential Human-caused and Natural Disasters

# Assuming We Can Survive Natural- and Human Disasters, What Might The Future Hold for Humans?

- ① great advances in technology and science



A fictional vision from 1922 of a floating city in 10,000 years. (cc [Advances in Technology and Science](#))

It is almost impossible to imagine how far technology might advance in 1000 years.

Some speculative examples from Wikipedia's [Hypothetical technology](#) page:

- [Artificial general intelligence](#)
- [Mind uploading](#)
- [Spaceflight](#)

# Space Travel and the Spread of Humans Throughout first the Galaxy and then Further into the Universe

- ② space travel and the spread of humans throughout first the galaxy and then further into the universe



A star forming region in the Large Magellanic Cloud. (cc [Space Travel](#))

From Wikipedia's [Space colonization](#) page:

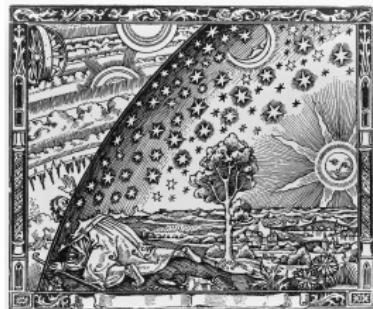
“Looking beyond the Solar System, there are up to several hundred billion potential stars with possible colonization targets.

The main difficulty is the vast distances to other stars. ... some combination of very high speed, or travel times lasting centuries or millennia, would be required.

These speeds are far beyond what current spacecraft propulsion systems can provide.”

# Greater Understanding of the Cosmos and the Forces and Energies that Comprise it

- ③ greater understanding of the Cosmos and the forces and energies that comprise it  
(cc) [Understanding of the Cosmos](#))



“The image depicts a man crawling under the edge of the sky, depicted as if it were a solid hemisphere, to look at the mysterious [Empyrean](#) beyond.”

From Wikipedia’s [Cosmos](#) page:

“The cosmos is an alternative name for the universe or its nature or order.

The cosmos, and understandings of the reasons for its existence and significance, are studied in cosmology – a broad discipline covering scientific, religious or philosophical aspects of the cosmos and its nature.”

# In the Short Term Humans will Look More Alike

- ④ in the short term humans will look more alike, tending towards an average/amalgam of all current types



(cc) Humans Alike

U.S. President Barack Obama's official photograph in the Oval Office on 6 December 2012.

From [Wikipedia](#): "He was born to an American mother and a Kenyan father. His mother, ... was born in Wichita, Kansas and was of English, Welsh, German, Swiss, and Irish descent."

From Wikipedia's [Race of the future](#) page:

"The race of the future is a theoretical composite race which will result from the ongoing racial admixture.

Richard von Coudenhove-Kalergi in 1925 in *Practical Idealism* predicted:

"The man of the future will be of mixed race. Today's races and classes will gradually disappear owing to the vanishing of space, time, and prejudice."

# Contact with Other Intelligent Species from other Parts of the Universe

- ⑤ contact with other intelligent species from other parts of the Universe



(cc) Grey Aliens

Grey aliens are a common way to depict extraterrestrials in fiction.

From Wikipedia's [Extraterrestrial life](#) page:

"The hypothesis of ubiquitous extraterrestrial life relies on the vast size and consistent physical laws of the observable universe. According to this argument, ..., it would be improbable for life not to exist somewhere else other than Earth.

[Dark forest hypothesis](#): "...many alien civilizations exist throughout the universe, but they are both silent and hostile, maintaining their undetectability for fear of being destroyed by another hostile and undetected civilization."

# Humans may Evolve into Different Species

- ⑥ If humans can overcome some very difficult technological problems related to space travel, we may be able to spread out from Earth to other worlds.



A visible-light image of the Andromeda Galaxy, taken by Torben Hansen.  
(cc) [Different Species](#))

- ⑦ In the longer term, as humans spread throughout the galaxy/universe, humans may evolve into different species, as different groups lose contact with each other
- ⑧ Humans born in other parts of the Universe will likely feel no attachment to Earth

# Some Snapshots/Speculation About the Future History of the Earth and Universe

Some Snapshots/Speculation About the Future History of the Earth and Universe

# Future Ice Ages Over the Next Few Million Years

- ① future ice ages over the next few million years



Figure: The present period of glaciation (the [Quaternary](#)), began  $\sim 2.58$  million years ago, and is ongoing, with the Earth presently being in an interglacial period. (cc [ice age](#))

Previous periods of glaciation lasted for periods lasting from 40 million years to more than 100 million years.

The glacial/interglacial cycle length is currently about 100,000 years.

The next return of the ice has likely been delayed by natural- and human-caused global warming until sometime between 50,000 and 100,000 years in the future.

# Continued Movement of Tectonic Plates

## ② Continued Movement of Tectonic Plates

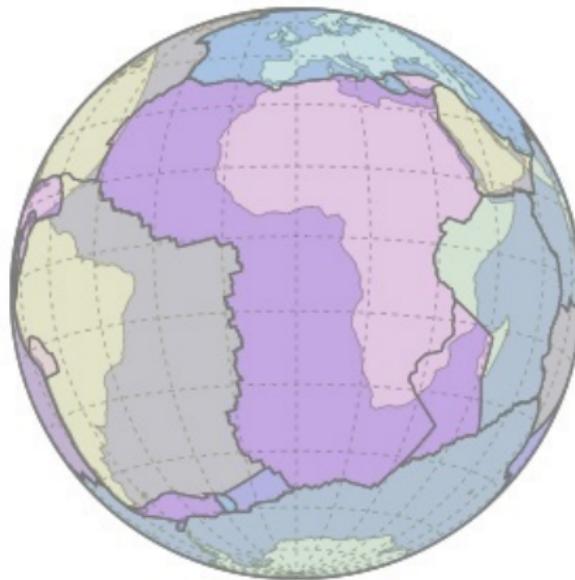


Figure: Around 50 million years in the future, Africa's collision with Europe will have closed the European basin, creating a new mountain range like the Himalayas. (cc Tectonic Plates)

# Continuing Slowdown in the Earth's Rotation and Consequent Increase in Day Length

- ➊ By 180 million years ahead, a day on Earth will be one hour longer, due to the Earth's rotation slowing down.



**Figure:** Around 4.5 billion years ago, the length of the day was around [5 hours](#), with tidal effects slowing down the Earth's rotation since then. (© [daylength](#))

Over the past [500 million years](#), the length of the day has increased as shown:

- 23 hours and 20 minutes around 100 million years ago
- 22 hours around 300 million years ago
- 20 hours and 40 minutes around 500 million years ago

# A New Super Continent

- ④ By 250 - 350 million years ahead, the continents may have fused into a super continent, possibly leading to a new glacial period.



Figure: Pangaea Ultima is a possible future supercontinent configuration that could form within the next 250 million years. (cc [Pangea Ultima](#))

# The Eventual Passing of All Lifeforms From Earth

- ⑤ About 600 million years in the future conditions necessary to sustain life will have greatly deteriorated.



Figure: By 1.3 billion years ahead, only the simplest unicellular life forms will still exist on Earth. (cc [End of Life](#))

From the Wikipedia [Future of Earth](#) page: “The luminosity of the Sun will steadily increase ... In about 600 million years from now, the level of carbon dioxide will fall below the level needed to sustain C3 carbon fixation photosynthesis used by trees. ... the long-term trend is for plant life to die off altogether. The extinction of plants will be the demise of almost all animal life ... .”

# Evaporation of the Oceans; Earth and Moon Fall into the Sun

- ⑥ By 3.5–4.5 billion years ahead, the Sun's luminosity will have increased by 35–40%, causing all water currently present in lakes and oceans to evaporate, if it had not done so earlier.

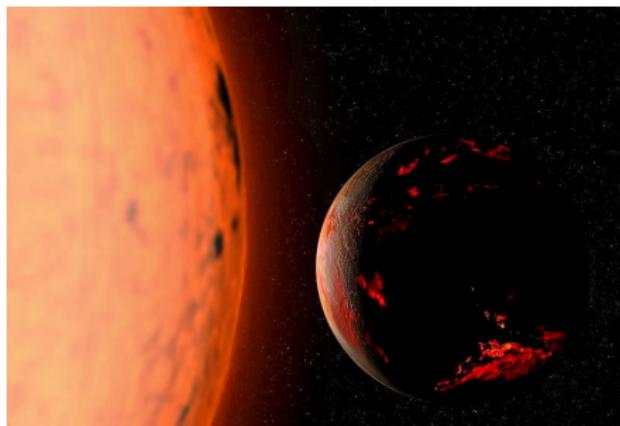


Figure: Artist's concept of the Earth 5–7.5 billion years from now, when the Sun has become a red giant. (© [Red Giant](#))

- ⑦ By 7.59 billion years, the Earth and Moon will have fallen into the sun.

# Andromeda–Milky Way collision

- ➊ By <5 billion years, the Andromeda galaxy and the Milky Way galaxy will have merged.



Figure: The [video](#) is a NASA conception of the collision using computer-generated imagery. The video also shows the Triangulum galaxy, which will join in the collision and perhaps later merge with the Andromeda/Milky Way pair. (cc  
[Andromeda–Milky Way](#))

From [Wikipedia](#): “The Andromeda–Milky Way collision is a galactic collision predicted to occur in about 4.5 billion years between the two largest galaxies in the Local Group—the Milky Way (which contains the Solar System and Earth) and the Andromeda Galaxy.”

# The Big Rip

- ④ By 22.3 billion years according to one estimate, the Universe will have ended in a “Big Rip” (one theory about how the Universe ends).



Figure: The [video](#) shows an artistic recreation of the Big Rip. (© [The Big Rip](#))

From [Wikipedia](#): “In physical cosmology, the Big Rip is a hypothetical cosmological model concerning the ultimate fate of the universe, in which the matter of the universe, from stars and galaxies to atoms and subatomic particles, and even spacetime itself, is progressively torn apart by the expansion of the universe at a certain time in the future, until distances between particles will infinitely increase.”

# Heat Death of the Universe

- ⑩ Other theories have the Universe dying a “heat death” over very, very long time spans ( $\sim 10^{10^{50}}$  years), with stars dying, matter decaying, ...



Figure: The **supermassive black holes** are all that remain of galaxies once all protons decay, but even these giants are not immortal. (cc Heat Death)

From [Wikipedia](#): “The heat death of the universe (also known as the Big Chill or Big Freeze) is a hypothesis on the ultimate fate of the universe, which suggests the universe will evolve to a state of no thermodynamic free energy, and will therefore be unable to sustain processes that increase entropy.”

# Does The Observable Universe Lie Inside Something Bigger?

Does The Observable Universe Lie Inside Something Bigger?

# An Infinite Number of Hubble Volumes?

## ① An infinite number of Hubble volumes?

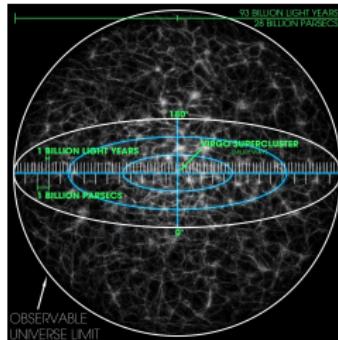


Figure: Visualization of the whole [observable universe](#). The inner blue ring indicates the approximate size of the Hubble volume. (© [Hubble Volume](#))

From [Wikipedia](#): “In cosmology, a Hubble volume ... is a spherical region of the observable universe surrounding an observer beyond which objects recede from that observer at a rate greater than the speed of light due to the expansion of the universe.”

If the Universe is infinite, there is an infinite number of Hubble volumes, each out of contact with all the others.

# The Multiverse or Many-Worlds Interpretation of Quantum Mechanics

## ② The multiverse or many-worlds interpretation of quantum mechanics

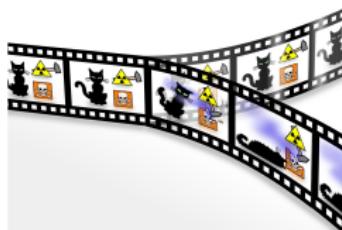


Figure: The quantum-mechanical "Schrödinger's cat" paradox according to the many-worlds interpretation. In this interpretation, ...the cat is both alive and dead, even before the box is opened, but the "alive" and "dead" cats are in different branches of the multiverse. (cc Many Worlds)

From [Wikipedia](#): "The many-worlds interpretation (MWI) is a philosophical position about how the mathematics used in quantum mechanics relates to physical reality. ... The many-worlds interpretation implies that there are most likely an uncountable number of universes."

# Oscillatory Universe Theory

## ③ Oscillatory Universe theory



Figure: The [video](#) shows an animation of the expected behavior of a Big Crunch. (cc Cyclic Universe)

From [Wikipedia](#): “A cyclic model ... is any of several cosmological models in which the universe follows infinite, or indefinite, self-sustaining cycles. For example, the oscillating universe theory briefly considered by Albert Einstein in 1930 theorized a universe following an eternal series of oscillations, each beginning with a Big Bang and ending with a Big Crunch; in the interim, the universe would expand for a period of time before the gravitational attraction of matter causes it to collapse back in and undergo a bounce.”

# The Brane Multiverse

- ④ The brane multiverse, which has the physical Universe existing on a membrane in hyperspace

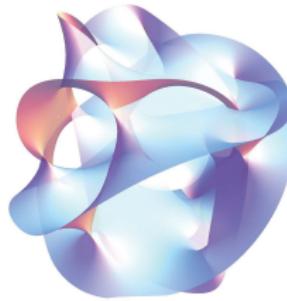


Figure: In one version of string theory known as the topological B-model, the **D-branes** are complex submanifolds of certain six-dimensional shapes called Calabi–Yau manifolds (© [Brane Multiverse](#))

From [Wikipedia](#): “The **brane multiverse** version postulates that our entire universe exists on a membrane (brane) which floats in a higher dimension or “bulk”. In this bulk, there are other membranes with their own universes. These universes can interact with one another, and when they collide, the violence and energy produced is more than enough to give rise to a big bang.”

# The Simulation Hypothesis

## ⑤ The Simulation hypothesis

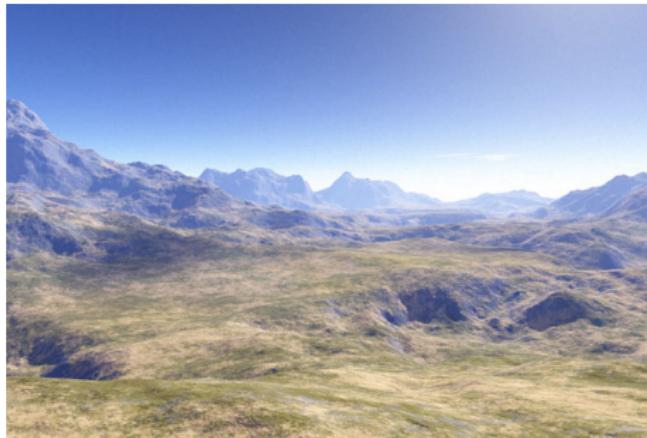


Figure: A [fractal landscape](#) created using the [scenery generator](#) program [Terragen](#).  
(cc) [Simulation Hypothesis](#))

From [Wikipedia](#): “The simulation hypothesis proposes that what humans experience as the world is actually a simulated reality, such as a computer simulation in which humans themselves are constructs. There has been much debate over this topic, ranging from philosophical discourse to practical applications in computing.”

# Black Hole Cosmology

## ⑥ Black hole cosmology

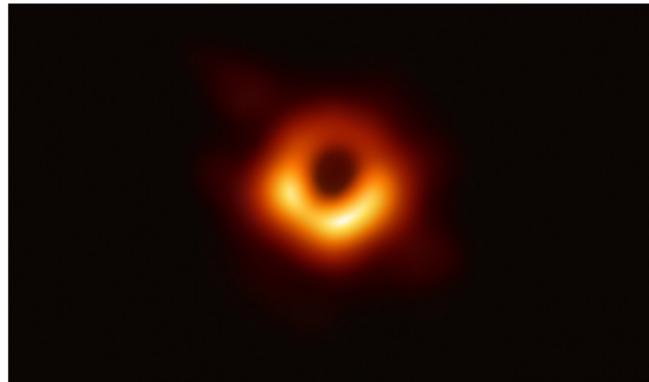


Figure: The first direct image of a [supermassive black hole](#) in Messier 87, a supergiant elliptical galaxy in the constellation Virgo. (cc [Black Hole Cosmology](#))

From [Wikipedia](#): “A black hole cosmology (also called Schwarzschild cosmology or black hole cosmological model) is a cosmological model in which the observable universe is the interior of a black hole.

In the version as originally proposed ... the observable universe is the interior of a black hole existing as one of possibly many inside a larger parent universe, or multiverse.”

# Philosophical Speculation About the Universe

## Philosophical Speculation About the Universe

- ① Realism - There is a reality independent of any beliefs, perceptions, etc., etc.



Figure: Depiction of Plato (left) and Aristotle (right)  
(cc Realism)

From [Wikipedia](#): “Philosophical realism .... is the view that a certain kind of thing (ranging widely from abstract objects like numbers to moral statements to the physical world itself) has mind-independent existence, i.e. that it exists even in the absence of any mind perceiving it or that its existence is not just a mere appearance in the eye of the beholder.”

“Realism can also be a view about the properties of reality in general, holding that reality exists independent of the mind, as opposed to non-realist views (like some forms of skepticism and solipsism) which question the certainty of anything beyond one's own mind. ”

# Physicalism/Materialism

- ② Physicalism/Materialism - everything is physical, including consciousness, thoughts, beliefs, emotions, abstractions, art, music and so on.

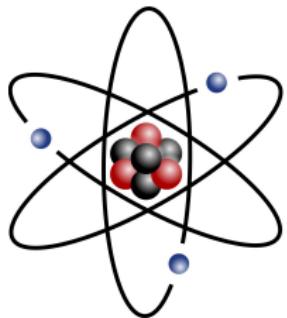


Figure: Stylised atom. (cc  
Physicalism/Materialism)

From [Wikipedia](#): "In philosophy, physicalism is the metaphysical thesis that "everything is physical", ... Physicalism is closely related to [materialism](#), ...Physicalism encompasses matter, but also energy, physical laws, space, time, structure, physical processes, information, state, and forces, among other things, as described by physics and other sciences, as part of the physical in a monistic sense."

From a physicalist perspective, even abstract concepts such as mathematics, morality, consciousness, intentionality, and meaning are considered physical entities, although they may consist of a large ontological object and a causally complex structure."

# Idealism

- ③ Idealism - Reality is entirely a mental construct; ideas are the highest form of reality or have the greatest claim to being considered “real”; consciousness (the mind) is the origin of the material world.



Figure: The Upanishadic sage [Yajnavalkya](#) (c. possibly 8th century BCE) is one of the earliest exponents of idealism . . . (cc [Idealism](#))

From [Wikipedia](#): “Idealism in philosophy, also known as philosophical idealism or metaphysical idealism, is the set of metaphysical perspectives asserting that, most fundamentally, reality is equivalent to mind, spirit, or consciousness; that reality is entirely a mental construct; or that there is some higher “ideal form” of reality.”

# Double-aspect Theory

- Double-aspect Theory - The mental and the physical are two aspects of, or perspectives on, the same thing; there is an underlying reality that is neither mental nor physical.

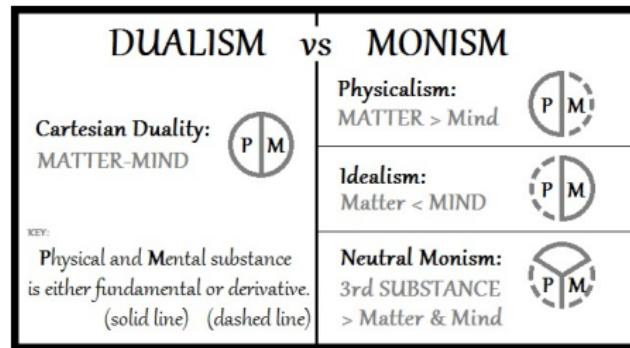


Figure: This diagram contrasts dual-aspect theory (akin to neutral monism) with physicalism and idealism, as well as Cartesian dualism. (© Double-aspect Theory)

From Wikipedia: "... double-aspect theory ... also called dual-aspect monism ... "dual-aspect approaches consider the mental and physical domains of reality as aspects, or manifestations, of an underlying undivided reality in which the mental and the physical do not exist as separate domains." "

# Mind–body Dualism

- ⑤ Mind–body Dualism - Either the view that mental phenomena are non-physical, or that the mind and body are distinct and separable.

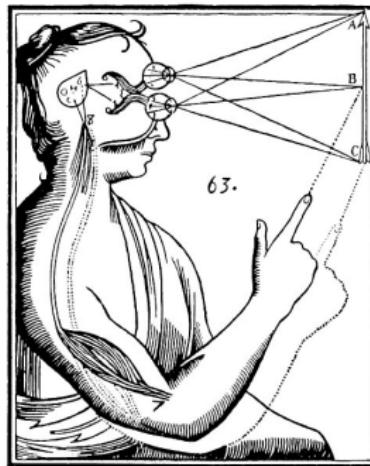
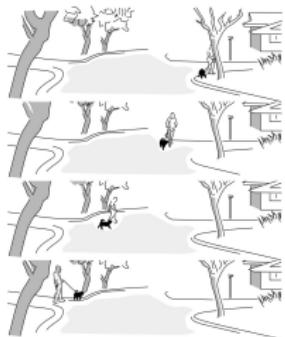


Figure: René Descartes's illustration of dualism. (© Mind–body Dualism)

From [Wikipedia](#): “In the philosophy of mind, mind–body dualism denotes either the view that mental phenomena are non-physical, or that the mind and body are distinct and separable. ”

# Presentism Vs. Eternalism

- ⑥ Philosophical Presentism - only the present exists.
- ⑦ Eternalism - All existence in time is equally real, space-time as an unchanging four-dimensional “block”.



A Man walking his dog

(cc) Presentism/Eternalism

“Time progresses through the series of snapshots from the bottom of the page to the top. In a common sense view of time, each of those four instants would exist one after another. According to eternalism, those four instants all equally exist.”

From [Wikipedia](#): “... eternalism is an approach to the ontological nature of time, which takes the view that all existence in time is equally real, ...

... [presentism](#) ... argues that only the present exists. The present does not travel forward through an environment of time, moving from a real point in the past and toward a real point in the future. Instead, it merely changes. ”

## Philosophical Ideas about the Universe - I

- ⑧ Panpsychism - The mind or a mindlike aspect is a fundamental and ubiquitous feature of reality.



## Illustration of the

Neoplatonic concept of  
anima mundi emanating  
from The Absolute, in  
ways a precursor to modern  
panpsychism

(cc) Panpsychism)

From Wikipedia "In the philosophy of mind, panpsychism is the view that the mind or a mind-like aspect is a fundamental and ubiquitous feature of reality. It is also described as a theory that "the mind is a fundamental feature of the world which exists throughout the universe". In the 19th century, panpsychism was the default philosophy of mind in Western thought, but it saw a decline in the mid-20th century with the rise of [logical positivism](#). Recent interest in the hard problem of consciousness and developments in the fields of neuroscience, psychology, and quantum physics have revived interest in panpsychism in the 21st century."

# Anima Mundi

- ⑨ Anima Mundi - The Cosmos is a living creature endowed with soul and reason.



Illustration of the correspondences between all parts of the **created cosmos**, with the anima mundi depicted as a woman  
(cc) [Anima Mundi](#))

From [Wikipedia](#) "The anima mundi or world soul is, according to several systems of thought, an intrinsic connection between all living beings, which relates to the world in much the same way as the soul is connected to the human body. ...  
... Plato adhered to this idea, identifying the universe as a living being:  
"Thus, then, in accordance with the likely account, we must declare that this Cosmos has verily come into existence as a Living Creature endowed with soul and reason [...] a Living Creature, one and visible, containing within itself all the living creatures which are by nature akin to itself." "

# Spiritualism (philosophy)

- ⑩ Spiritualism - There is an immaterial reality that cannot be perceived by the senses.

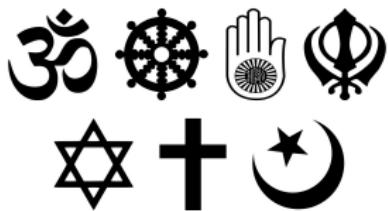


Figure: icons of various religions.  
(cc Spiritualism)

From [Wikipedia](#): “In philosophy, spiritualism is the notion, shared by a wide variety of systems of thought, that there is an immaterial reality that cannot be perceived by the senses. This includes philosophies that postulate a personal God, the immortality of the soul, or the immortality of the intellect or will, as well as any systems of thought that assume a universal mind or cosmic forces lying beyond the reach of purely materialistic interpretations. Generally, any philosophical position, be it dualism, monism, atheism, theism, pantheism, idealism or any other, is compatible with spiritualism as long as it allows for a reality beyond matter.”

# Digital Physics

- ① Digital Physics - The Universe can be conceived of as a vast, digital computation device, or as the output of a deterministic or probabilistic computer program.

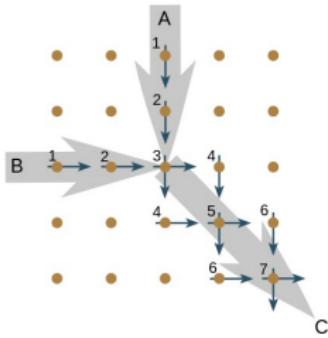


Figure: An elementary process in Zuse's Calculating Space: Two digital particles A and B form a new digital particle C. (© [Digital Physics](#))

From [Wikipedia](#): “Digital physics is a speculative idea that the universe can be conceived of as a vast, digital computation device, or as the output of a deterministic or probabilistic computer program. The hypothesis that the universe is a digital computer was proposed by Konrad Zuse in his 1969 book *Rechnender Raum* (“Calculating-space”).

Digital physics suggests that there exists, at least in principle, a program for a universal computer that computes the evolution of the universe. The computer could be, for example, a huge cellular automaton.”

# Mathematical Universe Hypothesis

- ⑫ Mathematical Universe Hypothesis - Our external physical reality is a mathematical structure.

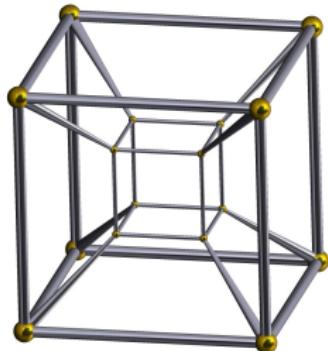


Figure: Central projection of the tesseract, a Schlegel diagram. (© described by mathematics, but is math-  
[Mathematical Universe Hypothesis](#))

From [Wikipedia](#): "In physics and cosmology, the mathematical universe hypothesis (MUH), also known as the ultimate ensemble theory, is a speculative "theory of everything" (TOE) proposed by cosmologist Max Tegmark."

According to the hypothesis, the universe is a mathematical object in and of itself. Furthermore, Tegmark suggests that not only is the universe mathematical, but it is also computable. ...

... the physical universe is not merely described by mathematics, but is mathematics — specifically, a mathematical structure. Mathematical existence equals physical existence. "

Is The Physical Universe just a cross-section of something even larger - ideas from religion

Is The Physical Universe just a cross-section of something even larger - ideas from religion

# Creation

- ① Creation - The Universe was created from nothing by a supreme being.

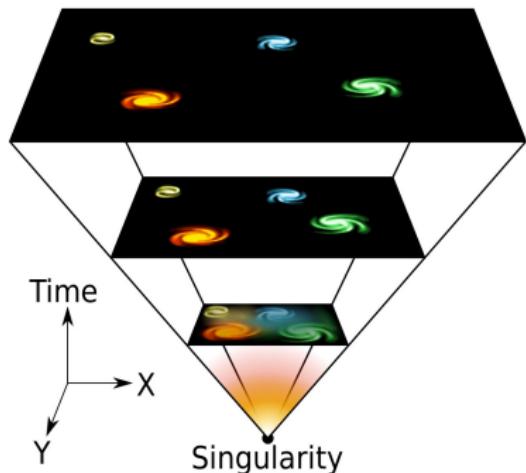


Figure: Some modern religious beliefs regard the Big Bang as the moment of creation. (cc Creation)

From [Wikipedia](#): "Since the emergence of the Big Bang theory as the dominant physical cosmological paradigm, there have been a variety of reactions by religious groups regarding its implications for religious cosmologies.

Some accept the scientific evidence at face value, some seek to harmonize the Big Bang with their religious tenets, and some reject or ignore the evidence for the Big Bang theory."

# Religious Cosmology

- ② Religious cosmology and Other Realms - The physical Universe is just one of several realms/planes such as “Heaven”, “Hell”, “The Underworld”, “The Afterlife”, ...



Figure: God rests with his creation.

Julius Schnorr von Carolsfeld 1860 (cc  
Religious Cosmology)

From [Wikipedia](#): “Religious cosmology is an explanation of the origin, evolution, and eventual fate of the universe from a religious perspective. ... Religious cosmologies describe the spatial lay-out of the universe in terms of the world in which people typically dwell as well as other dimensions, such as the seven dimensions of religion; these are ritual, experiential and emotional, narrative and mythical, doctrinal, ethical, social, and material. ”

# Deities and Other Supernatural Beings

- ③ Supernatural Beings - The physical universe and other realms contain various supernatural beings such as Gods, Demons, Angels, Ghosts etc., etc.



**Figure:** In ancient Celtic and Gallo-Roman religion, Cernunnos or Carnonos is a god depicted with antlers, seated cross-legged, and is associated with stags, horned serpents, dogs and bulls. (© Supernatural Beings)

From [Wikipedia](#): “A deity or god is a supernatural being considered to be sacred and worthy of worship due to having authority over the universe, nature or human life.”

[Non-physical entities](#) also include things such as [angels](#), [demons](#), [souls](#), and [ghosts](#).

# Soul or Spirit

- ④ Soul or Spirit - Individuals have an eternal, non-physical aspect to their being.



Figure: Artist's depiction of a human soul leaving the body.  
(cc) Soul or Spirit)

From [Wikipedia](#): “In many religious and philosophical traditions, the soul is the non-material essence of a person, which includes one's identity, personality, and memories, an immaterial aspect or essence of a living being that is believed to be able to survive physical death. The concept of the soul is generally applied to humans, though it can also be applied to other living or even non-living entities, as in animism.”

# God - There is a Universal, Eternal Supreme Being

- ⑤ God - There is a Universal, Eternal Supreme Being that exists everywhere and at all times.

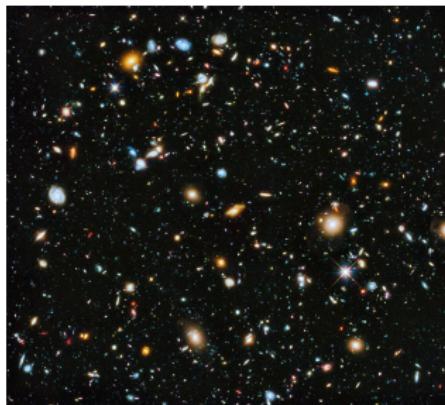


Figure: Representation (for the purpose of art or worship) of God in (left to right from top) Christianity, Islam, Hinduism, Sikhism, Judaism, and the Bahá'í Faith. (cc God)

From [Wikipedia](#): "In monotheistic belief systems, God is usually viewed as the supreme being, creator, and principal object of faith. In polytheistic belief systems, a god is "a spirit or being believed to have created, or for controlling some part of the universe or life, for which such a deity is often worshipped". Belief in the existence of at least one god is called theism."

# Pantheism

- ⑥ Pantheism - Reality, the universe and the cosmos are identical to divinity and a supreme being or entity, possibly that the physical Universe is like the layer of dead skin cells that surround a living human.



**Figure:** Pantheists believe that the universe itself and everything in it forms a single, all-encompassing deity. (© Pantheism)

From [Wikipedia](#): “Pantheism is the philosophical religious belief that reality, the universe, and nature are identical to divinity or a supreme entity. The physical universe is thus understood as an immanent deity, still expanding and creating, which has existed since the beginning of time. The term pantheist designates one who holds both that everything constitutes a unity and that this unity is divine, consisting of an all-encompassing, manifested god or goddess. All astronomical objects are thence viewed as parts of a sole deity.”

# Transcendence

- ⑦ Transcendence - The aspect of existence that is completely independent of the material universe, beyond all known physical laws.



Figure: Stained glass window in Holy Family Roman Catholic Church, Annacloy Road, Teconnaught/Annanclay, County Down, Northern Ireland. (cc Transcendence)

From [Wikipedia](#): "In religion, transcendence is the aspect of existence that is completely independent of the material universe, beyond all known physical laws. This is related to the nature and power of deities as well as other spiritual or supernatural beings and forces. This is contrasted with immanence, where a god is said to be fully present in the physical world and thus accessible to creatures in various ways. In religious experience, transcendence is a state of being that has overcome the limitations of physical existence, and by some definitions, has also become independent of it. This is typically manifested in prayer, rituals, meditation, psychedelics and paranormal "visions"."

# Eternal Battle - The Universe exists as part of an eternal battle between Good and Evil, Chaos and Order

- ⑥ Eternal Battle - The Universe exists as part of an eternal battle between Good and Evil, Chaos and Order, . . . .



Figure: One of the five paintings of [Extermination of Evil](#) portrays Sendan Kendatsuba, one of the eight guardians of Buddhist law, banishing evil. (cc [Good and Evil](#))

From [Wikipedia](#): "In religion, ethics, philosophy, and psychology, "good and evil" is a very common dichotomy. In cultures with Manichaean and Abrahamic religious influence, evil is perceived as the dualistic antagonistic opposite of good, in which good should prevail and evil should be defeated. In cultures with Buddhist spiritual influence, both good and evil are perceived as part of an antagonistic duality that itself must be overcome through achieving Śūnyatā: emptiness in the sense of recognition of good and evil being two opposing principles but not a reality, emptying the duality of them, and achieving a oneness."

# Apocalypticism

- ④ Apocalypticism - The world and civilization will soon come to a tumultuous catastrophic end.



Figure: [Four Horsemen of the Apocalypse](#), woodcut print from the [Apocalypse of Albrecht Dürer \(1497–1498\)](#), [Staatliche Kunsthalle Karlsruhe](#). (cc) [Apocalypticism](#)

From [Wikipedia](#): “Apocalypticism is the religious belief that the end of the world is imminent, even within one's own lifetime. This belief is usually accompanied by the idea that civilization will soon come to a tumultuous end due to some sort of catastrophic global event.”

Apocalypticism is one aspect of eschatology in certain religions, the part of theology concerned with the final events of human history, or the ultimate destiny of humanity (societal collapse, human extinction, and so on).”

# Cycles - The world goes through cycles

- ⑩ Cycles - The world goes through cycles of decay, redemption, and rebirth.

From [Wikipedia](#): “Eschatology concerns expectations of the end of the present age, human history, or the world itself. The end of the world or end times is predicted by several world religions (both Abrahamic and non-Abrahamic), which teach that negative world events will reach a climax. ... In the context of mysticism, the term refers metaphorically to the end of ordinary reality and to reunion with the divine. Religions treat eschatology as a future event prophesied in sacred texts or in folklore. While other religions may have concepts of renewal or transformation after significant events, the explicit description of a new earth is primarily found in Christian teachings within the context of eschatology, this description can be found in Chapter 21 of the Book of Revelation.”



Figure: Icon of the Second Coming. Greek, c. 1700 A.D. (cc [Cycles](#))

- ⑪ Frashokereti - Evil will be destroyed, and everything else will then be in perfect unity with God.



Figure: The **Faravahar** or Frawahr is one of the symbols of Zoroastrianism (cc Frashokereti)

From [Wikipedia](#): "Frashokereti is the Avestan language term for sum of [that person's] thoughts, the Zoroastrian doctrine of a final words and deeds, ... ." Thus, renovation of the universe, when each human bears the responsibility for the fate of his own soul, evil will be destroyed, and everything else will be then in perfect unity with God (Ahura Mazda). responsibility for the fate of the world."

The doctrinal premises are (1) good will eventually prevail over evil; (2) creation was initially perfectly good, but was subsequently corrupted by evil; (3) the world will ultimately be restored to the perfection it had at the time of creation; (4) the "salvation for the individual depended on the

# Magic

- ⑫ Magic - The use of rituals, symbols, actions, gestures, or language with the aim of utilizing supernatural forces.



Figure: The Magician, an illustration from the Rider-Waite tarot deck first published in 1910  
(cc) Magic

From [Wikipedia](#): “Magic is an ancient practice rooted in rituals, spiritual divinations, and/or cultural lineage—with an intention to invoke, manipulate, or otherwise manifest supernatural forces, beings, or entities in the natural world. It is a categorical yet often ambiguous term which has been used to refer to a wide variety of beliefs and practices, frequently considered separate from both religion and science.”

# Sacred

- ⑩ Sacred - Objects or places dedicated or set apart for the service or worship of a deity.



Figure: The Sacred Hindoo Grove near Chandod on the Banks of the Nerbudda by [James Forbes](#), 1782  
(cc) Sacred

From [Wikipedia](#): "Sacred describes something that is dedicated or set apart for the service or worship of a deity; is considered worthy of spiritual respect or devotion; or inspires awe or reverence among believers. The property is often ascribed to objects (a "sacred artifact" that is venerated and blessed), or places ("sacred ground")."

# Personality Traits Might Prevent an Evolving Intelligent Species Getting Past "The Great Filter"

Personality Traits Might Prevent an Evolving Intelligent Species Getting Past  
"The Great Filter"

# Getting Past "The Great Filter" - Too Self-Destructive?

There are various ways a species might not "have what it takes" to get past "The Great Filter" (add or delete from this list as you see fit).

- ➊ too self-destructive ?



Figure: Pair of drunkards

(cc) [Self-destructive](#))

From [Wikipedia](#): "Self-destructive behavior is any behavior that is harmful or potentially harmful towards the person who engages in the behavior."

However, what is meant here is also self-destructive behaviour that affects so many people that it becomes a social problem, such as alcohol or opioid addiction, addiction to gambling or pornography.

# Getting Past "The Great Filter" - Too Violent?

- ② too violent ?



Figure: Cain slaying Abel

(cc) Violent

From [Wikipedia](#): "The World Health Organization's definition of violence: "the intentional use of physical force or power, threatened or actual, against oneself, another person, or against a group or community, which either results in or has a high likelihood of resulting in injury, death, psychological harm, maldevelopment, or deprivation.""

Can we get past our present fractured, fragmented world to a stage where we realize that we are all equally part of something that is greater than us all?

# Getting Past "The Great Filter" - Too Near-sighted, Time-wise?

## ③ too near-sighted, time-wise ?

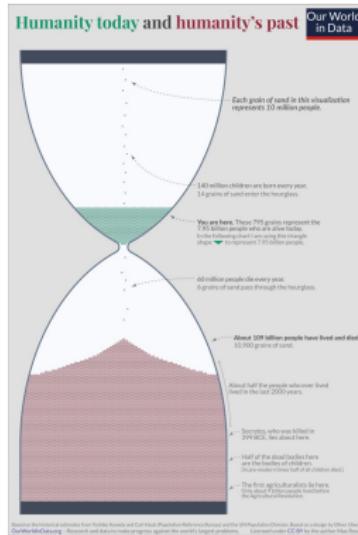


Figure: Comparing the number of human lives in the past and present history."

### (cc) Near-sighted

From [Wikipedia](#): "Longtermism is the ethical view that positively influencing the long-term future is a key moral priority of our time. It is an important concept in effective altruism and a primary motivation for efforts that aim to reduce existential risks to humanity."

From the article [The future is vast – what does this mean for our own life?](#): "If we manage to avoid a large catastrophe, we are living at the early beginnings of human

# Getting Past "The Great Filter" - "Running out of Steam"?

- ④ running out of steam?

(cc) [VHEMT](#))

Birth-rates are falling in many parts of the world, with an increasing proportion of people appearing to not want children.



[Figure](#): Voluntary Human Extinction Movement

The VHEMT is a small minority in terms of numbers, but together with falling birth rates, perhaps indicative of a growing apathy.

From [Wikipedia](#): "The Voluntary Human Extinction Movement (VHEMT[A]) is an environmental movement that calls for all people to abstain from reproduction in order to cause the gradual voluntary extinction of humankind."

# Getting Past "The Great Filter" - Too Close-minded?

## ⑤ too close-minded?



Figure: Close-minded: not willing to consider different ideas or opinions

(cc) Close-minded

The future will likely be increasingly complicated, with future developments in technology, increased understanding of the Universe, an increasingly complex society, etc., etc., and close-mindedness will work against people.

From [Wikipedia](#): "Futures studies, futures research, futurism research, futurism, or futurology is the systematic, interdisciplinary and holistic study of social/technological advancement, and other environmental trends; often for the purpose of exploring how people will live and work in the future."

# Getting Past "The Great Filter" - not grounded enough in "reality"?

## ⑥ not grounded enough in "reality"?



Skewed viewpoints have often leads to large-scale social problems, including war and genocide.

What an “un-skewed” viewpoint might be is open to debate (for example, how much is still unknown to us?), but clear access to unbiased information is clearly desirable.

Figure: A stereotypical caricature of a villain

(cc) Not Grounded)

Biased viewpoints may be the result of external factors, such as [fake news](#), [disinformation](#), psychological and emotional [manipulation](#), [censorship](#), [groupthink](#), etc., etc.

They may also be the result of personal neglect to seek after truth in the face of [stereotypes](#), [prejudices](#) based on false understanding, [Idée fixe](#), [confirmation bias](#), etc., etc.

# Getting Past "The Great Filter" - Too Nihilistic?

## ⑦ too nihilistic?



From [Wikipedia](#), "Nihilism (from Latin *nihil* 'nothing') is a family of views within philosophy that rejects generally accepted or fundamental aspects of human existence, such as knowledge, morality, or meaning."

"There have been different nihilist positions, including that human values are baseless, that life is meaningless, that knowledge is impossible, or that some set of entities does not exist or is meaningless or pointless. "

**Figure:** Nothing  
(Nihilistic)

# Getting Past "The Great Filter" - Too Credulous?

## ⑧ too credulous?



Figure: Illustration of a fairy by C. E. Brock  
(Credulous)

From [Wikipedia](#), "Credulity is a person's willingness or ability to believe that a statement is true, especially on minimal or uncertain evidence."

"Credulity is not necessarily a belief in something that may be false: the subject of the belief may even be correct, but a credulous person will believe it without good evidence."

Widespread credulity has implications as regards politics, rumours that lead to social unrest, false belief that cause widespread health issues, etc., etc.

# Getting Past "The Great Filter" - Too Atheistic?

- ➊ too atheistic?



Figure: Symbol of atheism endorsed by the Atheist Alliance International

(Atheistic)

From [Wikipedia](#), "Atheism, in the broadest sense, is an absence of belief in the existence of deities."

If there is an aspect to existence and/or the cosmos that does involve a religious component, then if people follow a wholly atheistic path, then they will not be fully engaged with the Universe going forward, and may head into a dead end.

# Getting Past "The Great Filter" - Too Religious?

- ⑩ too religious?

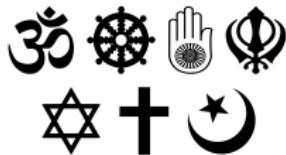


Figure: Icons of various religions including Hinduism, Buddhism, Jainism, Sikhism, Judaism, Christianity, and Islam  
(Religious)

From [Wikipedia](#), "Religion is a range of social-cultural systems, including designated behaviors and practices, morals, beliefs, worldviews, texts, sanctified places, prophecies, ethics, or organizations, that generally relate humanity to supernatural, transcendental, and spiritual elements — although there is no scholarly consensus over what precisely constitutes a religion."

If the various criticisms of religion - [opium of the masses](#), ["viruses of the Mind"](#), [mental illness](#), [Immature stage of societal development](#), [man made social construct](#), etc., etc. - have validity and there is no Divine or Supernatural aspect to existence, then religion is a hindrance to human progress.

# Getting Past "The Great Filter" - Too Frivolous?

## ① too frivolous?



Figure: "In good times,  
beware the consequences"

(Frivolous)

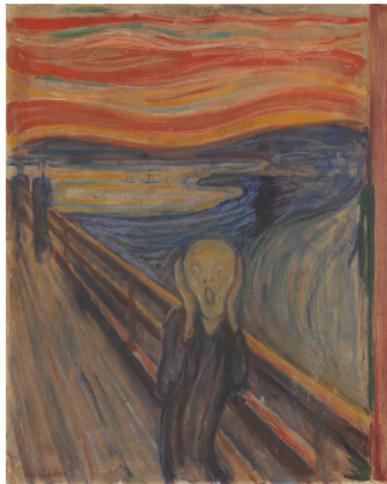
Various forms of **life stance** or **worldview** take a more considered approach to living, for example, **mindfulness**, **eternal now**, **nepsis**, **carpe diem**, **intentional living**, **personal development**, **sustainable living**, etc., etc.

Other forms take a less considered view, such as various forms of **addiction**, **hedonism**, **thrill-seeking**, **impulsivity**, **sensation seeking**, **compulsive behavior**, **libertinism**, **dropping out**, **Peter Pan syndrome**, etc., etc.

Wider prevalence of the former group of forms would be more helpful to the development of the human world, going forward.

# Getting Past "The Great Filter" - Too Wound-up?

## ⑫ too wound-up?



Various approaches to life, or life conditions, can add to, or create stress, in a person's life. These include **workaholism**, getting caught up in the "**rat race**", **overwork**, **occupational burnout**, various forms of **fanaticism**, etc., etc.

Other approaches try to reduce stress. These include seeking a beneficial **work-life balance**, **down-shifting**, practising **moderation**, **living simply**, etc., etc.

Figure: The scream of nature by Edvard Munch (1863–1944)

Wide-scale stress can cause a lot of social problems, hindering the world from moving forward properly.

(Wound-up)

## ⑬ too ...? too ... ? too ... ? too ... ? too ... ?

# Education and Life, the Universe and Everything

Education and Life, the Universe and Everything

# The Great Filter Again

- ① The Great Filter represents something real that humans, like all intelligent species, need to get past.

## The Great Filter

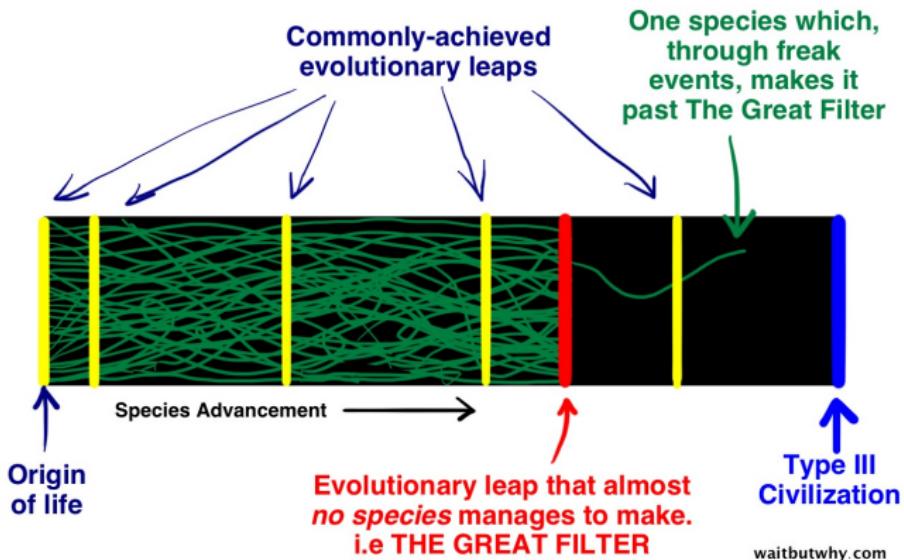


Figure: Image initially appeared on this [Wait But Why](#) page in May 2014.

# The Big Picture and Education I

- ② The big picture of the history of the Universe, the history of life on Earth, how the present human world developed from the time of our pre-human ancestors, should all be taught in elementary- and high school.

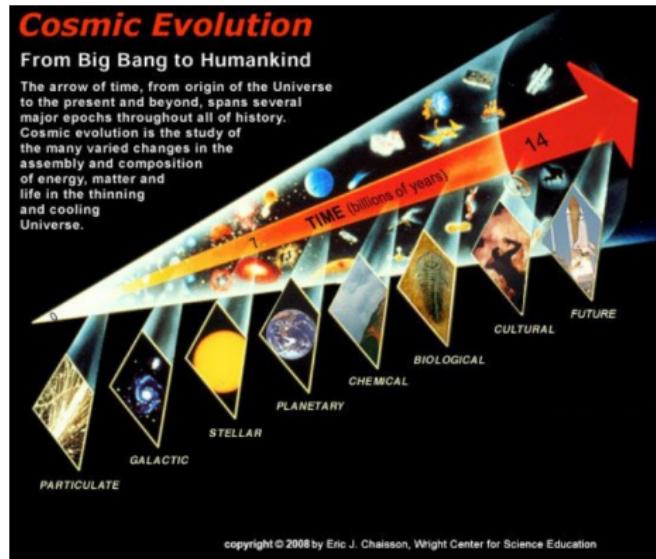


Figure: Copyright © 2008 [Eric J. Chaisson](#), Harvard-Smithsonian Center for Astrophysics  
(© Cosmic Evolution)

# The Big Picture and Education II

- ③ Life on Earth and the human experience should be presented in terms of its place in the overall history and structure of the Universe, instead of putting the Earth, humans, the present human world, etc., etc. at the center of the picture.

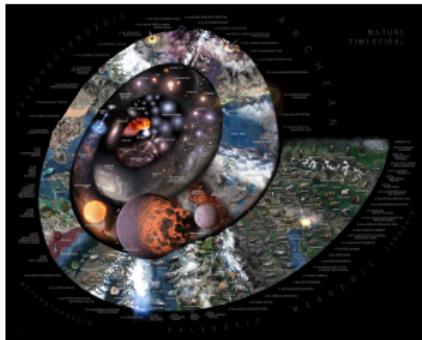


Figure: The present as a cross-section through Time. (cc [The Present in Time](#))

The present time should be presented as a cross-section/slice through the history of all human-related life, stretching back billions of years to the origin of life on Earth, and possibly stretching billions of years into the future (assuming we get past The Great Filter).

# The Big Picture and Education III

## ④ Education, the Cosmos, and The Great Filter

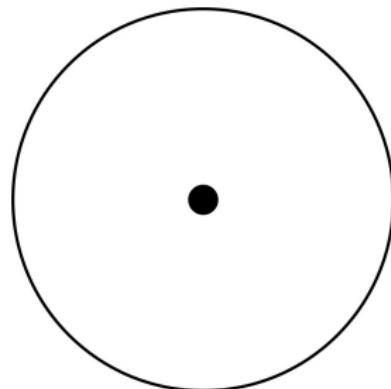


Figure: Why is there anything at all?

(Education and the Cosmos)

One of the central messages of education about the Cosmos, and the place of people in it, should be that the true nature of the Cosmos lies somewhere between the minimal picture consistent with what has been observed/is “known”, and the maximum that is theoretically possible.

Students should discuss “big ideas”, with the aim of presenting the largest range of possibilities that is not directly contradicted by scientific evidence, rather than being taught the viewpoint that nothing can possibly lie outside of what has been observed.

Almost certainly, most of our discoveries about the Cosmos lie ahead.

# Image Licensing Information

## Image Licensing/Copyright Information

# Image Licensing Information

- (cc Constellation Fornax) This file is in the [public domain](#) because it was created by NASA and ESA. More information [here](#).
- (cc Hubble Zoom Out) This file is in the [public domain](#) in the United States because it was solely created by NASA. More information [here](#).
- (cc Big Bang) This file is in the [public domain](#) in the United States because it was solely created by NASA. More information [here](#).
- (cc Laniakea) This file is licensed under the [Creative Commons Attribution-Share Alike 4.0 International](#) license. More information [here](#).
- (cc Solar System) This file is in the [public domain](#) in the United States because it was solely created by NASA. More information [here](#).
- (cc Moon) This file is in the [public domain](#) in the United States because it was solely created by NASA. More information [here](#).
- (cc Magma Oceans) This file is licensed under the [Creative Commons Attribution-Share Alike 4.0 International](#) license. More information [here](#).

## Image Licensing Information Continued

- (cc Early Oceans) This file is licensed under the [Creative Commons Attribution-Share Alike 4.0 International](#) license. More information [here](#).
- (cc Stromatolites) This file is made available under the [Creative Commons CC0 1.0 Universal Public Domain Dedication](#). More information [here](#).
- (cc Devonian) This work is in the [public domain](#) in the United States because it was published (or registered with the U.S. Copyright Office) before January 1, 1929. More information [here](#).
- (cc Ediacaran) This file is licensed under the [Creative Commons Attribution-Share Alike 2.0 Generic](#) license. More information [here](#).
- (cc Fish) This file is licensed under the [Creative Commons Attribution 4.0 International](#) license. More information [here](#).
- (cc Forest) This file is licensed under the [Creative Commons Attribution-Share Alike 2.0 Generic](#) license. More information [here](#).

# Image Licensing Information Continued

- (cc) [Dinosaurs and Mammals I](#)) This file is licensed under the [Creative Commons Attribution-Share Alike 2.5 Generic](#) license. More information [here](#).
- (cc) [Dinosaurs and Mammals II](#)) This file is licensed under the [Creative Commons Attribution 2.0 Generic](#) license. More information [here](#).
- (cc) [Mammals](#)) This file is licensed under the [Creative Commons Attribution 2.0 Generic](#) license. More information [here](#).
- (cc) [Hominids](#)) Image credit [Velizar Simeonovski](#)
- (cc) [Early Humans](#)) This file is licensed under the [Creative Commons Attribution-Share Alike 4.0 International](#) license. More information [here](#).
- (cc) [Migrations](#)) This work has been released into the [public domain](#) by its author, [NordNordWest](#). More information [here](#).
- (cc) [Behavioral modernity](#)) This file is licensed under the [Creative Commons Attribution-Share Alike 3.0 Unported](#) license. More information [here](#).

# Image Licensing Information Continued

- (cc Modern World I) This file is licensed under the Creative Commons Attribution-Share Alike 3.0 Unported, 2.5 Generic, 2.0 Generic and 1.0 Generic license. More information [here](#).
- (cc Modern World II) This work is licensed under the Creative Commons 'Attribution-NonCommercial-ShareAlike 4.0 International' License:  
<https://creativecommons.org/licenses/by-nc-sa/4.0/>.  
Photo © Brian W. Schaller / License: CC BY-NC-SA 4.0. More information [here](#).

## Image Licensing Information Continued

- (cc AI takeover) This file is licensed under the Creative Commons Attribution-Share Alike Attribution-Share Alike 4.0 International, 3.0 Unported, 2.5 Generic, 2.0 Generic and 1.0 Generic license. More information [here](#).
- (cc Biotechnology risk) This file is a work of a U.S. Army soldier or employee, taken or made as part of that person's official duties. As a work of the U.S. federal government, it is in the public domain in the United States. More information [here](#).
- (cc Population Decline) This file is licensed under the Creative Commons Attribution-Share Alike 4.0 International license. More information [here](#).
- (cc Climate Change) This file is licensed under the Creative Commons Attribution-Share Alike 4.0 International license. More information [here](#).
- (cc Ecosystem collapse) This file is in the public domain in the United States because it was solely created by NASA. NASA copyright policy states that "NASA material is not protected by copyright unless noted". More information [here](#).

# Image Licensing Information Continued

- (cc Grey Goo) This file is made available under the [Creative Commons CC0 1.0 Universal Public Domain Dedication](#). More information [here](#).
- (cc Nuclear holocaust) This image is a work of a United States Department of Energy (or predecessor organization) employee, taken or made as part of that person's official duties. As a work of the U.S. federal government, the image is in the [public domain](#). More information [here](#).
- (cc Asteroid impact) This file is in the [public domain](#) in the United States because it was solely created by [NASA](#). More information [here](#).
  
- (cc Deadly Pandemic) Published by N+1 a popular science online publication of Russia <https://nplus1.ru/>, [protein models](#) are derivative works of the [free license site](#) ([freely available for both non-commercial and commercial use](#)). More information [here](#).
- (cc Large Scale Volcanism) This file is licensed under the [Creative Commons Attribution 2.0 Generic](#) license. More information [here](#).

## Image Licensing Information Continued

- (cc) Snowball Earth) This file is licensed under the [Creative Commons Attribution-Share Alike 4.0 International](#) license. More information [here](#).
- (cc) Planetary Collision) This image is from the NASA article [What Happens When Planets Collide](#). More information on NASA Images and Media Guidelines [here](#).
- (cc) Gamma Ray Burst) The copyright holder of this file, [National Science Foundation](#), allows anyone to use it for any purpose, provided that the copyright holder is properly attributed. More information [here](#).
- (cc) Extraterrestrial Invasion) This work is in the [public domain](#) in the United States because it was published (or registered with the U.S. Copyright Office) before January 1, 1929. More information [here](#).
- (cc) Advances in Technology and Science) This media file is in the [public domain](#) in the United States. This applies to U.S. works where the copyright has expired, often because its first publication occurred prior to January 1, 1929, and if not then due to lack of notice or renewal. More information [here](#).

# Image Licensing Information Continued

- (cc Space Travel) This file is in the [public domain](#) because it was created by [NASA](#) and [ESA](#). This applies to U.S. works where the copyright has expired, often because its first publication occurred prior to January 1, 1929, and if not then due to lack of notice or renewal. More information [here](#).
- (cc Understanding of the Cosmos) This work is in the [public domain](#) in its country of origin and other countries and areas where the copyright term is the author's life plus 100 years or fewer, including in the [United States](#). More information [here](#).
- (cc Humans Alike) This file is a work of an employee of the Executive Office of the President of the United States, taken or made as part of that person's official duties. As a work of the U.S. federal government, it is in the [public domain](#). More information [here](#).
- (cc Grey aliens) This file is licensed under the [Creative Commons Attribution-Share Alike 4.0 International](#) license. More information [here](#).
- (cc Different Species) This file is licensed under the [Creative Commons Attribution 2.0 Generic](#) license. More information [here](#).

# Image Licensing Information Continued

- (cc ice age) This file is licensed under the [Creative Commons Attribution-Share Alike 3.0 Unported](#) license, more information [here](#).
- (cc Tectonic Plates) This file is licensed under the [Creative Commons Attribution-Share Alike 4.0 International](#) license, more information [here](#).
- (cc daylength) This file is made available under the [Creative Commons Attribution-Share Alike 4.0 International](#) license, more information [here](#).
- (cc Pangea Ultima) This file is made available under the [Creative Commons CC0 1.0 Universal Public Domain Dedication](#) license, more information [here](#).
- (cc End of Life) This file is licensed under the [Creative Commons Attribution-Share Alike 2.0 Generic](#) license, more information [here](#).
- (cc Red Giant) This work is free software; you can redistribute it and/or modify it under the terms of the [GNU General Public License](#) as published by the [Free Software Foundation](#); either version 2 of the License, or any later version. More information [here](#).

## Image Licensing Information Continued

- (cc) [Andromeda–Milky Way](#)) This file is in the [public domain](#) in the United States because it was solely created by [NASA](#). NASA copyright policy states that "NASA material is not protected by copyright unless noted". More information [here](#).
- (cc) [The Big Rip](#)) The copyright holder of this work has released this work into the [public domain](#). More information [here](#).
- (cc) [Heat Death](#)) This file is in the [public domain](#) in the United States because it was solely created by [NASA](#). NASA copyright policy states that "NASA material is not protected by copyright unless noted". More information [here](#).
- (cc) [Hubble Volume](#)) This file is licensed under the [Creative Commons Attribution-Share Alike 3.0 Unported](#) license. More information [here](#).
  
- (cc) [Many Worlds](#)) This file is made available under the [Creative Commons CC0 1.0 Universal Public Domain Dedication](#). More information [here](#).
  
- (cc) [Cyclic Universe](#)) The copyright holder of this work has released this work into the [public domain](#). More information [here](#).

# Image Licensing Information Continued

- (cc Brane Multiverse) The copyright holder of this work has released this work into the [public domain](#). More information [here](#).
- (cc Simulation Hypothesis) This file is licensed under the [Creative Commons Attribution 3.0 Unported](#) license. More information [here](#).
- (cc Black Hole Cosmology) This file is licensed under the [Creative Commons Attribution 4.0 International](#) license. More information [here](#).
- (cc Realism) This work is in the [public domain](#) in the United States because it was published (or registered with the U.S. Copyright Office) before January 1, 1929. More information [here](#).
- (cc Physicalism/Materialism) This file is licensed under the [Creative Commons Attribution 3.0 Unported](#) license. More information [here](#).
- (cc Idealism) This file is licensed under the [Creative Commons Attribution 3.0 Unported](#) license. More information [here](#).

## Image Licensing Information Continued

- (cc) Double-aspect Theory) This file is licensed under the [Creative Commons CC0 1.0 Universal Public Domain Dedication](#). More information [here](#).
- (cc) Mind–body Dualism) This work is in the [public domain](#) in its country of origin and other countries (including the [United States](#)) and areas where the copyright term is the author's life plus 70 years or fewer. More information [here](#).
- (cc) Presentism/Eternalism) This work is in the [public domain](#) in its country of origin and other countries (including the [United States](#)) and areas where the copyright term is the author's life plus 70 years or fewer. More information [here](#).
- (cc) Panpsychism) This work is in the [public domain](#) in its country of origin and other countries (including the [United States](#)) and areas where the copyright term is the author's life plus 70 years or fewer. More information [here](#).
- (cc) Anima Mundi) This work is in the [public domain](#) in its country of origin and other countries (including the [United States](#)) and areas where the copyright term is the author's life plus 100 years or fewer. More information [here](#).

# Image Licensing Information Continued

- (cc Spiritualism) This work is in the this file is licensed under the [Creative Commons Attribution-Share Alike 4.0 International](#) license. More information [here](#).
- (cc Digital Physics) This work is in the this file is licensed under the [Creative Commons Attribution-Share Alike 4.0 International](#) license. More information [here](#).
- (cc Mathematical Universe Hypothesis) [Robert Webb](#) gives general permission for this file to be used. It was created by [Stella Software](#), whose home page may be found [here](#). More information [here](#).
- (cc Creation) This work is in the this file is licensed under the [Creative Commons Attribution-Share Alike 4.0 International](#) license. More information [here](#).
- (cc Religious Cosmology) This work is in the [public domain](#) in its country of origin and other countries (including the [United States](#)) and areas where the copyright term is the author's life plus 100 years or fewer. More information [here](#).

# Image Licensing Information Continued

- (cc) Supernatural Beings) This file is licensed under the [Creative Commons Attribution-Share Alike 3.0 Unported](#) license. Attribution: [Nationalmuseet](#). More information [here](#).
- (cc) Soul or Spirit) This work is in the [public domain](#) in its country of origin and other countries (including the [United States](#)) and areas where the copyright term is the author's life plus 100 years or fewer. More information [here](#).
- (cc) God) These images are either in the [public domain](#) in its country of origin and other countries (including the [United States](#)) and areas where the copyright term is the author's life plus 70/100 years or fewer, in the public domain because copyright has expired, are ineligible for copyright and therefore is in the [public domain](#), is made available under the [Creative Commons CC0 1.0 Universal Public Domain Dedication](#), or the copyright holder of the work has released it into the [public domain](#). More information [here](#), [here](#), [here](#), [here](#), [here](#) and [here](#).
- (cc) Pantheism) This work is in the [public domain](#) because it was created by [NASA](#) and [ESA](#). More information [here](#).

# Image Licensing Information Continued

- (cc Transcendance) This file is licensed under the [Creative Commons Attribution-Share Alike 3.0 Unported](#) license. Modified from [File:Stained glass, Holy Family Church, Teconnaught, September 2010 \(27\).JPG](#), a file created by [Ardfern](#). More information [here](#).
- (cc Good and Evil) This work is in the [public domain](#) in its country of origin and other countries (including the [United States](#)) and areas where the copyright term is the author's life plus 100 years or fewer. More information [here](#).
- (cc Apocalypticism) The author died in 1528, so this work is in the [public domain](#) in its country of origin and other countries and areas where the copyright term is the author's life plus 100 years or fewer. This work is in the [public domain](#) in the [United States](#) because it was published (or registered with the U.S. Copyright Office) before January 1, 1929. More information [here](#).
- (cc Cycles) This work is in the [public domain](#) in its country of origin and other countries (including the [United States](#)) and areas where the copyright term is the author's life plus 70 years or fewer. More information [here](#).

## Image Licensing Information Continued

- (cc Frashokereti) The copyright holder of this work has released this work into the [public domain](#). More information [here](#).
- (cc Magic) The author died in 1942, so this work is in the [public domain](#) in its country of origin and other countries and areas where the copyright term is the author's life plus 80 years or fewer. This work is in the [public domain](#) in the [United States](#) because it was published (or registered with the U.S. Copyright Office) before January 1, 1929. More information [here](#).
- (cc Sacred) This work is in the [public domain](#) in its country of origin and other countries (including the [United States](#)) and areas where the copyright term is the author's life plus 100 years or fewer. More information [here](#).
- (cc Self-destructive) This work is in the [public domain](#) in its country of origin and other countries (including the [United States](#)) and areas where the copyright term is the author's life plus 100 years or fewer. More information [here](#).
- (cc Violent) This work is in the [public domain](#) in its country of origin and other countries (including the [United States](#)) and areas where the copyright term is the author's life plus 100 years or fewer. More information [here](#).

# Image Licensing Information Continued

- (cc Near-sighted) This work is in the this file is licensed under the [Creative Commons Attribution-Share Alike 4.0 International](#) license. More information [here](#). The original source is this [article](#).
- (cc VHEMT) This file is licensed under the [Creative Commons Attribution-Share Alike 3.0 Unported](#) license. More information [here](#).
- (cc Close-minded) This work is in the this file is licensed under the [Creative Commons Attribution-Share Alike 4.0 International](#) license. More information [here](#).
- (cc Not Grounded) This file is licensed under the [Creative Commons Attribution-Share Alike 3.0 Unported](#) license. Subject to [disclaimers](#). Attribution: J.J. at the [English-language Wikipedia](#). More information [here](#).
- (Nihilistic) This black square was generated using the computer algebra system [Mathematica](#).
- (cc Credulous) This work is in the [public domain](#) in its country of origin and other countries (including the [United States](#)) and areas where the copyright term is the author's life plus 80 years or fewer. More information [here](#).

# Image Licensing Information Continued

- (cc Atheistic) This file is made available by copyright holder under the [Creative Commons CC0 1.0 Universal Public Domain Dedication](#). More information [here](#).
- (cc Religious) This work is in the this file is published by the copyright holder, and licensed under the [Creative Commons Attribution-Share Alike 4.0 International](#) license. More information [here](#).
- (cc Frivolous) The work of art depicted in this image and the reproduction thereof are in the [public domain](#) worldwide. The reproduction is part of a [collection of reproductions compiled by The Yorck Project](#). The compilation copyright is held by [Zenodot Verlagsgesellschaft mbH](#) and licensed under the [GNU Free Documentation License](#). More information [here](#).
- (cc Wound-up) This work is in the [public domain](#) in the United States because it was published (or registered with the U.S. Copyright Office) before January 1, 1929. More information [here](#).

# Image Licensing Information Continued

- (cc) [Cosmic Evolution](#)) This image, Copyright (cc) 2008 [Eric J. Chaisson](#), Harvard-Smithsonian Center for Astrophysics, may be found on the [Web page](#) for the book [Cosmic Evolution](#).
- (cc) [The Present in Time](#)) This work is in the this file is licensed under the [Creative Commons Attribution-Share Alike 4.0 International](#) license. More information [here](#).
- (cc) [Education and The Cosmos](#)) This work has been released into the [public domain](#) by its author. More information [here](#).