

THE GEEKLY

The Perfect Magazine for Science Lovers.

**MIND BENDING
PARADOXES**

DARK MATTER

**ARTIFICIAL
INTELLIGENCE**

ORGANIC FOOD

BACTERIOPHAGES

THE BIG BANG

MUSIC OF THE UNIVERSE

Akhilesh Balaji

Exploring the very building "Blocks" of the universe. Thinking of atoms? Oh, no, it doesn't end there, it doesn't end there at all...



The background is white with various colorful abstract shapes and plus signs. In the top left, there are orange and purple organic shapes with a small white plus sign. In the top right, there are pink and blue striped circles and a purple organic shape with a blue plus sign. In the center, there is a large orange organic shape. In the bottom left, there is a yellow and green organic shape with a yellow plus sign. In the bottom right, there is a blue and teal organic shape with a white plus sign. A pink and purple wavy line is on the right side. A blue and white striped circle is in the lower right. A pink and purple brushstroke is in the bottom center.

EDITOR'S NOTE

Hi, readers! It's me, Akhilesh, your faithful editor. The magazine, the Geekly, is intended mainly for kids 7th and above, and adults, too! Maybe you could include first graders with an IQ of above 200 in that list. But, wait! Did you know that a high IQ doesn't always make you knowledgeable, or any more intelligent than the average person? In this issue of The Geekly, we explore the very music of the universe, and delve into the underworld, a world unbelievable to humanity, dark matter. Much more to come!

Happy Reading,
Akhilesh Balaji and Dhruv Ramu
Editor and Founders of The Geekly
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AKHILESH BALAJI

MUSIC OF THE UNIVERSE

HERE WE DELVE INTO THE VERY HARMONICS OF THE UNIVERSE. WE DELVE BEYOND THE SUPERFICIAL ATOM, AND THE ENIGMATIC QUARK, BEYOND THE SHINING PHOTON AND THE CLINGY GLUON. "WHAT IS BEYOND THESE?", YOU MAY ASK. WE ARRIVE AT THE VERY FABRIC OF THE UNIVERSE. A FABRIC WHICH IS A UNIVERSE OF ITS OWN: STRING THEORY.





MUSIC OF THE UNIVERSE

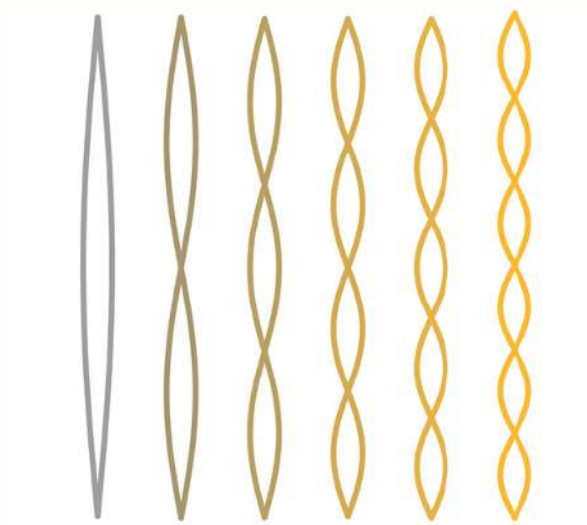
Akhilesh Balaji

You are sure to have heard of Einstein's famous equation:

$$E=mc^2$$

Einstein's formula is part of a greater field called general relativity. General relativity is a set of laws that govern space and celestial going-ons. These laws state that space (Or space-time, rather) is 4 dimensional. The zeroth dimension is a point is space. This has no mass, or volume. The first dimension is a line, the second is a 2 dimensional shape, the third, a 3 dimensional shape, and, lastly, the fourth dimension is space-time. Any object that has a mass warps space-time.

We also have the fabled Quantum Mechanics. Quantum mechanics is the study of the behavior and properties of everything smaller than the atom. One of the properties of a quantum particle, for example, is that it can be everywhere and nowhere at the same time.



In the above diagram, the probability of a quantum particle being on any specific point on the wave increases as the amount of nodes increases. The above diagram is just a simple representation of what really goes on. In reality, there are much more complicated patterns of nodes.

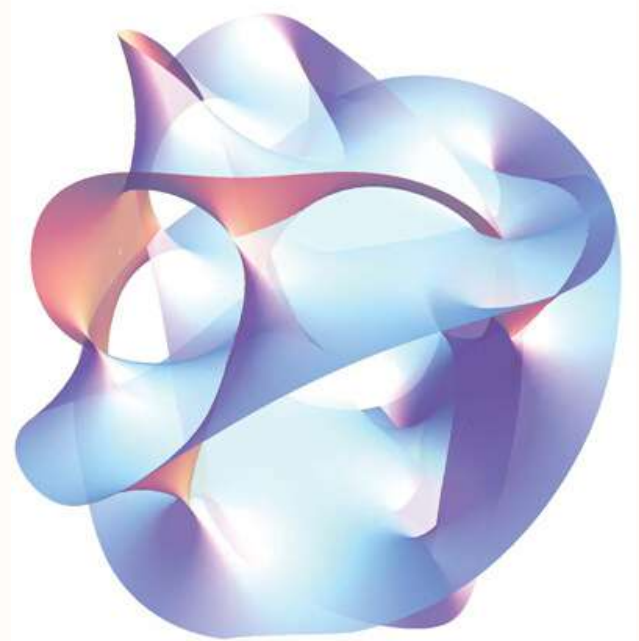
In simple terms, Quantum Mechanics governs everything small, and Relativity governs everything large, or "Out of this world." It is these two theories that govern the universe. But, scientists wonder if these two theories could be combined to create one theory: A theory of everything.

There is one problem in combining these two theories: Gravity (□). Einstein's theory states that gravity is the geometry of space time: If particles are the actors, and the universe is the play, then gravity is the stage. In Einstein's theory, everything is supposed to be measured accurately, whereas, in quantum mechanics, nothing can be measured accurately.

Scientists tried to resolve this problem by creating a new particle: The graviton. When they tried to add this particle to the standard model, they couldn't, as there was no connection between the graviton and the other particles.

That's where string theory comes in. Scientists asked themselves: What is more complex than a point? A line, or a string.

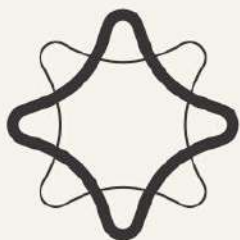
The same way different violin strings produce different notes, different strings produce particles. But, there's just one issue. String theory requires ten dimensions to work, whereas our universe has only four dimensions. The below image is a slice of a Calabi Yau manifold, a shape which the remaining 6 dimensions are predicted take.



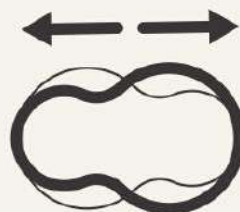
Type I
string theory



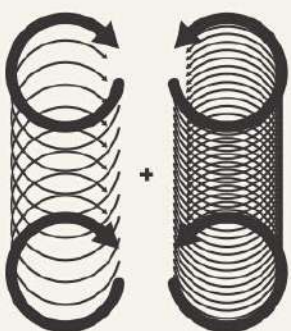
Type IIA
string theory



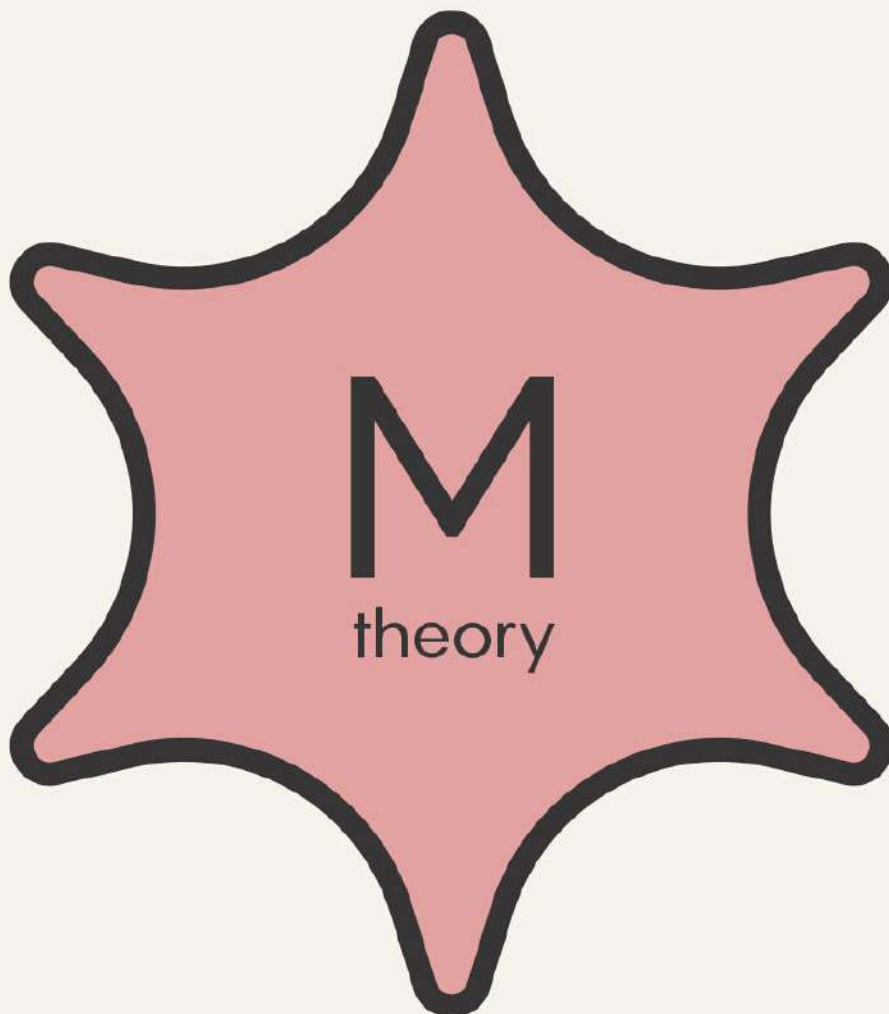
Type IIB
string theory



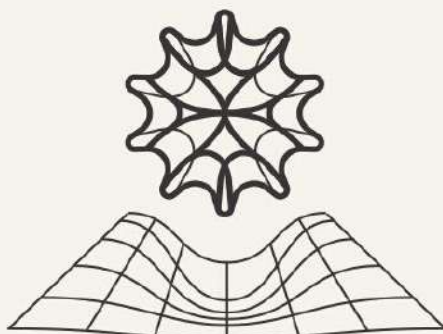
SO(32)
Heterotic
string theory



$E_8 \times E_8$
Heterotic
string theory



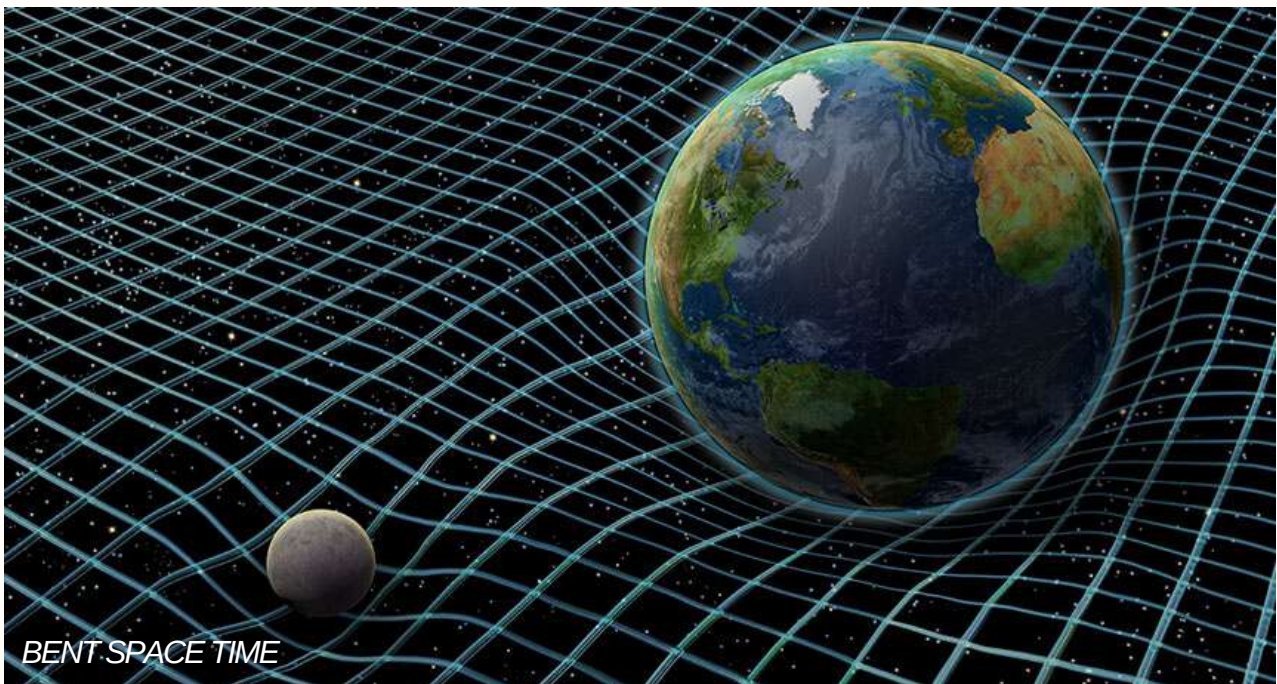
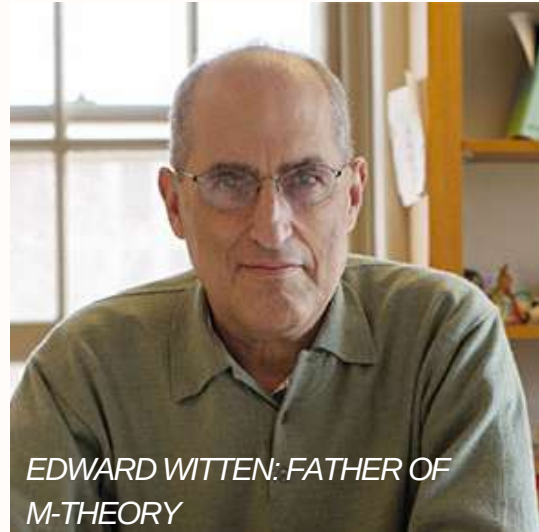
11-Dimensional
Supergravity
particle theory

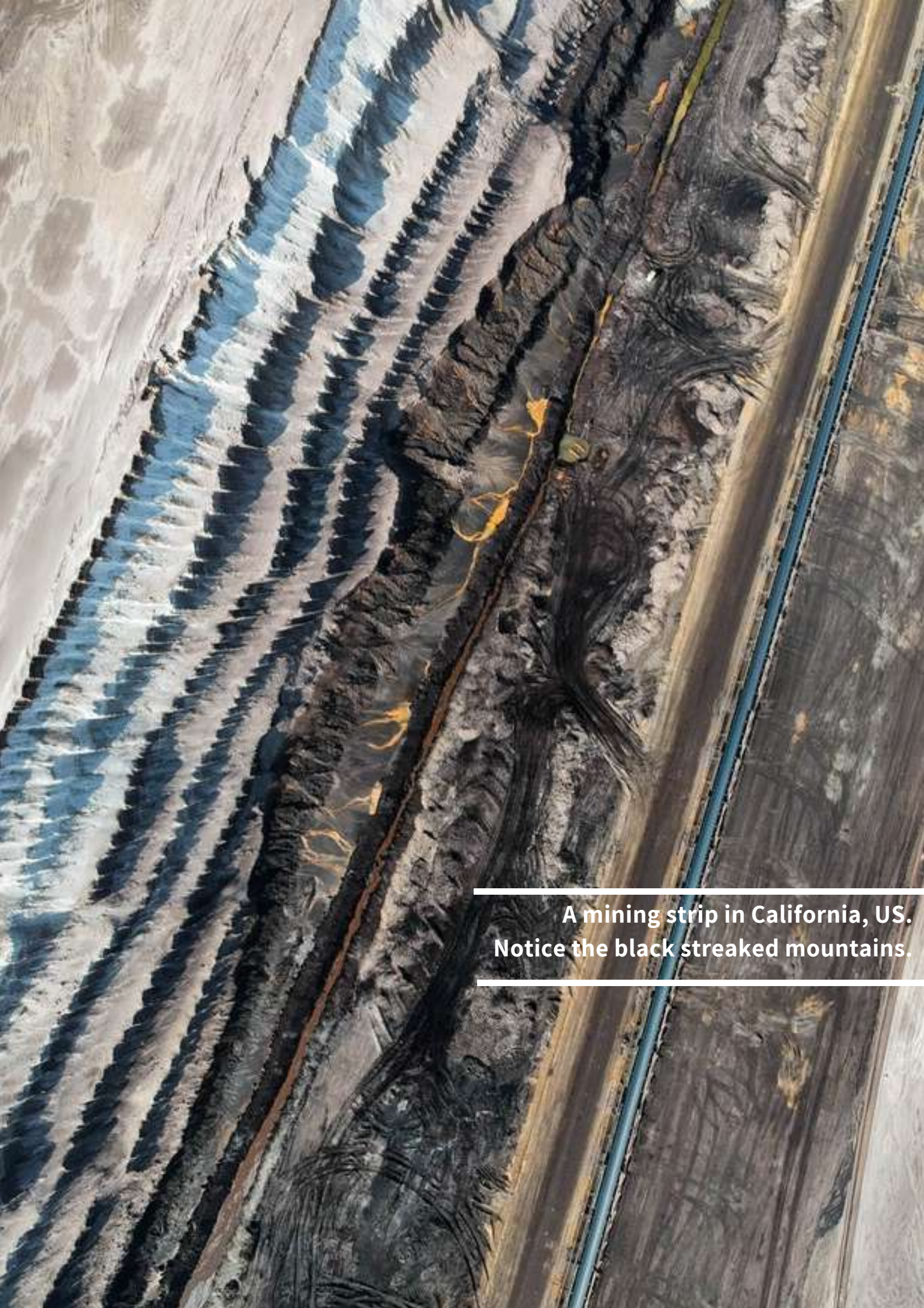


As yet, string theory has only graduated as a possible theory of everything. It is not the theory of everything as it does not fit within the laws of quantum mechanics and relativity. Scientists continue to explore other possible theories of everything, and whether they fit into the laws of modern day physics.



GALLERY





A mining strip in California, US.
Notice the black streaked mountains.

The background of the entire page is a vibrant cosmic image featuring a dense field of galaxies, nebulae, and star clusters. The colors range from deep blues and purples to bright oranges and reds, creating a sense of vastness and energy. The text 'THE BIG BANG' is superimposed on this background in a large, white, sans-serif font.

THE BIG BANG

The beginning of the universe had been discussed for a long time. According to a number of old cosmologies in religious traditions, the universe started “at a finite and not a very distant time in the universe”. A similar quote was found in the book ‘City of God’ by St. Augustine. St. Augustine accepted the creation of the universe according to the book of Genesis. Aristotle and other Greek philosophers, on the other hand, thought the theory had divine interventions and they answered the argument about progress by saying that periodic floods and other disasters caused humanity repeating. Most people believed that either the universe started at some point in time or it always existed. Later, people believed in a static and unchanging universe.

Whether there was a beginning or not is a question of metaphysics or theology. However, in 1929 Edwin Hubble made a significant discovery. He found out that galaxies are receding in every direction at velocities

directly proportionate to their distance from the Earth and each other. This means that earlier, objects were closer to each other. This led to speculation that there once was a time where all matter was in one place. This was the foundation for Lemaitre's theory.

This discovery led to a new realm of science which brought the question of the formation of our universe. Hubble's observations also suggested that there was a ‘big bang’ where a lot of densely packed matter exploded and sent radiation and particles throughout space.

The Big Bang theory states that all matter began at an infinitely small point. This point contained all the matter and energy in the universe today. Suddenly, a huge expansion occurred, called the Big Bang. As it expanded, the universe cooled and its matter spread far apart.



In 1925, with more advanced telescopes, Edwin Hubble noticed that there is more to our universe than the Milky Way and showed that there are more 'clouds of stars' existing in the universe.

Then, in 1929, Hubble declared an additional discovery. With the benefit of improved telescopes, Hubble began to notice that the light appearing from these galaxies was shifted a little towards the red end of the spectrum due to the Doppler effect which is also known as "redshift", which meant that the galaxies were moving away from us. After comprehensive research, Hubble concluded that the galaxies and clusters of galaxies were, in fact, flying apart from each other at great speed and that the universe was consequently definitively expanding in size.

Later, it was found that this expansion, usually referred to as the "metric expansion" of space, is a "broad-brush effect" in those individual galaxies themselves are not expanding, but the clusters of galaxies are more thinly spread out through space. This means that the galaxies themselves are not expanding, but the space between them is. One analogy to describe this is if you draw dots on a balloon. When inflated, the space between the dots increases. A clearer analogy is that of a raisin cake expanding as it bakes so that the raisins (galaxies) gradually all move away from each other.

The visible brightness of a star depends on two circumstances - luminosity and how far it is from us. For nearby stars, we can measure both their apparent brightness and their distance, so we can work on their luminosity. Conversely, if we knew the luminosity of stars in other galaxies, we could work out the distance by measuring their apparent brightness. If we found stars in another galaxy, we could assume they had the same luminosity. Therefore, we could determine the distance to that galaxy. If we could do this for a number of stars in the same galaxy, and our computations always gave the equivalent distance, our estimate may be right. Through this method, the distance to nine galaxies was determined by Hubble.

**"The radiation left over from the Big Bang is the same as that in your microwave oven but very much less powerful. It would heat your pizza only to minus 271.3°C - not much good for defrosting the pizza, let alone cooking it."
- Stephen Hawking**

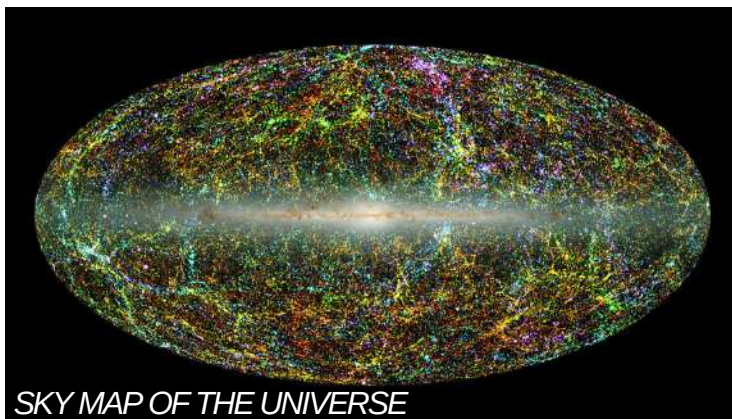
Echoes of the universe

By chance, on May 20, 1964, American radio astronomers Robert Wilson and Arno Penzias detected the CMB, which is the oldest light in the universe, dating from the first era in which photons could travel freely. This theory states that very shortly after the Big Bang, as nbcnews.com says, "the cosmos was a seething-hot, opaque fog of plasma and energy." It only changed 380,000 years later when it became

transparent. And they did so completely by accident when using a homemade horn antenna. They detected CMB, a thermal echo of the explosive birth. This was the landmark find to put the Big Bang theory on solid ground, suggesting that the cosmos did indeed grow from a tiny seed — a single point — about 13.8 billion years ago.

“By looking far out into space we are also looking far back into time, back toward the horizon of the universe, back toward the epoch of the Big Bang.”
-Carl Sagan

GALLERY

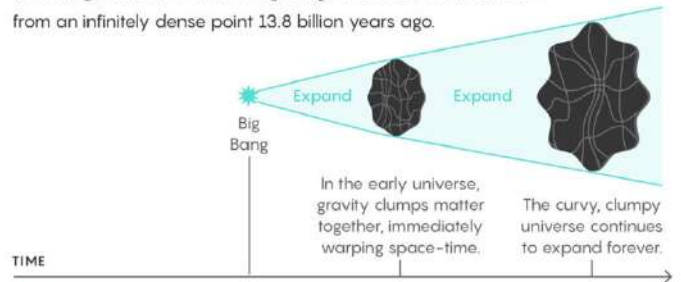


A Cosmic Mystery

Scientists have long sought to explain how our universe came to be.

The Big Bang

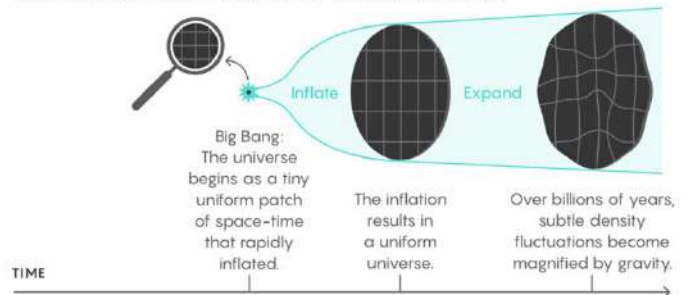
To explain why the universe was expanding, cosmologists began theorizing in the 1920s that a Big Bang event birthed the universe from an infinitely dense point 13.8 billion years ago.



But cosmologists observe a uniform early universe, not a clumpy crumpled one. Something was missing.

Cosmic Inflation

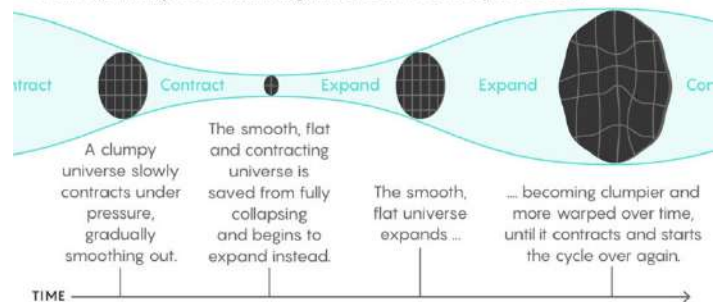
About 30 years ago, cosmologists proposed an updated Big Bang theory called "cosmic inflation" to explain our smooth, flat universe.

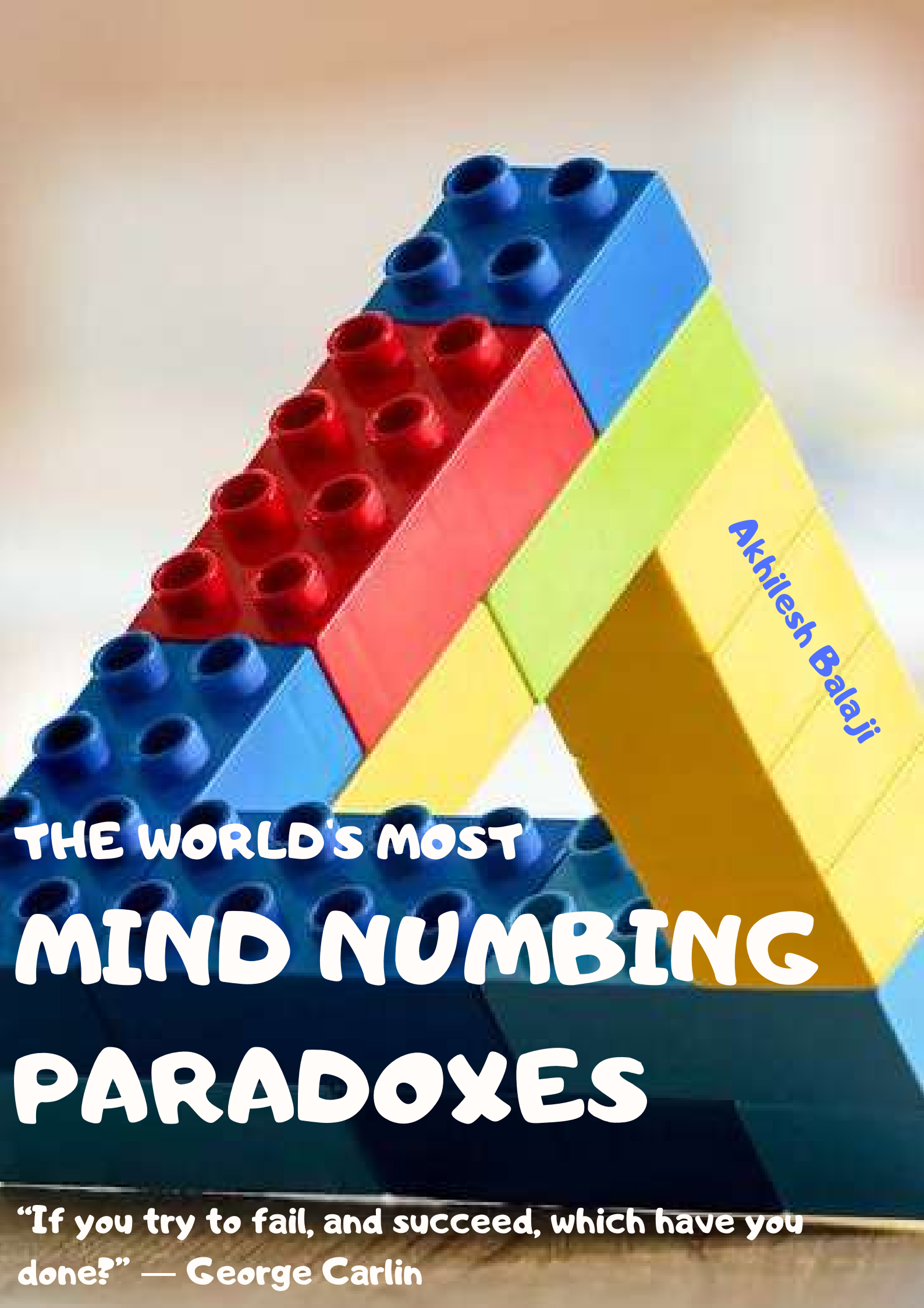


But what happened before the Big Bang and where did the original patch of space-time come from?

The Big Bounce

Recently, researchers have been taking a new look at the possibility of an expanding and contracting universe that could cycle forever.





Akhilesh Balaji

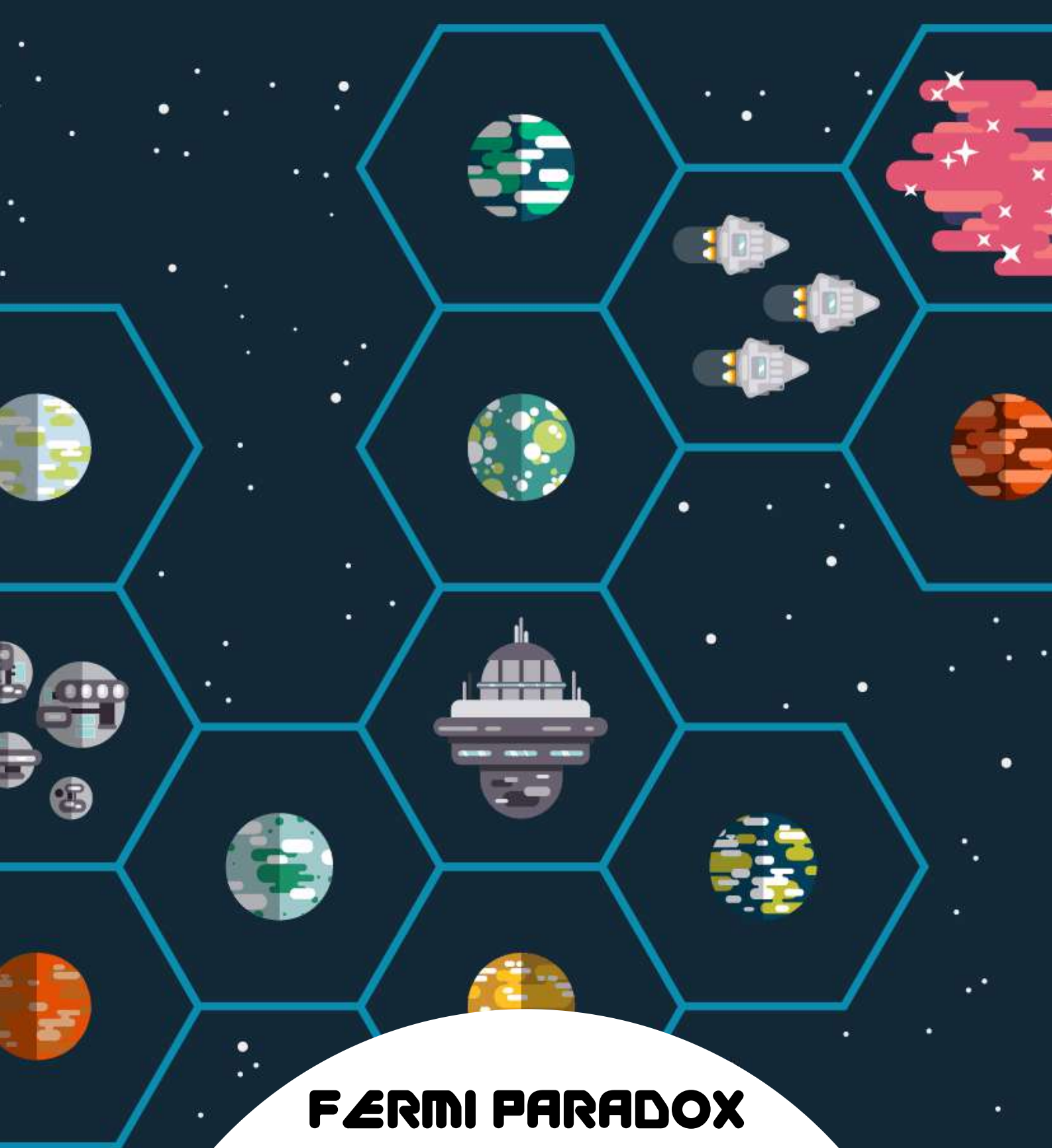
THE WORLD'S MOST MIND NUMBING PARADOXES

"If you try to fail, and succeed, which have you done?" — George Carlin

GRANDFATHER PARADOX

If you go back in time and kill your grandfather before your father was born, he couldn't be killed because you are still alive. So the time traveler is never born, so he doesn't go back in time, so the grandfather doesn't die, so the time traveler is born, etc. This paradox doesn't necessarily correspond to your grandfather, it is just about changing the past.





FERMI PARADOX

The Fermi Paradox is about the contradiction between the lack of evidence that we have for an alien civilization, and probability estimates for an alien civilization. In the observable universe, there are 100,000,000,000 galaxies, each with about the same number of stars. We have also learnt that planets are very common, too. Then, there should be trillions of habitable planets out there with a chance for life to develop.

POLCHINSKI'S PARADOX

If you had a wormhole with two entries that are at the exact same place, and you threw a billiard ball through it at the correct angle and speed, then that billiard ball would be just in time to hit the same billiard ball which is about to go in, preventing it from going in the wormhole!





ZENO'S DICHOTOMY

Let us take, for example, that you are travelling from A to B. The dichotomy says that you must first travel half the distance from A to B, then half that distance, then half that distance, so on and so forth. You might think of Zeno's argument as silly, but he has a valid point there: How on earth are you able to travel from A to B if the dichotomy states in impossible?

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WALKIE TALKIE

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Humans are an inquisitive species. They learn from trial and error, as other animals do. But now, scientists are trying to give machines the same intellect as we have, enabling them to learn from mistakes. Many fear that if we give robots enough intelligence, they might... take over the world. It sounds straight out of a sci-fi movie, but it could happen!

It all started with Donald Michie in 1961. Michie built a device called MENACE (**M**achine **E**ducable **N**oughts **A**nd **C**rosses **E**ngine). MENACE is a device constructed from 304 matchboxes, each one representing a different combination of noughts and crosses on the board.

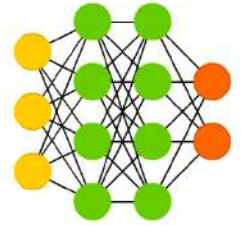
Each matchbox would be filled with beads of different colors, each color representing a different position on the board. Each matchbox tray would have two extra cardboard pieces attached in a "V" formation. So, when the game begins, the matchbox tray is shook so that a bead tumbles into the "V" formation. Whichever color the bead is, in that spot the game piece is placed. Sounds easy, right? Not so, as there are a *couple* of complications. After all, without the machine-learning bit, it would be an ordinary machine that gave out random outputs.

Neural Networks

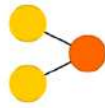
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-  Backfed Input Cell
-  Input Cell
-  Noisy Input Cell
-  Hidden Cell
-  Probablistic Hidden Cell
-  Spiking Hidden Cell
-  Output Cell
-  Match Input Output Cell
-  Recurrent Cell
-  Memory Cell
-  Different Memory Cell
-  Kernel
-  Convolution or Pool

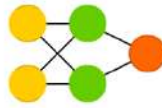
Deep Feed Forward (DFF)



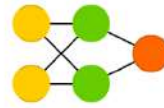
Perceptron (P)



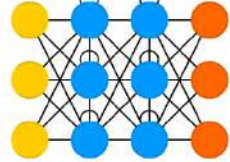
Feed Forward (FF)



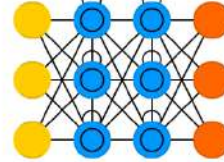
Radial Basis Network (RBF)



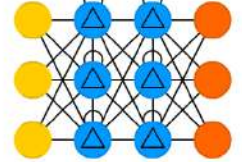
Recurrent Neural Network (RNN)



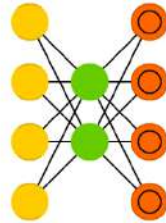
Long / Short Term Memory (LSTM)



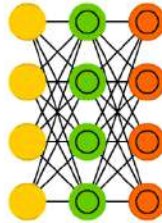
Gated Recurrent Unit (GRU)



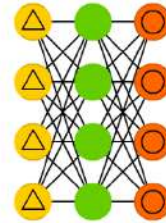
Auto Encoder (AE)



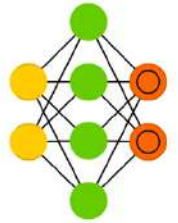
Variational AE (VAE)



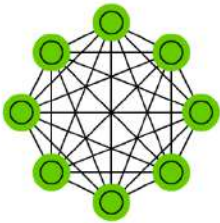
Denoising AE (DAE)



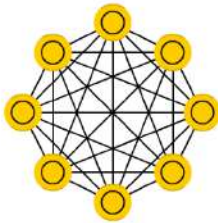
Sparse AE (SAE)



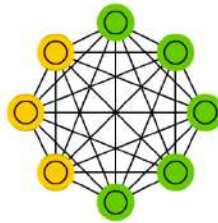
Markov Chain (MC)



Hopfield Network (HN)



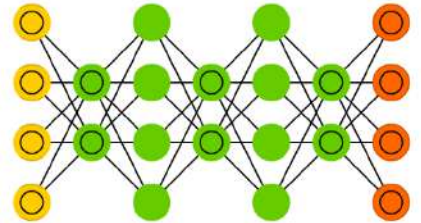
Boltzmann Machine (BM)



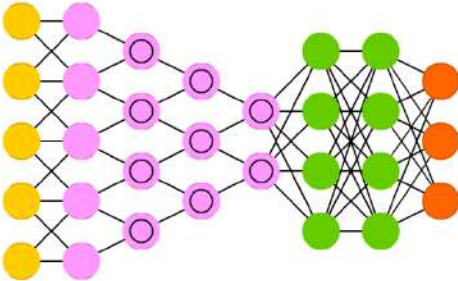
Restricted BM (RBM)



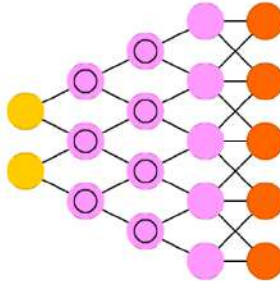
Deep Belief Network (DBN)



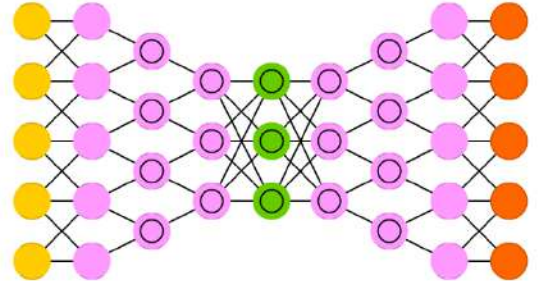
Deep Convolutional Network (DCN)



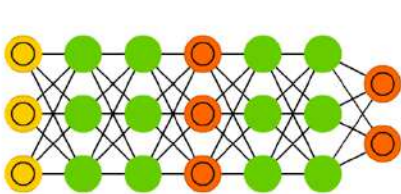
Deconvolutional Network (DN)



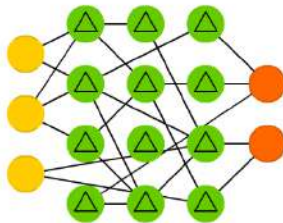
Deep Convolutional Inverse Graphics Network (DCIGN)



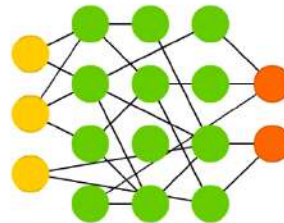
Generative Adversarial Network (GAN)



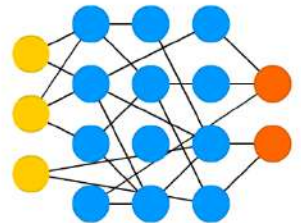
Liquid State Machine (LSM)



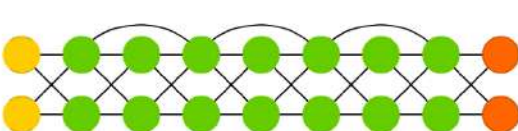
Extreme Learning Machine (ELM)



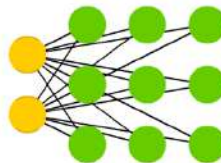
Echo State Network (ESN)



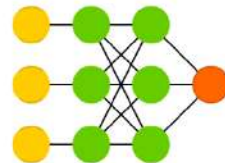
Deep Residual Network (DRN)



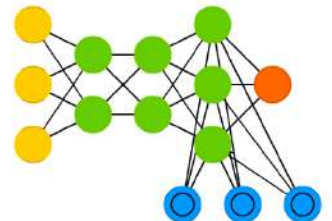
Kohonen Network (KN)

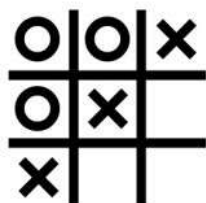
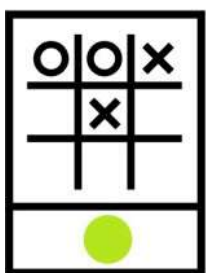
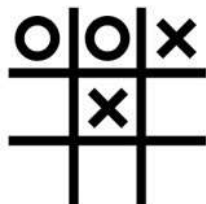
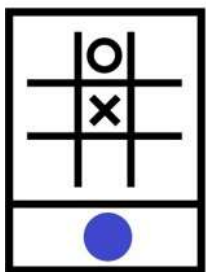
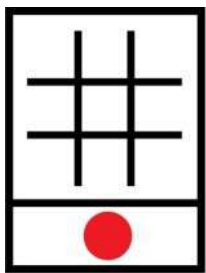


Support Vector Machine (SVM)



Neural Turing Machine (NTM)





To the right is an example game played against MENACE. If Menace loses the game, then it must be punished. Hence every bead that represented a move played is removed from its corresponding box. If MENACE wins, then one more bead that represented a move is added to each box.

This way, MENACE learns from its mistakes. The first few times Michie played against it, it was quite vulnerable. But, soon, it was beating Michie in almost all of the games he played against it.

Dhruv Shah at Medium says "Think of a little baby: crying results in candy – the reward. Over time, if the parents keep satisfying the child's desire for candy, the baby will learn to cry every time he or she wants candy."

A type of machine learning called Deep Learning mimics the human brain to learn more. In Deep Learning, there are many layers, each one extracting one piece of valuable information. It mimics networks of neurons that, in Deep Learning, are called neural networks. Turn the page over to get a cheatsheet of neural networks.

Are you interested in machine learning? Like to test some programs on your own? You can do this on TensorFlow, a machine Learning framework developed by Google.

We have covered three topics in this article. Regardless of their differences, all of them continue to make a profound impact on our society.

Bacteriophages

Head



Genetic Code



Bacteriophages are the most deadly beings on earth. They have an icosahedral body, and a tail filled with a strand of genetic material. They attack cells by injecting their DNA into the cell, forcing it to produce more phages. Once there are enough, they break out of the cell, and repeat the process with other cells.



Can rakshasas or asuras be called the Hindu devil?

Devdutt Pattanaik

Devil is not a Hindu concept. It's a Christian concept. The Hindi word for devil – shaitan – is actually an Urdu word rooted in Persian thought. We often assume that all religions are the same and every mythology must have the devil. Hindu mythology does not have the concept of devil because Hinduism does not have the concept of evil. Devil is the embodiment of evil in Christian mythology.

Evil is a concept used by religious folk in the West to explain negative events that have no root cause. God is good and kind and so he cannot be the source of hurricanes and tornadoes, and murders and rape. So these negative events are attributed to the devil who spreads evil. Of course, people argue if God is all powerful why does he not defeat the devil and end all negative events. To this, the priests who have appointed themselves as defence lawyers of God say: we are suffering for the evil decisions made by humans who have succumbed to the devil's temptations. God had given humans the freedom to choose between himself and the devil, the good and the evil.

Such ideas are alien to Hinduism, Buddhism and Jainism, where all events are the outcome of karma. Every action is karma. Every reaction is karma. Every cause is karma. Every consequence is karma. We live in a web of karma. We have control over our karma, but not on karma generated by others. And so bad things happen to good people and good things happen to bad people. Good and bad are human judgements, based on how we interpret the world. There is no good or bad in the world itself; it's an outcome of human understanding. People with lesser wisdom prefer to divide the world into binaries of good and bad, right and wrong. People who are more wise, see the bigger picture, and hold no one responsible for good or bad events. They need neither god nor devil. So there is no need for shaitan. Buddha, Tirthankaras, Brahma, Vishnu, Shiva and all the gurus help the ignorant become wise so we don't feel the need

to describe an event as evil. Every event, even the inexplicable, irrational ones, has a cause. There is no God or devil out there causing it. God, in Hinduism, is our ability to be wise, to look beyond good and evil. So who are the asuras and rakshasas? How does one describe Andhaka, who is killed by Shiva, or Kansa, who is killed by Krishna, or Ravana, who is killed by Ram, or Mahisha, who is killed by Durga? For this we have to go back to the basics of Hindu mythology.

The puranas say that all creatures are born of Brahma. From Brahma come various rishis and prajapatis who father different kinds of living creatures. So Kashyapa, son of Brahma, has many wives such as Aditi, Diti and Danu, who give birth to different children such as adityas, daityas and danavas. Though born of same father, adityas and daityas are always quarrelling. English writers called adityas the gods of Hinduism and daityas as the demons of Hinduism. Daityas and danavas are clubbed together as asuras. But things are not so simple.

Diti was about to give birth to a child greater than Indra, leader of adityas. Indra cut the embryo into 11 parts. Each part started to cry. Indra said, "Don't cry and so they called themselves maruttas, the children who don't cry. They became followers of Indra, and friends of the adityas, and called themselves 11 maruttas. They were also called rudras, the howlers. Thus, the 33 "devas" or gods of Vedic-Hindu mythology were made of 12 adityas and 11 maruttas as well as eight vasus and two ashwins, not all born of the same mother, but everyone traced to the same father, Kashyapa. Enemies of the devas, also born of Kashyapa, were called asuras. Their battle was vertical between earth and sky, with asuras inhabiting realm under the earth (patala) and devas occupying the glittering realm beyond the sky (swarga). Rakshasas descended from another son of Brahma –

Pulatsya. From Brahma came Pulatsya, from Pulatsya came Vishrava, from whom came the rakshasas and the yakshas, who were led by Ravana and Kubera respectively, according to the Ramayana. Just as devas fought asuras, rakshasas fought yakshas. Rakshasas lived in south while yakshas moved north. Rakshasas also fought rishis. Rishis clubbed the rakshasas with asuras. Hence, in the Mahabharata, the various forest dwellers who oppose the Pandavas and the Vedic lifestyle – Baka, Hidimba, Jata, Kirmira – are all called asuras. Vedic lifestyle was based on yagna, that is exchange, you give in order to receive, while rakshasas lifestyle was based on either grabbing or sharing, suggesting an old tribal order. In fact, rakshasas are described as guardians (raksha) of forest. Thus, the battle here suggests conflict between rishis who preferred agriculture and trade and rakshasas who preferred old hunter-gatherer ways. The battle here is horizontal on earth, between settled village communities and nomadic tribals.

Curiously, there in the list of marriage, deva-marriage means the father giving his daughter to a man who proves his worthiness by serving the father; asura-marriage means where a man buys a wife; and a rakshasa-marriage is one where a man abducts a wife. Thus, we see asuras linked to wealth and rakshasas to force. Lakshmi is often called patala-nivasini (resident of the nether regions) as all wealth comes from under the earth. She is called Paulomi (daughter of the asura-king Puloman) which makes her asura-putri (daughter of asuras), who rises up from the below to become deva-patni (bride of the gods).

Asuras are sometimes like tree spirits who are killed. Hence, we find gods kill asuras during harvest time: Krishna kills Narakasura, Durga kills Mahishasura, Vishnu overpowers Bali. Their enemy is the devas who are supported by later Puranic gods like Shiva, Vishnu and Devi. Rakshasas are in conflict with humans and sages. Rama kills Ravana and his brothers and his sons. They seem to follow matya nyaya, or the fish law, which is law of the jungle: might is right. Rama and the rishis follow the dharma way, where mighty have to protect the weak.

Christian missionaries and European orientalisists were eager to show that Hinduism was either similar to Greek mythology (which is why asuras and rakshasas were called demons) or similar to Christian mythology (which is why asuras and rakshasas were called devil). Indians educated in English got confused and started using rakshasas and asuras interchangeably. Both were “demons”. Both were manifestations the “devil”. Contrarians and social activists went out of the way with no data to speculate wildly and prove these “demons” were wronged subaltern people, dark Dravidians and tribals overpowered by white Aryans. They use simplistic racial arguments and pointed to look at the black/green colour of Mahisha. They ignore that Rama and Krishna are portrayed as dark while Ravana (a rakshasa) and Prahalada (an asura) are painted as fair.

Hinduism saw asuras and rakshasas as different types of beings, born of Kashyapa and Pulatsya, one living under the earth, and one living in forest. Devas had amrita (nectar of immortality) while asuras had sanjivani vidya (knowledge of resurrection). Both were equally powerful. Devas were powerful in summer, asuras in winter. Rakshasas were seen as barbarians by some as they opposed Vedic way. Yet the king of rakshasas in Ramayana is a Vedic scholar, who is associated in later scriptures with Tantra, Shaivism and Tantrism. We learn of good rakshasas like Vibhishan just as we learn of good asuras like Prahalad and Bali, who adore Vishnu. Words like evil and devil make no sense in rebirth worldviews. Hence, have no place in Hinduism, Buddhism or Jainism. Asuras and rakshasas are powerful and eternal forces that we may not like but have to co-exist with. We live in a web of multiple forces, some that help us and some that harm us. The forces themselves are neither negative or positive. It's our relationship with them that makes them negative and positive. The wise will not judge; they will just understand.





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*COCOONED TREES: A TREE COVERED WITH SPIDER
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A SPIDER BLOWS BALLOONS OUT OF ITS WEB



A MOWHAWK JUMPING SPIDER




FLOWER CRAB SPIDER CLINGING TO A BLOOM IN A
FIELD



DARK OVER LIGHT

You've lived your entire life believing that everything is made of matter. But what if I told you that there was a chance, a sliver of a possibility that it wasn't?



Matter, is all around us. On our home planet Earth, the trees, your house and you are matter. Everything we feel is matter. This is what we know about the matter. Unfortunately, this kind of matter accounts for only 5% of the universe. There are speeding clusters of galaxies all over the universe. There is something holding them all together, not the 5% of matter we know about, because it is not strong enough to form galaxies or complex structures. So, then, what is there?

Based on what we know today, 27% of the universe is dark matter and 68% is dark energy*. Both dark matter and dark energy are invisible. It becomes stranger when we hardly know anything about it. What is dark matter? How much do we know about it?

This may seem strange, because it is nothing like what we have experienced. Unfortunately, we know what dark matter isn't rather than what it is. In fact, scientists only know dark matter exists because it has a gravitational effect on normal matter. We know for sure there is something holding the stars in galaxies together, but as it does not interact with electromagnetic forces, it does not emit or reflect light, making it 'invisible' and harder to spot. Places with a high concentration of light bend light when they are passing nearby. Also, dark matter is not made up of baryonic particles. There is evidence to show this because baryonic clouds absorb radiation and we have not seen that either. Dark matter is not antimatter because unique gamma rays are produced when it interacts with normal matter. However, we do know that dark matter is distributed evenly in space and time. In simpler words, as the universe expands, its effect is not diluted. Dark matter also has a gravitational effect on the universe as a whole and not locally.

As for now, there is little we know what dark matter is. According to CERN, dark matter is light enough as a particle to be created at the LHC (Large Hadron Collider). There are more possible and viable theories of the existence of dark matter, such as it being baryonic matter, but in "small, dense chunks of heavy elements", says nasa.gov. To conclude, the most common idea of dark matter is that it is made of more exotic particles with properties we have yet to discover. Research in astrophysics will guide our way to an answer.

As strange as you may find dark matter, many scientists say that dark energy could be even stranger. It is a mystery, an important one. As you may know, according to current results, dark energy occupies roughly 68% of the universe. We know it exists because of its effect on the expansion of the universe#.

Here are some Explanations and theories...

This explanation owes to Albert Einstein, and how he realized that empty space is not 'nothing'. In this theory, dark energy is a property of space. space has different properties, one property being that it is possible for more space to come into existence.

One of Einstein's theories was about a cosmological constant. Later, however he called "a big blunder". Einstein's research about a cosmological constant led to the second explanation. It states that empty space possesses its own energy. This means that it will not dilute as energy is a property of it. As scientists and astronomers delved further in this theory, they realized that when there is more space, it will cause more of this energy-of-space to appear. Unfortunately, there is a lot we don't know in this theory (much of it about the cosmological constant).

Quintessence, the fifth element of the greek philosophers – This is the term used by some theorists describe dark energy as a dynamic, or changing energy field. This explanation states that this dynamic energy field or fluid fills space in the universe but has opposite effects on the expansion of the universe compared to 'normal matter'. A mystery, isn't it?

Another explanation for dark energy has a lot to do with quantum theory. This explanation explains how space acquires energy. In this theory, empty space is actually filled with virtual particles that form and then disappear. However, physicists received extremely incorrect results when calculating the amount of energy required to give empty space.

There is a unique explanation that what we know about the theory of gravity is all wrong! This theory is about gravity affecting the way clusters behave, For this, we need to observe how galaxy clusters behave. So, if this really can be plausible, then a new theory must define the motion of the bodies in our solar system. There are few theories which can actually fit in all ways, as far as we know.

What does this mean?

This means, that more and better data is required to decide between the possible explanations of dark matter, and with developing technology, in the distant future, we can know the truth.

Gadget Gyroscope

A Gyroscope is a device that stays upright despite all attempts to push it over. This is due to the spinning wheel at the center. This particular one is quite fancy, priced at \$71 apiece.



OF THE MONTH

Material Aerogel

Aerogel is a synthetic porous ultralight material derived from a gel, in which the liquid component for the gel has been replaced with a gas. The result is a solid with extremely low density and low thermal conductivity.

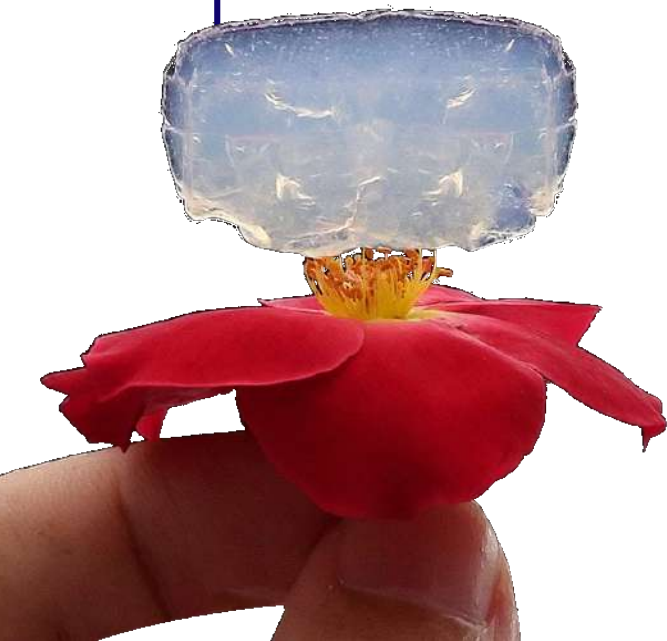
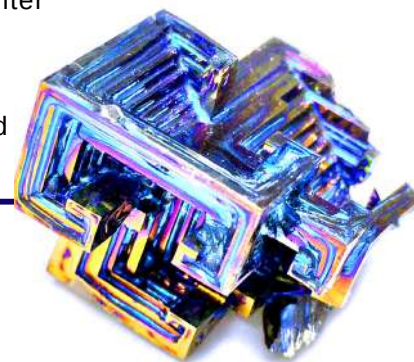


Species *Ambystoma mexicanum*

Axolotls are neotenic salamanders related to the tiger salamander. Although the axolotl is colloquially known as a "walking fish", it is not a fish, but an amphibian. The species was originally found in several lakes, such as Lake Xochimilco underlying Mexico City. Instead of developing lungs and taking to the land, adults remain aquatic and gilled.

Element Bismuth

Bismuth is a chemical element with the symbol Bi and atomic number 83. It is a pentavalent post-transition metal and one of the pnictogens with chemical properties resembling its lighter homologs arsenic and antimony. It forms large Hopper crystals when cooled in the right way.



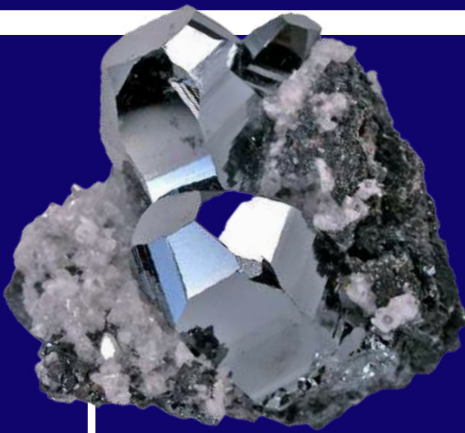
Scientist Erwin Schrödinger

Erwin Schrödinger was a Nobel Prize winning Austrian physicist who developed a number of fundamental results in the field of quantum theory: the Schrödinger equation provides a way to calculate the wave function of a system and how it changes dynamically in time.



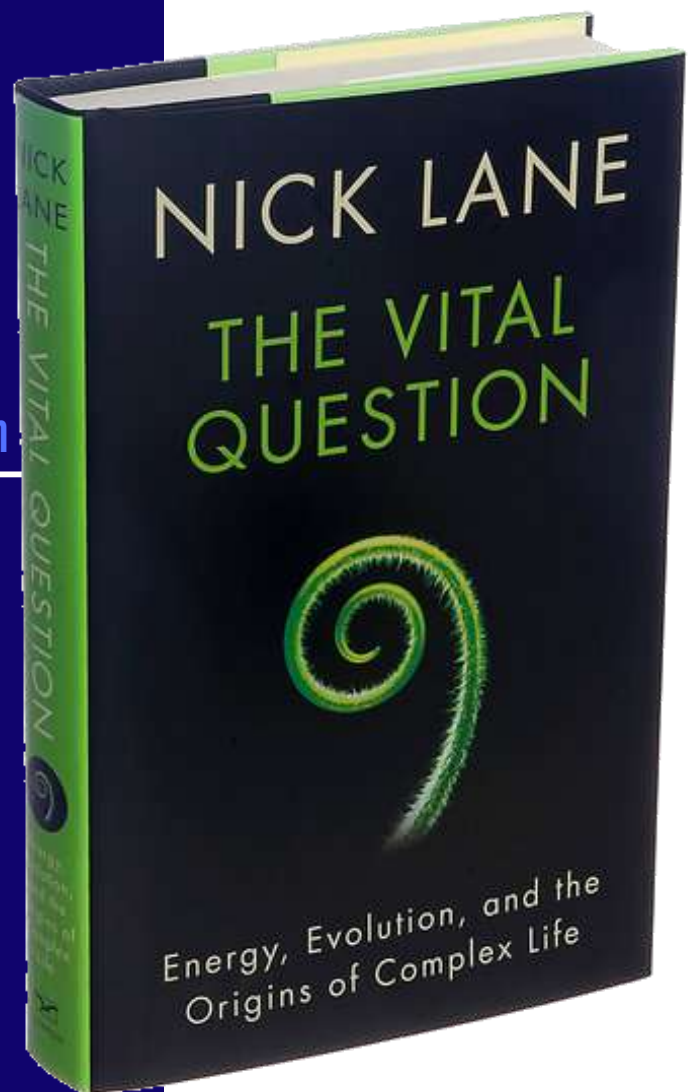
Compound Hematite

Hematite, also spelled as haematite, is a common iron oxide with the formula Fe_2O_3 and is widespread in rocks and soils. Hematite crystallizes in the rhombohedral lattice system, and it has the same crystal structure as ilmenite and corundum.



Book The Vital Question

Oxygen takes the reader on an enthralling journey, as gripping as a thriller, as it unravels the unexpected ways in which oxygen spurred the evolution of life and death. The book explains far more than the size of ancient insects: it shows how oxygen underpins the origin of biological complexity, the birth of photosynthesis, the sudden evolution of animals, the need for two sexes, the accelerated ageing of cloned animals like Dolly the sheep, and the surprisingly long lives of bats and birds. Drawing on this grand evolutionary canvas, Oxygen offers fresh perspectives on our own lives and deaths, explaining modern killer diseases, why we age, and what we can do about it.





WHAT IF?

**What if we set off all the Nukes in the world?
What would happen?**

A thought experiment conducted by scientists confirmed that if this event should occur, within milliseconds, a fifty-kilometer fireball will form, and destroy all life and/or infrastructure within a three-thousand-kilometer diameter. The explosiveness of the event will also cause pressure waves that would circle the world for a few weeks after the disaster.

If this 'basket' of fifteen-thousand explosives is set alight in the amazon rain forest, the carbon dioxide released from burning all trees and plants would be mixed with other incarcerated material which would be catapulted in the sky. Slowly, a 'mushroom cloud' forms, restricting sunlight and heat from reaching most of Earth's surface, causing what is distinguished as a nuclear winter. The next consequence is that the extreme heat of the explosion will result at the beginning of forest fires, spreading (in this case) across South America, definitely breaking records. The extreme levels of radiation would then begin to kill all forms of life within hundreds of kilometers from the crater. However, figures display that after a massive loss in the human population, human life will continue.

-Dhruv Suresh Ramu

OORG

CANDID O



ANIC

RSCAM?






The term "Organic" is used to describe any food item that does not use any man-made fertilizers, insecticides, pesticides, or other artificial elements. Now, the question that I try to address here is: Is it really good for you?

In organic food, farmers use more traditional ways of keeping the food non-contaminated, and safe to eat. Several studies have found that Organic food has more antioxidants, which are good for you. Some studies have also found that organic food is more nutritious, as it contains more Vitamin C, and Omega-3 Fatty acids.

Organic food may be more costly, but people buy it to prevent something that's toxic, from, say artificial fertilizers or pesticides. But, studies have proven that organic foods may be just as high in cholesterol, sodium, and other unhealthy substances as non-organic food, though this does not necessarily imply that Organic food has a lesser number healthy substances.





Organic Food, the new hit in supermarkets, wherein people pay extra money in the hope that they will eat food that isn't sprayed with pesticides or fertilizers. Is Organic Food just an expensive, trendy scam? First off, what is organic food? By definition, it is "something that is derived from living matter," according to organic.org. Simply stated, organic foods are foods that are grown without the use of pesticides, synthetic fertilizers, sewage sludge, genetically modified organisms, or ionizing radiation. Livestock such as pigs and cows are not fed antibiotics or hormones to produce more eggs or meat. It is important to know... Understanding food labels in supermarkets and marketing claims is sometimes an issue for many customers. If you shop, and do not know what to choose, continue reading! Companies use these labels to convince customers, and sometimes customers cannot differentiate that product with others. Sometimes, the simple phrase "organic ingredients" is enough to persuade, but if you understand what "organic" really means, people can make informed choices rather than misunderstanding.



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