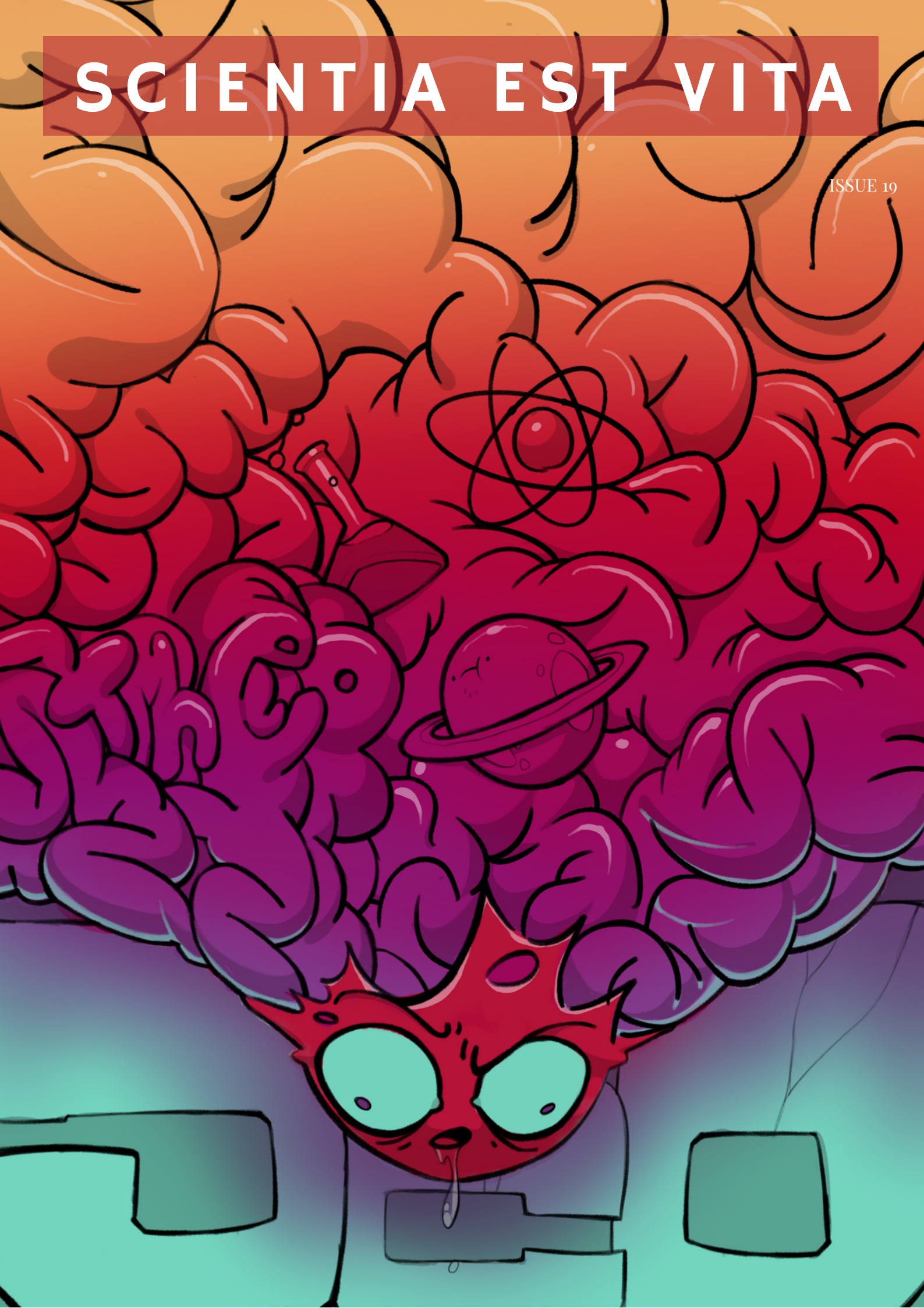
SCIENTIA EST VITA

ISSUE 19



Editorial

Welcome, fellow science enthusiasts, to a captivating edition Scientia est vita Talk!" Prepare yourself for an exhilarating journey through the fascinating realms of artificial intelligence (AI), the extraordinary lives of rats, and so much more. In this special edition, we'll take a closer look at the cutting-edge advancements and quirky phenomena that make the world of science truly extraordinary.

With the power of science anything is possible from ai to animals.

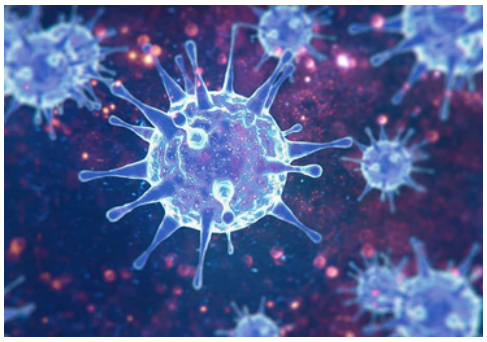
Scientia est vita - Knowledge is Knowledge

Luke Owen Simms
HONOURARY EDITOR

RECENT SCIENCE NEWS

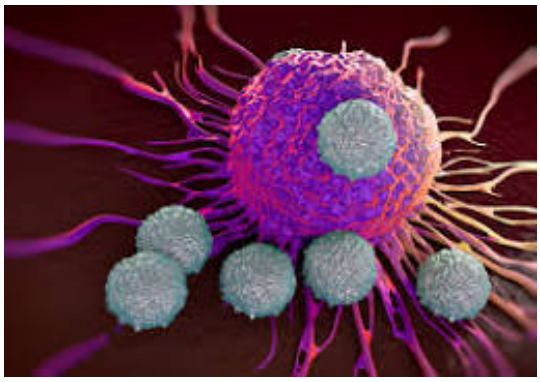
COVID NEWS

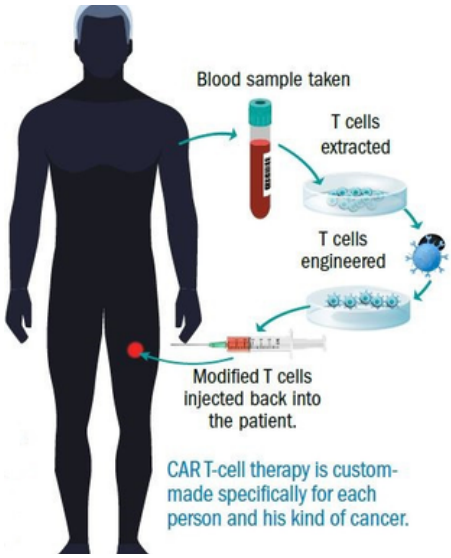
Recently there have been discoveries of a new variant of Covid called XBB.1.5 aka "The Kraken" which is sweeping the northeast us and dodging immunity. The World Health Organization has deemed XBB.1.5 the most transmissible version of the Omicron variant to date.This might mean another lockdown but it is only in the US at the moment so there is nothing to worry about just yet.



CANCER TREATMENT BREAKTHROUGH

There is now a new treatment for cancer called CAR T therapy. With CAR T therapy, a patient's own immune cells are engineered to attack cancer cells. Results from a Phase 1 clinical trial showed that a new CAR T cell therapy appears to be safe and effective in treating multiple Myeloma, a form of blood cancer. This therapy targets a protein called GPRC5D.





HOPE FOR THE NEW MALARIA VACCINE

Malaria is a serious and sometimes fatal disease caused by a parasite that commonly infects a type of mosquito which feeds on humans. People who get malaria are typically very sick with high fever,chills, and a flu-like illness. Now there is new vaccine, called R21, this is a potentially improved version of another vaccine, called RTS,S. The World Health Organization approved it last October for broad use in regions with significant malaria transmission. RTS,S was the first-ever vaccine for a human parasitic infection.

Hey there, hay fever!

By Dr J Castelino

Picture this.
You wake up with crusty eyes and an itchy nose. Your throat feels dry and sore. You rub your eyes but they are red and watery. As the day progresses, your symptoms get worse. And then you have a sneezing fit.
The only repreive is when you sleep and even then sometimes, you wake up to sneeze.
Sound familiar? If not, you are one of the lucky few you don't experience one of the most common allergies in the country. That's right, we are talking about hay fever.

Hay fever, also known as allergic rhinitis, is an allergic reaction to pollen. Pollen are actually cells released by plants. They are the equivalent of animal sperm. You're welcome.

For many people, when they breathe in pollen, their body's defense system mistakenly thinks it is harmful and releases chemicals that cause those sneezes and sniffles.

The main culprits of hay fever are trees, grasses, and flowers. They release tiny particles of pollen into the air, which can travel for miles. So even if you're nowhere near a park, you might still experience hay fever symptoms.
Hay fever is often seasonal, meaning it occurs at specific times of the year. Spring and summer are common hay fever seasons because that's when plants release a lot of pollen. However, some people may experience symptoms year-round due to different allergens like dust mites or pet dander.

Your immune system, the body's defense mechanism, is responsible for fighting off harmful invaders like bacteria and viruses. But sometimes, it overreacts to harmless substances like pollen. The immune system produces antibodies and histamines that trigger those uncomfortable hay fever symptoms.

To manage hay fever, there are a few things you can do. First, try to avoid going outside when pollen levels are high, especially on windy days. Keep your windows closed and use air filters to reduce pollen indoors. If needed, your doctor may prescribe medication to relieve symptoms.

Antihistamines are medications commonly used to treat allergies, including hay fever. They work by blocking the effects of histamine, a chemical released by the body during an allergic reaction.

Some people with hay fever may experience oral allergy syndrome (OAS), also known as pollen-food syndrome, which can cause temporary discomfort when consuming certain fruits.

OAS occurs because some fruits and vegetables contain proteins that are similar to the allergenic proteins found in pollen. When a person with hay fever consumes these fruits or vegetables, their immune system may mistake the proteins for pollen and trigger an allergic reaction in the mouth, throat, and sometimes the lips.

Common symptoms of OAS include itching, tingling, and swelling of the mouth, lips, and throat. In some cases, it can lead to mild hives or an itchy rash around the mouth area.

These symptoms usually occur shortly after eating the specific fruit or vegetable and typically resolve within minutes to hours.

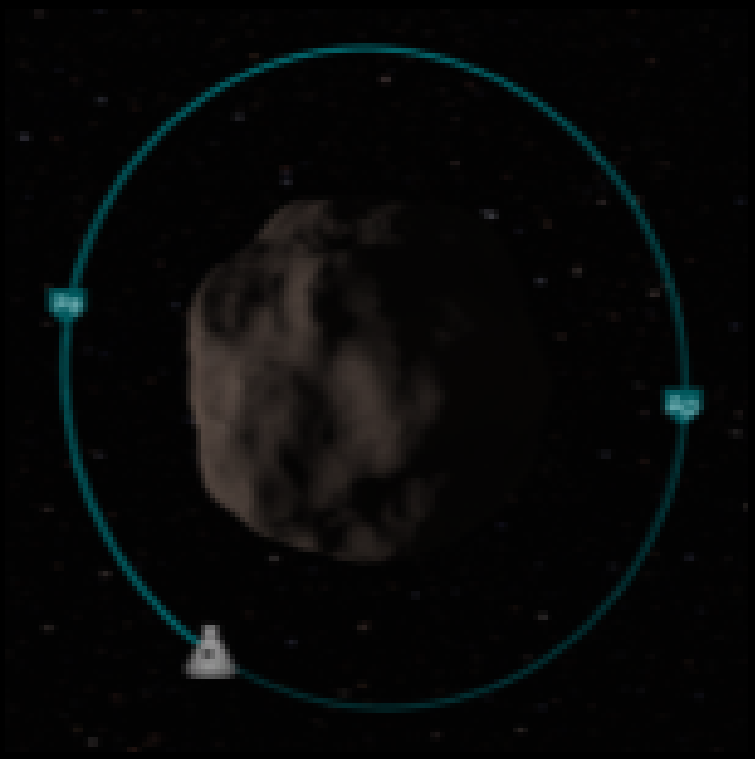
The specific fruits that may trigger OAS vary depending on the pollen a person is allergic to. For example, if someone is allergic to birch pollen, they may experience OAS symptoms when consuming apples, cherries, or peaches. Ragweed pollen allergies may cause reactions to melons and bananas.

It's important to note that not everyone with hay fever will develop OAS, and the severity of symptoms can vary.

If you suffer from symptoms that make it difficult to focus or manage, speak to your GP for advice.

Orbits!!!

By Maksymilian Mankowski



The easiest way to define an orbit is when you are constantly falling, however you move too fast in one direction that isn't down that you miss the object. However, you can further guess the parameters of an orbit to make precise orbital manouvers.

Jebediah Kerman is orbiting Gilly and would like to know his orbital parameters to made a transfer back to Kerbin.

Orbital parameters

- Periapsis - Lowest point of orbit
- Apoapsis - Highest point of orbit
- Semi-Major axis - Periapsis + Apoapsis ÷ 2
- Eccentricity - the shape of the orbit, in this case, the higher the number (0 to 1) the more eliptic the orbit
- Inclination - the degrees the orbit is tilted (90°) would be a polar orbit
- Longitude of the Ascending node - the horizontal alignment when the orbit passes through north to south
- Argument of Periapsis - The orientation of the orbit based on the LAN and the Periapsis.
- True Anomaly - The position where the object is orbiting at a specific time.

Neat Orbital Facts

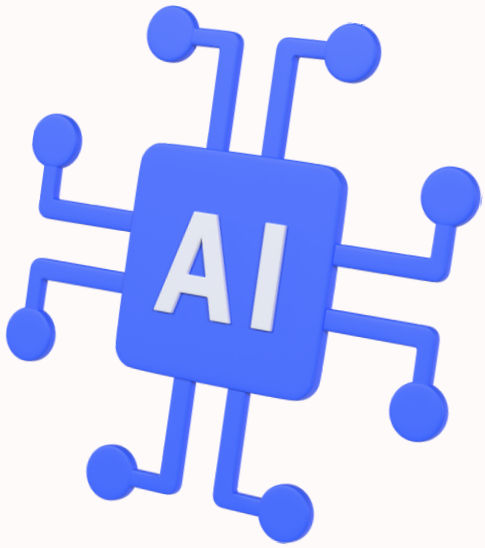
- If you increase velocity the opposite side of the orbit is affected, not the side you are on.
- On a geostatic orbit, you will always face the same side of the of the object you are orbiting

With this information, Jeb can now return home with all the science he got from spending some time around gilly.

THE INNER WORKINGS OF AI

What is AI

Artificial Intelligence (AI) involves acquiring data, using learning algorithms to analyze it, and making informed decisions. AI systems learn from labeled or unlabeled data and employ rule-based or probabilistic approaches for decision-making. Techniques like natural language processing and computer vision enhance their capabilities, making AI a rapidly evolving field with potential for revolutionizing industries.



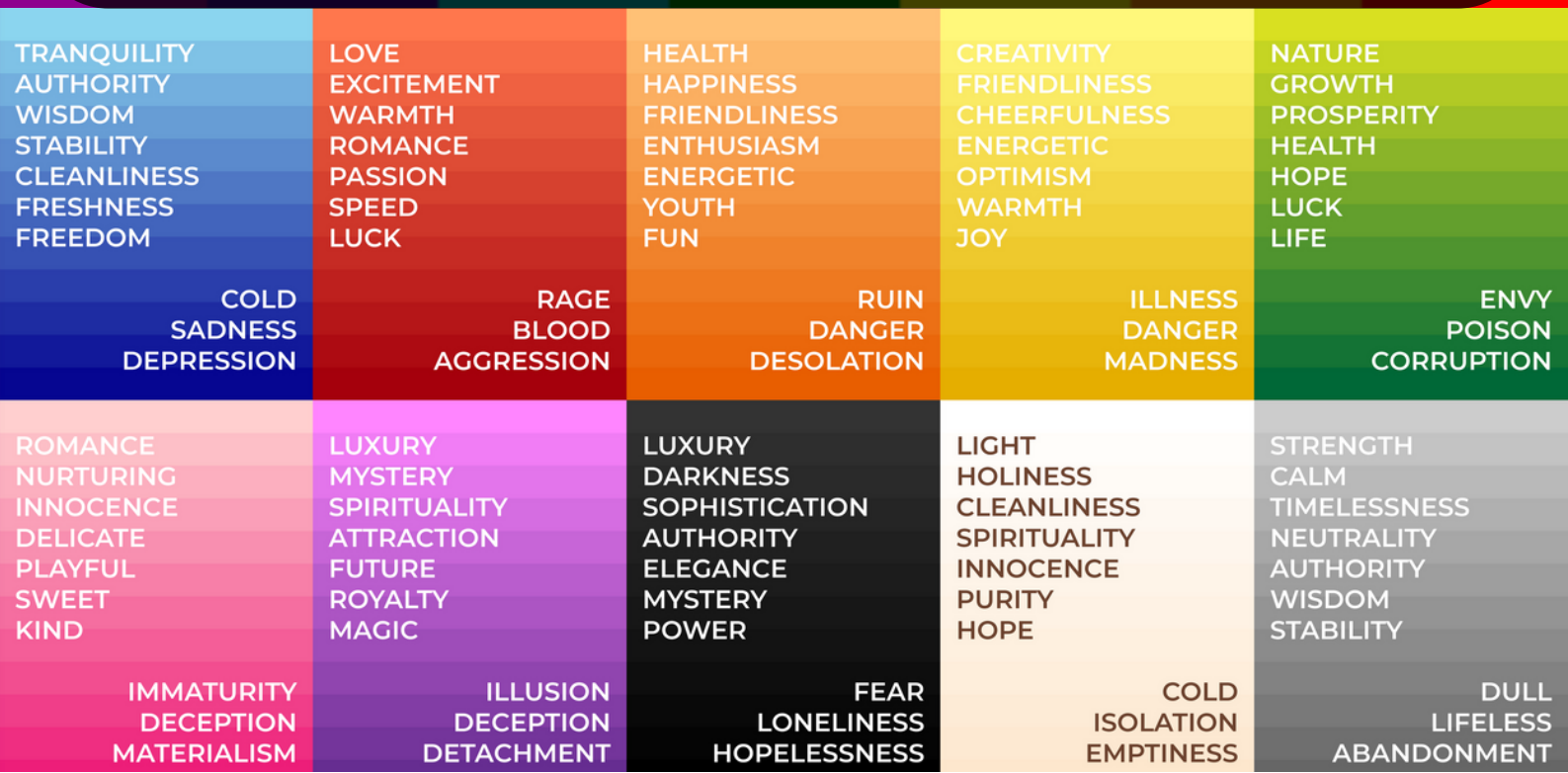
How AI works

AI's inner workings rely on neural networks that simulate the human brain, enabling pattern recognition and prediction. Reinforcement learning allows agents to make optimal decisions through trial and error. With advancements in deep learning and neural networks, AI has made significant breakthroughs in areas like natural language processing and image recognition. AI's potential to drive innovation and solve complex problems across various fields makes it a key technology shaping the future.

Emotions

what are emotions?

Emotions in a nutshell are just thoughts create by our brain. This isn't all there is to emotions though. At first scientist Paul Ekman proposed the idea that there are 6 different unique emotions: Fear, Anger, Disgust, Surprise, Joy and Sadness. This theory was later expanded by Robert Plutchick to create what we know as an emotion wheel. An emotion wheel consists of the main "primary" emotions but also contains "secondary" emotions by combining these "primary" emotions E.g hapiness + anticipation = excitement this theory was later further evolved by Ekman to create the emotion wheel we know today. **Why do we familiarise colours with emotions?** A simple answer would be that we see colours in our natural environments and we just naturally assosiate those colours to emotions. To add to this colours help us to express how we are feeling in a more familiar term.



~RATS~

By Alice Ledger

Rats are a well known rodent, however unfortunately have grown to be known as ‘dirty’ and ‘diseased’, whereas in reality they are friendly and smart, and can create incredible bonds as pets.
The best known species of rats are the black rat (rattus rattus), and brown rat (rattus norvegius), however are definitely not limited to these. They have been bred and kept as pets since the 19th century, and carry as few diseases as other house pets such as cats and dogs, however earned their bad reputation after having contributed to the spread of the black death and other diseases, however it was found that urban-dwelling mammals, such as the rat, carry 10 times more diseases than other mammals, but this may not be the full truth. In the research carried out, urban animals were roughly 100 times better studied than any other animals, meaning there may have been a ‘sampling bias’.

It is also important to recognise that animals living in cities carry more diseases, simply from being close to human beings, which will have also contributed to the spread of diseases and bacteria, but since they aren’t commonly known as friendly animals, or pets, the label has stuck. However rats are actually incredibly clean, grooming themselves regularly, as much as cats.
Studies and incidents such as that have led to rats’ other qualities being widely disregarded, they are actually incredibly smart creatures, and are considered by experts to be one of the smartest animals, and also have an incredibly similar brain structure to that of a human being. They also love to learn, so are great to train as pets, and also incredibly social, meaning that they also have to be kept in pairs or groups.

Dr M Bradley

THE TWO GREAT MYSTERIES OF SCIENCE

There are lots of unsolved problems in science – conundrums which still need to be worked out: how life arose from non-life; how to make nuclear fusion easy and practically useful; and whether there is life on other planets. These problems will probably be solved one day – it is just a matter of hard work and time. But there are only really two great mysteries left in science – problems for which any possible solution just doesn't even seem to make sense, problems where we just seem to be stuck without any idea of how to continue. Let's have a look at them...

Mystery 1: Why is there something rather than nothing?

We are here now in the midst of the universe – a universe full of interesting things, like planets, protons and pizzas. But where did everything come from? Where did it all originate? There are a number of possible answers, but none of them seem to be satisfactory.

1) **God made everything**. Well, so far as science goes, this isn't a very scientific answer, but then maybe religion answers some questions that science cannot. The real problem though, is that this isn't really any advance at all, since we can immediately ask the questions: well, where did God come from then, and how was it possible for him to make a universe? Though not an argument against God's existence, it is an argument against using the deity to answer the question of where everything came from.

2) **The universe was brought into existence by something that came before it** (like another universe, or some weird laws of physics). The problem with this answer is that whatever we say brought the universe into existence faces the same problem that we began with: where did this thing come from? In fact, no matter what we offer as an answer to the problem just faces the very same question all over again. We never get any further!

3) **The universe came from nothing!** This is one of the current theories that physicists offer. The universe was created from nothing at the big bang and there is no further question to be asked. Problems? Well, even though the big bang was created from the quantum vacuum, the quantum vacuum is still something and not nothing and so we are back where we started! And if our physicist wants to say that the universe was created from nothing, period, then this doesn't even seem intelligible. How can something come from nothing? Why was this universe created instead of a different universe, or a giant moose, or a pink apple pie that can talk Swahili?

4) **The universe never began to exist because it's always been here – it stretches infinitely into the past.** Not bad, but then we need an explanation for why there is an infinite universe. Also, if the universe has always been here, and time flows from past to future, how could we ever arrive at the present moment, since there are an infinite number of moments before this one, and, by definition, you can never complete an infinite series! We could never arrive here! Frustrating!

Mystery 2: How is consciousness possible?

We are here now in the midst of the universe – a universe full of interesting things, like planets, protons and pizzas. But where did everything come from? Where did it all originate? There are a number of possible answers, but none of them seem to be satisfactory.

Think about all of the various sensations and feelings that you can have: the reddishness of a tomato, the fizz of lemonade on your tongue, and the piercing sensation of a papercut along your finger. Now, where do these sensations come from? They are partly from the world – from tomatoes, from lemonade, and from sheets of paper. But it is the brain which ultimately produces these sensations, which gives rise to the feelings that we have. The problem is, how does it do it? The brain is made up of around 86 billion nerve cells, and they are constantly sending electro-chemical signals to one another. But how does any of this add up to the conscious awareness that we have from moment to moment. There seems to be a vast explanatory chasm between the physical processes that go on in your nervous system and the amazing variety of conscious feelings that you have and that make up your mental life. Tell me that brain region 26 produces the feeling of love and I am none the wiser about how it does this; tell me that the cerebral cortex is responsible for the feeling of self-conscious embarrassment when I fall over in the corridor, and I'm still as perplexed as I would be if you had told me that my awareness was produced by a strawberry blancmange. We know the brain is responsible somehow, we just don't know how it does it.

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