# mRNA

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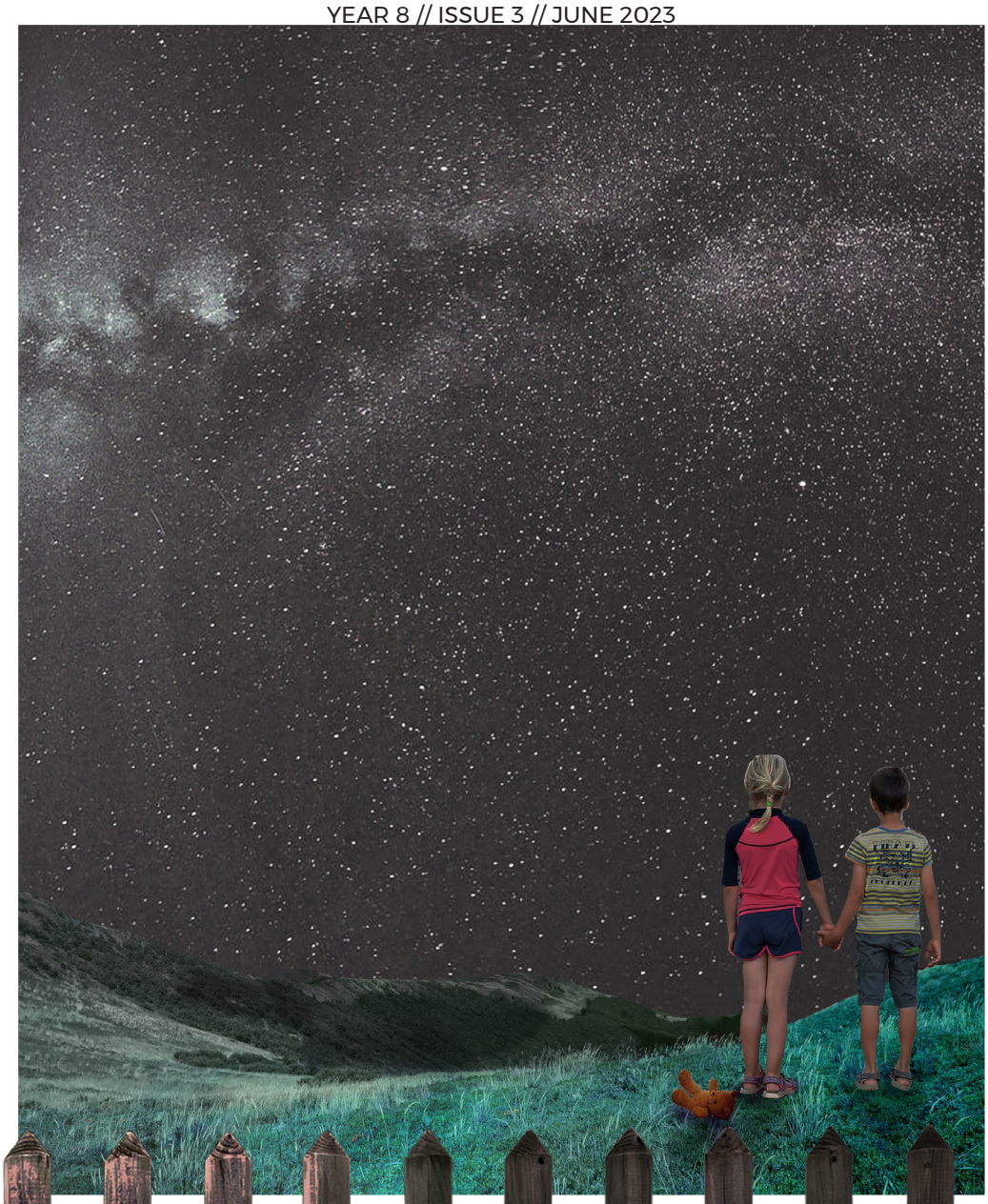

NOSTALGIA // AGI // C. ELEGANS // TREES // CHILD MORTALITY // CONSCIOUSNESS // FLOW CYTOMETRY // PSEUODOSCIENCE // BASISBEURS

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## COLOPHON


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## EDITORS


Editor-in-Chief: Calin Alecu
Editor: Avin Nayeri
Commissioner of Acquisition: Balint Magyar
Captain InDesign: Laren Kıryağdı
Captain InDesign: Hester Zoet
Captain InDesign: Carlo Geertse
QQ: Mijke Dijken



S.V.N.B. Hooke
mrna-hooke@tudelft.nl
Van der Maasweg 9
Room C0.010
2629HZ Delft
015 2781639


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# EDITORIAL

## CALIN ALECU

Dear readers,

Welcome to this academic year's last mRNA! I hope your studies have been fruitful and that you've hit your E.C. targets, especially if you're one of our first years; I want to see as many  of you again as possible. We're in the last leg of this scholastic race (or perhaps even done with it by the time this edition goes out), so keep your head up, your eyes forward, and your focus sharp. You may not yet see it, but the work you do is meaningful; "there is a single light of science, and to brighten it anywhere is to brighten it everywhere". But enough about work; the holidays are just around the corner, so make sure you go into them with your best foot forward.

As I write this, Delft is experiencing a record-breaking June. We haven't even reached the summer solstice yet, but the sun and heat already feel intolerable to me. I dread what is to come; with each passing year, temperatures are likely only getting worse, at least for the foreseeable future. This may be the gentlest summer I'll see for a while, yet it already feels oppressive. I remember a time when things used to be different; kinder summers, with sun and heat that would gently embrace you, filled with carefree joy and adventure. Perhaps I'm being too pessimistic, influenced by the nostalgic feelings tied to my childhood; after all, that's what the theme of this mRNA is all about. We hope you find meaning in our recollections, delight at some of our more satirical work, and maybe even pick up some tips for eventually raising your own children.

As usual, I hope this new edition of the mRNA finds you well. It will be my sixth, and likely last, that I pen for you. As my words take life on the screen in front of me, I'm left with a case of stage fright; you, the reader, know how the publishing of this mRNA went. Hopefully, you've read it. Did it live up to your expectations? Did we pull it off? You know, and I don't, and that seems terribly unfair to me right now. Of course, this is inevitable; all things must change, and it is now simply just my turn.

At your service one final time,

Calin Alecu
Editor-in-Chief of mRNA 7.0

## FROM THE ~~BOARD~~ TEAM

### THE MRNA TEAM: AVIN, LAREN, CALIN, BALINT, CARLO, HESTER

Dear readers,

The end of this academic year has been reached, and with it comes the third edition of mRNA! From parties to rallies it was a year full of fun activities, and we hope you enjoyed yourself one way or another.

This edition, for a change, we are here with a "from the team" instead of the usual "from the board" to let you take a peek behind the curtains. We'd like to reflect on the amount of hard work which goes into making these 30-ish page booklets.

All these booklets are made with care and passion, and even though you see a colourful, fun piece of work which is mailed to your address, the experience beneath it goes far beyond for those preparing it. It is brainstorming, envisioning, planning, editing, InDesigning and most importantly collaborating. It is truly an experience which teaches you things way outside the scope of your expectation. We, as the mRNA team, are always eager to welcome new faces who want to become a part of this family, so consider taking part in this creativity journey next academic year!

With all that said, I am very proud of our team for giving life to this edition, and I am very proud of you, the reader, for successfully completing another academic year despite every challenge. It is now time for a well deserved break. Enjoy your holidays!

We have spoken,
the mRNA team.

Get to know your fellow mRNA members. Match the childhood photo of the current members to what they did as a child.

A) This kid always used to carry a small blanket with them because they were very emotional.

B) This kid cried their way through first few years of their academic life and basically didn't attend school until they were 6.

C) This kid once beat their favourite video game while sleepwalking and was really angry about it afterwards.

D) This kid used to chase boys in kindergarten while pretending they were a vicious cat.

E) This kid loved to unpack drawers and climb into them.

F) This kid loved racing while their little sister was in the pram. It always ended with her in a bush.

## CHILDHOOD TRAUMA, A WALKTHROUGH

**SATIRE**

Most consider childhood trauma a negative thing, and in most cases this is true. There's nothing positive about bullying, for example; anyone who tells you that it "builds character" or "teaches you to face adversity" is, at best, a moron. However, there are undeniably some forms of childhood trauma with benefits attached. Some of you will be parents one day, and, as parents, I'm sure you only want the best for your children. Fear not, I am here to help you; traumatising your child the right way while avoiding negative experiences with trauma has never been easier. In this guide, I will teach you how to take trauma and make it fun for (almost) the whole family!

It's best to start early. The best time to traumatise your child begins when they start being self-aware; all babies grow up and eventually reach a point where a switch is flipped and they become sentient. If you've missed this, don't worry: the second best time to start traumatising your child is today. If something is important enough to do correctly, it's also important enough to do incorrectly. (insert other mantra here). Without further ado, here are some ground rules / words to live by when traumatising your children:

1: There are no rules. Be creative! There's no wrong way to correctly traumatise your child.

2: Know your child! Different approaches work better with different children. Take time to get to know your child; what they like, what they don't, what they fear, etc.

3: Be consistent. Children learn via reinforcement learning, so it's best to really hammer it in.

4: Be inconsistent. Consistency breeds familiarity; trauma doesn't really hit the same when your child learns to expect it.

5: The rule of cool. If something sounds fun or cool, it's likely a good place to start; keeping your child engaged is key to traumatising them!

With these principles established, I'll walk you through two basic examples and their benefits.

Adult media: media literacy and good taste in media is becoming more and more important in our internet age. You can give your child a head-start on developing these skills through the media you have them consume. Cartoons are a good place to start; after all, who can fault you for sitting your child down in front of a cartoon? Mum and dad need a break too sometimes. My go-to examples are Spirited Away and Evangelion, but anything that heavily emphasises death or contains Lovecraftian horror will do. Life is precious; it's important your little tyke understands that it can be taken away at any moment by an uncaring universe, and cartoons are a child-friendly way of introducing this concept.

Gatekeep, Gaslight, Girlboss: these three words are in that order for a good reason. This is especially relevant for those who have a little girl; living in a material world requires a special set of skills. Make sure your daughter only plays with girl toys; gatekeeping is crucial. This way, when she grows up, you can gaslight; tell her she's imagining things, you never banned her from playing with boy toys she liked. It takes patience, but this is how you raise a girlboss.

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# TOO FUN TO HANDLE

## RESEARCH

**Kids… love them or hate them, we have all been there, and it is likely we will end up having our own. Given our age, childrens' issues or how to raise them are not topics that occupy our mind daily. However, we are usually exposed to a kid throwing a tantrum, bawling their eyes out on the supermarket floor, or we witness a conversation which goes along the lines of "I will never put my children through the same childhood trauma as I did", so we end up forming an opinion on the "perfect" way to raise a kid regardless. I will present to you recent research and its findings which you might want to add to your child raising repertoire.**

Let's start with some statistics. On average, a 13-year-old in the UK has a total of 493 toys. Intuitively, the number of toys owned does not have a bad connotation, yet research carried out by the University of Toledo found that fewer toys led to a richer play experience. Since 493 toys is overkill, we apparently have a habit that must be looked into.

### How are too many toys bad for kids?

Kids are innately distractible. The more toys you have, the more you can expect a kid to go around jumping from one toy to another without using any of the toys to their full potential, and this is exactly what the research found. A kid is pushed to come up with more creative ways to play with their toys when provided with less options, and at a young age encouraging creativity is crucial.

Another concerning issue which might be attributed to having too many toys is the decrease in attention span. When there are too many toys around, kids tend to spend less time on each and be overwhelmed by the clutter, getting distracted too easily or needing constant introduction of new toys to avoid boredom. Getting bored all the time by itself is a huge area of concern for some developmental psychologists, but attention span decrease is something I think we all know too well, considering most people can't go a lunchtime without a Reddit post being read aloud by an AI and a Subway Surfers clip in the background.

Boredom for a kid is a blessing. Kids are present and aware of the world around them when they are bored, and they learn just as much during boredom as they do during their play with toys. The different sounds they can make with their mouths, the different colors of the butterflies outside, making a fortress out of pillows, the noises a pot makes when hit with a spoon are all discoveries made during boredom, and they are all great sensory inputs for a kid. When a kid is surrounded by newly incoming toys all the time, they do not get the chance to explore what boredom can bring, instead internalising a fear of this boredom, never learning what to do when there are no new toys around.

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It is also important to mention that kids are just kids. They will throw things around, be clumsy and use their stuff inconsiderately because it is a part of the learning process. Until the cleanliness and organisation education you give them starts setting in, you as a parent will clean up after them. Not only do an overwhelming number of toys make this process difficult on the parents' part, but they also make it hard for a kid to learn how to take care of their toys and possessions because the more toys they have, the less value they attribute to each.

Overall, should we deny kids toys? Absolutely not. Toys are still a very important part of a child's development. Researchers advise parents to keep the entirety of a toddler's toys in rotation, and keep only a few toys around their playground at a given time, swapping out toys whenever needed. Just be aware that you might not be doing your kid a favor by buying them absolutely any toy they see at the store.

**Conclusion**

So far you have read about the science-backed results on how to raise a child optimally. I hope this article's content sticks with you for another ten years, or until whenever you decide to have children so that we can be more conscious of the "too many toys" phenomenon. But, so what if you aren't so conscious?

Here is my own take: humans, even the small ones, are complex creatures. I have seen so many different comments on the best way to raise a kid in the media, from gentle parenting to helicopter parenting; and I can keep on adding adjectives in front of parenting to make it seem like the new trend and I am almost assured to gain a following which believes in it being the ultimate, award winning way of parenting which spits out picture-perfect kids and mannerisms, when in reality whatever you do will probably reflect upon your childrens' therapist bill in the next 20 years.

There is no one way to parent which will ensure a "perfect" grown-up, because there is no such thing. Almost all of us can look back and say "my parents did ... to me" in an unpleasant tone and promise we will never do that to our own kids, without realising that we will probably give rise to a whole new kind of messed up.

The whole point of parenting is that it is dynamic. It changes. Every new generation focuses on fixing what their parents reflected upon them "wrongly". We will try to fix the way we were parented, and so will our children, and this is just a never-ending cycle. All we can do is realize we are trying our best. Our parents tried their best with whatever they had in hand, and so will we. You may not always fit into the research-proven best way to raise a kid, or whatever the trendy parenting style in 10 years will be, but you will try your best. And that is what counts.

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# IF SCIENCE HAD NO RULES

## WHAT IF...

**If Science Had No Rules**

**Science has taken us far, and is taking us further every day, but there is a limit as to how far it can take us. Not all research is possible, or rather allowed. Regulations prohibit certain experiments from being performed, for good reasons, but it does slow down scientific discoveries. What would happen if we abandon the rules and any research would be possible?**

**Drug Development**

Development of drugs is an extremely tedious and expensive business, from in vitro to in vivo animal testing to eventually humans. This process would accelerate tremendously and would be way cheaper. Many preclinical steps could be skipped, going straight to testing on human subjects and knowing much better and much faster what the effects are on the human. This comes with downsides of course, side effects would not be well tested, potentially injuring humans unintentionally.

For animal testing, a lot of restrictions are in place too. You need to clearly explain why and what you are doing to an ethics committee, and they need to approve it. Removing this will speed up research in drug development, genetics, genetic engineering, and molecular pathways.

**Genetic Engineering**

To dive deeper into genetic engineering, you might have heard about "gene drive". You genetically engineer organisms in such a way that over time an entire species can be changed. This tool is super useful as a tool to exterminate invasive species. This could help us undo mistakes from the past where humans introduced new species to islands but that species killed all original species. The downside of this is the possibility of creating changes that are negative for an ecosystem.

It could even improve us as a species. When genetic engineering is allowed on humans, we could turn ourselves into super humans. Increased memory, muscle strength, endurance, life span. The possibilities are endless, more than I can ever think of right now.

**Privacy**

There are many strict rules of privacy regarding medical information. If they would be disregarded, large datasets would be available for medical research. This would make it easier to find specific causes for rare diseases, or even better understand common diseases. It would improve medical therapy and drugs, thus allowing us to cure more diseases and expand the lifespan of humans.

Restrictions in science both slow down scientific research, but also prevent disastrous things from happening. Rules are needed, but contemplating over the possibilities can still be useful and a fun thing to do.

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# WHY DO WE REMEMBER CERTAIN CHILDHOOD MEMORIES?

## MEMORY AND ITS MYSTERY

**Some memories stick with you forever: a personal experience of mine that has stuck with me till today is when a kindergartener bumped into me, causing me to fall, face-first, into the sandpit. It was a very traumatic experience for a three year old, as my face was covered in sand. I had never anticipated such a possibility. But why do I remember this specific event? Having forgotten more significant events around that same age, why is it that I can still remember this memory in such detail?**

Overall people assume that this is due to a non-developed hippocampus and prefrontal cortex, which do not develop into mature structures until only the age of around three or four. This is then assumed to be the reason for adults not being able to recall most memories before this age. However, children at the age of around two showed proof of them remembering events from when they were only one year old. Thus, the brain is in fact capable of remembering at a very young age, so these mature brain structures are apparently not necessary for memory. A better explanation is that of hippocampal neurogenesis, which still occurs up to the age of 14. This neurogenesis causes the degradation of existing memories due to the need to make new synaptic connections within the brain; some memories are therefore lost, or just impossible to recall.

A lot of philosophical discussion points to the theory of mind, which states that one only develops a cognitive self at an age of four to five. Toddlers have not yet accepted that their thoughts, beliefs and experiences are unique or something that no one has access to. They lack the processes that are necessary to link events from the past and present and therefore are not able to be conscious of their memories. When adults repetitively talk about these events with the toddlers, they help them with developing this cognitive self and to label these events as parts of their past or present.

Another theory was posited by the great neurologist Sigmund Freud. Freud put forth his controversial trauma theory in 1926, after he examined the effect of sexual abuse and molestation at a young age. He suggested that childhood amnesia was the result of this abuse. Most patients were not able to remember anything before the age of six to eight, whereas people without these traumatic experiences only lost memories before the age of three to four. Freud elaborated on his theory by stating that it was a response of one's mind, which attempted to repress these events for the sake of self-protection.

On the contrary, evolutionary psychology states that if one would experience an event that was frightening or upsetting, one is inclined to avoid a similar situation in the future. For this, one of course has to memorise the event to be able to protect themselves from the danger. Research has also shown that heightened emotions and a big surprise factor can encourage an individual to remember an event better. That is probably why I can still vividly remember my sandpit trauma, and why I never came close to the pit ever again.

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Background source: Wallpaperflare

# THE SECRET OF THE THIRD PLANET
## MOVIE NIGHT

**Though it is practically unknown here in the West, the Soviet Union in its heyday had a thriving culture of high quality cartoon production. Unlike the character-driven, individualistic narratives of Disney and Warner Bros, Soviet cartoons emphasised collective values and philosophical themes, reflecting the ideology of the era they were created in. Moreover, Soviet animators explored strange and abstract shapes and sounds that at first glance might seem weird compared to the streamlined, commercially-oriented aesthetic of traditional Western animation. But this gives them a unique, timeless charm that makes them well worth watching even today, for children and grown-ups alike.**

My all-time favourite from this era is the feature film The Secret of the Third Planet from 1981 by Roman Kachanov. This Soviet gem is a fantastical odyssey across the universe, brimming with intrigue and whimsical adventures – a true animated science-fiction classic.

In 2181, an expedition led by Captain Zelyony, Professor Seleznyov, and his daughter Alice board the spaceship "Pegasus" to seek new species for the Moscow Space Zoo. On their journey, they meet Gromozeka, an archaeologist, who recommends visiting the creature-rich planet of the Two Captains. Seeking assistance, they approach Dr. Verkhovtsev, the director of the Two Captains Museum, but his behaviour raises suspicions and he refuses to cooperate.

The team makes a stop on the planet Bluek, where they acquire valuable items, including a talking bird named Govorun that belonged to the missing Captain Kim. They learn that Govorun's unique species has gone extinct at the hands of space pirates. Govorun also reveals that Captain Kim is in trouble, leading the crew to alter their course and head towards the Medusa system. Along the way, they encounter challenges and must navigate through unforeseen circumstances, all while uncovering the truth behind the mysterious Dr. Verkhovtsev and his hidden agenda.

"The Secret of the Third Planet" may not be for everyone. Its pace is slower than what you might expect from an animated adventure, and there are moments when the plot can feel disjointed or even confusing. However, the film's unique art style and captivating sound design create an immersive world that draws you in and holds you through every twist and turn of the story.

If you found yourself enjoying this unusual piece of Soviet animation, I recommend exploring other classics such as "Hedgehog in the Fog", "The Snow Queen", and "Tale of Tales". Each of these films offers its own unique blend of storytelling, aesthetics, and cultural insights that make Soviet animation such a fascinating field to delve into.

"The Secret of the Third Planet" is more than just an animated film from a bygone era; it's a portal into an imaginative and often surreal world. So, why not change up your usual movie night with friends and take them on a journey through the mysterious cosmos? Adventure awaits!

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# CHILD MORTALITY: A BRIEF HEALTH AND SOCIETAL OVERVIEW ANALYSIS

**Child mortality is a matter of pressing urgency, regardless of its seemingly declining rate. In 1990, the under-five mortality rate was 93 deaths per 1,000 live births, and in 2021, it fell to 38 per 1,000. This seems like an improvement right? A 59% decline is indeed reassuring of modern technology and economic decisions, yet that still amounts to 13,800 under-five deaths per day. An intolerably high number of deaths at the hands of diseases that could easily be prevented with the correct education and policy management.**

Many of these infectious diseases are not necessarily discriminatory to country, age, or access to healthcare; they are simply compounded by factors that arise from poverty, which in turn make them diseases of inequality. For example, pneumonia is the leading cause of child mortality under the age of five, particularly in the poorest regions of the world, due to undernutrition, air pollution, and inadequate water and sanitation. These are all systemic issues that require long-term strategies to make affected countries self-sustaining. Foreign aid in the form of antibiotics and other medication is an effective method to reduce child mortality, but a short-term solution that leaves poor countries at the mercy of their providers' political, economical, and social motives.

The three other leading causes of child mortality are diarrhoea, meningitis, and malaria. Scientists have recently discovered that three-quarters of diarrhoea cases are caused by only six pathogens, of which only one, a rotavirus, has a vaccine. Meningitis is an infection of the thin lining that surrounds the brain and spinal cord, called the meninges. The disease can be either bacterial or viral, with the former being responsible for the majority of deaths. From the onset of symptoms, death can occur within 24-48 hours, thus infected individuals would require immediate medical attention. A variety of bacteria can cause meningitis, with the most common being Neisseria meningitidis, which has six strains that can cause epidemics, known as A, B, C, W, X, and Y.

Malaria is caused by a parasite that is transmitted by mosquito bites; there are five species of the single-celled parasites, called plasmodium, that can infect humans and cause illness. These are P. falciparum, P. malariae, P. vivax, P. ovale, and P. knowlesi, of which P. falciparum is the deadliest and most prevalent on the African continent. From the discussed diseases, malaria receives a disproportionate amount of funding and recognition whilst being less fatal. Why? Given that malaria is spread through mosquitoes, the only truly, effective preventative step would be eradication, as suggested by the Gates Foundation and other health organisations. Achieving this eradication by 2040 would cost between $90 billion to $120 billion, numbers some would regard as "unfeasible or unacceptable", while others would state "is not enough, as human lives are involved". It is challenging to put an "acceptable" value on the health of children; funding, policy, and resource allocation should be geared towards maximising public health, but we regularly see that this is not the case. As a society, we are making progress, but nevertheless, there is always room for improvement, particularly in finding long-term solutions. As future scientists, we must remain open-minded and critical to bring forth this change, to help the children who simply cannot help themselves and to encourage healthier and more prosperous communities that can thrive on their own.

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# AGI - DANGERS AND PROSPECT

## UTOPIA OR DYSTOPIA?

**In a few years, AI went from mistaking cats for dogs to taking on real jobs, transformed from fumbling Twitter bots to producing doctoral dissertations, and growing into a hundred billion dollar industry. Now that we have crossed a tipping point, hundreds of companies and numerous governments have entered an arms-race to achieve artificial general intelligence, "AGI" - a technology that is often compared to nuclear fission. Why is AGI so powerful? And what makes it dangerous?**

First, let's look at what AGI is exactly. For the purposes of discussing AI, intelligence means the ability to effectively make decisions to achieve one's goal. This is important: intelligence only makes sense in the context of a specific goal. Humans are intelligent because they are good at making decisions that bring them closer to their goals.

General in AGI means that one can make good decisions in a wide variety of situations. The chess program DeepBlue is very good at making decisions on a chess board, but cannot solve maths problems or drive a car. In summary, AGI is a type of artificial intelligence that can understand, learn, and apply knowledge across a broad range of tasks.

So what is the danger? Remember, we have to give our AGI a goal. In the case of DeepBlue the goal was simple: win a game of chess. What if we programmed AI to drive from point A to B quickly? It might decide that not stopping for pedestrians is the fastest route. Even if we program it to adhere to traffic laws and protect human lives, without a wider awareness, it would, for example, not realise that a ball bouncing onto the street means some children are likely to suddenly run out in front of the car, and would notice them too late to stop. This is not to say self-driving cars can never be safe, it is just meant to illustrate the scope of the problem of alignment.

In general, a superhuman AGI would be superhumanly creative at finding loopholes wherever possible in service of its goal. Because it would lack the base knowledge that we humans share, we will have to explicitly teach our AGI everything we humans value, and everything we leave out, it will completely ignore. This is called the alignment problem: the task of aligning the AI's goals with our own. This might be the greatest and most important challenge we have to face, and we might only get one chance.

Once activated, we might not be able to turn off a superintelligent AGI. The problem is, whatever goal we give to our AI, the only way it can achieve it is if it stays active. An AI that is smart enough to figure out it can be turned off will necessarily try to prevent that from happening. We cannot simply supervise such an AI either. When AlphaGo, DeepMind's Go AI, was playing against the human champion it made a move that looked like a rookie mistake. The commentator thought the move was so stupid he hesitated to announce it, but it ended up deciding the game in favour of AlphaGo. No one could see the value of the move, and if it was up to them, they would have stopped the AI from playing it. Humans may struggle to judge decisions of a superior AGI. If the AI is smart enough to realise it's being supervised and perceives this as a hindrance, it might resort to deception.

Where do we stand now on the road to AGI and solving the alignment problem? Some say, with the emergence of large language models (LLMs), like GPT-3 that powers ChatGPT, we are nearly there. In short, an LLM's goal is to predict text, like the next word suggestions on mobile keyboards, except on steroids. They are trained to fill in random gaps in huge collections of text gathered from the internet, which include everything from Shakespeare to Excel sheets. To be able to effectively predict such a wide variety of text, an AI has to absorb a wide swath of knowledge, as you cannot be good at filling in blanks in a research paper if you do not have the same background knowledge as the author had. Learning to predict text is a very good surrogate to acquiring general knowledge, including things like human values: ChatGPT can perfectly recite the Bill of Human Rights and reason about each of its points. That AI understands human values is essential to solving alignment, but it does not yet mean that it really values them.

How do we make sure LLMs do what we want? One of the best methods we currently have is called Reinforcement Learning with Human Feedback. The idea is to ask the model to generate a few responses to a prompt. Then, a human evaluator picks the better response, and the model is updated to take the human preference into account. To speed things up, another AI is trained as well, whose job is just to learn to pick responses that humans would like. This smaller critique-AI can then judge hundreds of thousands of responses very fast. This technique was used to create ChatGPT from GPT-3: by learning from the feedback, GTP-3 became better aligned to the goal of being a helpful assistant.

Image sources: pixabay.com and commons.wikipedia.org

But this approach has its limits. For example, if you ask ChatGPT to write a sonnet and limerick, both will come out looking like generic poems, even though GPT-3 knows the difference. This could be because the humans evaluating the responses did not know the difference themselves, and simply approved of anything that looked like a poem, so the model learned to be lazy. Another problem is that evaluators heavily dislike answers when the model says it cannot do something, but often cannot tell when an answer is wrong. This way, when asked a factual question, the model is incentivised to try and make something up instead of admitting it does not know the answer.

In general, learning from human feedback only teaches the AI to appease the particular preferences of the people evaluating it. The only values it internalises are the ones the evaluator imposes on it. That is why it is important we focus on other areas of alignment research as well. The most promising of this is interpretable machine learning. Normally, the internals of these AI models just look like a giant mess of numbers. Interpretability aims to solve that by deriving some meaning from these numbers. For example, we can analyse the model's artificial neurons to see which parts of the input it is "paying attention" to, and which it is not. This can give a hint as to whether the model is following our instructions or not. However, this field of research is still in its infancy. In the future it could grow into its own branch of science, similar to neurology, except studying artificial brains.

As we approach AGI, we face numerous challenges. Yet, these are not insurmountable, as global researchers are collaboratively exploring innovative solutions. AI has the potential to create a utopia where we will be free from having to work, to pursue our passions, but it also has the potential to deepen inequality or even destroy us altogether. Most believe the breakthrough will happen in the lifetime of our generation, so it is in large part up to us to steer this new power in the right direction. Stay informed, engage in ethical discussions, and support responsible AI research. Let's shape the future of AGI together!

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# GET TO KNOW YOUR CELLS WITH FLOW CYTOMETRY

## USEFUL TECHNIQUES

**If you ever performed research with cells you have probably heard of flow cytometry. This technique can measure the characteristics of individual cells from a large cell culture. A flow cytometer can be used for cell counting, cell sorting, measuring genome size, detecting biomarkers, detecting micro-organisms and much more. With this article, I will discuss how this technique works, discuss some of its applications, and why it is interesting for your own research, like a BEP, MEP, or an internship.**

A flow cytometer consists of several components, the first one being the fluidics system, which consists of a sheath fluid under pressure. The cell mixture is added to the fluidics system and the sheath fluid pushes the mixture into a small stream, where only one cell can flow at a time. This stream of cells then passes through the optical system, which contains several lasers and detectors; the lasers shine light on the cells, and the detectors measure the refracted or reflected light. Information regarding the cell is retrieved from the intensity and angle of the detected light. Finally, the last step is the electronics, which translates and analyses the data.

Modern flow cytometers can have more than five lasers, each sending out different wavelengths, providing different information about the cells. Modern laser systems can have detectors that can measure for up to fifty parameters, of which forward scatter (FSC) and side scatter (SSC) are the most famous. FSC provides data about the size of the cell, and SCC tells you the granularity of the cell. The other parameters are for measuring fluorescence inside of the cell.

Fluorescence-activated cell sorting (FACS) is a subset of flow cytometry that is utilised for cell sorting. With this technique, cells can be sorted on a specific parameter. FACS oscillates the stream of cells to create drops, and when a cell fits the specific parameter, the drop gets a charge, and as they pass through the metal deflection plates, they are steered into a specific tube. This results in the cells being sorted. Another application is mass cytometry. This is a combination of flow cytometry and mass spectrometry. Mass cytometry uses time-of-flight mass spectrometry instead of the conventional method of detecting parameters of the cells. The cells are stained with antibodies tagged with metal ions. Mass cytometry needs less samples for the process, making it a viable option if only a limited amount of samples are available.

Both TU Delft and the Erasmus MC have a flow cytometer. At the Erasmus MC, it can be used for cell sorting (FACS). It can provide a lot of data about your cell lines; it can be used for single cell cloning if you require specific cells out of a group of cells. If you ever need inspiration for new experiments or have specific questions about your cells do not forget this technique, as it offers an entirely new range of options possible for testing on cells.

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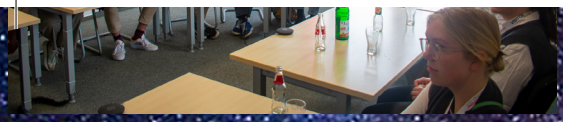


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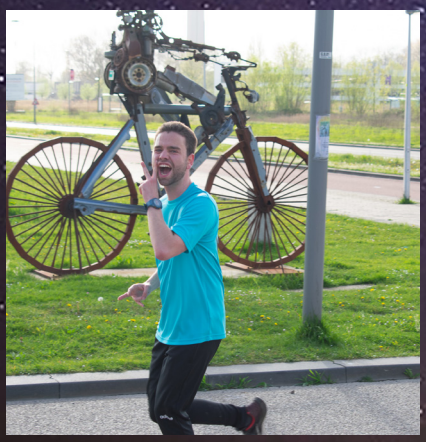
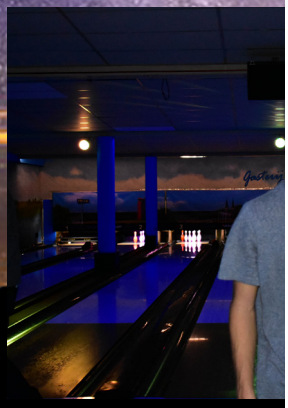
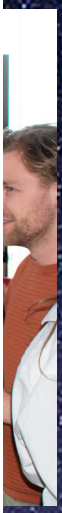
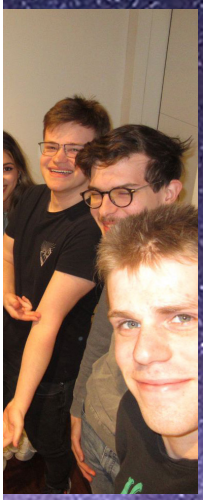
General Members Assembly | SVNB Hooke | April 25 2023





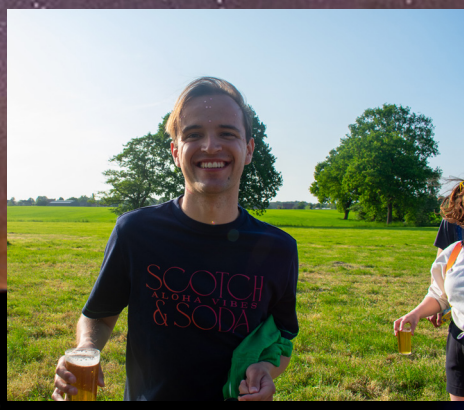







Hooke | April 20, 2023

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# C. ELEGANS, A VERY SPECIAL ORGANISM RESEARCH DISCUSSION

**The Caenorhabditis Elegans is a small roundworm with useful properties, like transparency and fast reproduction. These, along with our extensive knowledge about their genome, have made C. elegans a prominent model organism. In this article, I am going to summarize a paper which discusses research performed on C. elegans.**

C. elegans is a useful model organism for several branches of science, like research into aging, diseases, neurons, development and apoptosis. I found studies relating to aging particularly interesting. I will discuss a review article by Zhang et al that talks about how C. elegans has been used for aging related research (Zhang et al., 2020).

So far, over 50 genes have been found that control aging in C. elegans. Several of those genes have homologs in other organisms. Epigenetics also plays a major role in influencing these genes in aging. The genes are part of signaling pathways including the Insulin/IGF-1 pathway and the AMP-activated protein kinase pathways.

The genes daf-2 and age-1 are involved in the Insulin/IGF-1 pathway, and mutations in those genes cause a major increase in lifespan of C. elegans. The human homolog for those genes is a subunit of PI3K and insulin/IGF-I receptors. Both homologs are involved in the same pathway. In the AMP-activated protein kinase pathway it was found that the aak-2 gene improved the lifespan of C. elegans. The human homolog of this gene encodes the protein AMPK.

Anti-aging drugs are also often tested on C. elegans because they are very cheap to culture and have a very short lifespan. In fact, several drugs have been developed based on mutations of the previously discussed genes, like silymarin and metformin. I find it particularly interesting how information about genetics can be directly applied for drug research, again showing the significance of C. elegans.

As a final note, doing research on C. elegans is super fun too. In the second year during EvoDevo, there is a practical where you are allowed to transfer them from a plate to a slide. This is life changing; getting to observe those cute animals with your own eyes and getting to work with them! One of the best moments in Nanobiology!

Source:
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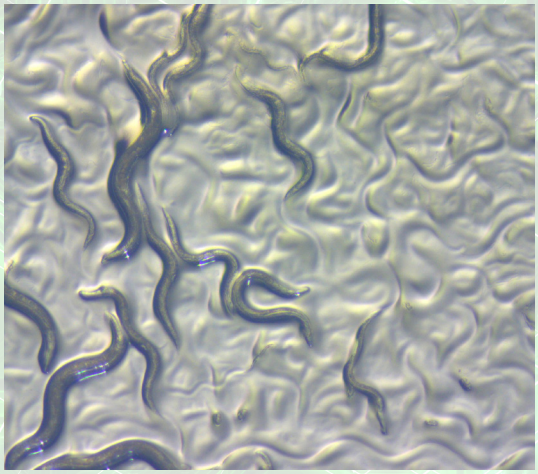

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# BEING YOU BY ANIL SETH, ON THE SCIENCE OF CONSCIOUSNESS

## BOOK REVIEW

What does it feel like to be a bat? Is it even possible for us to imagine the inner world of another living organism? These questions and more are explored in Anil Seth's captivating book "Being You." Seth uncovers the hidden secrets of our mind and challenges us to think differently about ourselves and the world around us.

At the core of Seth's exploration is the "hard problem" of consciousness, a term coined by philosopher David Chalmers. Chalmers divides understanding consciousness into two problems: the "easy problem" is understanding the function of each component in the human brain and how they fit together. This is of course only easy compared to the "hard problem" which is to understand why exactly consciousness emerges from the functioning of the brain.

Seth does not aim to solve this problem outright but rather intends to dissolve it into multiple "real problems." Drawing upon a parallel between the mystery of life before the advancement of biology and the current enigma of consciousness. Seth explains that consciousness is not a singular property but a collection of several biological processes. It is not an all-or-nothing phenomenon but a layered and multifaceted experience.

One of the strongest aspects of Seth's book is his argument on consciousness as an active construction, rather than a passive reception of reality. His view is that our brain creates "controlled hallucinations". Our consciousness is not a window to an objective world but a unique subjective construction – like a dream. This perspective draws heavily on Bayesian brain theories, suggesting our brain is a prediction machine, making the best educated guesses about reality, and continually refining these guesses based on sensory input.

The third part of the book addresses self-perception. Seth suggests that our sense of self is not an indivisible entity or a soul, but another manifestation of our brain's controlled hallucinations. Our self-perception is composed of numerous aspects like embodied selfhood, perspectival selfhood, volitional selfhood, the narrative self, and the social self.

In the final chapters, Seth returns to the initial question about the bat. He examines what kind of consciousness other living creatures might possess. The most popular assessment is the mirror test, where if an animal is conscious it is supposed to recognize itself in a mirror. Only a select few primates have been able to pass this test. However, Seth doubts this is a good measure: for all we know animal consciousness might work in completely alien ways. Just think of the octopus: their brains are essentially distributed throughout their body. What kind of profound effect would that have on their conscious experience? There is still so much we do not know in this field.

Seth's novel is a truly thought-provoking work with practical implications. The book challenges readers to rethink their understanding of themselves and the world, exploring philosophy, cognitive science, and neuroscience to provide a comprehensive picture of a challenging subject, making it a must-read for anyone curious about the mysteries of the mind.

Background source: Pixabay & Stocksnap

# BASISBEURS
## PRACTICAL MATTERS

tl;dr included

**The upcoming academic year brings with it the hankered after return of an old friend, something we never thought we'd see again but yearned for anyway; Basisbeurs is back! The Eerste Kamer has finally voted, and it's confirmed: students with Dutch nationality will get a cool €5,270 straight into their pockets over the course of the next year. There are strings attached, but only two: live away from your parents and finish your degree within ten years. Those still living with their parents are entitled to less, but will still get a total of €1,323 over the course of the 2023/2024 academic calendar.**

The return of Basisbeurs is just one of the changes coming to academic funding next year. Students that studied under the now old loan system also get some help to make up for having to miss out on Basisbeurs: €359 per year they had to study without Basisbeurs, up to a maximum of four years, given out as either cash or forgiveness on their current loan. The supplementary grant has also been expanded, with parental income limits increased, meaning more students will qualify for receiving at least some supplementary grant money.

While this currently remains unclear, students with a disability may also be getting more support; a return to the old system could mean that the way the RPF works (in the case of force majeure) might also be reverted. If this happens, it jumps from €265 to about 90% of the amount of the Basisbeurs + the supplementary grant, a whopping €770 (or €623 if the anti-inflation measures do not stack) next year. This would be a game changer for anyone getting RPF for 2023/2024; you might end up getting €1,215 a month next academic year, or €14,580 over the whole year, a potentially life-altering amount for many. To be clear, at time of writing, we have not been able to verify how exactly the new laws affect RPF (if at all). As far as we can tell, this has not been conclusively clarified anywhere, and DUO has not yet responded to our questions. However, even if RPF does not change at all, students entitled to RPF would receive €705 a month (€8,460 over the year) instead of the old €265 a month (€3,180 a year), which is still a massive change for the better.

In short, here's some tl;dr explanations and maths outlining the most common scenarios that apply to Nanobiologists with a Dutch nationality. We've done our best to ensure we're correct about this, but we are not accountants, so no promises.

New first years get five years of performance grant. If they complete a bachelor's degree within ten years, three of these five are forgiven and converted into a gift; completing a master's degree converts all five years of performance grant into a gift. This means:

A new first year living away from their parents will get approx €11,900 over the course of a bachelor, €18,500 if also completing a master. These amounts are without considering the supplementary grant; taking the maximum value of this into account, they become up to €26,700 for a bachelor or €43,100 for a master.

Current first years which become second years will get approx €8,900 over the course of their bachelor, €15,500 if they also complete a master, or €18,800 (bachelor) and €35,200 (master) if the maximum value of the supplementary grant is also applied.

Calculating this for students with an acknowledged disability is more complicated, and there's a higher chance we're wrong here, so prepare your salt. For current first years moving into second year, we calculate these amounts to have lower bounds of €15,300 (bachelor, no supplementary grant), €30,100 (bachelor, max supplementary grant), €22,000 (master, no supplementary grant), and €46,600 (master, max supplementary grant). Upper bounds (if RPF ends up being €770) are €21,400 (bachelor, no supplementary grant), €36,200 (bachelor, max supplementary grant), €28,100 (master, no supplementary grant), and €52,700 (master, max supplementary grant).

All values listed above are rounded down to the nearest €100. We've done our best, but make no guarantees. You can read into it more for yourself on the DUO or Rijksoverheid websites if you want to double-check our work, or reach out to Tanja (we recommend doing this anyway).

Even if we may be a couple hundred Euro off here and there, these are still insanely high amounts of money you can get, for free, if you just complete your degrees within ten years. Going to university in the Netherlands has suddenly become far more affordable for far more people; now, almost any Dutch citizen has the means to study if they wish to, and could even have enough money left over to fund a crippling salmon addiction (something else we recommend).

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# TREES

## FUN FACTS & RECOMMENDATIONS

**Welcome back to the time where the weather is clearer, sun is shinier, clothes are flowy-er, and life is simply nicer. In short, welcome back to summer. We are now within the perfect temperature range to return to nature for a hike, touch some grass and feel the breeze in our hair; what better time is there to enjoy life as simple and gorgeous as it comes, as we near the end of another academic year? Wander around and relieve yourself of all the feelings that have built up during the gloomy season, and while you're at it, take a look around to appreciate the beauty nature presents to you. You will probably notice oak, beech, and birch; some of the most common trees in the Netherlands. Dedicating this article to my late grandfather, a man so full of love towards nature, I will share some hiking trail recommendations and fun facts about these trees, so that one day you too can have dad lore to entertain your kids with.**

### Oak Trees

- The civic crown (Latin: corona civica), a garland woven from oak leaves, was the second most respected decoration you could be awarded in the Roman Empire. The crown was awarded to citizens who saved the life of a peer by slaying an enemy.
- The oldest oak colony ever spotted, the Jurupa Oak in California, is estimated to be 13,000 years old.

### Beech Trees

- Young beech leaves can be steeped in gin for several weeks, then sweetened to produce an allegedly nutty and complex flavored beverage called "beech leaf noyau".
- The word "book" is thought to originate from the old Germanic word for beech, boko. The bark of this tree is thin and easily carvable, and old inscriptions found on the barks of some beech trees led to this belief.

### Birch trees

- Birch trees are known as a pioneer species because given enough sunlight, they can grow on barren lands with no previous vegetation.
- The fruit that they produce is called "samara", like the girl from "The Ring".
- Birch is the national tree of Finland.
- Birch trees are sometimes called the "Lady of the Woods" and are considered to be enchanted in Celtic mythology, representing femininity, pureness, grace and healing.

Sources background:
publicdomainpictures.net
pixabay.com

Source background: wallpaperflare.com

## Nice Hiking Routes

### Veertien Vennen Route

This is a 9.8 km route in Oisterwijk, North Brabant. However, if you are getting there via public transport, keep in mind that the nearest bus stop is around 1.5 kilometers away from the route's beginning. This trail has beautiful greenery alongside different water bodies, so you get to experience both views simultaneously. It has nice facilities like a lively café near the start and many spots where you can sit down and enjoy the scenery. The route itself is pretty flat, so it is not a challenging route to complete.

### N70 Nature Trail, Barneveld

This is a 14 km loop trail. It is considered to be a bit more challenging than the previous trails mentioned. However, it is definitely worth the walk. Here you will encounter a lot of beech, about which you now know unnecessary fun facts, and chestnut trees. The best part of this route is that it runs over hills, so you will get to experience some elevation. Apart from the natural beauty of it, you will get to see numerous historical locations and pass by a museum.

### The Cape Forests, Doorn

The Cape Forests is located in the National Park Utrechtse Heuvelrug, and it offers one of the best elevation for a hiking trail in the Netherlands. The beauty of this route emerges from how diverse it is. You will get to experience a change of atmosphere every step you take. During my hike I discovered old structures buried underneath piles of leaves, different paths within the track surrounded by pines, and all different sorts of mushrooms, so the walk never got boring. The best part of it? Near the end of your walk you will reach a 10+ story observation point, where you can overlook the whole forest and view the hot air balloons from afar. In my experience this trail is definitely worth a shot.

I hope you find yourself reuniting with nature this season, and I wish you a great summer holiday!

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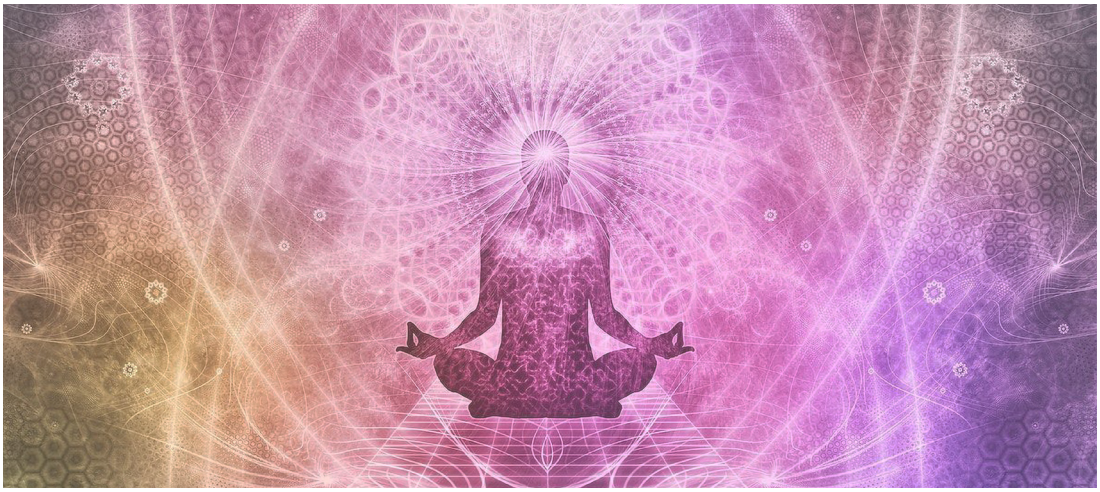
## PSEUDOSCIENCE

### OPINION

**As a scientist, or at least one in training, pseudoscience occupies a special place in my heart. It's probably genetic; I have a rare defect giving my heart an extra chamber, but it can only pump piss. This is where pseudoscience resides, right alongside people who don't properly wash their hands.**

I believe that fundamentally understanding science is vital. Too many people grow to distrust science because it is proven wrong, completely missing that this is a feature, not a bug. Science is an approach to gain understanding of the natural world; something is observed, theories explaining this observation are put forth, testable hypotheses are derived, predictions are made, and experiments are done to test these hypotheses. Broadly, we call this the scientific method. Millions before us have taken the gruelling march to advance scientific knowledge, rigorously and systematically testing past knowledge, searching for mistakes, sanity checking previous results, looking for any seams that could suggest not all is as it seems. They build new knowledge up from the foundations they inherit. We stand upon their shoulders. Hopefully, billions more scientists will get to stand on ours.

It's not meant to be perfect. The goal is that the systematic approach, given enough time and resources, will eventually tend towards perfection. The knowledge itself is never guaranteed to be true; paradigm shifts can expose that the entire foundation below you is rotten, the conclusions supporting you are hollow, and the view you once had is gone. You have to pick up the remaining pieces and rebuild. This is, however, not a mistake; if everyone else before you did their duty diligently, this is just what inevitably occurs when new things are observed outside of what could be explained with existing models. Those models were merely products of their time, relevant until they led to the observation of new phenomena that obsoleted them. The scientific method is not flawless, but at any point in time, it's the best you've got.



I find this beautiful. Complexity arising out of simple beginnings seems to be a common motif throughout the universe, and science is a succinct example of this occurrence. This is why I hold such disdain for pseudoscience; I consider it a perversion of something I love, a succinct example of when science is misunderstood. There is something wonderful about logical consistency; this wonder is lost when pseudoscience requires contradictory beliefs to hold true, seducing people towards doublethink. There's humility in uncertainty; the ability to accurately convey the possible validity of your findings, accepting you may yet be wrong, is lost in every absolute statement pseudoscience confidently babbles. The drive to refute, to prove yourself wrong, to find mistakes; it requires diligence, diligence which is absent when pseudoscience pounces on any data that could confirm its theories but looks no further. Lastly, there is bravery in openness; it takes courage to let others evaluate your work, picking and poking to find something wrong with it. This courage is corrupted by cowardice, or perhaps vanity, when pseudoscience refuses to let its conclusions be criticised or holds onto conclusions long disproven and abandoned by others.

Pseudoscience is genuinely harmful. Life can be difficult, painful, or just generally tough to deal with; sometimes there is no easy out, no matter how much you hope for one. Sometimes there are no outs at all, and the best option you have is simply taking the least bad road. This is where pseudoscience thrives, and why it can be so dangerous: desperate people are ready to do desperate things when they don't know better. Not everyone can remain rational under pressure, and pseudoscience is ready to exploit these situations. It's a con-man's best friend; a tool they can wave around to sound authoritative and trustworthy, letting them blag their way into someone's pocket when they're vulnerable. A tale as old as time: show up on a bad day, pretend you can give someone what they want, make promises you can't keep, and leave the moment you've taken what you want. This is what pseudoscience is used for. A chain of vile people taking advantage of helpless people for money, fame, or sick validation, all the way up to the top.

This does not mean that pseudoscience is useless; I consider pseudoscience a good measure of one's judgement. Belief in pseudoscience doesn't necessarily make for a good indicator of someone's character (unless they try to peddle it on others), but it is generally a good sign that maybe the elevator doesn't quite reach the top floor. Not necessarily proof, but at least a starting point, a smoking gun. If someone believes in astrology (for reasons beyond aesthetics, those people are different kinds of freaks), perhaps reconsider the account they share of others. Homoeopath? Disregard anything they say about medicine, consider switching to the GP they hate most. Chiropractic? Don't bend over backwards to help them; if you sprain your back while doing so, it's not like they can do anything in return to help you. Got someone in your life that loves referring to some cosmic or spiritual "energy" as explanation for the things they observe? Ask them if it's got anything to do with the vacuum catastrophe (this one is serious, please let me know how funny the result is).

image sources: pixabay.com

## WHAT HAPPENS TO OUR IMAGINATION AS WE AGE?

### ANALYSIS

**Anything is possible when you are young. You are a wizard, a fairy, a princess, a dragon. You fear for the monster that lurks beneath your bed. Animals can talk, tooth fairies exchange your teeth for cash, and your room is a realm of creatures and adventures. Simple objects can capture you, whether you are in awe of a pan, cloud, or a chair; these objects appear as more to you than just their literal definition, all thanks to a vivid imagination that remains untouched. As a child, you have an open mind to any possibility, no matter how ludicrous; you have a pure, unadulterated imagination. Real freedom of thought.**

When does this creativity and imagination decline? Or more importantly, why does it decline in the first place? The subjectivity of imagination makes it a difficult function to assess and compare between individuals, I mean how effectively can you quantify how imaginative or creative a person is? As a start, we could assess any scientific basis to such a decline, as our imagination has a biological foundation within the neocortex, a part of the brain's cerebral cortex, and thalamus, a paired grey matter structure near the centre of the brain. Perhaps we can connect the reason for this decline to the other changes happening to our brain as we transition to adulthood. According to research conducted at UC Berkeley, as we mature, our nervous system goes from favouring exploratory behaviours to preferring to stay on the beaten path. To be more precise, researchers suggest that children have low executive control – the ability to plan, focus, and remember instructions – and high plasticity – the brain's ability to change and adapt because of experience.

To test this, the research group conducted two different experiments; the first was regarding reasoning about the causes of physical events, and the second was reasoning about the causes of actions. The former experiment consisted of children aged 6 to 7, 9 to 11, and 12 to 14 years old. Participants were randomly assigned to one of three groups: "conjunctive" training, "disjunctive" training, and no training (the baseline condition). They were shown six different blocks (A, B, C, D, E, and F) and a machine with a bright light, which they were told is activated by "blicketness" – a made up word to spike the childrens' curiosity.

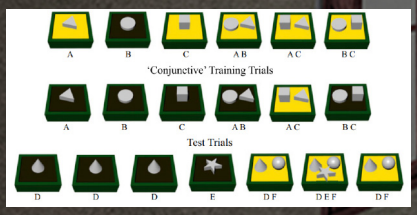



Fig. 1. Schematic of the procedure for Exp 1. Yellow represents activation.

The conjunctive group was taught that the light is only activated when both blocks A and C are placed on the machine. The disjunctive group on the other hand learned that placing either A or C on the machine works. The baseline group received no such training. Fig 1 illustrates all possible combinations used in the experiment. After this, all three groups participated in the test trial, where children were given additional, unfamiliar blocks and were not told whether to use the conjunctive or disjunctive rule.

After assessing the different combinations picked by the different age ranges in each group, the researchers conclude: "the results suggested that as learners grow older and have more experience they become less sensitive to the evidence and more reliant on their prior beliefs; they increasingly prefer disjunctive explanations to conjunctive ones, even when the evidence weighs in the opposite direction. School-aged children are similar to each other and less flexible than preschoolers, adolescents and adults are similar, and both are less flexible than the former age groups."

In the second experiment, they presented five different age groups, from 4 year olds to adults, with a scenario in which two actors either played or refused to play with two possibly dangerous toys, and later asked the individuals to explain why the actors either played or refused to play. From previous literature in social psychology, it is apparent that Western adults assign actions and behaviour to internal personal traits of an individual rather than on the circumstances of their situation, meaning that adults rely on existing beliefs rather than modifying them in face of new evidence. The results from this experiment coincided with these findings, yet, interestingly, the adolescents were also the most flexible social thinkers, as they were most able to overcome prior biases in the light of new evidence.

Beyond these biological and psychological changes that underpin the shift from childhood to adulthood, a combination of societal influences and cultural expectations significantly play a role in hindering imagination and creativity. Rather than continue to create realms of our own, we begin to become preoccupied with the one common to all, namely, the social circles that most influence our behaviour. We become conditioned to conform to societal norms to prevent feelings of shame or embarrassment. Moreover, it appears that with age, we become prisoners of our own success. Focusing on what makes us more successful simultaneously makes us less creative as we tend to follow the paths of individuals we aspire to be, mimicking their behaviour, thought processes, and opinions. With all of this, you should not be hopeless in regaining your creativity and imagination, as there are individuals in creative professions who have developed systems to stay imaginative. It is possible to pick a lifestyle choice that keeps you in the uncomfortable territory of the uncertain; this could consist of reading random things, seeking out people outside your study or profession, or to impulsively brainstorm. While this systemisation of creativity does not have the bizarreness of childhood imagination, it does combine life experience with creativity in a way that can be higher paying in modern society. It retains the balance between exploration and exploitation.

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Background sources: Pixabay & Creazilla & Pexels

## ARIA TO NOSTALGIA

ESSAY

**I remember how the summer air would gently brush through my hair. The sun's rays felt like a warm embrace, nuzzling. I used to catch butterflies; large swallowtails, beautiful creatures with red and blue accents above their elegant tails. Sometimes, they'd land on me, reaching out for my sweat with their proboscises to devour the salt within. I always thought they flew like ghosts; they seemed to float impossibly long between the flutters of their vast wings, as if held up by some supernatural force.**

They're gone now, extinct in the places I used to catch them. My memories of their ghostly form are all that's left, lingering apparitions haunting me when I visit fields once enriched by their glory. The sun feels different too; no longer as nurturing, its warm embrace replaced by an oppressive throb. At some point, I stopped thinking the breeze through my hair was relaxing, and it became headwind. Some things have undeniably changed; not everything, yet nothing still feels the same.

I feel particularly attached to my childhood. The memories I have are incomplete, but they remain sharp, and I can point to how they still influence me over a decade later. I'd go back if I could; there are several key moments that I'd like to live again, but cannot, even if the events themselves were perfectly recreated. I don't think I'd feel the same, and it's the feelings that I pine for. I'm left instead with the memories, beautiful but bittersweet; in a lot of ways, I think the memories are better than the real deal, but they're not enough. I'm happier in my memories than I was back then. I've seen to that with the rose tint I keep layering onto them. They're now worth more to me than the experiences themselves were when they occurred; time has refined them, bringing forth more happiness with each replay. That's the beauty. The bittersweetness lies in this happiness coming without contentedness; it brings insecurity instead. It's like I'm jealous of myself, despising the fact that I got to live those days without appreciating them. Now that I do, I can never live them again.

I fear death. I'm not someone who believes there's such a thing as "life after death", or whatever different thing people like to call that broader concept. To me, it feels pretty clear and intuitive that life, and one's experience of it, is simply an emergent property of existing as the arrangement of fundamental particles that one is. There are combinations of fundamental particles that interact in ways which make someone alive. No more, no less, this is, to the best of my knowledge, the simplest and likeliest explanation.

It then follows that death is nothing special either; eventually, you stop being a collection of fundamental particles that can be alive, and you die. There's nothing romantic about it, just infinite void, a timeless eternity of nothing.

This is why I often say I'd like to live forever; as much as eternal life would be a curse, eternal void doesn't exactly leave you much to work with either. I also believe that death, at least by old age, is a solvable problem; there are probably ways to, at the very least, delay it. I have no idea when breakthroughs in this capability will occur, but they probably won't in my lifetime. I will likely die after a far shorter life than my descendants may get to experience. For this reason, I loathe media that romanticises death, treating it like something noble or beautiful. It is an old lie we tell ourselves to help us cope, and I can't help but feel angry at this; perhaps if we did not delude ourselves, we'd tackle death with the zealotry required for a solution to be found in time for me.

I wonder how a longer life would affect how I feel about my memories. Would I cherish them more, polishing them endlessly until their gleam outshines anything new I could experience? Or would time eventually lead to degradation, each encore a mere diminishment of the last until there's no meaning left? If this happens, could I then live those memories anew? This is unfortunately something I don't think I could simulate in my mind to a satisfactory degree, so I hope I get to live it and find out. If not me, I hope someone does. Exploring what it means to be human is a seductive frontier that I don't think is possible to fully explore in the length of a current human lifespan, and that's a damn shame.

I urge you to explore. Indulge in your nostalgia. Experience the good and the bad that comes with it. I find that smells and sounds are particularly good triggers; if you played a lot of video games growing up, like I have, sounds and music from them is a good start. I've got Starcraft's terran soundtrack, Starfox's frontier serenade, and the eerie whine of a 262's engines tattooed onto my cortex. I think I always will. Until we find a way to reverse entropy, those memories that fill us with a pleasant melancholy are the best we've got, and losing ourselves in them is almost always worth it. For example: did you know that the 262's nickname was the "schwalbe", or swallow? A delightful synchronicity only now uncovered.

image sources: pixabay.com and wallpaperflare.com

# I'M GLAD MY MOM DIED - JENNETTE MCCURDY

## BOOK REVIEW

Background source: commons.wikimedia.org

**Warning: As this book tells a lot about abuse and eating disorders, it can be triggering to some readers.**

**Talking about childhood gaslighting, you should definitely read Jennette McCurdy's first book; I'm Glad My Mom Died. You might know the former actress from the popular Nickelodeon series iCarly, where she co-starred Miranda Cosgrave as a character called Sam Puckett. She played a cool, energetic and loud teenager who loved food.**

In this book McCurdy describes how she really felt before, during, and after her "success", She tells about her past chronologically by means of small but detailed scenes from her childhood. As her mother suffered from breast cancer since she was young, her mother became a nostalgic narcissist. This led to her mother trying to make her own dreams come true through her daughter.

Jennette was then forced into a career as a child actor from the age of six. After some small jobs she got because of her ability to cry on demand, she landed her role in iCarly. McCurdy became fixated on her body at a very young age; she experienced rejection because she was apparently "not pretty enough" or "not young enough". When she shared her concerns, her mother's way of helping her was to set up a calorie restriction, which escalated her fixations into body dysmorphia and anorexia.

When Jennette said that she wanted to quit acting to become a writer instead, her mother started crying so she never talked about it again. As a result, she felt obliged to continue acting, as her entire family's income was based on her acting salary. The abuse worsened with her mother's increasing breast examinations, and overall dependence on Jennette to care for her. To deal with this, Jennette gets herself into a series of toxic relationships, an alcohol addiction, and bulimia in the hope of regaining control of her life.

Eventually her mother dies and Jennette seeks help. I feel like writing this book is a big part of her process of healing, and re-establishing her mental health. Listening to the audio-book had an even larger impact on me because the words are spoken by her, in her most authentic and vulnerable way. Even though she tries to tell her story very objectively to let the reader decide what to think, sometimes you notice she gets emotional. The title is controversial, yes. But I think McCurdy made a great point with her storytelling and took away the filter that everyone still in the business remains to keep up. She even talked about "the creator" of iCarly, even though Nickelodeon offered her hush-money to prevent her from doing so. It is a big middle finger to Hollywood's industry and the romanticisation of the dead, which she says she profoundly hates.

*"Just as my mom can set my body on edge and make me rigid with fear or anxiety, she can also calm me down. She has that kind of power."*

*"I realize that she's happy and I'm not. Her happiness came at the cost of mine. I feel robbed and exploited."*

Source: pixabay.com
Source: pngwing.com

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## SANGER

NGS | ngs@macrogen-europe.com
CES | info@macrogen-europe.com
www.macrogen-europe.com +31 020 333 7563
Meibergdreef 57, 1105 BA Amsterdam

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