Sample Translation by Matt Bagguley

Hilde Østby

Creativity

The science behind ideas and how daydreaming can save the world

Translated from Norwegian by Matt Bagguley

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Dr. Seuss

Introduction

I hit the wall by the river Akerselva

or

Can bumping your head make you more creative?

So I hit the wall. Literally.

It was a stone wall, which I could almost taste when I smashed into it. It tasted like...stone. A cold, strangely metallic taste. Or that could have been just the taste of blood.

It was the day my sister Ylva and I were due to launch a book we had written together, *Adventures in Memory*; and we were scheduled to meet radio and press journalists to talk about the book which was all about memory and the brain. I had

just delivered, well, more like thrown my daughter into kindergarten and was on my way to work, cycling as fast as possible along the path beside the river Akerselva. My heart pounded in my jugular veins while I mentally prepared myself for what I was supposed to be doing that day. I followed the unbroken strip of steel-blue water that cuts through the middle of Oslo, under bridges and past long embankments of gray autumn grass. Then – although I don't know what kind of impulse triggered it – I absentmindedly turned my head, convinced there were a good few meters remaining between my bike and the low bridgehead arching over the path before me.

When I turned round again, there was the bridge – stout and steadfast as it had been since 1827. And it didn't move a millimeter when I hit it, although I think it should have done, out of pure politeness. We are talking about a grand old gentleman, raised in the early 1800s, and this was definitely no way to treat a lady. When I finally crashed to the ground after what felt like minutes – time slowed down it really did – it was with quite a thud. My bike was lying several meters ahead of me – it had just continued rolling, the bike, as my head struck the bridge with all the force I had been pedaling with.

My face had instantly become a pulverized mess of cuts and bruises, and a sizable lump was sprouting from my forehead. Blood cascaded down my brown overcoat. It wasn't until later that I found out my nose was broken. Ironically, and luckily for me, the bridge I had just collided with on my daily commute, was right next to the local Emergency Room.

Nybrua, meaning Newbridge was once a proud new feature of the road network and an unquestionable boost to the lives of those living in Christiania, as Oslo was called at the time. This impressive landmark was part of an extensive town plan that made Trondheimsveien the main road into the city from the north. Now the bridge was both my worst enemy and my savior. I staggered across it, helped by a passing jogger, and lurched into the Emergency Room, massive

forehead first, where I was sent for a CT scan to check for intracranial hemorrhaging.

I can safely say that my life has been turned upside down because of what happened to my head beside the river that day. That ordinary Tuesday in late October.

But what was it that actually happened?

Something happened.

After a couple of days, I had developed what is called "periorbital ecchymosis", dark blue rings around my eyes like a raccoon. But by then I'd already been sent home from the ER with a leaflet explaining how I shouldn't read (that's right, I read a leaflet about not reading and felt somewhat tricked) and how I should take it easy for three weeks and that everything would be okay. I had mild concussion apparently. It wasn't dangerous. I hadn't even fainted. I'd just had a little knock, as I understood it. Thousands of people are similarly injured every year. It's so normal that it's almost not worth trying to evoke sympathy from a reader.

So I was now just a statistic – a "cyclist without a helmet with a head injury", TBI (Traumatic Brain Injury) according to medical literature. According to the Head Injury Severity Scale (HISS) from 1995, I didn't even have a mild head injury. Since I hadn't fainted, and therefore hadn't lost consciousness, my injury would be classified as a "minimal head injury". So theoretically, the severity of what I'd experienced was so minimal I was unlikely to notice anything and would soon be completely heathy again. But as I writhed about on the ground, bleeding and in shock, I already suspected I might get problems with my memory. It wouldn't be unusual, I thought, since memory is so fragile and involves so many networks throughout the brain. After all, I have a sister with a PhD in neuropsychology and memory – and as I already mentioned, I had just co-written a book with her all about the subject.

But it would turn out, unsurprisingly, that my self-diagnosis wasn't entirely correct. After the accident my memory was still crystal clear, not only regarding all I had experienced in life, but also the research I had gone through when writing the memory book. My brain had been injured in some other way, and in any case: *injured?* Surprisingly enough, right after the crash I found myself having an incredible amount of ideas and was bursting with energy. Lying still felt totally impossible. In the week following the collision I sat down to write a short list of ideas for potential non-fiction books. And instead of a few ideas, I came up with twenty. Had the blow to my head made me more creative and efficient than normal? When I told my doctor about this she laughed and said: "Perhaps everyone should get a knock on the head now and then?" I laughed too, joking that I would take out a patent for "Hilde's Iron Bar Method". Little did I know that it would be the last joke I would crack for a very long time.

Research shows that some people have experienced huge bursts of creativity following a blow to the head or trauma, be it mental or physical, because it can clearly destabilize the levels of dopamine in the brain. Dopamine is the brain's reward system, and when it is connected to expressing yourself creatively, it can make your head buzz with ideas. I also read that damage to the temporal lobe can make a person more creative.

"Mania and depression can appear in complex combinations," writes the neurologist Alice Weaver Flaherty, who became hypergraphic after the premature birth of twin boys who died after only a few days; a huge trauma for a young mother. Afterwards, she had an irrepressible urge to write, regularly getting up in the middle of the night to sit in front of the computer. She believes that the temporal lobe is the key to creativity, it is here that both hypergraphia and writer's block originate.

"Even now, when I am writing normally again, my pulse increases, I feel gripped by something stronger than my own will, and I get a little of the same incredible feeling I had when I was at my most hypergraphic."

When I was finished reading Flaherty's story, I started reading a lot of far more sobering research about blows to the head, including an article about the renowned French composer Maurice Ravel. Those researching his case believe that a car accident was probably to blame for him losing the ability to write music. There are far more examples of people becoming *less* creative, not more, after a head injury or trauma. In my case it was impossible to know for sure. Perhaps my brain had entered a manically-creative artist mode?

Much later – after many months of being unable to work – my doctor and I were no-longer laughing about my iron bar method. I had suffered a number of strange breakdowns where I cried uncontrollably, like a child, like my own child in fact – small children will cry frequently and for no reason – because there was too much noise or commotion. All sound made me feel totally exhausted. When walking through Gardermoen airport's tax-free area I had to curl up on a bench, gasping for breath in a fetal position. The impressions around me were just too much. I slept at least twelve hours a night, yet still wanted an afternoon nap because I was so tired.

My working memory, my executive function, had clearly been affected.

Executive function is very important for what we call focus and concentration. Like the captain of a ship, executive function guides our thoughts. Whether you are calculating something in your head, replying to an email, or sitting in a meeting, you need to have your executive function in order if you are going to be focussed, alert, and operate several thoughts at the same time. Memory researchers believe there are between five and nine "units," such as numbers or items on a shopping list, that can be moved about in your working memory simultaneously. With a working executive function you can also plan and gauge the consequences of what you are doing, create future scenarios and retrieve memories. But when my captain was knocked out, each impression I experienced came at me with equal intensity, and the future became a whirl of confusion.

Executive function is not just the captain either, it is the ticket inspector, and without a ticket inspector any impressions can just come on board and quarrel and fall over the side while the whole voyage descends into chaos and the ship sails away with nobody at the helm.

Much later I found a scientific article describing how traumatic brain injury (TBI) can affect the brain's different networks; both executive function, which I have just described, and what is called the default mode or "daydream" network (DMN), and how they interact. At the time I knew very little about what this meant, but I was convinced that something had been inhibiting me in the past that was not inhibiting me now, after my accident. My ideas and daydreams were now insistent, wild and unstoppable.

I already knew that the brain was wildly associative, and that we are, at any given time, controlled by strong feelings, memories and associations. And since I knew that memory is highly creative and unpredictable I believed existing memory research could answer the question about what had happened to me and my creativity. Countless experiments show that we are even able to remember things that never happened, and we probably remember many of the most important events in our lives incorrectly. Memory is a tape-recorder at the very least, and a teller of fairytales at best. The first law of memory is that we remember everything that stands out or evokes a strong emotion; trauma occupies far more space in our memory than brushing our teeth. And since most of us have a limited capacity for memories, the second law applies: That we bundle things which are normal and not particularly exciting, like brushing our teeth, into so-called collective memories, but even here your brain's creativity is already at work; the things you forget and the things you remember are governed by your feelings, by what you personally think is important. In addition to this, our memories are shaped and altered when they are retrieved.

Nevertheless, memory research cannot describe every aspect of creativity. Because the brain can produce strange and spontaneous ideas, and aha moments

that seem completely detached from both the past and present – thoughts like "what if?" which after my accident came to me frequently – and this is something memory researchers know very little about. So what *do* we actually know about our most amazing and marvelous attribute – our capacity for creative thinking?

Creative thinking has given us palaces and pyramids, the moon landings and the Mona Lisa, waterwheels and automobiles, the most incredible discoveries, fantastic cities and amazing technological solutions that have allowed us to conquer the planet. Our creativity means that scientists now talk about the "Anthropocene", an era where mankind, not nature, is leaving huge, ever-lasting lasting scars on the planet. Human creativity is deeply and profoundly connected to our position on earth, and for last 200 years we have used this power to such a great extent that it may lead to catastrophe. The climate crisis is one of the most direct consequences of our shared creative ability to survive, our surfeit of energy, our curiosity, knowledge and the stories we tell each other.

While I lay on the sofa, trying to get my concussed and overactive head to calm down, I thought about *Alice in Wonderland*, a book we had recently discussed in the reading club my friend Vera and I had established many years earlier. Vera loved knitting, and I though about the way her knitting needles had moved while we discussed the book. I tried to remember what she had said about the white rabbit, it felt important. It felt like I was mentally chasing a stressed white rabbit, as I lay there, without really understanding why – just like Alice.

Some people help us change the way we think, offering us vivid and colorful images and dreams, simply because their inner world is so wild and urgent that it needs to be shared. Lewis Carroll's *Alice in Wonderland* left an indelible mark on modern culture, and when I read it again as an adult I understood how radical the book is: It taught me that stuff and nonsense is highly important and should be taken with the utmost seriousness. I also felt like I was now finding myself in Wonderland quite regularly, after my knock on the head.

Carroll's legendary children's book was conceived on a beautiful July day while boating on a lazy river in Oxford. The book you have in your hands now was born from a trip along an equally lazy river on a cloudy October day in Oslo more than 150 years later. Since that day much of what I once took for granted has vanished into thin air, like the Cheshire Cat leaving you with nothing but a smile. Now I see life quite differently. I moved house, quit my job, and for the first time in my life I earn a living from my creativity, which could be precisely why I need to find out what creativity is and how it works. What I have already realized is that anything can happen, and usually does when you least expect it. Because what happens if you do follow a white rabbit down a hole one warm summer day? What happens if you crash your bike one cold autumn day and your life is never the same again?

What if this event triggered something quite unexpected – what will happen if I write a whole book about creativity?

We are about to find out.

The Cheshire Cat appears

or

Good ideas, and 800 aha moments that can turn your life upside down.

"When I was your age, I always did it for half-an-hour a day. Why, sometimes I've believed as many as six impossible things before breakfast"

One of the most influential ideas of the modern age popped into the head of a 12 year old in 1900, in a tiny little Scottish village called Helensburgh.

This idea, which must have sounded like pure nonsense to all those around the young boy, would change modern life completely and is now something people all over the world take for granted. It is quite possible that you have never heard of him, but you will have certainly heard of his invention: The average American spends three hours of their day on what John Logie Baird invented in-between the

bouts of constipation, influenza and bronchitis that plagued him throughout his entire childhood. And this crazy idea, pursued him for his entire life.

So where did it come from? Baird was a smart and technically gifted 12 year old who, for example, managed to light his entire house with home-made electricity generated from a waterwheel, a dynamo, and some lead sheets wrapped in flannel which he immersed in sulphuric acid. At the same time, this little boy began studying the village telephone system, and built a copy of it at home. And it was while he was making his home telephone system that he had the groundbreaking idea that would write him into the history books: Because what if a telephone sent not-only sound, but pictures? Baird called the idea "seeing by wireless".

After completing his engineering studies he began to display a relentless level of get-up-and-go. For a while he ran a mango-chutney factory in Trinidad, where he boiled the ingredients in an an outdoor bathtub into which every nearby insect fell and drowned while cockroaches swarmed around the sugar bags. Later on he came up with the idea for a kind of air-cushioned shoe; a boot he had lined with balloons. He also attempted to make a rust-free razorblade out of glass, but his dream was duly crushed when he cut himself badly while shaving with the prototype. New ideas came constantly to young Baird. But even when he made it big selling soap, and as the inventor of the heated-sock, it still wasn't enough for him. He had a dream, and he refused to give up before trying to make it happen.

In 1924, Baird assembled the first model of his seeing telephone – using a tea-chest, a hat-box, a projection lamp, a lens from a bicycle light, glue, string, and some high voltage wire – and gave himself a 2000 volt shock in the process. In 1925, he met with a representative of the Italian company Marconi in London and asked if they were interested in a partnership. But they were absolutely not interested in the so-called "television", he was told. Later Baird described the rejection as being like he had asked them to invest in running a bordello.

“This episode shows the general attitude towards television in 1925. It was regarded as a wildcat myth, something on a par with the Perpetual Motion Machine. Television could never be realized unless some hitherto undreamt of discoveries were made, and nothing of the sort was in sight,” he wrote in his entertaining memoir.

There was, however, one thing that would pave the way for success. Thanks to the German engineer Paul Gottlieb Nipkow the Scot now had the most important component for producing his television: A rotating disc containing lenses, called a Nipkow disc, which divided an image into dozens of flashing lines. While Baird worked on his own home-made set he was often in danger of being struck by the lenses which would break free of the rotating disc and fly through the air before smashing against the wall. Anyone else would have given up there and then. But it was absolutely clear that Baird was so obsessed with his vision that none of this worried him.

From the moment he initially got his idea in Helensburgh, twenty-five years would pass before it was realized in 1925. Unbelievably, it was in Selfridges on Oxford Street, London’s grandest shopping street, that John Logie Baird, the former soap-seller from a tiny village in Scotland, demonstrated his latest invention. It was here, that the world’s very first TV images were seen.

All this may seem momentous today, but it was wasn’t a particularly exciting broadcast. The images consisted of white figures on a black background, and a high contrast was required for them to be recognizable, since the resolution was so poor. But the miracle had happened: He had succeeded in sending an image from one place to another, and had lain the foundation for the concept of modern-day TV-broadcasts.

“A grave danger to society,” exclaimed Sir John Reith when he heard about the invention in 1926. Reid was the first general manager of the BBC, and compared the TV-set to smallpox and the Black Death. At the time the British

Broadcasting Corporation was a company specializing in radio-broadcasts, and it would take years before it changed its view of Baird's discovery.

For Nipkow, who had dreamed of making a TV long before Baird but lacked the technical conditions to it through, it must have been strange to have stood in a queue in Berlin in 1928, waiting to experience the newest miracle everyone was talking about. At the end of the queue he would have seen the pictures flickering across Baird's apparatus, on display to curious Germans keen to watch TV for the first time. Forty-five years had passed since Nipkow had patented his disc, and dreamt of creating living pictures on a screen. Like Baird he had sacrificed a great deal but, unlike Baird, it didn't pay off for him.

What we already see here, is that even if someone has a fantastic idea, it doesn't necessarily lead to success. Most ideas have to be somehow connected to the world around you, they have to resonate and be realized. The people around you need to believe in it, understand it, help you make it happen and spread it. If you want to succeed with a good idea, you need to be in the right place at the right time.

When Arnfinn Hegg had his good idea, for example, nobody wanted to touch it. Which is why he isn't a billionaire today.

"I was just out for a walk. I'm not sure I was even thinking about skiing at all, there wasn't any snow," the inventor told me.

For 41 years Hegg worked as a dentist, but since he was a boy he had gone round looking at problems, well, *solutions to problems* mostly, that nobody had yet discovered. Hegg now has two patents for skis, one of them for a type of cross-country ski with a strip of special felt underneath, that increases your grip on the snow.

"Even in the 70s I was thinking: How can we put men on the moon and yet have cross-country skis that slide backwards? It didn't add up, the level of technology. There had to be some way of fixing these non-grip skis!"

Once he'd discovered the problem, it haunted him. For a long time. And then, one warm August day in 1992, it came to him, when he least expected – 20 years after he had first pondered over it.

"I was tying my walking shoes before setting off on a hike, and I suddenly realized that there had to be a difference between the level of a ski's grip-zone and slip-zone," he says, referring to the day the idea struck him: A new solution to an age-old skiing problem.

It was then, in the summer of 1992, that "Fantaski" was born. Several visits to ski manufacturers across Norway were made, to acquire some knowledge about how modern skis are made. Followed by a lot of trial and error, and many prototypes, built at home in his basement. The solution in the end was a ski equipped with a felt strip that prevented the skis sliding backwards. To bring the strip into contact with the surface you just had to tilt the ski a little.

"I haven't used the herringbone technique for 25 years. I just go straight up!" said Hegg satisfied.

But he wasn't a part of the skiing world, nor was he involved in ski production. So how could he make these skis readily available?

"I was in touch with the technical manager at one of Norway's biggest ski manufacturers, and he was keen to sign a contract with me. But the board members were afraid of committing to the idea," Hegg explains.

He's not bitter. Just slightly amazed. Because now, 25 years later, all the big ski producers make "skin skis". Not identical to his patented solution, but the principle is the same. The felt attached to the bottom of the skis makes them grip, and stops them sliding backwards.

Without trying to make any comparison, Leonardo da Vinci experienced the same thing: He invented a kind of helicopter way back in 1480 but his invention didn't see the light of day for another 420 years. The technological conditions or any appreciation of what he had actually invented didn't exist back then. Nobody

understood what a helicopter actually meant to transport and air-travel, and the idea was shelved until the time was ripe.

Inventors were perhaps most in vogue in the 18th and early 19th centuries, while city populations thrived, technology evolved and factories and trains facilitated the mass production and transport of goods: Markets and trends were given far more consideration than before. Many people dreamed of making it as an inventor, many of them willing to sacrifice a great deal to nudge humanity yet another millimeter towards comfort and civilization. One of my favorite books is called *Inventions That Didn't Change the World* which is about patents that never really caught on: A cigar holder you can attach to your hat, for those that always want a cigar at the ready. A highly advanced top-hat that can be turned easily into a bowler hat. A shoe with a rotating heel, so you can turn the heel round when a part of it has worn down. We can laugh at these things now, but for the inventors it was of course difficult to know: Perhaps this will be the next big thing?

Many inventors have also died from their own inventions.

One of those who sacrificed everything for his idea was Franz Reichelt.

In a film-clip from 1912 on the internet, shot on a cold February day in Paris, you can actually see him yourself, looking down at the ground far below. You can tell how cold it is from the cloud of breath rising from his mouth, and you can imagine how hard and fast his heart must have been pounding in his throat, and his eardrums and fingertips. He probably hadn't noticed himself, because he was too focussed on what he was about to do. The film-clip shows him wrapped in a large piece of fabric, moulded peculiarly around his body, ready for his terrifying stunt. Since he had told everyone what he was going to do, and had even brought two cameramen along, it was perhaps difficult to back out. He was 33 years old at the time, and had created a fair amount of hype as "the Flying Tailor". This was to be the day he would achieve his definitive breakthrough.

His idea had been to make a parachute that could be released if a plane malfunctioned in the air – something they regularly did in the early days of

aviation. There's no doubt that it was a good idea! Modern-day fighter pilots can eject with a parachute on their backs if their plane is about to crash, just as Reichelt had imagined. The problem with the Flying Tailor's invention was that it had only ever been tested at home in Reichelt's apartment, using dummies dropped from the height of the ceiling. When he applied to the Paris authorities for permission to use the Eiffel Tower, he had specified that a dummy would be used, not a person. Was he already aware that he wasn't going to test it on himself? Or did the idea come to him later? Did he understand that he was risking his life, or was he so confident about his own invention?

The cameraman waiting below would have got only a brief glimpse of Reichelt as he hurtled full speed towards the ground. The parachute never opened.

Afterwards the film-clip, showing Reichelt falling headfirst from the Eiffel Tower, was shown to the horrified public. He had to be almost scraped out of a small crater before he could be buried.

When I look at this video, I wonder how far I would be willing to go for something I thought was a good idea. Would I have sacrificed my life? When Franz Reichelt stood there, looking down from the edge of the Eiffel Tower, his breath floating in the cold air and his heart pounding in his ears, he must have considered for a moment whether it was worth dying for? Or does a good idea render you deaf and blind to doubters and naysayers? Why did he throw himself towards the ground from 57 meters up, who does something like that? Was the Flying Tailor just stark raving mad?

When you make a great discovery, it's quite possible that you lose touch with rules and conventions a little, it's perhaps even necessary for getting a good idea. You feel such a strong sense of insight and enlightenment, a sense of knowing something so important that your other emotions, like fear, get pushed aside. When the Greek mathematician Archimedes had one of his best ideas, for example, he no longer cared about the fact he was naked in public.

When I was in Sicily a few years ago, I visited the place where one of the world's most famous aha moments happened. On the south-western tip of this island west of the Italian mainland – yes the football balanced on the tip of the Italian boot – I rented an apartment with a roof terrace in the small city of Syracuse. The city was founded by the Greeks and had been the island's capitol thousands of years earlier; today it contains the ruins of 2500-year-old temples and a Greek theater where operas are still performed on warm summer nights. During antiquity, this was a grand and important city, a place the influential philosopher Plato visited many times. Now it is just a little dot on the Italian map, far from the centre of power.

After a week of stiflingly hot days days in Syracuse, where the temperature hit 40 degrees in the shade, I suddenly understood how someone might want to run naked through the city. Because 2200 years ago, that's precisely what Archimedes did.

Heiro, who was the king of Syracuse at the time, had recently had a new crown forged, but was suspicious that the goldsmith may have stolen some of the gold provided and replaced it with silver. To prove this they could have perhaps re-melted part of the crown, but that would have destroyed it of course, and it would have been highly annoying to find out that it was pure gold after all. Heiro turned to his entrusted man Archimedes, who was the greatest mathematician of his time and today is viewed as one of the most important mathematicians ever. Among other things, he derived the number Pi and created a formula for calculating the area of a circle and volume of a sphere; things we learn about at school to this day. He also invented several machines for defending the city, which was extremely important back then and of great interest to the king's greedy enemies.

Archimedes thought about king's problem, and went home to take a bath. While sitting in the bathtub, he suddenly realized that the water he displaced, was equal to the weight and volume of his body; and that material with a high density, like gold, displaces less water than material with a lighter density, such as humans

– and silver. In an instant he had solved the king's problem. We can picture Archimedes now, gleefully realizing this as he lowers himself into the water. His discovery was so groundbreaking for him that he left the bath immediately, and ran dripping wet and stark naked through the streets of Syracuse while shouting "Eureka! Eureka!" I could almost hear the echoes of his jubilant cries while I sweated my way around the city. And yes, the gold crown really had been mixed with silver, and the thief was duly punished.

So this is of course why the Greeks believed that their ideas were sent to them from the gods, because an idea will simply appear – like the Cheshire Cat – it will surprise you, smiling from the branch of a tree, when you least expect it. Even today a good idea that just pops into your head can feel almost magical. In ancient Greece they believed a person could get ideas via a form of divine madness, which at the time was divided into four types of madness – none of which should be confused with today's acute psychological disorders, the type which render us unable to participate in society.

The Greeks believed in a prophetic madness and a ritual madness, which were both connected to religious practice, and erotic madness, that anyone who's been in love can attest to. Then there was the madness brought about by a muse, poetic madness, the madness that produces ideas. A person would be inspired, and then luckily gain insight from the world of the gods. There were nine of these muses, who were the children of Mnemosyne, the goddess of memory, and the supreme god, Zeus. Later the poet Hesiod associated the nine female figures with their own artistic areas: Calliope was the muse for epic poetry, Clio for history, Erato for lyrical poetry, Euterpe for music, Polyhymnia for hymns, Terpsichore for song and dance, Thalia for theater and Urania for astronomy. But in Archimedes' day these muses were not "specialized" they were just nine sisters (sometimes just three sisters), who gave people divine inspiration. And the the mother of these nine muses was memory, the source of all art-forms. It is tempting to draw some

wisdom from this – that without knowing what has gone before, it is hard to create something new. Without memory, no creativity.

While I was in Syracuse, there was a rare lunar alignment between Saturn and the moon, and on 26 July that summer they were so close I was able to observe their dance in the heavens from my vantage point on the roof-terrace. Had I been alive 600 years earlier, during the Renaissance, I would certainly have believed this constellation was a sign of a new and creative period. In Roman times the god Saturn was honored at the so-called Saturnalia, a carnival where everything would be turned on its head for an entire week: Slaves would become masters for a short period, then return to their normal roles. Saturn was the god of carefully orchestrated chaos, frivolity, and exceptions from the rule, and was celebrated for one week in the middle of winter. But something happened to Saturn during the Renaissance, when the humanist philosopher Marsilio Ficino began talking about the planet at the court of Cosimo de' Medici, the prince of Medici.

Florence at the end of the 1400s could easily be described as the cradle of modern art, yes, we can even allow ourselves to proclaim it the Renaissance's creative capital. It was where the Medici family gathered artists and intellectuals to celebrate life and all that is beautiful. Ficino, a central thinker at the court of the Medici prince, spent much of his time translating Plato from Greek to Latin, to make him accessible to the current times. Plato describes how knowledge is hidden within us from the moment we are born, as lessons from an intangible world, the world of ideas; that we actually know all that we need to know, before we are even born; and that learning is about being able to remember these abstract concepts and ideas again. According to Plato, when you gain insights about the world it is like finally emerging from a dark cave and seeing the sun. He was also fascinated by the seemingly magical connections, between mathematics and music, that the Greek philosopher and mathematician Pythagoras had been able to demonstrate. During the Renaissance, these magical connections were

expanded to match the mathematical relationships between planetary orbits and people spoke excitedly about the "music of the spheres," the music of the universe. In this mystical world, everything was secretly connected and an insight of the world, the appearance of the sun and its magical associations, became linked to the Christian God.

During the Renaissance, people were unwavering in the belief of alchemy and astrology. Even the celebrated astronomers Tycho Brahe and Johannes Kepler offered horoscopes for money. In this transitionary period between the religiously dominated Middle Ages and our modern era, people lived in a semi-magical universe, where the planets and stars and the people on Earth invisibly effected each other; and every planet, star, plant, animal and stone had a secret insight hidden within them. (Some believe this is what made Issac Newton search, hundreds of years later, for the secret and invisible connection between objects – gravity – but that's another story). That Saturn could genuinely affect the mood of an artist or a man of science, did not seem at all unthinkable in the 1400s, and so now he was the planet of the artists, the god of creative power. At the same time, Saturn also gained control over melancholia, which was described by Aristotle as central to creativity: "Why is it that all those who have become eminent in philosophy or politics or poetry or the arts are clearly melancholics" asked the Greek philosopher in the 4th century BCE.

Ficino didn't just translate Plato, but also the Egyptian mystic Hermes Trismegistos, who was considered a key philosopher during the Renaissance (although is forgotten today, for good reason). This meant that Jewish mysticism, number mysticism and Plato's theory of ideas became combined with Aristotle's thoughts about the creative melancholic: According to Ficino's interpretation the world was full of secret connections and number magic – and the ideas and artistic inspiration, as well as dark melancholia were things that came from the planet Saturn. Ficino and the Medici family lived in an age of upheaval, the Renaissance, when a thousand-year-old Christian tradition was changing decisively. Suddenly

the future lay terrifyingly open, free of the safe grip of religious authority. In a way, they lived during a never-ending carnival, and Saturn became the symbol of lasting change. Artists, scientists and politicians embarked on shaping a secular world, paradoxically within a universe they considered to be governed by magical connections and symbols. This, it has to be noted, is megalomania, which from then on became a natural part of our culture, where humility had been an ideal previously. These new megalomaniac creators of a modern world were therefore convinced that their ideas came from the planet Saturn, something Ficino believed would also make them deeply melancholic.

Shakespeare was well acquainted with these ideas in 1611 when he wrote *The Tempest*. It was the last play he wrote before his death, about an artist and wizard ruling a tiny island with his daughter Miranda by his side (Miranda is a name Shakespeare came up with and means miracle). Many believe that the main character Prospero is a depiction of Shakespeare himself, who was an aging artist when the play was written. By then Saturn had become the most important planet for artistic inspiration, for political leaders, scientists and alchemists, and for artists like Shakespeare. In *The Tempest*, Shakespeare was therefor popularizing a figure that was already well known in the Renaissance. To test his art and magic Prospero controls a small elfish figure, Ariel – a spirit of the air whose name quite literally means air – and for an audience in the 1500s this flying hermaphrodite was a familiar sight. Alchemists talked about “the fifth element” or the magic ingredient quicksilver, the metal of the flying god Hermes, the god of communication, who ruled over all that was “in between”. It was a crucial element to the alchemists who wanted to have some control over life and death. Artistic inspiration or scientific insight drew from many resources during the Renaissance, and could come to the chosen ones from Hermes, Ariel, a muse, or directly from Saturn. When Shakespeare spread these ideas via his plays they broke through to the general public, and to this day we take the concept of inspiration for granted. The word is derived from the latin *inspira* which means “to breathe in” – it is something

that comes to us from the surrounding air, like a winged spirit filling us with insight. And in a way we still think like that: Ideas come suddenly, almost magically to us, energizing us, like an open window allowing fresh air into the room.

But since we don't believe in air spirits anymore – where do ideas really come from?

What about aha moments? In neuropsychology, there is actually a field of research dedicated to them. To a degree it is possible to explain why Archimedes happily ran naked through Syracuse. Rolf Reber is professor of cognitive psychology at the University of Oslo, and he and his research team have compiled a database of 800 aha moments. Now he is busy analyzing the aha moment's basic components.

"The brain processes things we recognize much faster, and we find that comforting. Thinking quickly is comfortable, thinking slowly, not so comfortable. According to research, this need to process things fast increases when we feel insecure. Insecurity makes us more fond of repetition, because it makes everything flow more smoothly. It's actually quite astonishing how much we like repetition. We like simplicity and systems we understand," explains Reber.

Researchers have found that when a statement is repeated it will seem more true; and if a research subject experiences a leap in perception and perceives the repetition even faster – fast thinking – it will be perceived as more true than before. This leap is one of the basic constituents of an aha moment. At the University of Basel, the research subjects looked at series of statements using colored words on more-or-less contrasting colored backgrounds. First they were shown low-contrast words a couple of times, which were difficult to read. Then the subjects were shown the same words with a high-contrast background. As the words became easier to perceive, a kind of aha moment occurred. The strange thing was that the statements they read were immediately perceived as being more true.

“The weird thing is that repeating a statement makes it seem more true, even if it isn’t necessarily so. Similarly, an aha moment will also seem fundamentally true,” says Reber.

Some researchers wanted to explore this further, and used false statements that included an anagram. For example, the research subjects were shown the following: “There are more than 100,000 craters on the noom.” Those who solved the anagram – in this case “moon” – were more inclined to believe that the whole statement was true, even when it clearly wasn’t (there are just over 5000 craters on the moon). This meant the researchers could prove that the sense of something being true increases when experienced in conjunction with a sudden insight. So you can easily believe something that is totally false, provided you have an aha moment at the same time.

In a similar study, people were shown a picture of an object (such as a camera) that was initially blurry but gradually became clearer. And as it became clearer the researchers observed a positive effect via the activity in the smile muscle (*zygomaticus major*) – a small Cheshire-Cat-like smile – which coincided with the subjects suddenly recognizing the objects they were looking at. The researchers believe this demonstrates how the tantalizing sense of well-being you get during an aha moment is an automatic response.

“We like things that go smoothly, and aha moments are moments of increased smoothness,” says Reber.

Three things characterize an aha moment: It comes suddenly, it feels right, and it involves pleasure. You feel like the solution to a problem or idea has fallen into place. What you are thinking suddenly makes sense, you process something you didn't quite understand earlier in an instantly understandable way. An aha moment feels effortless. You like it: Finally, your story makes sense, or you see something in a new way.

Aha moments can be as varied as understanding an equation, or suddenly realizing that you want to be a vegetarian, or in the blink of an eye understanding

that the Narnia books are based on the Bible. You are experiencing an aha moment when you realize that Thomas Anderson, the hero of the film *The Matrix,* has actually been trapped inside a computer-generated world controlled by evil aliens. Or you might understand a joke or a word-play. Think about how an audience member at a stand-up show will take a few extra seconds to understand a joke; how a lightbulb will suddenly flash in their head, and the laughter will burst out revealingly late; it's like you can literally hear the cogs creaking in the back of their head before they get it. Jokes are in many cases aha moments. An aha moment can also occur when you realize that everything you've recently experienced only makes sense when you find out that your partner is having a relationship with someone else. You see everything in a new light.

"There's perhaps not much pleasure to be gained from an aha moment like that, when your partner has been cheating, nevertheless there's a sense of things slotting into place, they makes sense, finally, compared to all the lies and inconsistent stories that didn't ring true. You end up with a balance between the pain caused by the dramatic insight of the infidelity, and the comfort derived from understanding something that was unclear before," says Reber.

The same would apply if you came out of an exam and realized that you answered a question incorrectly. Obviously it's not fun to realize that you might fail, but your discomfort would be overshadowed by the comfort of understanding something you hadn't earlier.

We humans clearly like to understand, to create meaning and make something complete, to give context to stories that don't add up. This does mean that prejudices and conspiracy theories can feel very comforting too, if you haven't examined the facts closely enough, because the comfort that comes from them being easy to understand provides a nice, strong feeling that they are true. So thinking fast can easily produce incorrect results too. An insight can feel so genuine and comfortable, so right and all-important, it will make you want to throw

yourself from the Eiffel Tower with no fear of the consequences: You will be totally convinced you can fly!

The 800 aha moments that Rolf Reber and his research team collected, have been categorized in several ways. By doing so they have seen that the men in the database experience aha moments mostly on their own, while the women more often have aha moments when they have company.

“Based on the material we have it’s also clear that many people have aha moments when they are traveling. Probably because they’re seeing life from a new perspective. But that’s something we do all the time, we look for patterns in everything around us. You look at the sky, and it resembles a face. You read the news and find conspiracy theories about the authorities. Looking for patterns is what scientific thinking is about too. Religious and magical thinking is the same,” says Reber.

Creating aha moments with other people is not as difficult as you might think: Many Hollywood film-scripts are full of “rewards” in the form of aha moments, made so that you the audience will, ideally, feel good when they are understood. The nice feeling that comes from an aha moment is so powerful it can also motivate children to learn.

“There’s a study from Canada that shows how pupils, who as a rule don’t like maths, became more positive towards the subject when they had an aha moment, compared with those who didn’t,” says Reber.

Now he is testing aha moments on children, between three and eight years of age, and the studies will continue until 2024.

“It’s uncertain if children have any idea of what an aha moment is, but they still want them, and we can test this using videos and pictures. We don’t really know what we’re going to find, and for example, children have more aha moments than adults. It’s hard to say, because there are no descriptive studies that show how many aha moments people normally have,” Reber says.

Two weeks after speaking to the aha-researcher, I am sitting on the edge of my four-year-old daughter's bed reading her bedtime story. Like most four year olds, she will use an unreserved amount of energy on acquiring sugar, in any shape or form. I am convinced she can smell candy from 100 meters away. Her thoughts revolve around chocolate, lollipops, apple juice and honey, despite her rarely getting any. On this particular night she looked at me attentively, while I sat, reading aloud from an illustrated copy of *Alice in Wonderland*.

"Chocolate-milk-juice" she said contentedly. "Wouldn't that be good, mamma?"

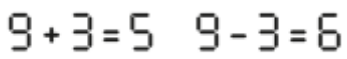
It was clearly an idea she found extremely comforting – she had finally managed to connect two things that tasted good, separately, into something totally new: Something disgusting.

"I just came up with now, in my head," she replied self-satisfied and precociously when I asked her where she got the idea from.

As far as I was concerned, I was sure I had just witnessed an aha moment. Unfortunately, her knowledge of soft drink production was clearly so bad that she was unable to create a nice, new beverage with any market potential; but luckily she had no food industry contacts either, so she was unable to go into production.

I would love to have seen inside her brain just as she got her revolting idea. But it's of course impossible to connect directly to the brain of a person suddenly having an idea, since they normally come without warning and in quite unusual settings, far away from brain researchers. Nevertheless, researchers working with aha moments are keen to find out exactly what happens when someone gets an idea (be it a good one or not). So they have devised several tests, like those I described earlier, which create a type of aha moment when they are solved. For example: What do we associate with the following three words: Cream, skate, water (the answer: *Ice*). Or something trickier like being shown the incorrect sum 9+3=5 written in matchsticks, and having to correct it using one matchstick (the

answer: Move the vertical matchstick in the plus symbol to the 5, making it into a 6. The sum would then be 9-3=6).



Using functional magnetic resonance imaging (fMRI), researchers can scan the brains of research subjects while they are actively solving similar tasks. Because what happens in the brain when it is solving a task can be measured; fMRI allows the researchers to view, among other things, the flow of blood in the active parts of the brain. Those taking part in the experiment have to press a button the moment they find the answer, which allows the researchers to see what is happening the instant a person solves a task creatively and has a kind of aha moment.

A test at New York University showed that when the subjects experienced these artificially-stimulated aha moments the emotional centre of the brain, the *amygdala,* becomes involved. Even during trivial tasks, like identifying a hot-air balloon in a blurry photo, the *amygdala* will stick the experience to the test-subject's memory via the brain's memory center, the *hippocampus,* the moment a test-subject has an idea. An aha moment is emotional, and therefore memorable. In an experiment at the University of London they were able to observe activity in the left temporal lobe (the area of the brain which solves complicated tasks) and also the *thalamus* (which sends signals from the sensory organs to the brain). The dopamine system, the brain's reward system, also activates when a person solves a task given to them by the researchers.

But you don't really need a neurologist to explain the feeling of satisfaction that comes from having an idea; and it is far too simple to use dopamine as an explanation for everything we like and become addicted to. Were I to tell you about my aha moments, you probably wouldn't feel anything, because an aha

moment that occurs spontaneously is intimately connected to you and what you know and understand – you cannot swap your idea with someone else's good idea and get the same, good feeling. A really good idea, that you are certain nobody has had before, feels like such an almighty kick that you might just want to run naked and cheering through the streets too.

But what happens before the idea hits you? You're perhaps walking round with a problem on your mind, something you want to solve, something that's bothering you: A royal crown that might actually be made of silver or skis that don't work properly, or a vague sense that you have to write a novel or understand something even though no one has asked you to. Large and significant aha moments come totally without warning, and do not show up in laboratories or fMRI scanners.

One of the most important ideas of modern times was conceived after years of pondering over a problem no one realized they had. A 16-year-old boy walking to school in Zurich one day began wondering about something that would change the way we perceive time and space. He had a sudden idea: What if it was possible to travel at the speed of light – would you be able to see yourself in the mirror? Would light reach you if you were traveling at exactly the same speed? Ten years later he had not forgotten the problem, and while working at the patent office in Bern, he met his friend Michele Besso and happened to discuss it with him. Albert Einstein later wrote that this conversation triggered a storm within him. The solution felt like a huge relief: He suddenly realized that time is not absolute. The following day he met Besso again, and without saying hello, just said, "Thank you. I've solved the problem." It was the spring of 1905, and Albert Einstein was about to change everything we know about the universe, time, and energy, with his theory of relativity.

The American scientist Richard Feynman who won the Nobel Prize in Physics in 1965 and had been involved in the development of America's top-secret atomic

weapons program during the Second World War, became primarily motivated in his research by how wonderful it was to get a good idea.

"It's total ecstasy. It's just totally wild," he said later.

One of his important discoveries was related to a theory about liquid helium, and how the gas becomes a so-called superfluid. He had been working on the problem for two years, at which point he looked up from his papers and said to himself:

"Wait a minute – it can't be quite that difficult. It must be very easy. I'll just step back and then treat it very lightly. I'll just *tap* it, boomp-boomp."

But Feynman was never able to recreate this wonderful feeling, and he dreamed about it for the rest of his life: "So how many times since then am I walking on the beach and I say, 'now look, it can't be so complicated.'"

It turned out that *forcing* an aha moment, on command, wasn't so easy. Think about: Have you ever managed to sit down and plan an aha moment? Have you ever managed to squeeze your eyes shut and just get an idea, from sheer willpower? Normally you will be doing something or thinking about something entirely different when it strikes you. You'll be standing in a forest and suddenly the Cheshire Cat will appear.

While the aha moments of scientific pioneers like Einstein often seem like great moments of insight, aha moments in art and literature are generally smaller. Instead, these artistic aha moments can come in long strings of insights, that will, for example, make an artist paint part of a picture several times, claims the writer William B. Irvine in his book *Aha! The Moments of Insight That Change Our World.* The reason for this could be that a work of art can often contain numerous small problems that need to be solved consecutively.

"To find it's *truer and more fundamental character* it is the third time I am painting the same place. It is the very park right in front of my house. But this corner of a park garden is a good example of what I told you. That in order to find an object's real character, one must look at it and paint it for a very long time," wrote Vincent van Gogh

to his brother Theo, consumed with the problem of how he could render the world around him as effectively as possible in strong, clear colors. On this occasion he was referring to a bench.

Similarly, a writer's understanding of their work will continually grow as a story evolves; each chapter filling with new ideas, and each twist representing a new collection of ideas, reflections and aha moments. But just referring to scientific ideas as *big*, and artistic ideas as *small*, isn't really enough. We need to perhaps differentiate between the huge, paradigm-shifting ideas, like the theory of relativity, that changed everything we previously knew – and small ideas, that occur within a system, like the ideas you might get while painting a picture. Some occur within specific area, like if you're working at a soft drinks factory and get an idea for a new product; and some are a giant leap into the unknown, like when you get an idea for a great new novel.

"When I was a child I dreamed about being both a writer and an actor. But as an adult my dreams were a bit more level-headed," says the author Maja Lund who I visited at her small terraced house where she lives on the east side of Oslo. Lunde is about to move into a new house, only a few hundred meters away, and a tiny bit bigger, which she has built using the money earned from her creativity. She likes the area for its light and space, its views of the city, and its close proximity to the forest.

"I was actually planning on becoming some kind of cultural bureaucrat. So I applied for six months unpaid leave, on top of my maternity leave, from the PR company I was working for. Then I began writing scripts for film, and for Norway's children's TV channel, *NRK Super*. And the scriptwriting just took over completely, it was like returning to something I had done as a child, and I didn't go back to my old job of course and in the end I just quit," says Lunde about how she became a full-time author.

"I started writing fiction out of frustration with the film industry, everything took such a long time, the scripts never came to anything, at least, it took a very long time before they were used. So I needed to find a way back to the feeling I had as a child, when I just lived in a world of my own. But I never thought I would earn a living from it. I'm not exactly a risk taker, and to live off writing isn't a particularly secure job," she says.

When she finally took the plunge, she had three small children and a mortgage, so she wasn't particularly yearning for a wild bohemian lifestyle. But she knew that she had

some good ideas. She began by writing the children's book *Across the Border*, about the smuggling of refugees into Sweden during the nazi occupation of Norway – and then she had an idea that would turn her life upside down: Now she is one of the few Norwegian authors to have a book (at one point three books simultaneously) at the top of the bestseller list in Germany, one of the world's biggest markets. Lunde's book *The History of Bees* is still on Germany's bestseller list, several years after it came out, and is is also a bestseller in Britain. All because of an aha moment she had in a quiet Norwegian suburb. The idea, which changed her life, came to her after watching a documentary about climate change and the extinction of bees.

"I'd been wrestling with all these stories that were closely-related to my own life, something we have quite a tradition for in Norway, but I just wasn't engaged by them. You have to write about what you're burning for, and the routine challenges of my life were not things I was burning for," she says.

When she switched off the TV, she knew she had the idea for her first novel, an idea that had emerged while she was learning about global warming, pollination and bees – it was almost like it buzzed out of the TV and became something bigger – a huge story. She could see the whole thing, three stories from three different times and places that could be woven together into one novel; a story about a British beekeeper during the 1880s; an American beekeeper who witnessed the bee extinction in 2007; and a story set in China in 2098, many years after the bees had vanished. Lunde immediately abandoned her other ideas because this book just had to be written. When the *The History of Bees* finally came out in 2015, it won the Norwegian Booksellers' Prize, and became an international success; at one point it was selling to the value of 200,000 Euros a week in Germany alone. Now, the book has been translated into 40 languages. Lunde then realized that she needed to write more, about the climate crisis, about the destinies it involves, and about the future of the planet – and this was when the idea of the climate quartet came about. The third novel in the series, *Przewalski's Horse,* came out in 2019, and she continually gets new book ideas, especially when she least expects it.

"I have a lot of projects in reserve that I've not yet completed, ideas I've had which I'm saving and will return to and write one day. There's a children's book, and a novel

about death. I've written outlines for them, but I need to find the right angle or approach. So they'll just sit there until I can figure out a way of doing them." says Lunde.

When she is out jogging, or walking, or cycling, she will try to avoid listening to music or audiobooks, and just allow herself to be enveloped in silence. Then, a picture suddenly will appear in her inner eye, and she'll know that it has to be examined more closely, to see where it leads. "Imagination is a gift. It makes us human, and it's something I'm extremely grateful for," she says.

There is also a great deal of *"what if…?"* thinking in Maja Lunde's work, and the most important of these questions for her right now is: *What if we enter a climate crisis because our goal of keeping the earth's temperature below 2 degrees has not been achieved?* Now she is writing the final book in her climate quartet. It is a complicated structure to weave together because, in the end, all four books must interlock to create an even bigger patchwork of events. All this requires a great ability to see the overall picture, a structured brain, and a lot of aha moments. Lunde incorporates the writing techniques she used in her script-writing years, she has to create a mental map of the events, and works in an orderly and systematic manner, often on a plane travelling abroad to one of her book launches. But while her books fly off the shelves around the world, she, on the other hand, lives a modest life in east Oslo typical of any mother of three. She has cut all uneccessary shopping, takes the family interrailing on holiday, and volunteers at the school flea-market which raises funds for her sons' marching band. Her life is far from all parties and champagne and private jets. But her success means that she can write free of any immediate money pressures, and knowing that she has an audience waiting for her next book.

One thing is clear about Maja Lunde's authorship: She somehow manages to articulate the thoughts and ideas pervading our lives; what 18th century German philosophers like Hegel called the *Zeitgeist*; the opinions, thoughts, wants and ideas that drive a whole culture. Things we don't normally think about, but take for granted – like sitting in a little boat on a river leading to the sea. Some people are more in touch with the spirit of the times than others, thought Hegel. Maja Lunde is perhaps one such person. When she began writing her climate quartet in 2011, there were significantly fewer people taking the climate question seriously. But this trickle of interest has become a raging

torrent, and many people are now extremely interested in what Maja Lunde felt the crucial importance of.

“A good book idea feels like getting married. You often end up having to live with it for a very long time,” she says.

The History of Bees was recently published in India, more than three years after first came out. So its important you don’t become tired of talking about it, or stop burning for the issues you have raised.

“Were there many ideas buzzing round in your head when you were not a professional author?” I ask her.

“As a child and teenager, yes. I didn’t have time when I was an adult. But I was restless, I didn’t like the feeling of churning stuff out. Deep down, I knew that I didn’t just want to leave a mountain of press releases behind when I die,” she says.

Before becoming a writer Lunde wrote a lot of press releases, and even though someone has to do it, it soon became clear to her that she needed something more. She likes to explore and learn while writing, and spends a lot of time acquiring the relevant knowledge. Which brings us to an important point: One of the most fundamental elements of creativity is *curiosity*. Without curiosity our world would never have grown – if we don't learn anything new, we don't get new ideas. Everything starts there. Questioning and probing and wondering has led mankind from the stone-age to the space-age, to roll the first wheel and investigate which plants are poisonous and which ones are edible. Curiosity, combined with our ability to study and collaborate, to think up good ideas and construct great stories, has actually changed the world so much that we are in the process of destroying the foundations of life.

“There’s something about people. They have this insatiable need to own everything, and curiosity is a part of that. Curiosity and creativity, our ability to see new connections, are crucial to science,” says the biologist Markus Lindholm, research manager at the Norwegian Institute for Water Research (NIVA). Lindholm, who previously wrote a book about evolution, is now writing a book about curiosity.

Lindholm wants to show how science is driven by a fundamental sense of curiosity, without which, we cannot progress.

“Science is all about fumbling in the dark, asking new questions and having crazy thoughts,” he says.

One might easily see curiosity as being synonymous with wonderment, but Lindholm believes the two things are essentially different. One leads us towards silence and poetry, the other towards more concrete knowledge.

“To wonder means to stand before creation and become filled with something existential. While curiosity has a direction. And to get a direction, you need to have knowledge. You work your way into a tiny hole, using highly specific knowledge, particularly when you’re working scientifically. After that, when you have passed through the hole, it opens up, and you can attain a sense of full-blown wonder. Child-like wonder doesn't get you that far, but that’s where it begins. It fuels our curiosity,” says Lindholm.

Research on curiosity, has shown that to have some knowledge radically increases our need for more. If you know nothing about something you are probably not so curious about it either. This is where *openness* comes in. Openness means asking and enquiring about things when you don't even need to, and wondering about things that can make you look naive. If you are open, then you dare to be inquisitive, even if it sometimes involves you being wrong.

But curiosity has a more winding history. It is as old as the Bible where Eve, out of curiosity, reached for the apple and immediately guaranteed her fall into sin. Not such a good idea then, being curious, when all it took was a woman’s curiosity to banish mankind from Paradise! In the 4th-century, the philosopher and Christian theologian Augustine classed *curiositas* as a sin, saying that it turned us away from the pure contemplation of God. Curiosity is directed outwards at the world around you and is instrumental, and leads invariably to temptation. “Curiosity killed the cat” we say, as a reminder not to poke our noses where they don’t belong. In the late 3rd- and early 4th-centuries something changed. Not that they weren’t creative in the Middle Ages – consider the amazing cathedrals, the beautiful illuminated manuscripts, and the elaborate arguments for God’s existence – but during the Renaissance what they idealized was the individual. People became more curious, and the world became a stage where everyone could have a leading role. And the Renaissance (meaning “rebirth”) – so named because of how the Greek artists and philosophers were rediscovered during this time – was about more than simply reproducing the past. The carnival never ended, and the future was open. The people of the European Renaissance felt entitled to own the universe, to conquer and control it in a whole new way, from the remotest stars to the innermost cells

of the body. In 1596, at the world's first university in Bologna, an anatomical theatre was built where the students could observe dissections and see inside a human body; something that before then had been as impossible as crossing the sea to a faraway continent. At the same time, Copernicus and Galileo's observations of the universe showed that the modern world was no longer magic: The earth and mankind was no longer the centre around which the sun revolved – and the Garden of Eden was no longer a geographical point on the map.

The artist and rebel Caravaggio painted *The Incredulity of Saint Thomas* around the year 1600, in which all the Christian virtues appear to have being turned on their heads: In the Bible, Incredulous Thomas (or Doubting Thomas) says he cannot believe that Jesus has risen from the dead before he sees it for himself – In Caravaggio's picture, Thomas has become the main character, the star, investigating the mystery with his bare hands. He has become the role model of the modern scientist or artist, for those who will not allow curiosity to rest and who want to find everything out for themselves, independently of the authorities or religious revelation. It starts with curiosity and continues with knowledge – and knowledge leads to great ideas that change the world. Good ideas are, as we know, far easier to get if you already know a lot about something than if you don't.

Curiosity has simply accelerated in our culture. It has gone from being a sin to being an ideal.

Trude Lorentzen's job is based entirely on curiosity. It is also specifically connected to the modern world, where our curiosity means we're constantly needing to know what is happening around us. Lorentzen is an award-winning journalist and has worked many years for *Dagbladet Magasinet,* one of Norway's biggest news-magazines. She has also been nominated for Norway's prestigious Brage Prize for her book about her mother's suicide, *Mysteriet mamma* (My Mother: A Mystery), and teaches journalism students all over the country. Curiousness, good language, and good ideas, are her livelihood.

"A good idea is an idea that makes the other journalists slightly envious, because there's something immediate about it. The moment you hear it, you know there's something there, you have captured something in time. You've put words to something that everyone has actually been wondering about, more or less unconsciously," says Lorentzen.

“When you present that kind of idea, something very special happens to the atmosphere in the room. Because everyone there has probably had that idea already, but were too afraid to formulate it completely. Like the time I saw a fashion show in Milan and thought, *is it possible for ordinary people to dress like that?* before thinking that I should really just try it. It’s something everyone has perhaps thought of, but I made it into a project and reportage.”

Like Maja Lunde, Trude Lorentzen has to be connected to something bigger than herself, to the culture and the invisible network of thoughts and ideas connecting us; to understand what people are passionate about, and connect the thoughts and ideas we already know about. A good idea will make you look at something you already know from a new angle, without abandoning what you know completely, like getting the idea for a phone that will show moving pictures. When you hear a good idea, you think: “Of course. Of course, that's a good idea!”

“I still get scared that nothing will come,” she says.

Because ideas don’t necessarily come when we want them to. You can’t always brainstorm them out, and you can’t just close your eyes and force them out either. Without ideas it is difficult to do a good job as a journalist. A high-octane workplace like *Dagbladet Magazinet* is driven forward by its journalists, it is they who develop the best articles, and it is those articles that are the most fun to write.

Therefore, every day Lorentzen takes a shower. Not solely because she wants to be clean, but because the shower has quite a special role in the process.

“That’s absolutely right! I get ideas in the shower,” she says.

In Lorentzen’s bathroom, there are no plans or demands, just solitude and warm running water to stand under. It’s a mental break-room where she cannot check her cellphone or the internet; and somewhere her two children or husband cannot interrupt her train of thought. In the bathroom she can make free associations, until something comes to her, and then she’ll often experience what Archimedes did in the bath.

When she gets an idea, it’s important to mould it into shape.

“Many of my ideas just float around in the back of my head. I spend a lot of time with my own thoughts trying to formulate a response to the world around me. I have a natural inner monologue, and I think it’s important to take my inner questions seriously.

My philosophy on life is that the world can always be different – I have lots of *'what if…?'* thoughts," she says.

For Lorentzen to call something a good idea two criteria have to be met: The idea has to sound catchy and be immediately recognizable to other people. It should also be a little bit tricky to follow through, uncomfortable perhaps, or difficult, or just embarrassing; like going out to buy milk and bread at the local shop dressed in *haute couture*. If you can tick both those boxes, then you probably have a good idea, she thinks.

One idea that ticked both boxes was an article she wrote about all her ex-boyfriends, and how totally different her life would have been had she ended up with one of them, instead of the guy she now lives with and has children with.

"I actually wanted someone else to write the article, but none of the editorial team would do it. So I just had to write it myself. The thing is, everyone has their own version of that story, so when I pursued the idea, I wanted to show the deeply existential aspect of something everyone already understands: How life, and you as a person, could have been different if you had made other choices. It's something many people have thought about, but no one has spent three weeks of work-hours figuring it out. This is where something being difficult comes in: Had it been easy, everyone would have done it, but in this case I was the first to write it. And that gives what I write a little edge, because something is at stake. I had to be brave to make it happen."

Another idea Lorentzen had, which had similar universal appeal, was to write about all the empty children's bedrooms being kept as they were by parents all over the country, just as her father does with hers. At first, it was a pretty tame idea about celebrities returning home for Christmas. Not quite what she was looking for. But while they discussed the idea in an editorial meeting, something struck her: There were 69 bedrooms just like this in Norway – now empty because of the Utøya massacre.

"Suddenly the idea acquired a totally new depth. I wanted to show the silence in those bedrooms, and talk about who these young people where when they were alive. It was a difficult article to write, and very many of the parents refused. But many of them said it was a good idea, even those who couldn't bear to speak in person. So I couldn't give up."

In 2012, Lorentzen, along with her colleague Eivind Sæther and photographer Adrian Øhrn Johansen, won the most prestigious award a journalist can receive in

Norway: *The Journalist's Prize* (Norway's Pulitzer), for the reportage *Empty Rooms/The Silence After*.

"There was no dancing on the tables to celebrate, because the whole story was totally heartbreaking," she says about receiving the award. "But the reportage had at least succeeded in showing who those young people were, according to those who loved them." Among the grounds for their decision the jury stated: "The power of this story lies in the simplicity of the idea."

Getting a good idea can often feel like luck, but luck and curiosity often go hand in hand. And it was pure luck and chance that gave us one of the most important discoveries of modern medicine – one that might never have been made had Alexander Fleming been a more hygienic scientist. One summer day in 1928, some fungal spores flew in through his laboratory window and landed in a petri dish where they remained for the rest of the summer. It wasn't until Fleming returned from his vacation that he saw what had happened. During the summer, the tiny spores had killed the bacterial cultures that had been living in the petri dish. In 1945, Fleming was awarded the Nobel Prize for this discovery, of one of the world's most important medicines – penicillin – which today is crucial for fighting infections and life-threatening bacterial attacks. Without coincidence and luck, this would not have happened, and without Fleming's openness and curiosity, we wouldn't have benefited from either.

Kaja Gjedebo, a renowned jewelry designer in Norway, who is now breaking through internationally after launching a collection in Germany, says that one of her greatest creative achievements came as a result of luck and untidiness. To be more precise: Her own untidy desk.

"Nothing I ever do feels like it's been wasted. It always leads to something, although I don't always know what it is. For me, creating something is about making myself available to chance. It's like kissing a frog – you might get a prince out of it in the end. That's how it started. I had put some parts on my desk, and there they were," she says.

Gjedebo lives in Bøler, Oslo, in a so called "artists-home" – a 50s-built, dual-purpose house and workshop, with large windows that fill the place with light. But instead of the clean, minimalist surfaces you might expect in a functionalist building, every work-

bench is covered in all sorts of mess: fragments of metal lie all everywhere, along with a random chaos of paper and tools and other bits and pieces.

"Sometimes, a botched project can be the best thing that can happen! I was actually making a ring once, drilling and fixing, but it didn't work out and I just left the pieces lying there. Then one day I tried using them on myself, as earrings. Now they're my biggest selling design. By sheer coincidence they fit perfectly round your earlobes and somehow raise them – it's a particularly good design if you have quite long holes in your ears," she says while handing me one of them. You would think it had been designed as an earring, not just part of a ring.

A similar thing happened with a pair of earrings that didn't turn out how she wanted: She welded the two parts together to form a ring and the piece ended up being extremely popular with her customers.

"It can take years for an idea to mature and become a piece of jewelry. I have so many different projects going on simultaneously. Whenever I tidy the workshop I'm always excited about what might happen. I'll find something, look at it, and think *no not today*. And suddenly I'll see the road ahead," she says.

Gjedebo's aha moments are entirely physical, they happen when objects are just lying around; pieces will suddenly lie at an angle she has never seen them in before or placed strangely on top of another. For her, untidiness is a prerequisite for having an aha moment. There's even research showing that untidiness is is good for creativity. In 2013 researchers concluded that an untidy desk was good for all creative work. The finding caused a media frenzy, and disorderly creative types the world over breathed a sigh of relief – now they didn't have to tidy up at all! However, a more recent study from 2019 showed that untidiness has no significant effect after all, which shot a hole in the first result. This shows, above all, that we have to be cautious when it comes to research, and perhaps with untidiness too. But for Kaja Gjedebo, a messy workplace is a godsend and essential to having good ideas – research or no research. Her jewelry is as simple and elegant as her desk is chaotic.

"What the research on creative people shows, is that they are not afraid to fail. They are humble. They have this huge inner drive to learn and explore, and they are very curious,"

says Joy Bhattacharya, Professor of Psychology at Goldsmiths, University of London; a university well known for its creativity with an alumni that includes the artist Damien Hirst. Bhattacharya's research is based on the work of Joy Paul Guilford (1897–1987), one of the founders of creativity research.

Guilford, who was an expert on IQ testing, had tested both children and military personnel, beginning in the late 1920s and throughout World War II. But something didn't add up, there was something missing from the tests. Then he had an idea: He would make a test of his own. In 1950, he was president of the American Psychological Association and delivered a speech at the opening of its prestigious, annual conference. During the speech he spoke enthusiastically about creativity, and started a flood of interest in the subject. Guilford believed that standard IQ tests were unable to identify people who thought differently (divergent thinkers); because they only really measured a person's ability to think conventionally, following a logical correctness – not unconventionally, irrationally and creatively. His concept of "divergent thinking" involves thinking differently and seeing many possibilities, while an IQ test will simply look for one answer to each question: the correct one. He believed that many of the most creative people can still score badly on standard IQ tests.

This was a turning point in creativity research. Neuroscience was still in its infancy in the 1950s and had only begun scraping the surface of how the brain functions. One of the most significant figures in the history of neuroscience is the now well-known patient Henry Molaison (previously known among researchers as HM) who, in 1953, had both of his *hippocampi* removed during an operation related to his epilepsy. The results of the operation helped researchers understand many of the mysteries of the brain, and particularly memory. With his *hippocampi* removed Molaison was unable to learn anything new, which immediately showed something quite crucial about how the brain functions. This meant that researchers could start mapping the function of the hippocampus, based on everything Molaison was able and, despite the damage, everything he *could* do. Until he died in 2008 Henry Molaison cooperated with the researchers, through a range of tests and experiments, allowing them to study how his brain worked after the operation. What they found was that long-term memory is very different to short-term memory (or working memory), because Molaison was able to recount his life up to a point three years prior to his operation, which showed that memories have to be

consolidated – massaged into our memory – over a long period. He could hold a conversation until something distracted him, at which point he would instantly forget everything he had been talking about, because this is how our working memory functions in extreme situations. He was able to learn motor tasks, although he could never recall how, which proved that we have a seperate motor memory. But he was unable to orient himself and had no sense of location. It is possible that he had also been unable to remember anything vividly, sensually or emotionally (characteristics of so-called episodic memory), because he would recount his memories in a quite flat manner. And after the loss of his *hippocampi* he was unable to attach new episodic memories to his brain either. From all these building blocks, memory researchers were able to compile a huge catalog of knowledge about this one specific, creative attribute of the brain. You could say the *hippocampus* is a kind of memory coordinator, retrieving and orchestrating memories; but most of the time it functions like the world's worst amateur theater-director, and never follows the script. Our memory is a narrator, not a video recorder, largely controlled by our emotions and associations.

What memory researchers have learned since Henry Molaison's operation is in many ways disheartening for those of us who thought we could rely on our memories. Memory compresses and expands what we think we remember, and this changes still further when we experience new events in our lives. Traumas adhere more easily to our memory than fleeting moments of everyday happiness. We recall our wedding day quite differently when we get divorced, and if we witness a crime we are unlikely to recall much of it correctly. Our memories are perpetually new stories about ourselves and what we know about the world, and are highly unreliable. We are all inherently creative.

But although memory research shows that our memories are governed by creative forces, it is not here that *creativity* research has its roots. It began of course with tests. In addition to IQ tests and Guilford's new creativity test, we now have personality tests – and the most popular of these among the world's psychologists and neuroscientists has been the so-called "Big Five" which measures five major personality traits: openness, conscientiousness, extraversion, agreeableness and neuroticism. In addition there are a total of 30 different measurable sub-traits, within the five major ones. Researchers assume

that we all have some of these major traits, to a greater or lesser degree. It is also possible for someone to have all five key personality traits.

Openness is perhaps the most important trait for people who are creative. It implies that people who earn their living from being creative are by nature curious and engaged – and can provide long and unexpected answers to questions like "what can a brick be used for?" or "what would happen if gravity was suddenly half as strong?" Guilford developed a comprehensive test that would measure specifically this type of divergent thinking (i.e., thinking which leads in many directions) called Guilford's Alternative Uses Task (GAUT). Later this was developed by the researcher Ellis Paul Torrance and used in the Torrance test. In addition there is Sarnoff Mednick's Remote Associates Test (RAT) for mapping convergent thinking (thoughts which are related) which measures strange associations to words.

"Of course, to define creativity using these tests is problematic, but it is the most widely-used method for enabling us to quantify creativity and in turn make it into a field of research. This way we have been able to build the research field brick-by-brick," Bhattacharya says.

Professor Bhattacharya's research shows that most people can become more creative using creative training programs (e.g., practicing various types of divergent thinking). But people who are particularly creative already, will find these exercises less useful.

"This is most likely because people working creatively, at a high level, already have their own creative system, which a new training program is likely to disturb. If these individuals are experiencing stress and depression, we know that their creativity level will most likely go down. So they are vulnerable," he says.

After Guilford opened the door to creativity for researchers within psychology and neuroscience, it created a rush of practical uses, creativity-exercises and techniques. You can just imagine how in demand creativity was after World War II, when much of the world lay in ruins and the survivors had to rebuild their surroundings and themselves. Creativity was essential to creating a new and better society.

But the wind had blown in this direction before Guilford. In 1942, the advertising executive Alex F. Osborn published the book *How To Think Up*, in which he coined a new and groundbreaking technique that you will certainly have heard of – "Brainstorming".

Applied Imagination, which Osborn published in 1953 and which became an immediate bestseller, included tasks for stimulating creativity, such as this: “If you were a toothbrush seller with a surplus of stock, how could you market your toothbrushes to sell them for anything other than brushing your teeth?” and and “What else can a helicopter be used for?” and “Can cocoa bean shells be made into anything useful?” Osborn traveled around, teaching in schools and the military, and in 1954 founded an institute that taught his “Creative Problem-Solving Process”. During the hippie era of the 1960s and 70s, the celebration of human creativity reached new heights, and both then, and since, countless books have been written full of exercises aimed at making readers more creative. On Amazon, I found 70,000 books on the subject. It is, after all, something everyone wants to be! But many of these books on creativity are really quite paradoxical, because following a creative method to the very last detail quickly defeats the purpose. Rules and norms can impede creativity. It also turns out that Osborn's “brainstorming” is not so conducive to creativity either, because you can so easily wind up following the group and end up with quite conforming ideas. We can get numerous weird and exciting ideas far more easily when we are alone, according to new research on the method. It is no coincidence that Einstein didn't brainstorm the theory of relativity.

There is also another problem: Guilford’s test was intended as a criticism of the definitive answers provided by IQ testing. What he ended up with in return was a new group of “test-winners”. But can a test like this really distinguish between what’s creative and non-creative, and can we really categorize people based on such a test? Is it possible to come up with a blueprint for what is creative? Given what we know about memory’s creative and associative nature, aren’t all humans quite creative? And if we’re all actually creative anyway, how can we unleash all this creativity?

What we now know, is that the White Rabbit can pop up when you least expect, to lure you into an absurd imaginary world. Try and outwit the Cheshire Cat, and he’ll vanish with a large grin. *Alice in Wonderland* is one of my favorite books because it is so strange, funny, and creative in every respect, and at the same time so unmoralistic considering it was written at a time when children’s literature was supposed to be morally edifying above all else. And this entire crazy universe popped up in the mind of Lewis Carroll while he was rowing a boat through Oxford, along with the children of the dean of Christ Church College where Carroll had a fairly un-creative job as a maths-teacher and

priest. On this quiet July day in 1862 – when the last thing he had on his mind was writing one of the world's greatest bestsellers and something that would become a cultural icon all over the world – Lewis Carroll had an aha moment. He created a modern classic, on this single rowing trip with the Liddell children, one of whom was called Alice. So when the children nagged him to entertain them with a story, he told them all about what happened, when Alice sat by a riverbank feeling bored one summer day, along with her big sister. You can safely say that the Cheshire Cat appeared that day, with a big smile on his face.

When it was published, in 1865, the first 200 copies were misprints, so Carroll decided to give them away to hospitals and various homes. In his diary he wrote that he hoped to sell 2000 copies of the reprint, so that he might break even.

"Any other further sale would be a gain. But that I can hardly hope for," he noted. One of the discarded misprinted books was offered for sale by Christie's in 2016, with a price tag of 2-3 million dollars.

When the second edition came out, the first 5000 copies were torn off the shelves, and the book has been in print ever since. It was one of Queen Victoria and her children's favorites and was read by a young Oscar Wilde. Since then it has been translated to 174 languages and sold millions of copies.

In 1937, a television version of *Alice in Wonderland* was made for the very first time. It was the same year that television started becoming more widely used in England – and it was also the year that everything turned upside-down for John Logie Baird.

In 1928, Baird became the first person to broadcast television images in color, and the same year the first to make a transatlantic broadcast from New York to London. But in 1937 he was slighted by the company owned by the Italian physicist, inventor and Nobel laureate Guglielmo Marconi – the same company that in 1925 had been so indifferent to his invention and wanted nothing to do with him. EMI-Marconi eventually managed to build a television that was less mechanical and cumbersome than Baird's, and was better and easier for the BBC to operate. Baird had gambled everything on his brilliant idea, and had been providing television solutions to the British broadcaster for nine years, but now he had to consider himself beaten and outperformed. Nevertheless he continued to improve and develop TVs, and pioneered both HD and 3D-TV technology. He also invented a video system, an infrared light and a kind of radar. His contribution to television history has, in posterity, been justifiably praised.

Now, more than 100 years since Baird had his peculiar idea in Helensburgh, I can watch one of his movies – the flickery, black-and-white broadcast of *The Man with the Flower in His Mouth*, from 1930 – on the screen of my smartphone. Strangely enough, John Logie Baird's idea of *seeing through the telephone* has become more of a reality than he could ever have imagined.