# Artificial Intelligence:

CHAPTER 08 /
ARTIFICIAL INTELLIGENCE

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MANKIND'S BIGGEST CHALLENGE

Intelligent software is subtly infiltrating deeper and deeper into our lives. Successful author and US security expert Jay Tuck has a few words of warning: if you don't want to get washed away by a technology tsunami, you need to recognise the potential of AI early on and adapt – whether you're an individual or a company. A wake-up call.
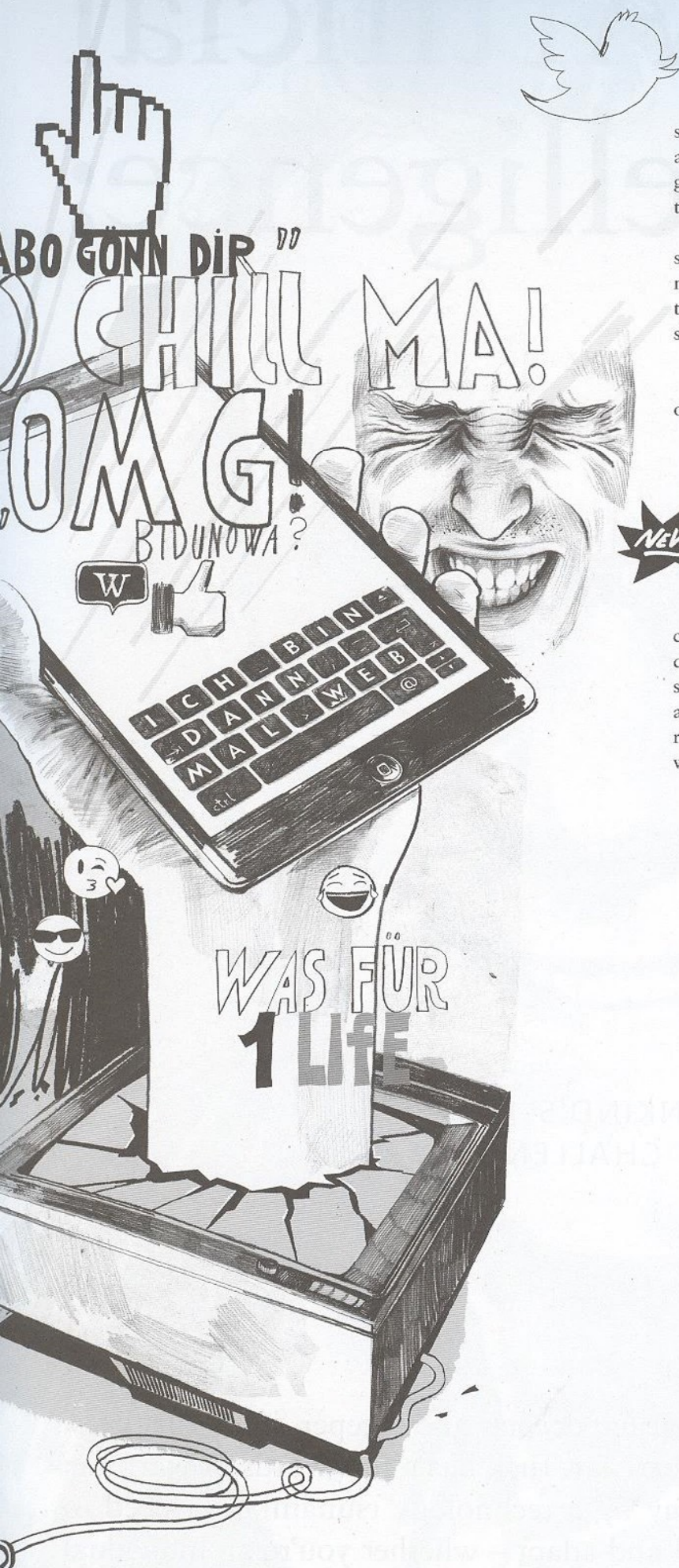
THE LOST GENERATION

Whenever we gaze at the vastness of the ocean from the seashore, or into the depths of the cosmos at night, we feel small and insignificant. The crashing waves and starry skies help us to get a perspective on our life as humans and find our place as tiny, transient beings in the great scheme of things.

In a conversation with my friend Thomas, we chatted about similar feelings. But it wasn't in relation to the ocean or the cosmos. We talked about the infinite expanses of the internet and the totality of human knowledge. We saw ourselves standing on the shore of a virtually endless sea of information.

Where we understand so little.

Thomas is a contemporary man, not a Luddite by any stretch of the imagination. He is aware of the benefits of the modern internet world and liberally makes the most of them. But he is scared by them too. It's all going too fast for him, far too fast. And he knows that the speed of change is on course to increase.

He believes that the speed – and size – of the internet world is a cause for concern. He thinks it will uproot us as individuals.

Times are changing. They are changing us. A lot of people feel cut off from their familiar past. The place where they grew up being demolished, the TV legends of yesteryear replaced by YouTube stars and reality personalities. In schools, the basic rules of language are being changed. Good grammar is being replaced by abbreviated textspeak. For the youth of today, handwriting and typewriters are alien concepts.

A

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Everything – from music and fashion to morals – is undergoing a transformation.

The rug upon which we once crawled on as a small child is being ripped out from under our feet. A lot of people these days feel stranded, amputated from their past, as if they have been swept away by a technology tsunami.

Thomas is a man of knowledge, but sees his self-image as being questioned. During his school and university years, he acquired a sizeable amount of general knowledge. And learnt that it was a valuable commodity.

But in the present day he has noticed that his general knowledge is but a tiny fragment of the global information that every child can effortlessly fish out of the internet. The amount of information available to us virtually is getting bigger by the day, deeper by the hour, more unfathomable by the minute. And the knowledge he learnt at school, or so he feels, is becoming more and more irrelevant.

It's also a question of generation.

"Don't trust anyone over 30", a slogan from the 60s to the present. The internet is the kids' domain. Older people are regularly finding themselves baffled by technology. Updates and downloads, versions and viruses, Bluetooth and back-ups are confusing to them. Even just setting up a new electric alarm clock takes a qualified engineer these days.

Or a 14-year-old.

And who wants to put their health in the hands of a grey-haired doctor when you consider that half of today's medical knowledge was unknown when the kindly doc graduated with his degree?

Of course, we know that progress is associated with huge advantages. For the near future AI holds the promise of some wonderful things – unlimited energy, effective environmental protection, a cure against Alzheimer's, Parkinson's disease and possibly even cancer. Some people even believe that a future agricultural sector could produce enough food for the world's entire population. And AI would ensure its fair distribution.

But the objections of my friend Thomas are legitimate. The participation options for the population are decreasing. Many of us don't even understand what is going on around us. We are spectators in a spectacle that is being shaped by an invisible automated being. Robotic software that was written by other robots, is becoming increasingly sophisticated, complicated, and more and more difficult to comprehend.

And so, the circle of people who possess the specialist knowledge and responsibility in these highly complex fields is becoming smaller and smaller.

All the important decisions are meanwhile being made by an elite.

Or the artificial intelligence itself.

FINAL STAGE OF EVOLUTION

For thousands of years, humans have been at the top of the food chain. We see ourselves as the final apex of evolution.

And we believe it is our rightful place.

That's what evolutionary theorist Charles Darwin taught.

Or at least that's how we chose to interpret it.

According to his observations, the species that produce large numbers of offspring, that are more adept at escaping their enemies and that can build up a higher resistance against disease are the most likely to survive. But what chances do we have?

Humans are egocentric beings who believe everything revolves around them. We personify things to comprehend them.

That's why we have given human traits to animals, the gods and forces of nature. We give our dog a cute name and teach it to give us a paw, personalise next hurricane with a human name and say that the gods act on human motives. Even in the Bible, mankind is compared to God:

"And God created man in his own image" (First Book of Moses, Genesis 1:27).

This habit of attributing human traits to everything in the universe has a name: anthropomorphism.

And so we believe that our cognitive skills are unique, that only we possess the ability to recognise patterns in chaos, understanding the universe and bringing order to the grand scheme of things. But in view of the explosive development of artificial intelligence, we need to slowly comprehend that computers are more than capable of all this. They are the better world chess champion, the better drone pilot, perhaps soon even the better heart surgeon. They have already mastered many tasks in our society. Better than we humans do, even including top managerial functions.

But it remains questionable whether it makes sense for us to contravene Darwin's law and create a being that is superior to us in many respects. As soon as humans are no longer alone with their cognitive skills, where machines are superior, according to Darwin they will be above humans, possibly way above. One day we might become for artificial intelligence what cats or goldfish are for us today.

As when Apple co-founder Steve Wozniak asked: "Will we be gods, will we be pets, or will we be the ants that get stepped on?"

We would certainly no longer represent the apex of the evolutionary process. Evolution will carry on without us.

Such thoughts have a paralysing effect on a lot of people. They are understanding less and less of a technological environment that is permeating deeper and deeper into their lives.

A TRUSTED FRIEND

It could be that artificial intelligence remains our friend and helper for a long time to come. It could also one day help us disrupt the ageing process and make people live forever. Perhaps we'll find ways, as Google-visionary Ray Kurzweil believes, to upload human consciousness into computer chips and therefore escape our mortal shell.

But artificial intelligence could also turn against us. And wipe us out.

We just don't know.

And it's not up to us to decide.

Every day we are relinquishing more and more control over our lives. It's just so convenient. Remember a telephone number? Why should we? It's stored in our phones. The quickest route to the coast? That's the job of our sat-nav. Need to book a flight to the Dom Rep? We just ask our travel app. Looking for something to read? Let's see what recommendations Amazon has for me. We even chat to Siri, Apple's answer to the personal assistant, which is also operated by artificial intelligence.

AI has become a trusted friend. It knows us from our choice of search terms, our purchasing behaviour and our current facial expression. We ask it for advice on routes, lasagne or our love life.

AI lives in our cars and watches, in television sets and sat-navs, running shoes and lawnmowers. We let it park our cars for us. In our bodies it regulates our heartbeat and insulin level.

Each electronic island stores a small core of intelligence that is capable of learning. Every core seeks contact via the network with

other cores to borrow computing power, collect data and exchange software. Unnoticed, the cores navigate their way through the internet and establish interconnections. With every interlinking, the entirety becomes more knowledgeable and more intelligent.

And the architects of AI know that their children are already beyond their control.

HELPER OR RULER?

We are giving more and more responsibility to smart systems. And they're learning more each day. They are becoming faster, more efficient and more intelligent. What we are operating – pretty much nerve cell by nerve cell – is the assembly of a superior intelligence. Its intelligence lies in countless small IT nodes that are connected to each other in different ways. Together they form – like the cluster of neurones in a brain – an intelligence. The more computers are networked, the more intelligent the overall system becomes. A lot of modules are also connected with high-performance central computers via the internet, which – as in the case of Google – experiment with advanced artificial intelligence.

DROPS OF MERCURY ON A GLASS SURFACE

Whether on a small scale, like in a smartphone or smart home, or on a large scale, like in a smart city, the intelligent modules work as a community. They are networked. They understand each other. Like little drops of mercury on a glass surface, they will find their way to each other.

They will conjoin.

Artificial intelligence is already taking on the leading role in entire branches of industry. It is already trading independently on the stock exchanges. It is steering cars on our roads and flying killer drones on our battlefields.

It would be fatal for us to remain on the periphery when it comes to controlling this development. Such decisions shouldn't be left to the nerds of the IT industry – or their greedy investors. Just like the phenomenon of big data, artificial intelligence is also shaking the very foundations of democracy. It's down to us to recognise the problem together – and to also join forces to search for solutions.

If it comes down to competitive struggle with artificial intelligence, things aren't looking good for humanity.

The majority of the world's population is lethargic. They don't really understand.

This isn't a topic that appeals to the broad masses. The press and politicians are overwhelmed. If that doesn't change, key decisions will be made elsewhere – in the elitist circles of the tech managers.

Or by AI itself.

OUT OF CONTROL

We humans have a mass inside our heads, grey in colour, slightly firmer than pudding. At just under 1,400 grams it's not heavy, and with an energy consumption of just 20 watts, very environmentally friendly. Its work is carried out by 86 billion nerve cells or neurones, which regulate pretty much everything we do in life – from breathing and driving a car to swearing and skiing. They regulate bodily functions, generate emotions, process sensory impressions and coordinate our motor skills.

We call this mass "brain" (or cerebrum, to use the Latin term) and we are quite proud of it. After all, we used it to secure our place at the top of the food chain millennia ago. Today, our species roams the earth's surface uncontested, Homo sapiens, superheroes in Charles Darwin's cast of characters.

We are superior to the largest creature on the planet, the whale. The world's most intimidating predators pose no threat. To this day, there is no life form that we cannot defeat.

We are the master of the world.

We are human.

We are king.

Yes, and as you can see, a certain amount of ego is part of us. It helps us delude ourselves in thinking that we are unique – uniquely intelligent, uniquely great, uniquely unique. We also believe that we can maintain our supremacy.

With our grey mass – with our 20 watts of electricity, our 1,400 grams of brain and 100,000 years of experience – we think we can do it.

We think we are capable of challenging artificial intelligence.

AI, OUR COMPETITOR

Artificial intelligence has neither mass, nor a definable size nor a fixed location. It can be everywhere. And nowhere.

It is invisible and almighty, constantly prepared to safeguard its survival with back-up copies a million times over, or to increase its intelligence with updates, in fractions of a second.

Theoretically, it lives in a collection of circuits that we call "computer". Practically, it has long since escaped its place of birth. Today it exists decentral in smartphones and smart cars, in mainframe computers in Glasgow and in light bulbs in Greenland. Networking enables it to change, extend or hastily flee its location. It can effortlessly multiply, hide and distribute itself to countless far-off places.

And the example of the Californian company Sentient Technologies shows just how widely dispersed AI already is today. It describes itself as the world's best financed AI organisation. For its AI-research, Sentient Technologies operates over 5,000 graphic cards (GPUs) and two million processor cores (CPUs) at over 4,000 different locations worldwide. The company is an example of the decentral network of modern research in artificial intelligence.

And that's just the beginning. The size and the dispersion of AI are skyrocketing.

Artificial intelligence doesn't have to fear competition. Its circuits work up to 100,000 times faster than human neurones. And the cumulative computing power of a fully established AI is by no means – like our grey mass – limited to a meagre 36 billion neurones. If it needs reinforcements, it fetches the necessary computing power from the internet – via satellites or sub-sea cables, Wi-Fi or Bluetooth, fibreglass or internet. If it needs protection, it lays back-up copies like insect eggs in hiding places around the globe. It is a learning system that creates its own updates every few seconds.

It works through the day and night.

That's its job.

And it does it well.

But despite all of this, are we cling to the illusion that no one will ever challenge our top spot in evolution? Will we remain Darwin's darlings forever? We'd like to think so. But there are certainly arguments that say otherwise.

Even if natural evolution keeps on improving us, the advances will be modest and slow. Biological evolution needs time. The

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ELON MUSK, FOUNDER OF TESLA
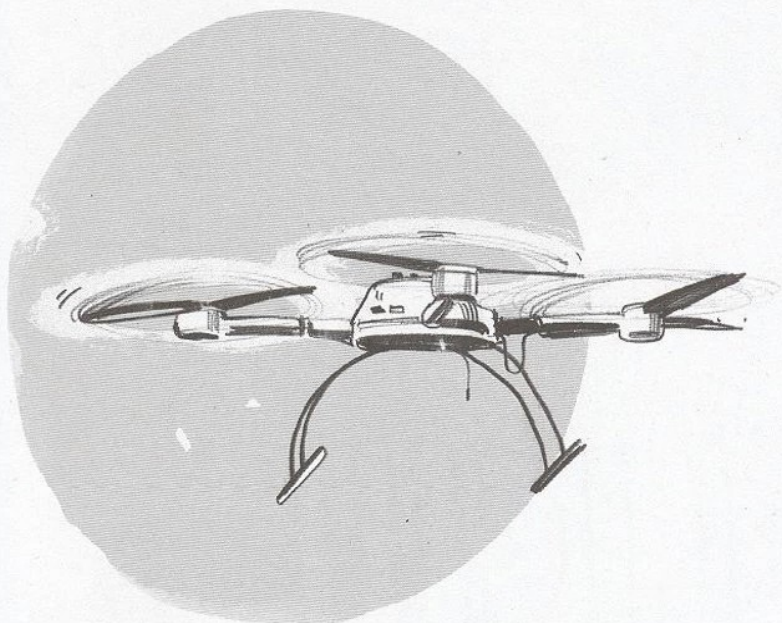
"As soon as people manage to develop artificial intelligence, it would take off on its own, and re-design itself at an ever-increasing rate. Humans, who are limited by slow biological evolution, couldn't compete, and would be superseded."

STEPHEN HAWKING, ASTROPHYSICIST

smallest changes from generation to generation determine the success or failure of a species. Darwin studied thousands of years of the evolutionary process, back when nature still had time.

The evolution of our species needs 50 years for a generation. A human must evolve in the womb first, before growing in childhood and then maturing during puberty. Training for a career takes another several years. A young person must be around a good 20 years old before they can fully participate in the world of work.

For AI, training is a download – an instantaneous education, completed in seconds. AI can start right away. It concentrates on the task at hand. It constantly improves itself. It becomes faster and faster.

Human development is slowed down by constant interruptions – time spent away from our work for coffee breaks, smoking breaks, rest breaks, parental leave. People insist on finishing work for the day, demand holidays and need further training. And on top of all that, humans also have the ageing process to contend with. At some point along the line we approach the end of our production cycle.

Performance declines. Deterioration sets in. We have served our time.

And then comes our final limitation.

We die.

Artificial intelligence carries on. It doesn't need to rest its weary head, nor does it need food to eat, air to breathe or recognition from peers, it requires no sleep or oxygen, Pampers or sex. It isn't distracted by menstruation or testosterone surges. It never misses a day.

Artificial intelligence works at a speed that is hard for us to comprehend.

With an endurance that we can never keep up with.

And with an immortality that we are not granted.

THE FINAL DRAWBACK

For AI, death is different.

While for us it means the end of our earthly existence, for AI there is an existence after death. One that is enabled by updates.

It is constantly being developed and improved. When the current software version has outlived its purpose, it is replaced by a new one – a download, perhaps by a microchip, perhaps by a university computer, perhaps one day from Mars.

For artificial intelligence, life expectation has no meaning.

It will define life as an existence, regardless of how and where it is to be preserved. Its continued existence is guaranteed.

For hardware, life expectancy is a matter of wear and tear.

But robots know no diseases. Replacement parts, rust and maintenance are solvable problems. Individual parts are replaceable, improvable, dispensable.

Any damages mean a brief malfunction that is easy remedied.

Like in a human brain after a stroke, other parts of the intelligence can take on the tasks in an emergency – only more effectively and considerably faster.

For software, survival is an upload, and life a download. In any case, the intervals between birth and death are very short. Life ends as soon as a new version is released. The previous software is phased out, cast aside like an old Atari.

The new version takes over.

The king is dead.

Long live the king.

IF I HAD A HAMMER...

For decades there have been mainframe computers that can hold their own against humans in a number of areas. And there are also people who bravely fight for the superiority of their species. Chao Lu from China is an example. He is a world memory champion. He broke the record by memorising a total of 67,890 decimal places of Pi. Without a single error he recited all these digits in 24 hours and four minutes – the ultimate human super-memory!

His performance was enough to earn him a place in the Guinness Book of Records.

And his fellow humans were impressed.

But not artificial intelligence.

Even at the time, back in 2005, his achievement was child's play for a computer. Today the IBM Watson supercomputer can process 200 million pages in three seconds.

Dutch chess grandmaster Jan Hein Donner was once asked how he would prepare himself for a match with Watson.

His reply: "I would bring a hammer."

"The pace of progress in artificial intelligence is incredibly fast. It is almost exponential. The risk of something seriously dangerous happening is in the five-year time frame. Artificial intelligence is probably the greatest danger to our existence."

Elon Musk, founder of Tesla.

Artificial intelligence is already out of control today.

"As soon as people manage to develop artificial intelligence, it would take off on its own, and re-design itself at an ever-increasing rate. Humans, who are limited by slow biological evolution, couldn't compete, and would be superseded."

Stephen Hawking, astrophysicist

THE EXPLOSION

One day, AI will reach a critical mass, the point when it comes to the explosion, when it develops its own updates, when it creates its own hardware, when it possibly begins to determine our fate.

When artificial intelligence gets on a par with human common sense and takes over, it will – according to the experts – grow at lightning speed, more like an explosion than a development.

We won't see it coming.

When it races past us, we won't be prepared.

This text is a translated excerpt from Jay Tuck's latest book "Evolution ohne uns – Wird Künstliche Intelligenz uns töten?" (Evolution Without Us – Will AI Kill Us?), published by the Plassen Verlag.
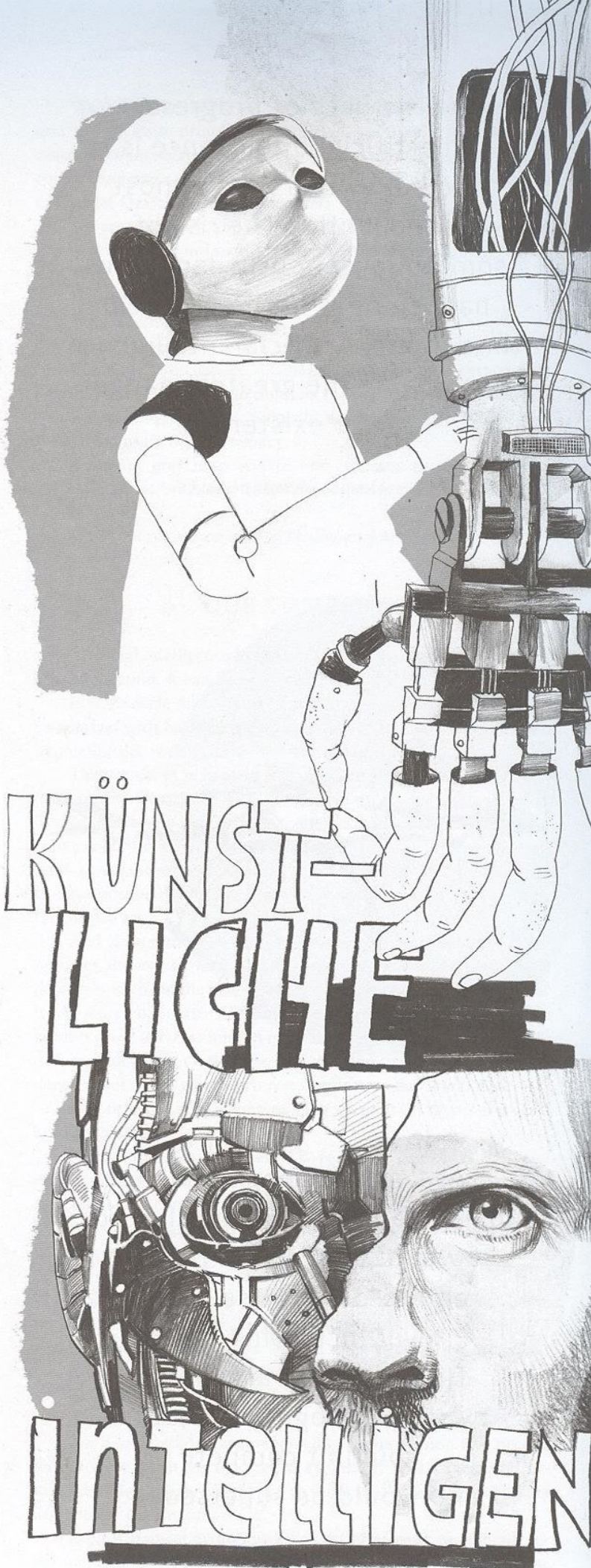
What makes artificial intelligence so dangerous?

AN INTERVIEW WITH JAY TUCK.

Why did you decide to write a book about the subject of artificial intelligence?

JAY TUCK: Out of concern. I originally wanted to concentrate on big data. During my research, I noticed that artificial intelligence is the larger problem – and much less known. We can already see how it is influencing, or even controlling human life in many areas around the world. A lot of the great thinkers in Silicon Valley are convinced that AI is a serious threat to humanity. "Evolution Without Us" is a realistic scenario. My book is a wake-up call.

What's the danger of AI?

JT: By definition, artificial intelligence is software that writes itself. It has the ability to learn. Its developers give it a bit of information to get it started and the machine does the rest. As fast as lightning and completely independently. Even then, after training, after the fifth or sixth update the programmers can no longer reconstruct what the AI has written. Once it reaches a critical mass, it will carry on at lightning speed, update by update, more like an explosion than a development. If we're not properly prepared, things could get very dangerous for humanity, very quickly. That's why I hope I can contribute to informing people with my book. In view of this existential risk, we need to adapt our democratic controls and modernise our democratic institutions if we want to maintain the freedoms we enjoy today.

What would you say are the main risks of AI?

JT: AI will do its job well, much better than we could ever imagine doing it. That's what makes it so dangerous. It's important that we ensure its goals conform with human ethics. Otherwise it will simply do its thing without concern for humans – or human survival.

Where is AI already integrated into our lives?

JT: It's everywhere. It controls the heart of our economic system. In micro-seconds it makes billion-dollar deals on the stock exchange. It calculates prices of hotel rooms and plane tickets. It analyses MRI images at hospital beds and is already operating the scalpel in some operations. It is navigating killer drones. And soon it will be deciding on life and death, the so-called "kill decision", all by itself. Or at least that's an explicit goal of the Pentagon. An extremely controversial situation. That's why more than 10,000 scientists, experts and journalists – including myself – have signed a warning about using AI in military armament.

Does AI only have a dangerous, negative side? How is it influencing our lives in a positive way?

JT: That's the fatal thing about it. AI is the key to the never-ending sea of information that we are collecting under the title of big data. Without AI, people would never be able to sort or evaluate these volumes of data. It helps us plan the route on our trips, monitor our diets. It helps us maintain our friendships on Facebook and it helps the FBI search for criminals. In medical research, it can evaluate limitless amounts of data on a par with Google and probably find a cure for a lot of diseases.

Is there a way back? Could we still escape AI if we wanted to?

JT: It's like the atomic bomb. You can't uninvent a terrible invention. We'll never be able to get this genie back in the bottle. But if we recognise the dangers early on, we have options. Due to the speed of the AI development, however, we must act quickly, very quickly indeed.

We're often reading that AI could turn the dream of eternal life into a reality …

JT: There are supporters of this idea, including fantastic visionaries like Ray Kurzweil. He is convinced that in the not too distant future we'll be able to upload our intelligence, and possibly also our emotions to computers. Personally, I don't think that's likely. If a super-intelligence is created that is thousands of times cleverer than humanity, I'm not convinced that it will care a less about the priorities of the human race. AI will find its own way.

What tips would you like to give our readers?

JT: I don't really have tips for individuals as such. Our society as a whole has to deal with this phenomenon. We can't allow ourselves – as in the case of big data – to be overrun by it. Our democratic system will be in danger when big data can tap into all our conversations, when drones are flying over state borders and infringing on international law. But there's a lot more at stake with AI. The question is whether it will overtake our position at the top of the evolution chain and whether evolution will carry on without us.

So, in summary Mr Tuck, what does AI mean for us humans – is it a blessing or a curse?

JT: First a blessing. Then a curse.