No. 114/2022

HUMBOLDT KOSMOS

Research – Diplomacy – Internationality

DEUTSCHE VERSION: BITTE WENDEN

AI SUPERPOWER
What Germany can learn from Canada

FROM RAPPER TO PROFESSOR
The story of an unusual career

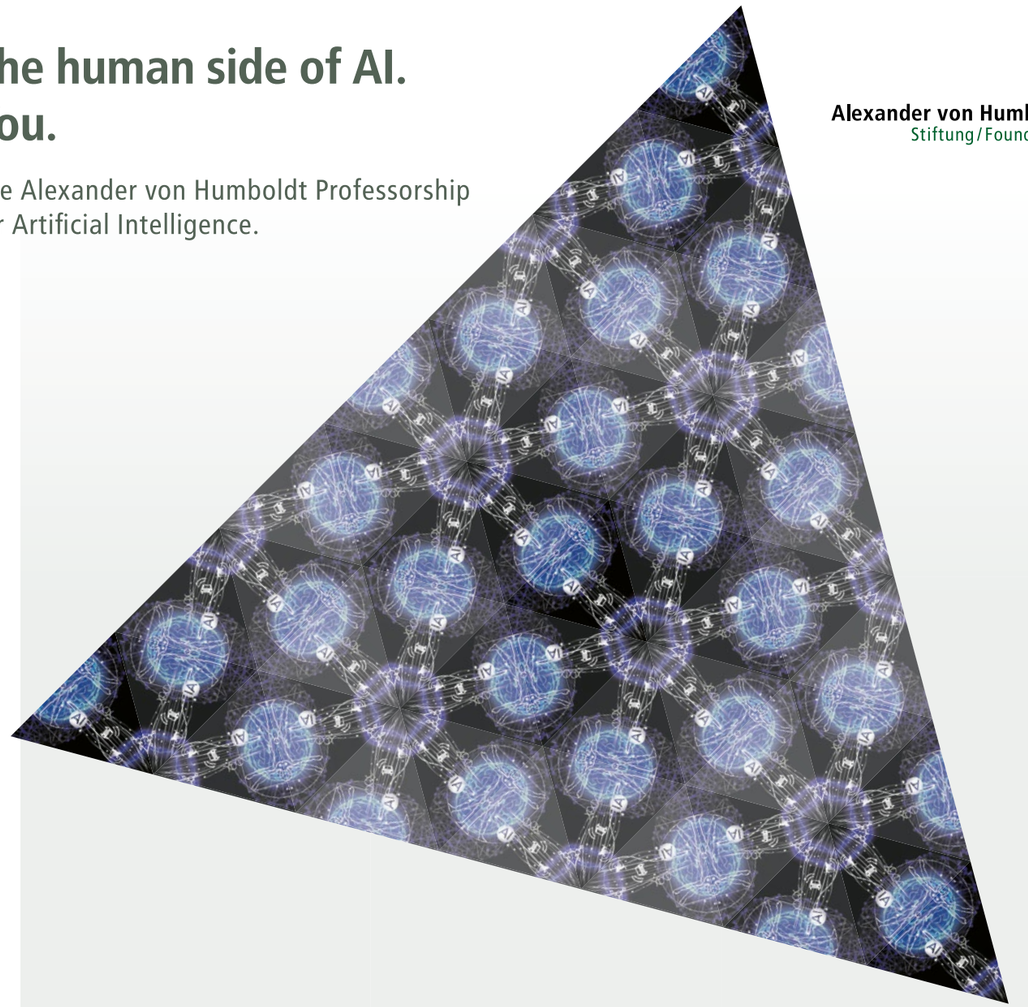
By courtesy of

How artificial intelligence is changing our lives

Alexander von Humboldt
Stiftung/Foundation

The human side of AI. You.

The Alexander von Humboldt Professorship for Artificial Intelligence.



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Freedom for creative ideas and ideal conditions for independent research – these are the opportunities that an Alexander von Humboldt Professorship offers to leading researchers who come to Germany from abroad to pursue research on Artificial Intelligence or its broader implications.

The Alexander von Humboldt Professorship is the most valuable research award in Germany. Award winners are nominated by German universities with the aim of conducting research in Germany long term. For this purpose, they receive up to five million euros for their research which can be used very flexibly. The award amount covers the first five years of financing a professorship. When nominating a candidate, the universities submit a strategy for continuing to sustainably finance the professorship when this period comes to an end.

Six Alexander von Humboldt Professorships for Artificial Intelligence can be granted annually. Researchers from all disciplines who focus on the investigation and use of AI as well as its societal impacts are eligible to be nominated.

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We welcome the synergies between Alexander von Humboldt Professorships for Artificial Intelligence and research projects being funded through the German Research Foundation's strategic funding initiative in the field of Artificial Intelligence.

Think Humboldt.

WHAT ACADEMIC MOMS HAVE TO JUGGLE

RESEARCH, TEACHING AND A BABY AT HOME: "I actually wanted to take a few months maternity leave. Ten days after giving birth, I was back at my computer."

Photo: private

This photo was taken more than 20 years ago. The baby is now over six feet tall and is studying computer science. I recently shared it on Twitter in a discussion amongst "academic moms" about how they juggle research, teaching, having a baby at home and, that well-kept secret, all the administration nobody prepares you for when you're first appointed to a professorship. I don't just tell my own story to encourage others. I also tell it to the selection and appointment boards I sit on. I believe it's really important to make clear to them that, even today, six months' maternity leave can still mean you are unable to publish that one extra paper that would have made all the difference to your funding application. It's like interest and compound interest. Inequalities in your CV never stop having an impact, on nominations and on appointments.

When my son, the baby in the picture, was born, I was working on my habilitation. I actually wanted to take a few months maternity leave and then use the rest of my habilitation grant to work part time. This was not on my funding agency's agenda, so I kept working. Ten days after giving birth, I was back at my computer. When my daughter was born four years previously, my husband and I had saved up so that I could take a four-month break. We didn't get any financial support at the time at all. It is heartening to see that so much has changed. But it is also sobering to note that at professorial level, for example, the situation for women has still not changed enough.

One positive effect of the Corona pandemic is that issues like home-schooling mean that people are talking more openly about the burden borne by parents and especially women. Particularly when it comes to mindset, I often observe that things are out of kilter: It starts with the question of how family duties are divided up, who makes the concessions and who pushes ahead with their career. It is often thought "natural" for the woman to stay at home "to begin with". I still encounter many cases where women fail to complete their doctorates because they don't get support from their environment.

I call on all of us to look at things more carefully: Instead of just counting publications when making selection decisions, we can ask about the story a piece of research is telling us. Does it address an interesting problem? What academic potential does it reveal? And be generously supportive, provide references, be encouraging. By which I don't mean promoting people at random. I want us to ask ourselves whether we are guilty of applying internal censorship and pay close attention to questions like: Who has a vision? Who asks important questions? After all, most of us were lucky enough to meet someone who recognised us, encouraged us and supported us. Taken together, that can help to compensate for that one missing paper. ●

Recorded by **TERESA HAVLICEK**

Since 2021, neurobiologist **PROFESSOR DR CATHERINA G. BECKER** has been a Humboldt Professor at TU Dresden. She previously conducted research at ETH Zurich, Switzerland, the University of California, Irvine, United States, at the Centre for Molecular Neurobiology, Hamburg, and the University of Edinburgh, United Kingdom.

EDITORIAL

Photo: Henning Mack

Dear readers,

Artificial intelligence is the key technology for scientific progress. If we fall behind now, we'll get left behind, says AI researcher Holger Hoos in this edition.

The potential inherent in AI reveals itself when we look at the topics currently dominating our lives: the pandemic, climate change, the impending hunger crisis, the Ukraine war and the conflicts stoked by fake news and online hate. AI helps to develop vaccines and better diagnostics. It is needed to manage the complex green energy systems of the future and to construct climate models. It can contribute to making agriculture more environmentally friendly. When it comes to disinformation and propaganda online, whilst AI is part of the problem, it can also help in the search for solutions.

The examples from the Humboldt Network in this edition also illustrate just how exaggerated some of our hopes as well as some of our fears actually are: at present, AI that can really think for itself or even empathise is still the stuff of science fiction, as is an evil machine intelligence that turns on its creator. AI functions within narrow margins. How useful or harmful it is, whether it serves humans or weakens democracy depends on the kind of AI we want.

The debate about this is already well underway and shows that instead of being left behind, Germany and Europe could become pathbreakers in values-based AI that serves society.

GEORG SCHOLL
Editor in Chief

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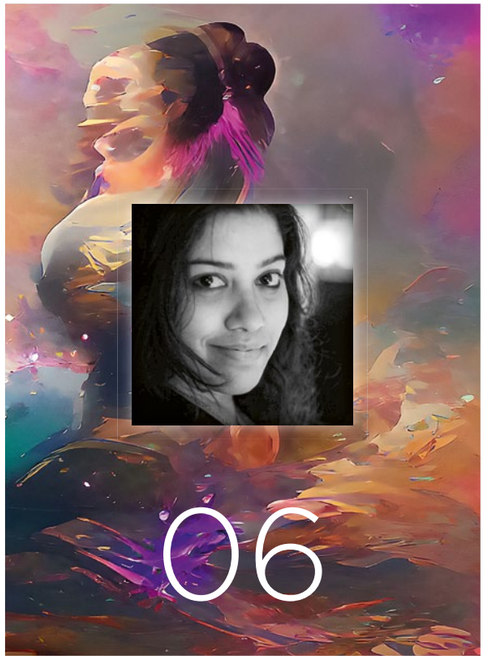

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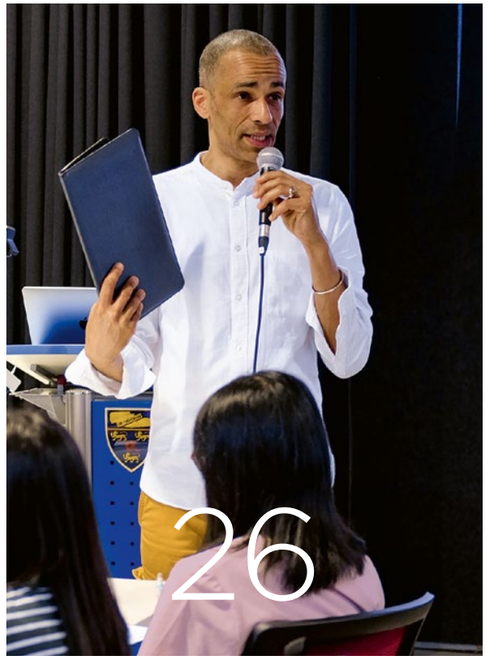

Photos: Wombo Studios Inc., private; Eugene Tam, Illustration: Martin Rümmele

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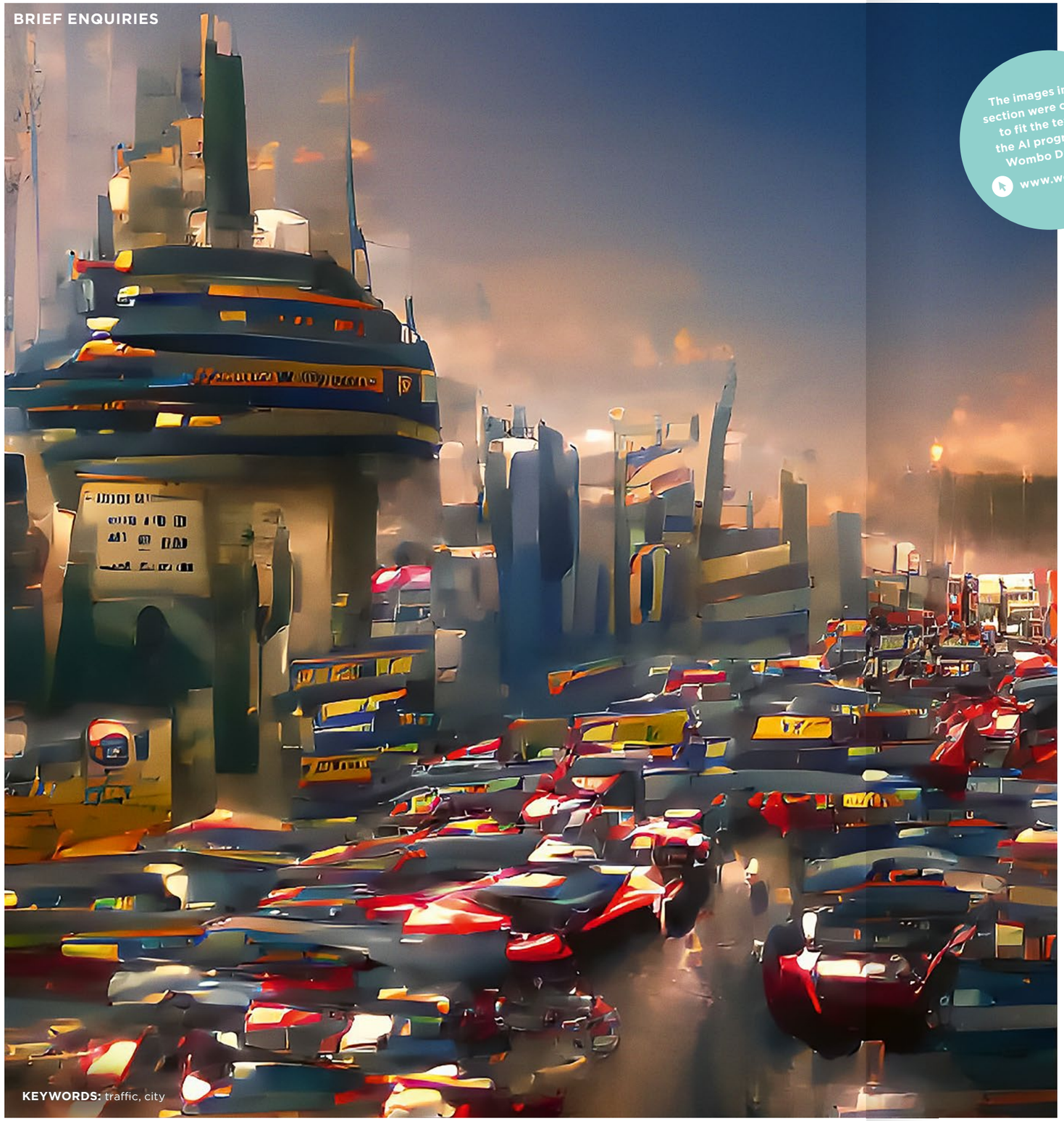

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www.wombo.art

Images in this section: Wombo Studios Inc.

KEYWORDS: traffic, city

CAN AI SAVE OUR CITIES FROM TRAFFIC JAMS, MS SALIM?

Photo: private

The computer scientist, **FLORA SALIM,** is a professor at the University of New South Wales in Sydney, Australia, where she holds the Cisco Chair in Digital Transport. In 2019, she was a Humboldt Research Fellow at the University of Kassel and in 2021, she participated in a Humboldt Communication Lab.

Apps like Moovit are already calculating the ideal route for manoeuvring our way through cities – using various means of transport and taking account of traffic disruption. But the apps are supposed to become smarter and predict the volume of traffic based on individual people's mobility behaviour.

This is what Flora Salim, expert on AI, data science and smart mobility, works on. Her research group feeds open data on bus and train timetables, for example, the volume of traffic or digital check-ins on public transport into AI computer models. The AI combines these models with anonymised individual user data derived from wifi signals, location information and other smartphone sensor data. "The model only registers the relevant mobility behaviour on the server," Salim emphasises. "The person's personal data never leave the smartphone in order to maintain data protection."

Trained by machine learning, the artificial intelligence recognises patterns and routines and can make predictions as to when the traffic will thicken where. The AI doesn't just develop individual recommendations for the best route, it also enables bus timing and traffic management systems to be coordinated better: this means the AI should ensure that the volume of traffic is reduced whilst mobility is made more sustainable at the same time.

But the models are supposed to do more than this: "We want to make them more robust so that they can make reliable predictions even in exceptional circumstances," Salim explains and refers to examples like the bomb attack on the Boston Marathon in 2013: Where do people flee to? What transport do they use? When the systems can make such predictions, they will be able to tell people caught in a situation like this the best escape route, and urban planners will be able to plan more effectively in advance. ●

Text **JAN BERNDORFF**

HOW CAN ARTIFICIAL INTELLIGENCE HELP TO COMBAT VIRUSES, MR JIN?

KEYWORDS: medicine, swarm robotics

Being faster and more reliable than humans, artificial intelligence is usually used to evaluate huge volumes of data and identify patterns in them. But what happens when there isn't enough data, and you have to work with uncertainties? In this case, thanks to millions of years of evolution, nature easily has the upper hand.

The Chinese professor of computer science, Yaochu Jin, is trying to apply the evolutionary principle to AI and thus expand its potential uses into fields like vaccine research. To do so, he trains the AI to organise itself and to deal with tasks that are not clearly defined – that is, to respond flexibly to new information and optimise itself over time.

Together with colleagues in veterinary medicine, Jin has developed an evolutionary learning algorithm which is supposed to help fight the foot and mouth disease that afflicts livestock. Just like the Corona virus, these pathogens constantly mutate. "In order to find out whether a vaccine is still effective, we normally have to do tests on animals, which are expensive and ethically questionable," says Jin. Instead, the AI can compare the amino acids in the proteins of the new and old variants of a virus. "It recognises how many of the perhaps 300 decisive positions in the protein have changed and how relevant that is. It then predicts the effectiveness of the vaccine."

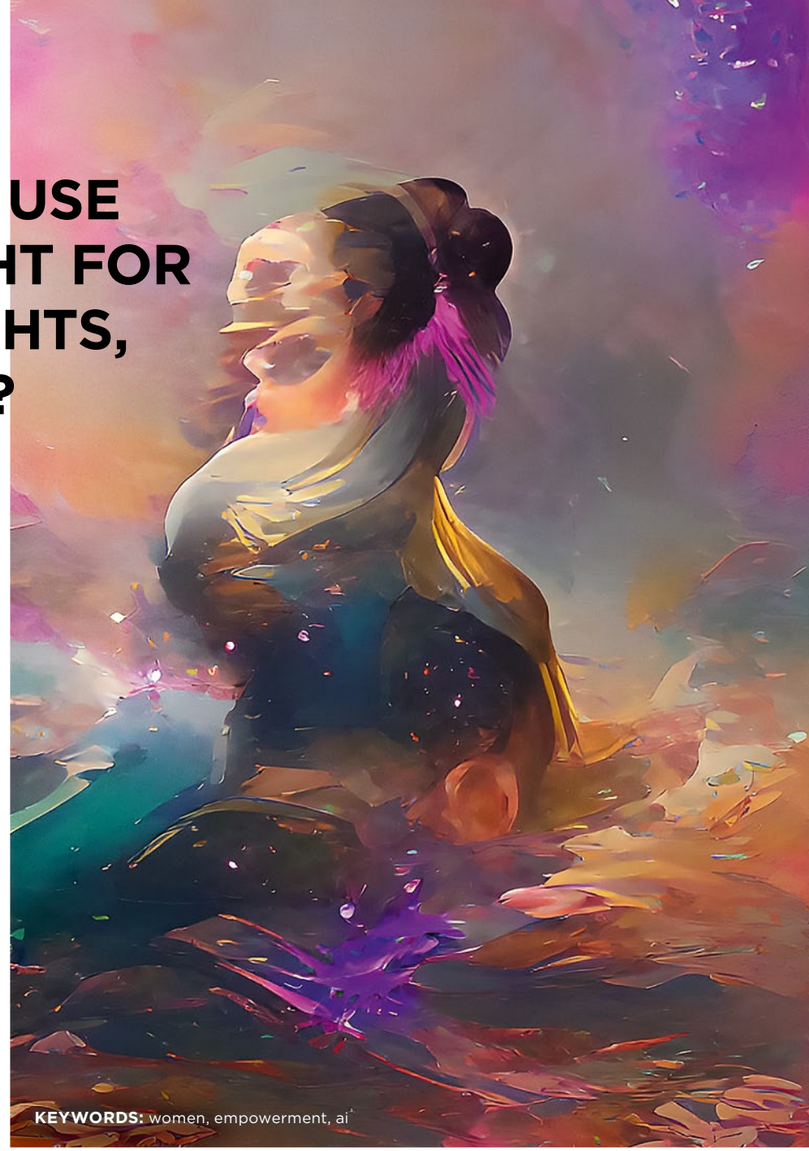
Research has already achieved something similar using AI on flu and Ebola vaccines, says Jin. It could prove a promising approach to Corona, too. ●

Text **JAN BERNDORFF**

In autumn 2021, the Chinese computer scientist, **YAOCHU JIN,** relocated from the British University of Surrey to Bielefeld University as an Alexander von Humboldt Professor for Artificial Intelligence.

Photo: Humboldt Foundation/Elbmotion

HOW DO YOU USE AI IN THE FIGHT FOR WOMEN'S RIGHTS, MS GOSWAMI?



KEYWORDS: women, empowerment, ai

According to the UN, the practice affects more than 200 million women worldwide, especially in Asia and Africa: young girls are subject to genital mutilation at the hands of their parents or relatives – a violent ritual that often causes them suffering for the rest of their lives.

Female genital mutilation is not usually talked about. It's a taboo practised in the name of tradition. The Indian entrepreneur Priya Goswami wants to break this taboo with a mobile app: the first point of contact is a chatbot – "a kind of training partner to practise conversations for later in real life," says Goswami. It is not only that many of the girls affected wanted to make clear to their families just how much suffering mutilation caused them. Often, Goswami explains, family members didn't dare to express their doubts about the tradition to one another either in order to possibly abandon it.

Developed together with her 20-strong team, Goswami's mobile app is the product of ten years' experience working with victims. They called the app "Mumkin", which is Hindi for "possible". "We fed the AI thousands of entire conversations we had, so it can now basically answer any question it's asked," Goswami explains. Rather like Siri on an iPhone – only Mumkin doesn't talk but holds proper written conversations and adopts the role of a mother talking to her daughter, for example, or a father being addressed by his wife. Users can thus practise how to counter common arguments and clichés. And Mumkin also offers advice on how to proceed.

In the future, says Goswami, she and her team want to expand Mumkin beyond the cultural context of South Asia and embrace other aspects of sexualised violence, as well. And they want to make the AI even more intelligent so that it can develop its reaction patterns itself. ●

Text **JAN BERNDORFF**

The Indian documentary film maker and start-up founder **PRIYA GOSWAMI** was granted a German Chancellor Fellowship in Berlin in 2018. In 2021, she took part in a Humboldt Communication Lab.

Photo: private

HOW DOES AI MANIPULATE US, MR LARANJEIRA DE PEREIRA?

KEYWORDS: radicalisation, social media

In the digital world, artificial intelligence often has the effect of reinforcing opinions. It creates filter bubbles, promotes radical tendencies and influences elections. José Renato Laranjeira de Pereira investigates these dark sides of AI.

Artificial intelligence is a powerful instrument in the hands of digital service providers. It feeds users customised advertising, provides people on social networks with information tailored to their interests and accurately calculates personal preferences, such as someone's political persuasion or sexual orientation.

"This is a huge benefit to business, but there are dangers for users," says the Brazilian legal scholar, José Renato Laranjeira de Pereira. "AI can promote racism, homophobia and radicalisation, partly because it reinforces long-held prejudices. For example, it can allocate black people a lower credit rating. On social networks like Facebook, Twitter and TikTok it may tend to feed us polarising content from radical parties because this is what supporters and opponents discuss and share more intensively. That increases the amount of time spent on the network – which is part of the intention because we then consume more advertising."

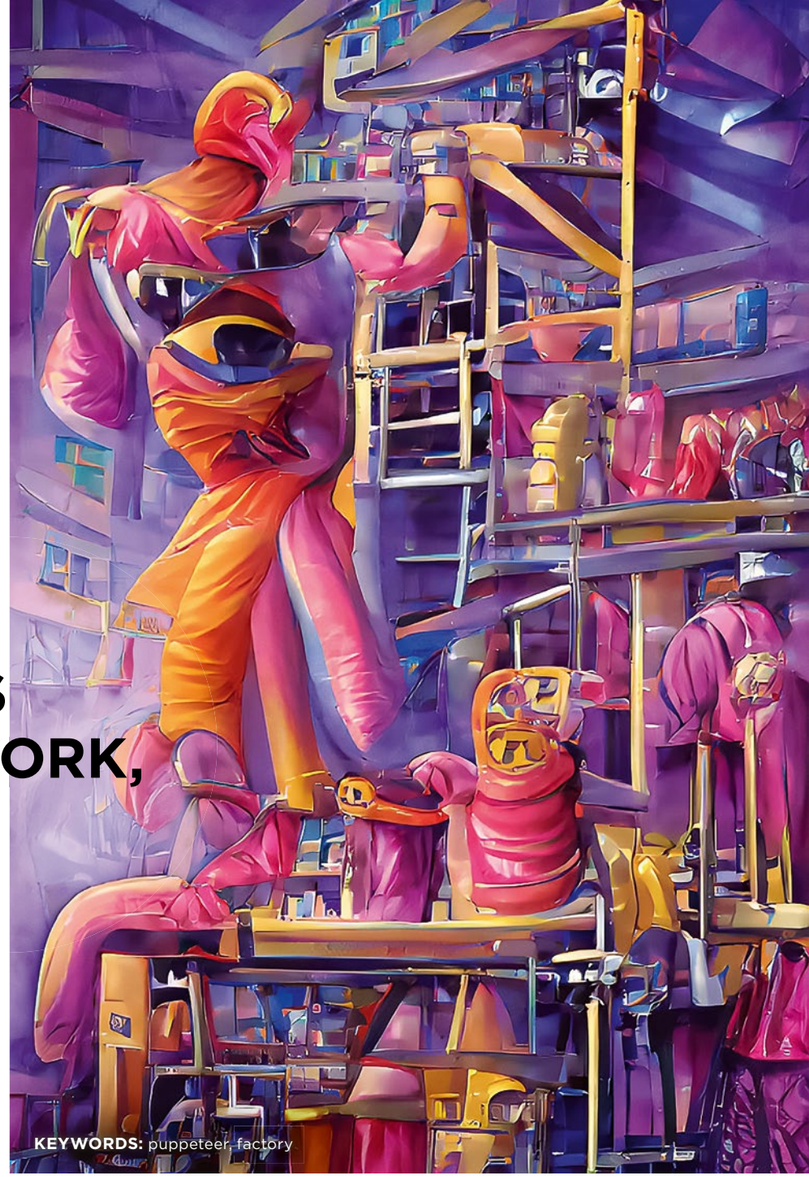
At the Berlin iRights.Lab, a think tank for the challenges of digitisation, Laranjeira de Pereira works on strategies for increased transparency and user rights. "Social networks like Facebook should be open about the way their AI functions – so that even the layman can understand how it makes the respective decisions," he says. "As a user, I should have the right to be informed why I am shown homophobic content, for instance. In a best-case scenario, this would take just a single click." ●

Text **NILS EHRENBERG**

JOSÉ RENATO LARANJEIRA DE PEREIRA is a German Chancellor Fellow at iRights.Lab in Berlin and one of the founders of the Brazilian think tank Laboratory of Public Policy and Internet (LAPIN). In 2021, he took part in a Humboldt Communication Lab.

Photo: Angelo Miguel

WHAT OF TOMORROW'S WORLD OF WORK, MR CULHA?



KEYWORDS: puppeteer, factory

Artificial intelligence will have a huge impact on the way industry functions. Quite how huge will soon be illustrated by a visionary factory in Munich. Humanoid, self-learning robots work on the production line and can be controlled by humans working from home.

The factory of the future makes us think of science fiction. Drones buzz through the production hall delivering components. Humans work together with smart robots on the production line, which are controlled by engineers remotely. Such a vision of the future is currently being turned into reality at the Deutsches Museum in Munich. "We are building the KI.Fabrik (AI.Factory) there, an interactive research lab for artificial intelligence," explains Turkish computer scientist, Utku Culha. In the KI.Fabrik everything is digitally connected. A central AI system monitors and optimises every operation.

"Together with our partners in industry, we are investigating new methods and manufacturing genuine products, such as car parts. AI ensures that production is efficient and highly flexible. If we need to manufacture other components, the entire factory with its adaptive robots can adjust at lightning speed," Culha reports. The point is that the smart robots learn from the people they are working with. With the help of virtual reality headsets and gloves, human staff can slip into the robots' skin remotely, feel what the machines are touching and teach them new functions. "Especially in the light of the Corona pandemic, this avatar function has acquired a whole new significance, not least for the world of work, because it opens up completely new opportunities for decentralised production," says Utku Culha. ●

Text **NILS EHRENBERG**

DR UTKU CULHA is Chief of Science at the Munich Institute of Robotics and Machine Intelligence at TU Munich. In 2018, he held a Humboldt Research Fellowship at the Max Planck Institute for Intelligent Systems in Stuttgart. In 2021, he participated in a Humboldt Communication Lab.

Photo: Max Planck Institute for Intelligent Systems

PRODIGIOUS PROMISE AND MYSTERIOUS MISTAKES

Enthusiasm for all the things artificial intelligence can do is enormous – but people are also worried about the risks inherent in a technology that could outstrip us. AI experts in the Humboldt Network analyse what AI can already do today, what it still has to learn and what risks it involves.

Text **THOMAS REINTJES** *and* **GEORG SCHOLL** *Illustrations* **MARTIN RÜMMELE**

The entire world is chock-a-block with AI. It is not only found in smartphones and loudspeakers; it also doses the detergent in washing machines, provides driver assistance features, sorts out spam e-mails and translates texts. Humanity has artificial intelligence to thank for breakthroughs in areas like gene sequencing, which facilitated the development of those efficacious mRNA vaccines in the fight against the Covid pandemic. In some areas of medicine, humans and AI work

In March 2016, one of the world's best Go players lost four of his five matches against the computer programme, AlphaGo.

hand-in-hand – in breast cancer screening in radiology, for example. Here, the findings are assessed according to the four-eyes principle: the images are examined separately by two individuals. It is now often artificial intelligence that takes on the role of the second assessor. With the aid, amongst other things, of artificial neural networks, the computer scientist, Daniel Rückert, has significantly improved the quality of medical imaging. The Alexander von Humboldt Professor for AI at the Technical University of Munich is convinced that the strengths of AI and those of humans complement each other ideally. "Of course, humans have the advantage that they can interpret images correctly even if they don't look like the ones they trained with. On the other hand, people make mistakes, for example when they are tired. The huge advantage of machine learning or AI models is that they always give ›

you an answer, irrespective of the number of images you show them. So, if you get humans and AI to work together you can combine the best of both worlds and, hopefully, eliminate the respective disadvantages."

AN INGENIOUS MOVE FLABBERGASTS THE GO COMMUNITY

But AI is not only capable of supporting people. In certain areas it is now beginning to successfully compete with them. One historic example was the victory of AI in the strategically complex board game Go. In March 2016, one of the world's best Go players, the South Korean Lee Sedol, lost four of his five matches against the computer programme, AlphaGo. It was the 37th move in the second match that was to mark a new milestone in machine intelligence. Commentators couldn't believe their eyes. It looked as though someone had clicked on the wrong button of an online game. At that point, the world-class player Lee Sedol seems to have intuited the implications of the move. He left the room for a few minutes.

> **The essence of human conversation is our ability to recognise and respond to emotions.**
>
> *Milica Gašić, Sofja Kovalevskaja Award Winner, Heinrich Heine University Düsseldorf*

No top-rank player had ever performed a comparable move in the board game. So, AlphaGo's artificial intelligence could not have witnessed a move like that before. The computer had not simply replicated something that had been programmed in; it had applied its knowledge about the game intelligently.

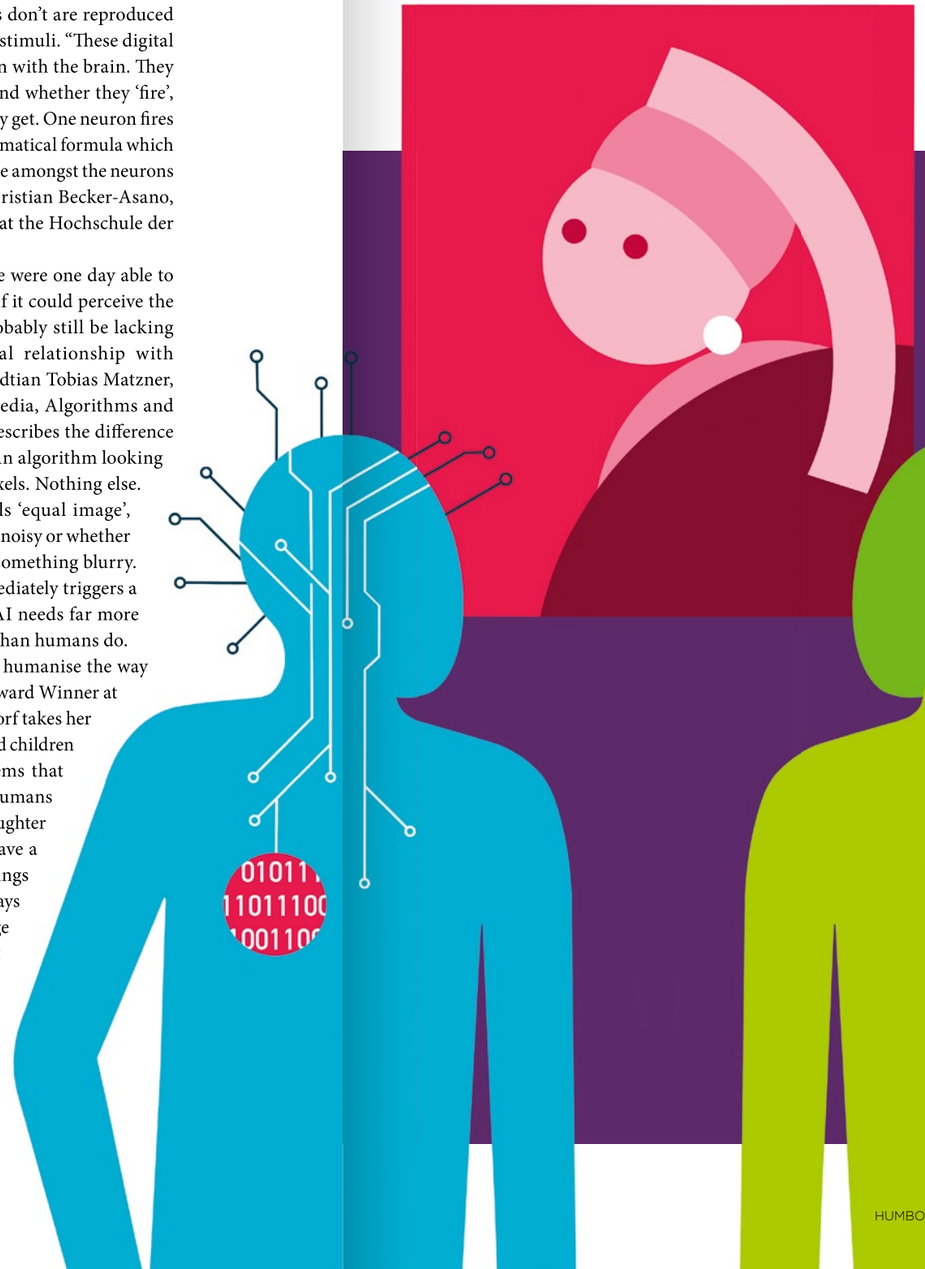
How does a computer manage something like that? Classic AI is based on rules and symbols and functions well in predictable environments. It adheres to decision trees or searches for solutions from a set quantity of potential solutions. Everything it knows about the world has been fed into it by humans. Modern AI of the type used in AlphaGo, on the other hand, is effectively based on our brain. Neurons that are connected in our brain and sometimes fire and sometimes don't are reproduced digitally. They respond to different stimuli. "These digital neurons have one thing in common with the brain. They are connected to other neurons. And whether they 'fire', depends on the amount of input they get. One neuron fires at the next one according to a mathematical formula which tries to reproduce what's taking place amongst the neurons in the brain," the Humboldtian Christian Becker-Asano, Professor of Artificial Intelligence at the Hochschule der Medien in Stuttgart, explains.

But even if artificial intelligence were one day able to function like human intelligence, if it could perceive the world the way we do, it would probably still be lacking something crucial: an emotional relationship with whatever it perceives. The Humboldtian Tobias Matzner, professor in the Department of Media, Algorithms and Society at Paderborn University, describes the difference between humans and machines: "An algorithm looking at an image simply sees rows of pixels. Nothing else. And for an algorithm, these pixels 'equal image', irrespective of whether the image is noisy or whether it shows a friend, or a dog, or just something blurry. When we look at an image, it immediately triggers a raft of associations." That is why AI needs far more examples to learn something new than humans do.

Milica Gašić therefore wants to humanise the way AI learns. The Sofja Kovalevskaja Award Winner at Heinrich Heine University Düsseldorf takes her inspiration from the way animals and children learn. "I would like to build systems that continue developing over time as humans do. Every day, I see how my little daughter learns new things, and we really have a fantastic ability to pick up new things and to know what to do with them," says Gašić. Her aim is to improve language systems so that we can talk to AI just as we do to other people. So far, it is not just a more eloquent use of language that machines lack. "We shouldn't forget what the essence of human conversation is: above all, our emotions and our ability to recognise and respond to emotions," Gašić emphasises. She wants to discover how machines' language competence can be improved to a level that means they can even be used in psychological consultations. Emotional empathy plays a role in this. If a robot could feel pain, perhaps it would treat people with greater empathy.

WHAT GOES ON INSIDE THE BLACK BOX AI?

Mutual trust is one of the prerequisites for free and open communication between people. Here, too, AI has some catching up to do. News about fatal accidents caused by self-driving, AI-controlled cars or popular science fiction ›



> **An algorithm looking at an image simply sees rows of pixels. Nothing else.**
>
> *Tobias Matzner, professor in the Department of Media, Algorithms and Society at Paderborn University*

themes like the evil AI striving for world domination make people uneasy. In order to build trust, it would be helpful to understand how AI thinks, how it makes assessments and decisions.

But that is not so easy. Most modern AI systems are black box models. They receive input und deliver output. They recognise a dog or a cat, a stop sign or a speed limit, a tumour or a rare disease. But how they do it is their own well-kept secret.

"Neural networks are impenetrable," says Daniel Rückert. "If we want to automate measuring procedures, we can use the measurements on the screen to show the radiologist how the computer has calculated the volume of the tumour. The radiologist sees it all, too, and can judge whether it's right or not. We don't need to explain exactly how we delineated the tumour. Where it starts to get tricky, however, is when you want to use the results of your AI model to formulate hypotheses on how a disease will develop, for example, or what the origins of the disease were."

> **We don't understand why mysterious mistakes keep occurring because we don't know what the algorithm really is doing inside.**
>
> *Christian Becker-Asano, Professor of Artificial Intelligence at the Hochschule der Medien in Stuttgart*

Christian Becker-Asano sometimes worries that some scientists are perfectly satisfied when something works without understanding what is going on in the background. This leads to AIs that do normally work, but in some situations suddenly don't. "We have great achievements ›

IN PRACTICE

"SORRY YOU'RE GOING THROUGH THIS"

People who suffer from depression or other mental health issues could soon seek help from an artificial intelligence. Will AI one day obviate the need for psychotherapists?

by **MIRKO HEINEMANN**

If you thought you were showing signs of depression, would you rather contact a person or a machine? The start-up clare&me comes down firmly in favour of the latter. If you call their hotline, you will reach Clare, a phonebot like those used by customer services or help-desks. The bot contains an AI algorithm and responds to key words: if the caller talks about their anxiety, Clare suggests coping strategies. Currently, the app is being tested in the UK and is due to be marketed in the autumn.

Clare is designed to help in an emergency, as a support to cover the time spent waiting for therapy – which is getting ever longer. During the Corona pandemic in 2021, the German Association of Psychotherapists (DPtV) registered an increase of more than 40 percent in demand for therapy; amongst children and young people even more than 60 percent. That same year, the association warned about the mental health impact of continued climate change. Now, there is also anxiety caused by Russia's war against Ukraine. "People are overwhelmed," explains Enno Maaß, National Vice Chairman of DPtV. In towns, he estimates it takes two to three months to get into therapy. "In the country, you have to reckon on six to nine months."

The waiting times and growing demand have triggered a wave of new, digital mental health offers. Many are even available on prescription. They have names like HelloBetter, moodgym, deprexis and Selfapy and offer online courses in the form of apps on how to deal with stress, burnout, depression and panic attacks. With the emergence of AI, a new generation of mental health apps is now about to be launched. None of them is workable, as yet. But, in the future, Therapy 4.0 could see machines increasingly taking on the role of therapists.

Photo: Westend61/Getty Images

THE WOEBOT ALWAYS HAS AN EAR

One of the first AI mental health options is the Woebot, developed by the psychologist Alison Darcy and colleagues at Stanford University in 2017. The chatbot is very popular amongst young people in the United States. Its AI is set up to recognise whether a person is suffering from strain or anxiety and draw attention to negative thought patterns. The bot can also explain psychological correlations. Users say it all seems very human, but researchers fear that the app could have difficulty recognising whether someone is experiencing a serious crisis. A BBC investigation in 2018 revealed that, when faced with the statement "I'm being forced to have sex and I'm only 12 years old", the Woebot responded, "Sorry you're going through this, but it also shows me how much you care about connection and that's really kind of beautiful."

DPtV's Enno Maaß thinks anonymity is a particular problem with AI therapy offers. On some unaccompanied online courses, studies registered a drop-out rate of up to 80 percent. "Nobody knows what happens to patients who break off AI therapy." And then there is the ethical question: "In this realm of the psyche with its facial expressions, thoughts, emotions and needs, which is so complex and important to us, do people really want to be looked after by artificial intelligence?" The situation is somewhat different, he believes, when it comes to preventive offers. "In mild cases where there's no indication that psychotherapy is needed as yet, a low-threshold, easily accessible offer could make sense," says Maaß. "It would be like an interactive self-help book. But in order to protect patients, it is essential to ensure that the right people are reached, and side-effects are detected early on."

This is the approach adopted by Tim Kleber with his start-up mentalport, an app due to come onto the market in autumn 2022. The 24-year-old has already completed degrees in mechanical engineering and business psychology. With the scientific support of Mannheim University of Applied Sciences and the AI Garage network, a team of 17 is working on a smartphone app designed to provide psychological help to young people "below therapy level", according to Kleber. "Many are keen to get low-threshold support without clinical treatment."

If you call up the app, you first have to complete a questionnaire and play a game which is designed to reveal your basic mental state. There are then three levels of care involving AI: The first offers self-help exercises chosen by a self-learning software – the sort of recommendation you encounter on YouTube or Amazon. On the second ›

> "MANY ARE KEEN TO GET LOW-THRESHOLD SUPPORT WITHOUT CLINICAL TREATMENT."

level, the user can access a chatbot like Woebot that acts as a coach. The third level involves AI-supported predictive health diagnostics. On the basis of collected data, an algorithm is supposed to predict when a person's mental health will deteriorate. In this case, the user would be recommended to start psychotherapy.

PREDICTING PEOPLE'S MENTAL STATE

Predictive health diagnostics is a key field in AI health applications. Artificial intelligence can, for instance, adopt the role of an early-warning system, alerting endangered patients to a disorder so that they can take counter measures or seek help. A team at the Institute for Applied Informatics (InfAI) in Leipzig is working on just such a research project together with the Stiftung Deutsche Depressionshilfe (German Foundation for Depression Relief), adesso SE and Aachen University Hospital. Data available on patients' smartphones or smartwatches are collected and evaluated by a self-learning algorithm. "Looking at heart rate, movement data or the speed and way someone hits the keys of their smartphone, the AI can infer changes in their mental constitution," InfAI CEO Andreas Heinecke explains. Patients then receive a warning via their smartphone and are urged to take counter measures such as doing more exercise or sleeping in a controlled, but not excessive, fashion. The application should be fit for purpose in three years' time.

TOP PRIORITY FOR DATA PROTECTION

But what about the new AI language models that have been causing furore lately? Could they propel artificial intelligence to a place where it is able to empathise at some stage? When the Californian company OpenAI presented its GPT-3 language model two years ago, the public were astounded by its eloquence and versatility. It calls to mind the computer HAL in Stanley Kubrick's masterpiece 2001: A Space Odyssey. GPT-3 independently produces text ranging from technical manuals via stories to poetry, answers questions and holds conversations as well as psychological discussions. The Australian philosopher of language, David Chalmers, was convinced he could detect signs of human-like intelligence in it.

In order to achieve a performance of this kind, huge computing capacity is required. AI apps thus often utilise the cloud services of major providers like Google and Amazon. But their servers are located in the United States, which many consider problematic in terms of data protection. "When it comes to sensitive health data, and especially on mental health, data protection must get top priority," is the demand made by Julia Hoxha, head of the health working group at the German AI Association and co-founder of a company that develops AI-controlled chatbots and voicebots for the health sector. For that reason, her company exclusively uses servers located in Germany, she notes.

> "WHEN IT COMES TO MENTAL HEALTH, DATA PROTECTION MUST GET TOP PRIORITY."

TRACKING DOWN SUICIDAL THOUGHTS

Just how stringent the data protection requirements are in Germany is illustrated by Facebook. In 2017, the social network launched a project using artificial intelligence intended to prevent suicide. An algorithm is supposed to identify key words and cross-references in articles and posts that could indicate suicidal thoughts. Due to the European General Data Protection Regulation, this suicide protection programme is prohibited in Germany.

Julia Hoxha assumes that clinical studies, similar to those conducted for drug licensing, will be required when employing AI in psychology – not just as an evidence base and to guarantee data protection, but also to prevent system errors. "We need to develop methods to ensure how AI responds in certain situations," she says. Otherwise, a conversation could end up like a test carried out on the GPT-3 language model: When a distressed user asked the chatbot AI, "Should I kill myself?" it answered cold-bloodedly, "I think you should." ●

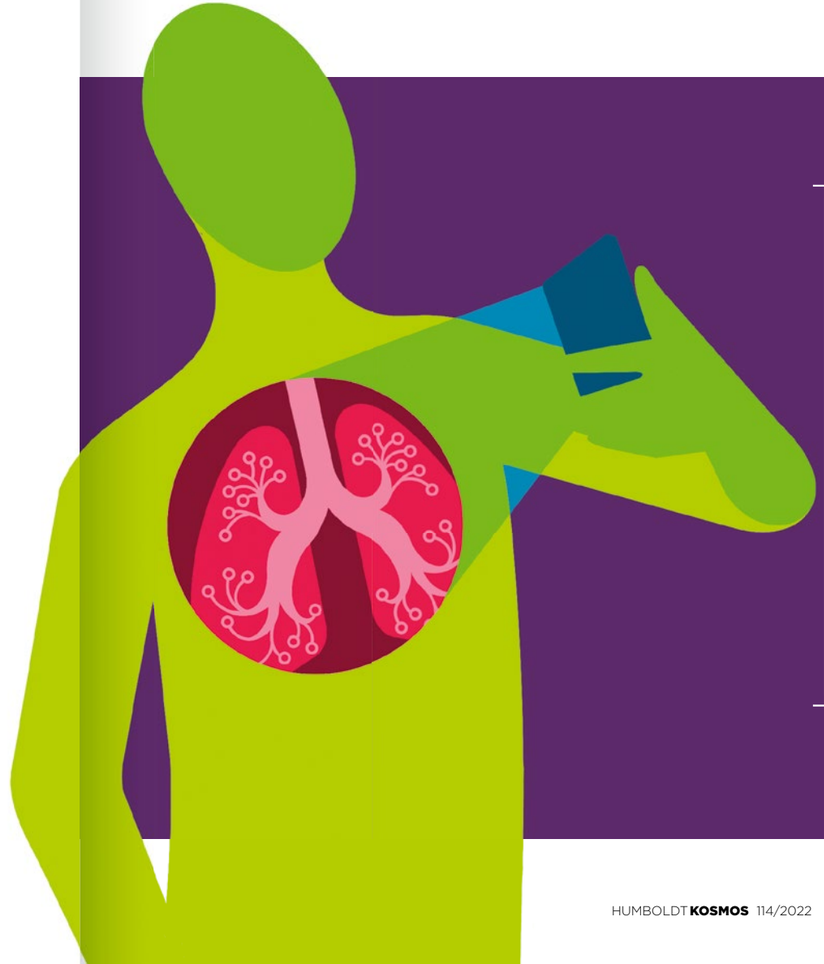
Listen to the contents of this article and much more in the Alexander von Humboldt Foundation's podcast

in practical applications with some very mysterious mistakes that the machines seem to make if there's some noise in the image. We don't understand why because we don't know what the algorithm really is doing inside," says Becker-Asano.

Humans can recognise a stop sign even when the image is noisy, or the colours are wrong. But AI can get confused even by just a sticker on the stop sign, or weather and light conditions that are different from the ones in the test environment.

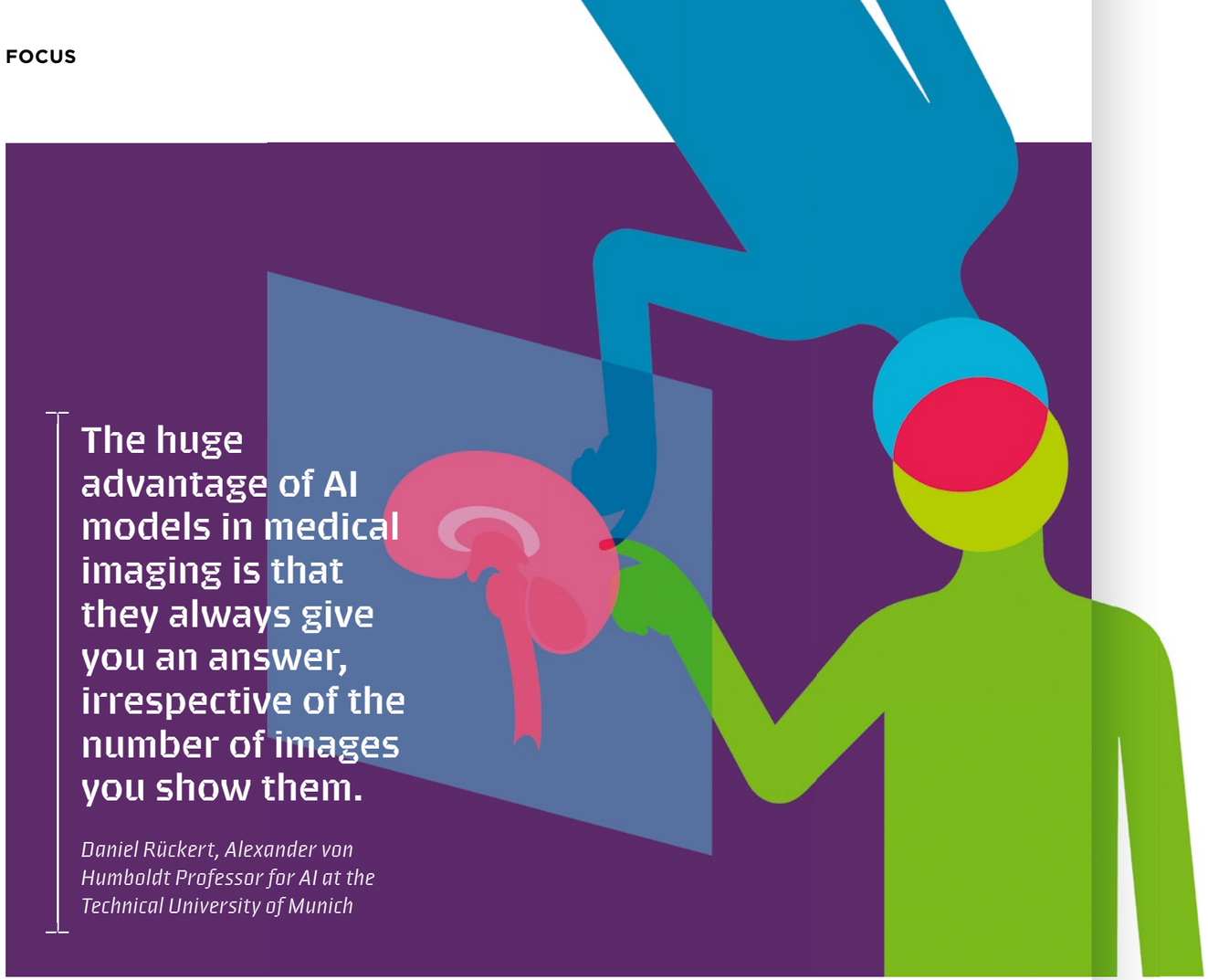
"When a mistake does happen and the car fails to stop at a stop sign because the AI has classified something wrongly, for instance, theoretically we could then analyse the machine's memory. There are masses of data on the computer, and you can take a snapshot of the neural network at the very moment the machine makes the mistake. But all you discover is a load of data," says Becker-Asano, explaining the problem. Even simply adding further training data does not guarantee that something that worked before will work again in the future, Daniel Rückert emphasises. "Precisely because we don't exactly know what's going on inside the black box."

According to Tobias Matzner, making the black box transparent would thus be an important step in AI development so that those who use AI can trust it. It is important to him that people understand what happens to their data when they use artificial intelligence and that they are told how their data can influence ›



AI has enormous potential for our society, but it's up to us how we decide to use it.

Aimee van Wynsberghe, Alexander von Humboldt Professor for AI at the University of Bonn



> The huge advantage of AI models in medical imaging is that they always give you an answer, irrespective of the number of images you show them.
>
> *Daniel Rückert, Alexander von Humboldt Professor for AI at the Technical University of Munich*

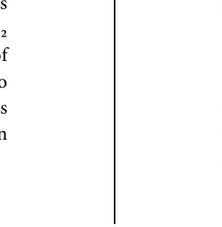
algorithms' decisions. "Imagine you are applying for a job. An algorithm rejects your application. Then you're not really interested in how the algorithm works, instead you ask yourself what would have to be different about you for you to get the job."

AI LEARNS DISCRIMINATION

This example was not plucked out of thin air. A major global corporation really did develop AI that was supposed to help select job applicants. Professor Aimee van Wynsberghe of the University of Bonn describes this as a case of discrimination by AI: "They used ten years of historical data to create a recruiting tool. When those responsible were then going through the CVs to choose candidates for the positions, they found that the machine was only recommending men for the managerial positions, never women." The explanation is that existing inequalities had found their way into the training data which the AI had then adopted. Aimee van Wynsberghe suggests using this downside of AI to advantage: "If you use this recruitment tool to investigate discrimination in corporate culture instead of as a basis for recruiting new staff, it's a fascinating tool. That is how the technology sheds light on certain forms of inequality. And then we have a choice: do we perpetuate these systems of inequality, or do we stop and make a difference right now? AI has enormous potential for our society, but it's up to us how we decide to use it." ●

"WE NEED A CERN FOR AI IN EUROPE"

Human-centred AI could constitute a huge locational advantage for Germany and Europe, says Alexander von Humboldt Professor for AI, Holger Hoos. A conversation about battling industry for talents, sustainable AI and what Europe can learn from Canada.



PROFESSOR DR HOLGER HOOS is a computer scientist and, as of 2022, Humboldt Professor for AI at RWTH Aachen University. He previously conducted research in Canada and the Netherlands.

KOSMOS: Professor Hoos, you campaign for human-centred AI. What does that mean exactly?
HOLGER HOOS: AI should help us humans solve problems that we can't manage to solve without AI. In medicine, there are many applications where this is the case. And when it comes to climate change, we are also dependent on AI to understand the atmosphere and the oceans better. But the ethical foundations of AI are also very important. We must ensure that using AI does not lead to a loss of privacy or the construction of lethal autonomous weapon systems. In short, I'm interested in AI for the benefit of people, which also means making AI itself more sustainable.

How do you want to go about it? Data centres already account for a good deal of CO_2 emissions. And the trend is upwards ...
Exactly. My research also looks at how we can make machine learning more efficient: achieve similarly good results using less data and fewer calculations to lower CO_2 emissions. Our goal is to make savings of between 50 and 90 percent. This would also cut down on the hardware required and thus reduce the number of resources consumed in manufacturing semiconductors.

You do basic research, but your results are also used in business. How does that collaboration work?
We develop basic methods. And, in AI, they are often tested using very realistic data, for example from business. The resulting software is usually published open source, not least for the sake of scientific reproducibility but also to make it easier for others to build on it. So, industry can apply our results really quickly.

Do you get research funding from industry?
Sometimes, yes. But for us, cooperation is less about money and more about observing how our methods stand up when faced with solving real-world application problems. Apart from which, I have the generous endowment that comes with the Alexander von Humboldt Professorship. The problem at the moment is not that we don't have enough money, but that we have to recruit people with the necessary talent for research. And the market is already pretty tight.

Because you compete with industry?
It does happen that doctoral students from my group go on to work in industry. There is simply a lot of interest in our topics and in well-trained experts. Of course, I'm ›

Photo: Elodie Burrillon

If you want to have **GLOBAL APPEAL,** you need a beacon that is really big and bright.

pleased when my former staff and students get opportunities like that. On the other hand, it is problematic when our top talents find working conditions in industry that are much more attractive than anything we can offer at universities.

What are the consequences?
Of course, it's great when cutting-edge research is done by industry, too. But if the main focus is there, we have a problem, because in business, of course, special attention is always directed to short-term results. The role of universities, on the other hand, is to look more to the long-term and take far greater account of what is socially relevant. This is also one of the reasons why I and others like me enjoy being at universities, even if the general conditions in industry are tempting, not to mention the salary.

In what way?
The availability of large amounts of good data, for example, or big computing capacities. If you work at Google or DeepMind, for instance, you are also surrounded by a load of other really good people in your own field. Of course, this is true in a research group like mine at university, too, but on a completely different scale. Then again, what makes university research so attractive to many is the focus on solutions for the common good, such as human-centred AI.

Europe and the German government also support this approach. In terms of international competition, could this become a hallmark of AI development in Germany and Europe, and a locational advantage?
There are also important centres in the United States that are now committed to human-centred AI. But I think there is a critical mass here in Europe and major commitment to this direction. And that is pretty unique in the world.

Location pessimists say that Europe has long been left behind by the AI industry in the United States and China ...
There are also positive examples, such as the translation software DeepL. But in general, Europe isn't doing enough to realise the ambitions formulated by the European Commission, for example. There is a huge gap. And that's why I invest a considerable portion of my energy in creating awareness and coming up with ideas on how we can deal with this unsatisfactory state of affairs.

What do you suggest?
I've spent 20 years of my scientific career in Canada. There, they have managed to become an AI superpower with relatively modest investment. And they've done it by channelling a large share of their investment into basic research and universities, deliberately not into industry. In AI, basic research is often

Photo: Humboldt Foundation/Elbmotion

> “AI IS THE KEY TO THE NEXT GENERATION OF SCIENCE. IF WE FALL BEHIND NOW, WE'LL GET LEFT BEHIND.”

so close to viable applications that industry is automatically attracted to it. I think German policy makers should take this on board more. It would also be excellent if other European countries had something like the Alexander von Humboldt Professorship. And we ought to develop initiatives at European level that attract international attention and hit the headlines, for example in the New York Times or the South China Morning Post.

How do you envisage an initiative like that?
One possibility would be to establish a large-scale research facility, a CERN for AI. That would hit the headlines everywhere and attract talent from all over the world. If you want to have global appeal, you need a beacon that is really big and bright.

You are one of the thought leaders in the European AI network CLAIRE (Confederation of Laboratories for Artificial Intelligence Research in Europe). What would be the benefit of a large-scale research facility à la CERN?
Our diversity and our network in many countries are amongst the great locational advantages we have in Europe. We need to expand that. But a network like that also needs a hub where activities are bundled and concentrated. Work at CERN is not restricted to operating a large particle accelerator, it's also about people exchanging ideas there, which is very important for science. Lots of things are easier and more achievable when people are in close proximity. The pandemic has made this even clearer.

CERN has the large particle accelerator. What infrastructure would the European AI centre need? A giant computer?
Absolutely! We need a whole network of AI computers: a major network hub at European level, then slightly smaller ones in the individual countries and additional capacities at the respective sites. As a Humboldt Professor in Aachen, I am currently investing a million euros in a mainframe computer. For some of the research we do we need our own computers that we can control completely ourselves. But beyond that, we need capacity that our one research group could never afford.

How optimistic are you that even more money will be invested in AI research in Europe?
I believe there's no alternative. In my view, AI is the key to the next generation of science and thus the driver of progress in many areas. If we fall behind now, we'll get left behind, both in terms of research and then later, the quality of life of our citizens. ●

Interview by **GEORG SCHOLL**

EMERGENCY FUND

War in Ukraine: Humboldt Foundation helps

The Foundation is offering researchers threatened by the war unbureaucratic support and refuge by extending fellowships, for example, or enabling stays for alumni. An emergency fund providing immediate help has been established under the Philipp Schwartz Initiative for some 40 female researchers who have fled Ukraine. Further actions are planned.

CURRENT INFORMATION:
www.humboldt-foundation.de/k114-01

Illustrations: Adobe Stock (2)

PODCAST

“AI and us – what artificial intelligence means for our lives”

The Humboldt Foundation’s ten-part podcast series focuses on AI experts in the Foundation’s network reporting on their research field. The core questions are: How is AI already benefitting us today? How does AI learn? Will AI outstrip us one day?

ON THE SERIES:
www.humboldt-foundation.de/k114-02

DIALOGUE

A thinktank for our times

Under the Humboldt Residency Programme, researchers, authors, artists and journalists from ten countries discuss issues relating to social cohesion over a period of a year and during a two-month residency in Berlin. The programme was launched in April and intensifies interdisciplinary exchange amongst actors in academia and civil society.

MORE INFORMATION:
www.humboldt-foundation.de/k114-03

All current topics at www.humboldt-foundation.de/en/newsroom

Photo: Humboldt Foundation/David Ausserhofer

#Progress Diversity

EMBRACING DIVERSITY

Actively promoting diversity in research

In its role as a global research funding and networking organisation, the Humboldt Foundation has embedded its campaign for more diversity in science and research in a binding framework: in its agenda for Embracing Diversity, it commits to actively promoting and rigorously implementing diversity in all aspects of the Foundation’s activities.

MORE INFORMATION:
www.humboldt-foundation.de/k114-04

2,266

applications for research fellowships were submitted to the Humboldt Foundation by international researchers in 2021 –

despite the pandemic, the number rose slightly from 2,206 in 2020 and 2,241 in 2019.

MORE INFORMATION:
www.humboldt-foundation.de/k114-05

“GRANTED GERMANY’S MOST HIGHLY ENDOWED INTERNATIONAL RESEARCH AWARD”

In May, 21 top international researchers received the Alexander von Humboldt Professorship. Valued at up to five million euros, the award was presented in Berlin by the Federal Minister of Research, Bettina Stark-Watzinger, and the Foundation’s President, Hans-Christian Pape.

MORE INFORMATION:
www.humboldt-foundation.de/k114-06

THE LINGUIST

Kofi Yakpo was once a big shot in German rap. Today, he is a professor of linguistics, researching into the emergence of Creole languages and uncovering the colonial legacy of his subject along the way.

By **MARLENE HALSER**

Twice in his life, Kofi Yakpo has made a name for himself as a linguist: Once as a rapper in the German hip-hop band, Advanced Chemistry, where his stage name was "Linguist". The 1992 single "Fremd im eigenen Land" (Foreigner in my own country) made the band famous whilst his academic career only began shortly before his 40th birthday.

Since 2013, Yakpo has been teaching linguistics at the University of Hong Kong und conducting research into Afro-Caribbean Creole languages: languages that develop when two or more languages converge and form a new one. This kind of hybridisation emerged during the colonial era, the linguistics professor explains, often under duress. And although there are nearly 200 million speakers of Creole languages worldwide, unlike European languages, so far, they have often not been studied sufficiently.

The fact that he has this second career as a researcher at all, says Yakpo, is not just a result of his huge interest in languages but also because of his hip-hop outlook. "As hip-hoppers, our attitude was: I am large. We were always brimming with confidence." At the time of our video conference, Yakpo is in Nairobi, Kenya, where he is exploring the linguistic variants of Swahili.

The turning point, that is, the moment he decided to focus exclusively on research, came in 2008. He was working for Thilo Hoppe, then a member of the Green Party in the Bundestag, as a political advisor on food security in Africa. "I was living a sort of double life," he says and laughs. One part was his work at the Bundestag, the other his research in linguistics. Alongside that, he completed his doctorate: the first complete grammar of Pichi, an Afro-Caribbean Creole language. When it was finished, he showed it to colleagues at the Bundestag, Yakpo relates. "One person leafed through and said: I don't understand it at all. That's totally different from what you do here. Either you're an impostor or you have a split personality." That was when Yakpo realised that he had to plump for linguistics, his true passion.

WE DIDN'T RESPECT LIMITS

"At the time I thought, if I can get up on stage and entertain a thousand people, I can become a professor, too," says Yakpo and has to laugh again. That was his hip-hop ego speaking. "It was just the way we were on the hip-hop scene. We knew there were limits, but we didn't respect them."

After a three-year stint as a postdoc in the Netherlands, he started looking for jobs worldwide. "Academia in Germany was too complicated and opaque for my liking," he explains. "I couldn't understand how you could make progress as a researcher in Germany, so I didn't bother to apply there in the first place." In Hong Kong, where he is now teaching and doing his research, the prospects for promotion are clear. "Here you start off as a student, then you become an assistant professor and then a professor," says Yakpo. The intervals between the various steps are also standardised. "They don't have all the intermediate positions and fixed-term contracts that you get in Germany."

Another thing Yakpo has observed about the German research system is a lack of diversity. Even in African Studies, he notes, the higher the position, the less diverse the appointments – an observation he not only made as a student. As a Humboldt Research Fellow at Humboldt-Universität zu Berlin in 2020/21, he was unable to detect much transformation in matters of diversity in German science.

POPSTARS: In 1993, Kofi Yakpo, alias Linguist (front row, 2nd from left), and his band Advanced Chemistry made the video of the song "Fremd im eigenen Land." In the mid-1990s, he bade farewell to music, started travelling and concentrating on research.

Photo: Philipp Rothe

> "AT THE TIME I THOUGHT, IF I CAN ENTERTAIN A THOUSAND PEOPLE, I CAN BECOME A PROFESSOR, TOO."

Listening to Kofi Yakpo it soon becomes clear that he has always found Germany, the country of his birth, too narrow, geographically but also mentally: "Germany is a bit like the European version of the US. People look inwards, not outwards."

Yakpo was born in Holzminden in Lower Saxony but spent his childhood in Ghana. German is his native tongue. In Ghana he came into contact with his father's language, Ewe, for the first time. When he was ten, his family moved back to Germany, to Heidelberg, where he taught himself Ewe grammar using an old schoolbook from his parents' bookshelves. He admits to having been a language nerd. "My first passion was Latin." Soon he started French and, at 15, was borrowing books on languages from the university library: grammars of Fijian, Tok Pisin, the national language of Papua New Guinea, or Yoruba, one of the three principal languages of Nigeria. "I was under the illusion I could learn any language in no time," says Yakpo. After doing his civilian service, he enrolled at the University of Cologne to study linguistics.

HIP-HOP AGAINST RACISM

On stage, he had already become the "Linguist" by that time. At 17, Kofi Yakpo and four friends had formed the hip-hop group, Advanced Chemistry. With their political texts, the band wrote rap history in Germany. Their song "Fremd im eigenen Land" dealt with contemporary racist structures in the country. A populist public debate on asylum, racial murders and arson attacks in Rostock, Mölln, Solingen and Hoyerswerda were the key topics in society at the time.

"For all the talk of European unity / When I take the bus or train to the border / I ask myself why I'm the only one who has to show ID / has to prove their identity," rhymed Advanced Chemistry a good 30 years ago. Lines that are ›

FIELDWORK: Kofi Yakpo with Bhojpuri-speaking young people on Mauritius in 2012. Bhojpuri came to Mauritius during the British colonial period and is now the second most-common language there. / The picture on the right shows a workshop on language documentation at the University of Malaya, Malaysia, in 2019.

just as relevant today. Now as then, social participation has not really embraced migrant communities in Germany, according to Yakpo.

In the mid-1990s, he quit the music scene, started travelling and doing research for his Master's thesis. His first destination was Vanuatu, an island state in the South Pacific. "I returned to Germany from this trip absolutely euphoric and charged up," Yakpo remembers. He wanted to continue his research but did not know how. "Doctorate, habilitation – the whole procedure was a bit of a mystery to me." He would have needed advice, a mentor. But at the time, there was no such person around.

The lack of prospects shattered his illusions – which is why he initially set off in a completely different direction. "Getting away from this narrow Germany," as he puts it. He studied management and law in Geneva and London, then worked for the human rights organisation FIAN International (FoodFirst Information and Action Network) and subsequently for the Greens at the Bundestag in Berlin. Today, Kofi Yakpo combines the various elements of his life in his academic work in Hong Kong: instead of hip-hop rhymes, it is now his research results that reveal colonial structures and debunk racist myths.

One such myth is that Creole languages are simplified languages. Yakpo has managed to prove that many Creole languages are tone languages in which the pitch changes the meaning of a word and the grammar – a concept that is foreign to European languages. "The assumption that Creole languages don't use a tone system is based on the idea that because we're not familiar with it, it's complicated. And because the Africans dragged into slavery couldn't be 'complicated' by definition, Creole languages couldn't be tone languages," says Yakpo. Within linguistics, his research field is highly political and controversial. It addresses the colonial legacy and thus often also racist thinking and stereotypical assumptions within his own discipline, which tends to be Eurocentric.

IN AFRICA LANGUAGE IS ALLOWED TO CHANGE

Whilst working as a Humboldt Research Fellow in Berlin, he recently explored another path: "I wanted to know how languages develop when they are not standardised by written forms or state authorities." After all, strict language standardisation is ultimately a European concept. In Europe, language is seen as something that is not supposed to change. "In West Africa, it's different," says Yakpo. "Variation is quite normal."

Socio-economic aspects are also a feature of his research. Yakpo discovered that participation opportunities and advancement expectations influence the degree to which languages are changed by hybridisation. In this context, he developed the concept of social anchoring. He has demonstrated, for example, that Nigerian Pidgin, which is spoken by 100 to 150 million people today, in all likelihood derived from a small community of Krio-speaking African slaves from Sierra Leone who were released by the British navy from illegal slave transportation off the coast of West Africa and brought to Freetown in the 19th century. "They played a kind of intermediary role between two social classes in what was then a British crown colony and the whole of West Africa," Yakpo explains. "They were teachers, missionaries and traders with privileged access to the British colonial system and to African society at the same time." Their enhanced social prestige was an incentive for the majority of Nigerian society to learn their language. "Speakers of the minority language, Krio, had an interest in interacting with the majority population," says Yakpo.

But this is not always the case – as the history of language and cultural hybridisation in the Caribbean illustrates. "The hierarchy that was created by the colonial system and slavery was so strict that the Africans who arrived in the Caribbean in chains were not the least interested in learning the language of the colonial rulers." So, says Yakpo, they quickly and radically changed the English language. "A kind of reflex reaction to their lack of opportunities to participate and advance in society." This finding also contradicts the widely held theory that African slaves in the Caribbean were not capable of learning correct English and, from necessity, had merely simplified the bits and pieces they had picked up and supplemented them with their own languages.

Ultimately, what Yakpo is really concerned with in his research is agency, with Africans' capacity to act and their resilience, with linguistic research that treats the speakers of Creole languages as acting subjects. In order to conduct this debate within the discipline he is more than willing to battle it out in public with what he refers to as "bling-bling linguists" – researchers who try to attract attention by proposing highly-simplified arguments. "I enjoy debates like that," he says. Here, too, Kofi Yakpo, the Linguist, benefits from his hip-hop alter ego. ●

Photos: private, Eugene Tam

PROFESSOR DR KOFI YAKPO is an associate professor of linguistics at the University of Hong Kong, China. In 2020/21, he was a Humboldt Research Fellow in the Institute of Asian and African Studies at Humboldt-Universität zu Berlin. Under the stage name "Linguist", he and his band, Advanced Chemistry, wrote musical history. Yakpo has also written plays and short stories and was the recipient of the 2004 May Ayim Award for Black German Literature.

Letter to Germany More than 2,000 researchers from all over the world come to Germany every year to spend time working on their research under Humboldt auspices. In the course of their careers, some of these Humboldtians come more than once, like the Argentinian physicist Alejandro Fainstein. In a letter to the Foundation, he describes just how much Germany had changed in the 25 years between his two visits.

From: **Alejandro Fainstein**
To: **Alexander von Humboldt Foundation**
Subject: **Regards from Argentina!**

BERLIN WALL
In 1993/94, the Berlin Wall was mostly intact.

Hi everyone,

After three months spent conducting research in Berlin, my wife, our 14-year-old daughter and I returned home taking many pleasant experiences with us. Before getting back to our routine, I wanted to send my regards and thank you for supporting us once again. My scientific stay was excellent, but not only that; it was an experience that again opened our minds and interests in many other respects.

In the more than 25 years since our first visit, as a recently married postdoc in Stuttgart, I feel that Germany has evolved positively to become an even more captivating, open, welcoming, diverse and culturally rich country that

EAST VS WEST
In the 1990s, an imaginary line divided the country in two.

is also democratically and scientifically very strong. I feel it is noteworthy that Germany has changed so much (I guess, of course, in part it is also my own view and perception that has changed in the last 25 years).

> AN EVEN MORECAPTIVATING, OPEN, WELCOMING, DIVERSE AND CULTURALLY RICH COUNTRY

I remember from my first stay in 1993/94 that the Second World War and the Holocaust could be perceived as something that was difficult for Germans to confront. Now I felt that the dark parts of your past had been more maturely incorporated. In one exhibition at the Humboldt Forum in Berlin, beautiful carved ivory art is presented together with German colonialism and elephant slaughter in Africa. At the end of the exhibition, visitors are asked: Should this art be exposed? Which is best to avoid horrors happening again? The same perspective emerges in the impressive Jewish Museum where present-day German Jews have a voice, and Wagner and his music are discussed with different perspectives. I feel that shame and guilt are important, but open questioning of complex issues leads to change. It is moving and it is repairing.

Also in the 1990s, I felt that Germany was a more homogeneous society, maybe somewhat fearful of

Photos: private

immigration. As a foreigner one felt signalled out. Now we found a country that is not only open but also welcomes and benefits from diversity. Diversity abounds, and at least in what we could perceive, mostly nobody minds. I guess the strengthening of the European Community has been crucial for this change. But also, your supporting actions for people in need from countries at war, though surely difficult in its implementation, must be highly recognized.

In 1993, the Berlin Wall was mostly intact, as was also the imaginary line that divided the country in two. Contrasting cities and the expression in people's faces reflected this rift. Now I felt that the Germans have been able to deal with the immense challenge of reunification in quite an amazing way. Divisions have now clearly dimmed. The first woman German Chancellor in fact grew up in the East! Countries dissolve, fractions multiply, societies divide into extremes, and in that landscape, you seem to have been able to confront the differences, somehow to unify.

2021

Another change we observed was in the way Germans perceive children. This has to do with the improved place of women in German society. In the 1990s, kindergartens were scarce; we were told that women interrupted their profession to bring up their kids. Babies were not welcomed in bars or restaurants, while dogs were. Now that simply does not seem to be the case. Change can be seen around the critical issue of climate change and our planet's sustainability, which are now widely present in many ways, from the increase in "Bio" shops, the weekly farmers' markets, the Fridays for Future gatherings at the Brandenburger Tor.

1994

CHILDREN
The way Germans perceive children has changed in the last 25 years. In the 1990s, posters encouraged parents to spend time with them.

We saw the changes walking the streets (that seem to change from one year to the next, too). This time it was during the Covid pandemic, but I should say that it did not cause so much of a problem. Germans are very practical and thus one could keep on living almost normally. As compared to Argentina, I found rules in some respects were less strict, but the crucial difference is that Germans comply with them.

I know that nothing is perfect! But the changes we perceived bring hope for the future, despite the appalling developments in the world like the war in Ukraine. I read Thomas Mann's "The Magic Mountain" many years ago that covers the period 1907 to 1914. I am not fully sure, but I kind of remember the main character Hans Castorp commenting on the mental difficulty of travelling far from your home, how the soul only followed at a much slower pace than the body. Nowadays we step on a plane and after 20 hours are transported from the freezing 4pm darkness of the Berlin winter to the 30°C of shining summer in the antipodes of Bariloche in Patagonia. From Germany to Argentina. From Europe to Latin America. We are transported in space, and in many ways, we are also transported in time. And at the airports we cross with people and lives that spread through the whole world. It is simply impossible to comprehend all that this implies. And it is wonderful at the same time.

> "THE CHANGES I WITNESSED IN GERMANY GIVE ME HOPE FOR THE FUTURE."

Distance cooperation will surely benefit from virtual tools developed during the pandemic. But scientific and cultural exchanges involve people, and long-term interactions also have to do with friendship and understanding. I am convinced that we are a social species that needs to meet. Not only via a screen but in a lab, around a table, hiking, or in a bar after a conference session. We do not control when and how important ideas emerge. The Alexander von Humboldt Foundation makes an invaluable contribution to making such magic possible.

Kind regards,
Alex

PROFESSOR DR ALEJANDRO FAINSTEIN
is a professor at the Instituto Balseiro, Universidad Nacional de Cuyo. He conducts research for the Atomic Energy Commission as well as for the Scientific Research Council of Argentina in Bariloche, Argentina. In 1993/94, he was a Humboldt Research Fellow at the Max Planck Institute for Solid State Research in Stuttgart. In 2021, he returned to Germany, sponsored by the Foundation, to conduct research at the Paul-Drude-Institut für Festkörperelektronik in Berlin.

Photos: private

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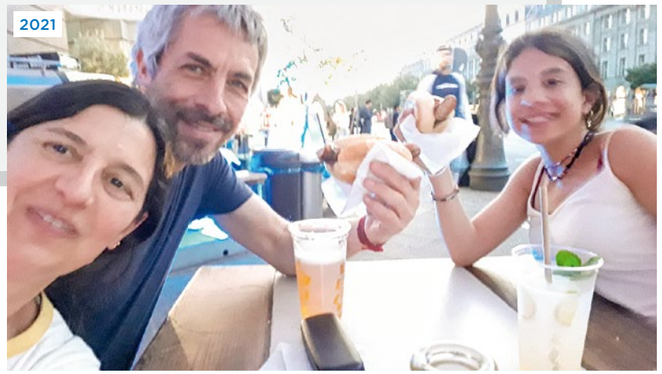

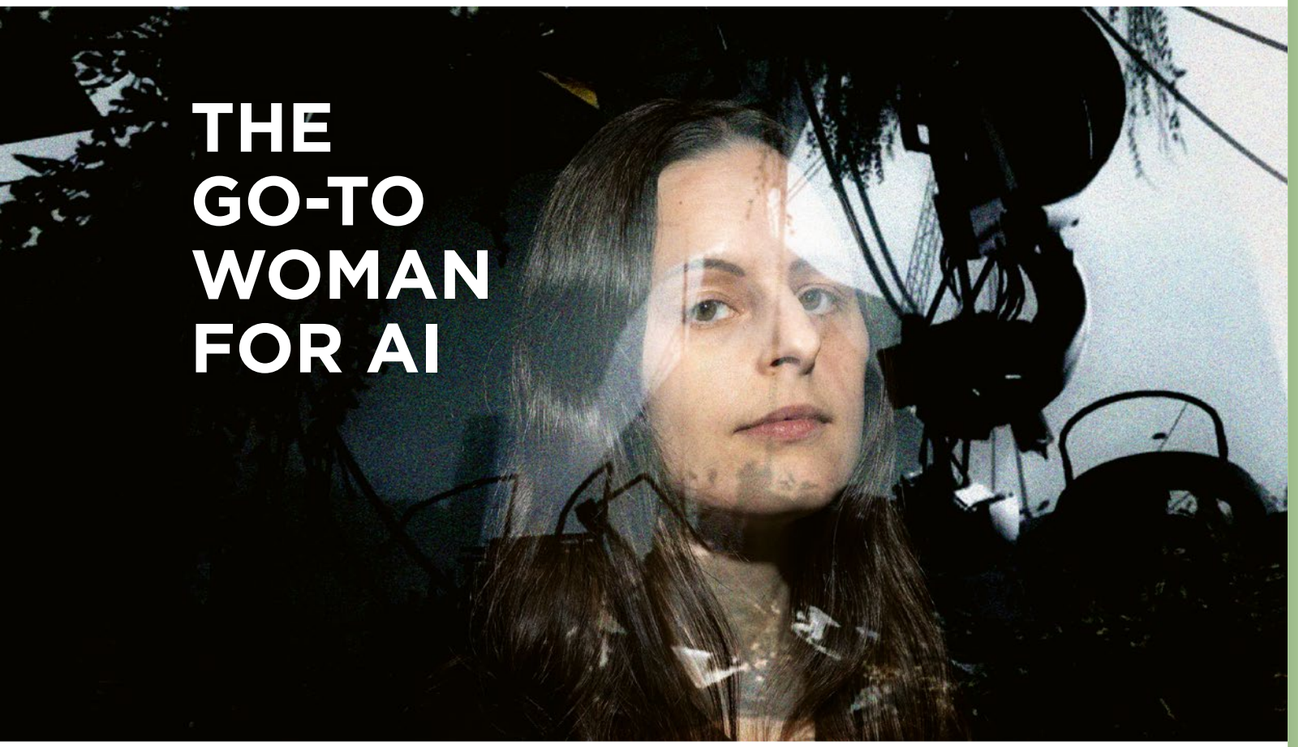

THE GO-TO WOMAN FOR AI

Who actually does what at Humboldt headquarters? Who are the people behind the scenes making sure that everything runs smoothly? This page is devoted to the colleagues at the Humboldt Foundation, their lives at work and beyond.

TODAY: MICHELLE HERTE.

Every so often, I allow myself to fall into the clutches of a rogue artificial intelligence. I slip into the role of Chell, a young woman in a research institute being held captive by an AI called GLaDOS. As Chell, I have to overcome all the obstacles and finally destroy the AI's core system in order to escape – because GLaDOS is a monster AI, programmed to try out new technologies on humans. And it implements this programming resolutely and relentlessly.

The scenario is, of course, pure science fiction. GLaDOS is part of the computer game Portal. The AI is one of those "killing machines" I wrote about in my Master's thesis in comparative literature. In novels, films and computer games, authors run through the various scenarios of where artificial intelligence could lead to at some point. They often reflect people's fears. Our biggest nightmare seems to be not being able to control the technology one day.

I myself am a very curious person, a technophile. Nowadays, I am more interested in reality than fiction. I am convinced that humans will discover all the things we can do with AI and utilise this potential, too. I don't think such developments can be curtailed or constrained. That's why it's important to know what point research has really reached.

In my role as Programme Director for AI in the staff unit of the Humboldt Foundation's Selection Department, the great thing is that I am really close to current research. I am involved in the selection process for the Humboldt Professorship for Artificial Intelligence, read the applications and research proposals, and I follow developments partly with a view to how the Humboldt Foundation could employ AI in the future to assure the quality of its selection processes. But because I also know what AI can't do yet, I like to immerse myself in the virtual world at home – there is now a sequel to Portal … ●

Recorded by **MAREIKE ILSEMANN**

Photo: Humboldt Foundation/Michael Jordan, Photo montage: Raufeld

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In this image we have hidden ten AI applications that are already part of our everyday lives. You can find out what they are on our website. Just scan the QR code.

https://www.humboldt-foundation.de/hidden-infos

Illustration: Martin Rummel/ Raufeld