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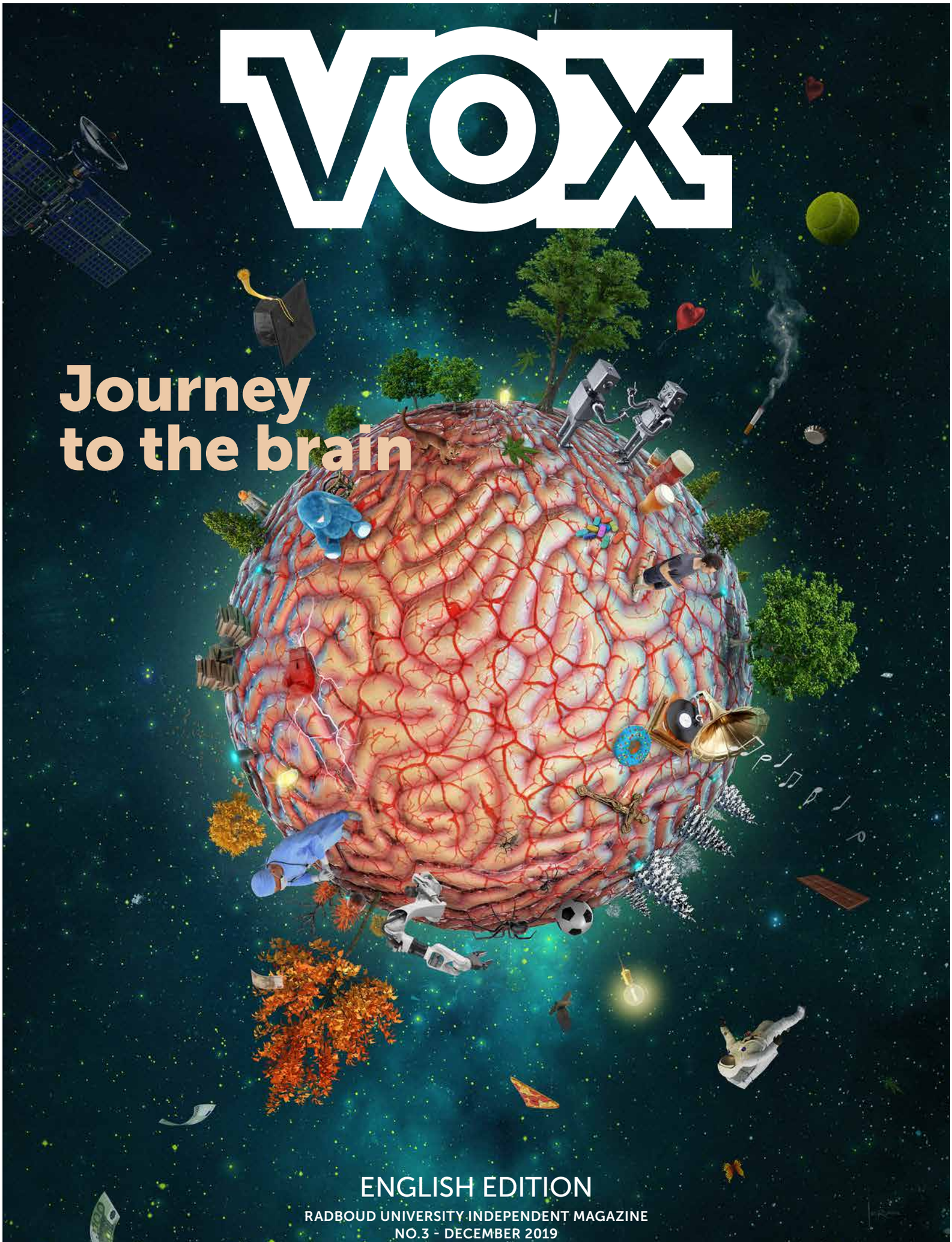

Journey to the brain

ENGLISH EDITION

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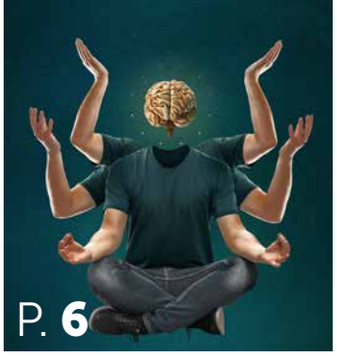
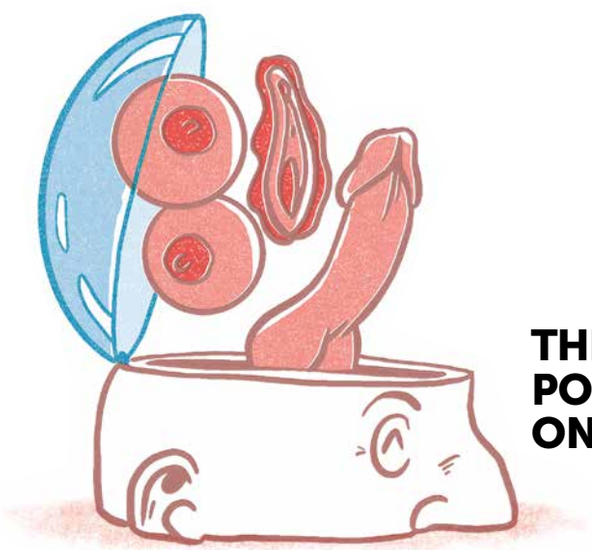


FRONT AND BACK COVER ART: JEROEN MURRÉ



THE EFFECT OF PORN (AND MORE) ON THE BRAIN / P. 13

EDITORIAL

SMART

"Use your brain!" my mother used to say when I'd done something stupid. I found this confusing. How was I not using my brain? After all, I was moving my hands and answering my mother – all activities controlled by the brain.

She meant something else: that I should give more thought to what I was doing. Not that she wanted me to enrol at university at the age of 10; rather she meant I should act smarter: not forget my gym bag, lock my bike! And so I discovered that being smart is not the same thing as being intelligent.

This *Vox* issue is all about the brain. We asked researchers about the difference between being smart and being intelligent (page 34). Our colleague Ken enrolled in a large-scale study on the brain of people in their thirties and wondered how he was helping science by spooning his poo into a jar (page 7). That there is indeed a connection between the brain and the digestive system became apparent in the article on the role of nutrition in the work of psychologists (page 26).

Instead of "Use your brain!" you could also say "Use someone else's brain". For example, by cutting it up – as in the fascinating open brain operation our *Vox* journalist was allowed to attend (page 18), or as part of a lunch dish. We now know that calf brains taste a big spongy (page 42), and that if you're going to kill an animal anyway, the smartest thing to do is to eat all of it.

Annemarie Haverkamp
Editor in chief *Vox*

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ABOVE PAR

INGE BLEIJENBERGH AND TIES VAN DER STAPPEN

PHOTO: REIN WIERINGA

Sexually tinted compliments, embarrassing questions aimed at women with headscarves, and rude remarks by students about lecturers whom they 'would like to go to bed with'. According to student Ties van der Stappen and Associate Professor Inge Bleijenbergh, there is still a lot to be desired when it comes to social safety at Radboud University. They shared their experiences with the Executive Board in a participational bodies meeting. The Board responded by saying they were working on facilitating access to confidential counsellors. "That's great for when things get out of hand," says Bleijenbergh, "but ideally things shouldn't have to get that far."
See also PUNT! (page 23)

DULY NOTED

"We'll manage, with lots of technology and organisational power. Even if it means giving up land or cities. But the same can't be said of other places in the world."

When it comes to the consequences of climate change, Climate Expert **Heleen de Coninck** is not particularly worried about the Netherlands. It's the most vulnerable people in the poorest countries who will suffer most, she said in *Volkskrant Magazine* on 30 November.

IN THE NEWS

DAY-TO-DAY NEWS: **VOXWEB.NL/INTERNATIONAL**

Room Casino If you like gambling, you'll enjoy SSH&'s new approach. As of next year, the student housing corporation wants to get rid of its waiting lists and allocate rooms by drawing lots. According to the SSH&, the new system is better suited to current times: students move out of their parents' home later and can often only secure a room in a coveted complex at the end of their study programme. Student organisations aren't happy with the plan. SP youth organisation ROOD protested against the drawing system with a banner proclaiming "SSH& Casino" in front of the complex on the Van Nispenstraat.

Groenewoudseweg rebels More news in the 'angry citizens' category (with once again a role for SSH&): Groenewoudseweg inhabitants are furious about the Municipality's plans to grant permission for a new student apartment building on the location of the current – soon to be demolished – Community Health Services

PHOTO: STAN VAN PELT

PHOTO: DICK VAN AALST

Campus ground staff are increasingly using cordless leaf blowers this autumn. For the sharp-eyed among you: the leaf blower shown here is still petrol-powered.

(GGD) building in their street. Together with SSH&, the Municipality is discussing the possibility of a new five-storey building with approximately 250 student rooms. According to Groenewoudseweg resident and Professor of Economics at Radboud University Esther-Mirjam Sent, this will disrupt the balance in the neighbourhood too much. "You can't even take your child to school safely anymore because of all the people flying by on bikes and the resulting traffic congestion."

Forced to retire If need be, he'll teach for free, he says. Exercise to Music teacher Fred van Lent doesn't want to retire. But the rules are set in stone: anyone who reaches retirement age must retire. The athletes at the sports centre aren't happy about it: they started a petition to allow Van Lent to stay. Three doctors at Radboud university medical center also got involved in the discussion. They wonder why the University and hospital, who are after all so committed to vitality for their employees, wouldn't honour Van Lent's request. After all, he's a "great figurehead of vitality", say the doctors.

Smoke policy As of 1 August 2020, Radboud University Campus will be smoke-free. The University announced a long time ago its intention to become smoke-free in the near future, but a change in legislation is now speeding up the process. So the covered smoking areas that were announced earlier this year will not materialise. To comply with the law Radboud University also needs 'site coaches': students to remind smokers of the rules. If someone refuses to leave or put out their cigarette, security services will be called in.

Brain drain A growing number of students who complete their Bachelor's programme at Radboud University move to the Randstad area for their Master's. Last year, more than 30% of students left after their Bachelor's programme to continue their studies at another university. This figure is no longer compensated by the new Master's student intake. The Master's programmes on offer will therefore be reorganised and information activities created to convince Bachelor's students that Nijmegen is the right place for the next step in their studies – or so the University hopes.

Future music Minister of Education Ingrid van Engelshoven is used by now to universities not welcoming her with open arms. "Being an administrator means taking responsibility and not just trying to make everybody like you," she comments in an interview on Vowweb.nl. She'd rather talk about her plans for the future: in early December she presented her Strategic Agenda for Higher Education, in which she calls for less competition and more collaboration. Funding should be less dependent on student numbers, which will hopefully benefit stability within universities. This is good news for small programmes like Dutch Language and Culture. "These kinds of programmes shouldn't have to constantly fight for their right to exist."

HEALTHY BRAIN STUDY

THIRTY-SOMETHINGS OBJECT OF STUDY

A better understanding of how people function in their daily life. That's the goal of the Healthy Brain Study, a large-scale study involving one thousand thirty-somethings from Nijmegen and surroundings. *Vox* editor Ken Lambeets (32) enrolled as a test subject, spent a week covered in activity monitors, and took part in a test day at the Trigon.

Text: Ken Lambeets / **Illustration:** JeRoen Murré / **Photo's:** Rein Wieringa

Vivian Heuvelmans guides Vox editor Ken into the MRI scanner

In a small office in the basement of the Trigon on the Kapittelweg, I slowly immerse my right hand into a bowl of ice-cold water. As my fingers slowly stiffen, a research assistant makes an ultrasound scan of my carotid artery, using a device normally associated with the bellies of expectant mothers. In the meantime, a camera records the effect of the ice-cold bath on my face. What's the purpose of this test again?

Fireworks

It's a question I ask myself a lot on my first test day at the Donders Institute. While I lie in an MRI scanner staring for ten minutes at a small cross on the screen above me. During a computer test which involves me getting small electric shocks. During the three times three minutes chewing on a cotton swab. Or when I'm asked to use a joystick to hit one ball with another, following which fireworks erupt on a digital screen while a robot arm pushes the joystick back to centre.

Granted, most of the tests are fun and painless, but research assistant Vivian Heuvelmans is not likely to answer my questions any time soon. The answers will come later this year, she promises, after the third of the three test days. Too much prior knowledge might influence the research results, and that's not allowed.

The tests are part of the Healthy Brain Study (HBS), a large-scale study conducted by Radboud University, Radboud university medical center and the Max Planck Institute on one thousand thirty-somethings from Nijmegen and surroundings. The study, which was launched last September, costs € 7.9 million. Over half of this money, € 4.4 million, comes from the Stichting Reinier Post, which manages the finances of the Stichting Katholieke Universiteit. The remaining € 3.5 million is funded directly by Radboud University.

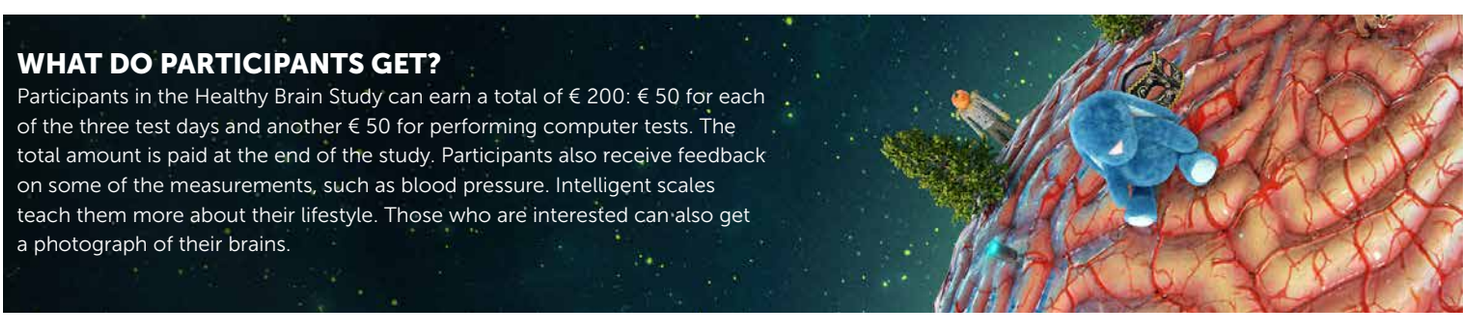
The HBS is intended to generate a gigantic database, to be used by researchers from various disciplines. The ultimate goal: more insight into the workings of the brain and how it impacts our daily life. A crucial topic, especially since researchers still have very little idea of how this interaction works. The goal of the HBS is to help them make progress on this matter.

Artificial

Why do people in their thirties make such interesting test subjects? Principal investigator

WHAT DO PARTICIPANTS GET?

Participants in the Healthy Brain Study can earn a total of € 200: € 50 for each of the three test days and another € 50 for performing computer tests. The total amount is paid at the end of the study. Participants also receive feedback on some of the measurements, such as blood pressure. Intelligent scales teach them more about their lifestyle. Those who are interested can also get a photograph of their brains.



Ken presses buttons to answer questions during the scan

Recording Ken's brain

Guillén Fernández from the Donders Institute calls them a relatively stable age group. "Their brain is fully developed, but not too old yet," explains the Hispano-German Professor at his standing table at the Trigon. "People in their thirties often face important decisions about their families, careers or economic status. We want to find out how all these decisions impact people."

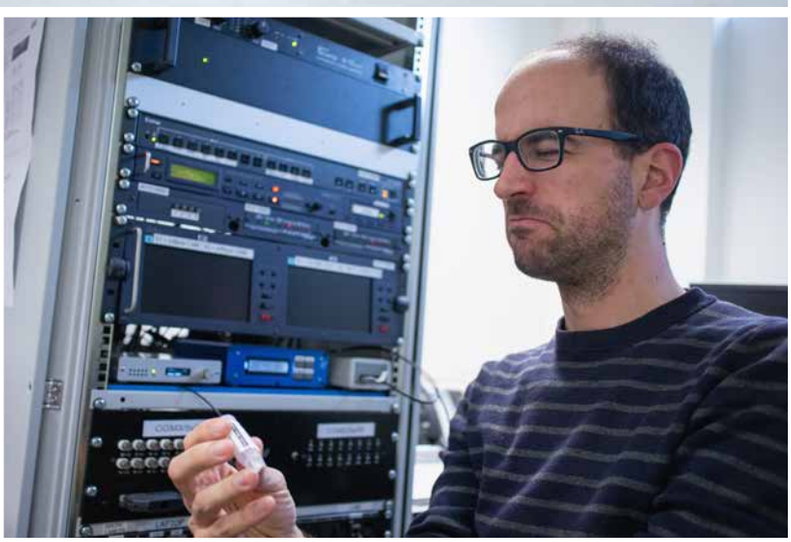
HBS is unique in terms of its scope and duration. Most scientific studies test specific hypotheses in small groups. But this method has its limitations. Lab studies are always a bit artificial anyway, and the number of test subjects is too small to identify individual differences. And that while the brain is our most individual organ. In addition, experiments usually only last one day, after which the test subjects – often students – go home. "This kind of controlled environment makes it easy to test hypotheses, but as a setting, it's far removed from everyday life," says neurologist Fernández.

This is why the one thousand HBS participants are required to wear activity monitors for three weeks during a period of one year and take part in three test days at the Trigon. Stepping outside the controlled environment makes it possible to investigate how people feel when they're hungry, stressed, or tired. "Our brain behaves differently at moments like this," says Fernández.

53 hours

In July 2022, researchers will finally get access to the 90 terabyte or 500,000 hours' worth of data the study is expected to produce, though it's not entirely clear yet how the data will be shared with the rest of the world. In all probability, the database will be released in three phases: in the first six months exclusively for the researchers who were involved in the study design, then after six months for the rest of Radboud University. After one year, researchers from other universities will be granted access to the data, presumably on a subscription basis.

'OUR BRAIN BEHAVES DIFFERENTLY WHEN WE'RE **HUNGRY OR STRESSED**'



Chewing three times on a cotton bud for three minutes

The difficult task of finding one thousand test subjects in the area between the Rhine, the Maas, the A50 and the German border rests on the shoulders of Janet den Hollander, the marketing expert hired specifically for this project. The panel should consist of 50% men and 50% women and form a representative cross-section of the population.

This in itself is a major challenge. Participants are required to devote about 53 hours spread over one year to the study, and people in their thirties are often busy with their career, family and social life. In her efforts to secure enough test subjects, Den Hollander was inspired by the Rhineland Study, a large-scale health study in Germany. The study's organisers were able to convince companies to give something back to society by giving their employees a day off to take part in the study. "We're trying to get local companies to do the same," says Den Hollander.

'WHEN I CAN'T **POO**, I'M A LITTLE UPSET'

The method seems to be working. To date some three hundred people in their thirties have signed an enrolment form, and 96 are already taking part in the study. Of the six people who have dropped out, four found the study too demanding. "This is why in our communication we now place even more emphasis on the time investment," says Den Hollander.

Sleep headband

It's no exaggeration to say the study requires a lot from the participants. One week before the test day at the Donders Institute, a courier on a bicycle appears on my doorstep. He hands me a large box containing four activity monitors and a computer.

A moment later I'm attaching a small exercise monitor to my right thigh. The device measures how much time I spend sitting, standing and walking. An hour later, I've already forgotten it's there. The same applies to a silicon bracelet on my wrist that registers what substances I come into a contact with, and a smart watch that keeps track of things like my heart rate and body temperature.

A trickier item is the sleep headband, which measures sleep depth and intensity. The first night I wake up a few times and can't get back to sleep again due to the faint glow of the LED light. After a few nights it gets better, though I'm not sure whether this is due to my getting used to the strange device on my head, or simply the fact that I'm just tired. Makes me wonder how representative these data are of how I normally sleep.

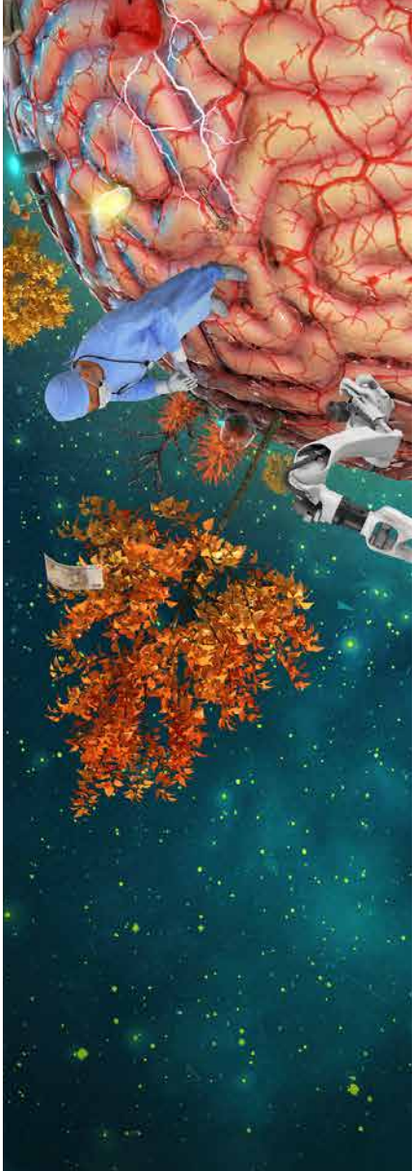
But the most annoying thing are the questionnaires I get ten times a day via an app and that take approximately 2.5 minutes to complete every time. What am I doing? Who am I in contact with online? Do I feel appreciated by the people around me? Am I able to concentrate? With regard to the last question: Usually, yes, until I get one of these annoying notifications.

Finally, there's some maintenance and administration work required to take part in the study. The sleep headband has to be charged every day, as does the watch, and I have to transfer data from these to a computer. When this fails to work on the first evening, I call the helpdesk, which turns out to be only contactable by telephone during office hours, so I send them an e-mail. In the end, it all works out fine.

Still, as the test week progresses, I find myself wondering repeatedly why I decided to take part in this study. The monitors and tests make it feel like a major medical check-up, but I won't be getting any personal reports. The odds of failing one of the memory tests or the cycling test are in principle very low. All data are anonymised, so for the purpose of the study I'm just a long code. Yet I catch myself trying to do my best on all measurements and tests. And when I can't poo on the evening before the test day – participants are expected to bring a faeces sample to the Donders Institute – I'm even a little upset.

Football World Cup

In the end, it probably boils down to vanity: my wanting to be part of a study that leads to a scientific breakthrough. And I'm not alone in this. So far, 132 of the 300 enrolled test subjects indicate that their main reason for taking part in the study is to make a contribution to science.



TEAM SCIENCE

HBS hopes to play a pioneering role not only in the study design itself, but also in how scientific research is conducted. "At present science involves far too many small research groups," says Fernández. "This model dates back to the 19th century, a time when there were only a few hundred researchers in Europe. Today there are more than one million researchers worldwide, and the problems we are looking at are too complex to be answered within a single research group. Faculties are very old-fashioned structures."

The neurologist refers to HBS as an example of team science. His dream is that all publications arising from the study will bear the signature not of individual researchers, but of the Healthy Brain Consortium. He'll probably have to compromise, and the names of the researchers performing the analyses will appear under the publications alongside the Consortium's name.

This is interesting, because the real research questions about the HBS data haven't been formulated yet. If you want to investigate the study data, you have to apply for a grant. And the costs of using the data can be considerable. As part of the study, three thousand blood samples will be collected (three per participant), so if you want to study protein in the blood, you'll have to raise a lot of cash.

'EVEN **HISTORIANS** WILL BE ABLE TO MAKE USE OF THE DATA'

In funding the HBS, Radboud University wants to support interdisciplinary research. Researchers working on the data have to think in broader terms than their own discipline. This also applies to the neuroscientists themselves. "A language researcher looks at language and a memory researcher at memory," says Fernández. "Sometimes their results overlap, and they're not even aware of this. Because this data set is so big, for the first time we'll be able to see interactions between different research areas clearly."

The data set is so big, in fact, that it can potentially be used not only by neuroscientists and medical experts, but also by researchers in science, communication sciences, social sciences and management. Fernández believes that by combining areas of expertise, and jointly analysing data from various disciplines, we can gain a better understanding of how people function in their daily life – for example how economic decisions are made. Historians can in turn use the database to investigate how historical events – a terrorist attack, a financial crisis or the Football World Cup – affect the brain.

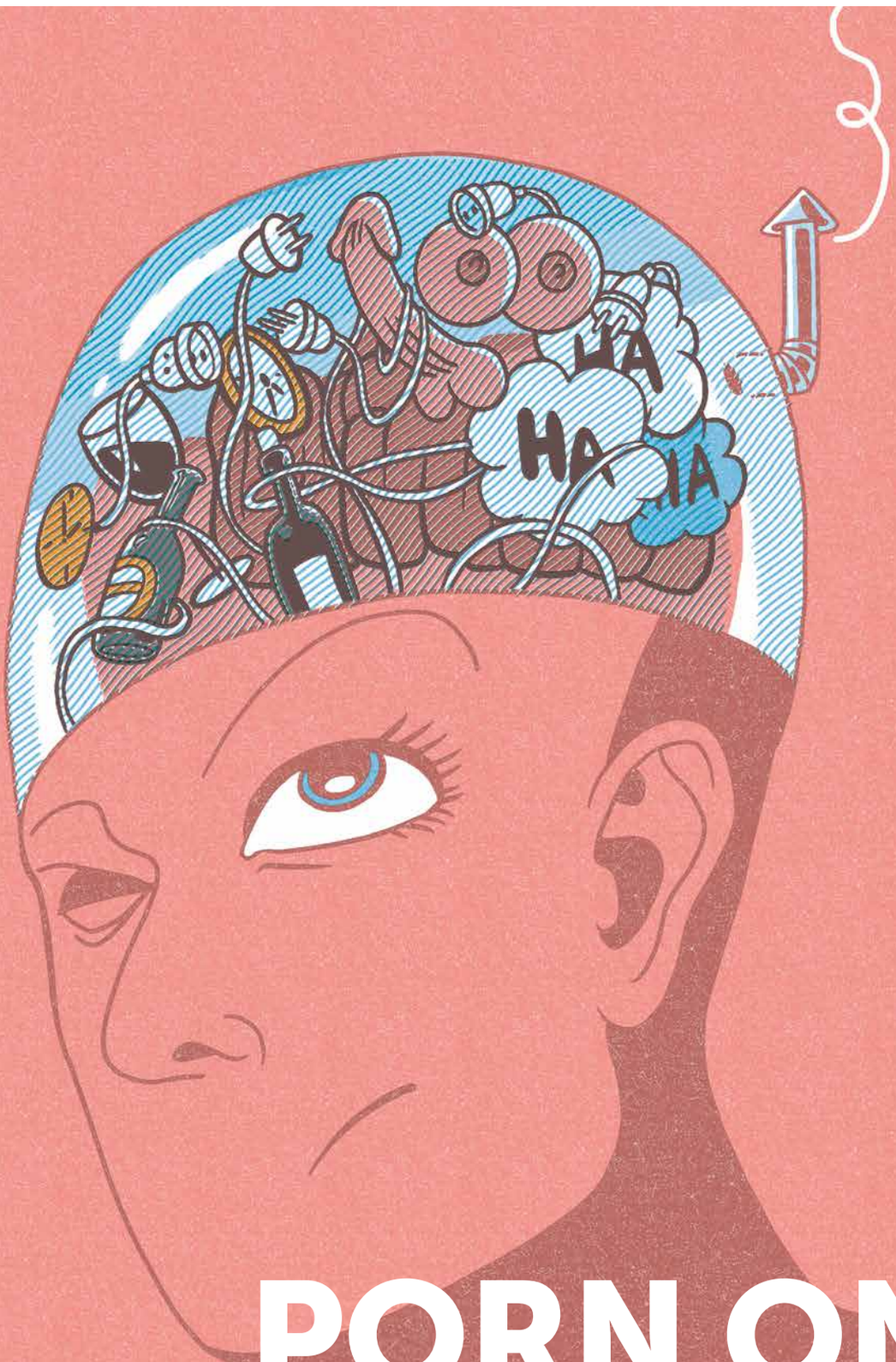
Nobel Prize

It's not something you usually think about, but a study that costs this much money and effort can also fail. "We may not be able to find enough test subjects, but I'm feeling more optimistic about that these days," says Fernández. "Or participants might find the study too stressful and give up after a while, although we try to support them as much as we can in the process. Another risk is that our measurements turn out to be less useful than we'd hoped or that the data are not of sufficient quality. Finally, participants might find the tests too difficult, or researchers might not be interested in analysing the data."

Whether the Healthy Brain Study will ultimately lead to a scientific breakthrough is therefore a matter for speculation. Fernández hopes the study will lead to new insights about the brain, an organ we still know very little about, despite decades of research. This is one of the reasons so few Nobel Prizes are awarded in Neuroscience. But if one of them ever goes to the researchers behind the Healthy Brain Study, I will know for sure: I didn't spoon my poo into a jar in vain. *

Ken records his mood several times a day

PARTICIPANTS WANTED
More subjects in their thirties are needed for the study. For more information and to enrol, go to www.healthybrainstudy.nl.



PORN ON THE BRAIN

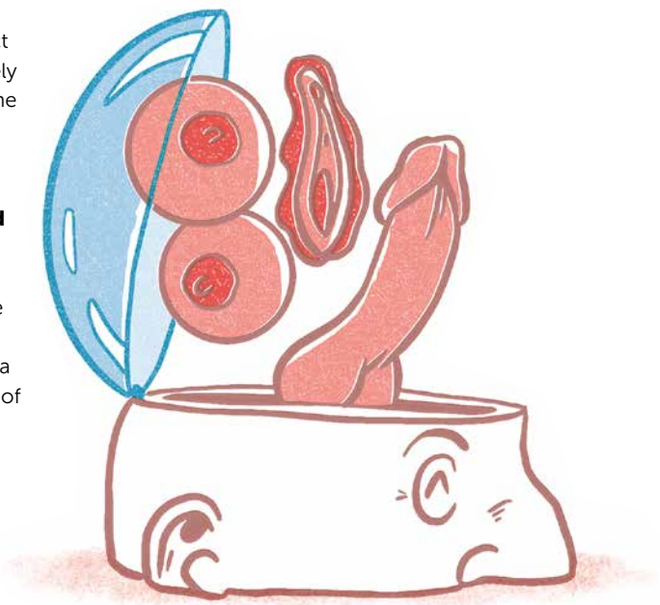
There are always so many things going on inside our heads. And at times, we're the ones responsible for confusing our brain activity. Have you ever wondered how alcohol, Ritalin, pornography and sleep deprivation affect the brain?

Text: Anouk Broersma / **Illustration:** Roel Venderbosch

Pornography

Get test subjects into a brain scanner to watch porn and your research is guaranteed to make **the news**. "The brain on porn" is a sexy topic – pun intended – but in fact, it's something we know very little about. Just because studies on pornography attract lots of attention doesn't mean its effect on the brain has been extensively studied. On the contrary. And the small-scale studies that are available tend to focus on 'porn addicts'. They show that watching porn activates **reward centres** in the brain of major consumers of porn.

In a study involving 64 men, the Max Planck Institute in Berlin found a link between watching a lot of porn and a lower volume of grey matter in an area of the brain's reward centre. But what does this actually mean? Does grey matter shrink from watching porn, or are people with less grey matter predisposed to watching porn? And how does this affect them in their daily life? This isn't clear. But not to worry: either way, research says nothing about the brains of average humans who sometimes surf porn.



Alcohol

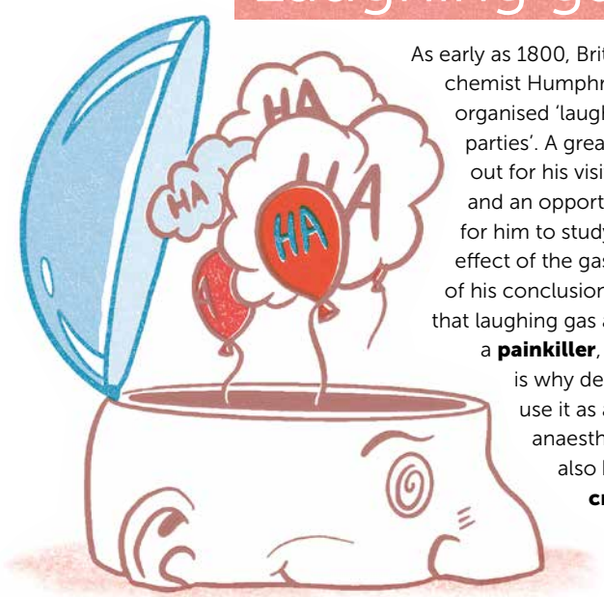
All kinds of things start happening in your brain after a few beers. Like laughing gas, alcohol affects NMDA receptors (see laughing gas box) and the fuddled brain produces more dopamine and serotonin, hormones that **improve your mood**. Alcohol also affects the gamma aminobutyric acid (GABA) neurotransmitter, which binds to special brain cell receptors and signals these cells to **slow down**. In this way, GABA inhibits communication between brain cells. Alcohol binds to the same receptors and gives GABA an extra push to latch on, more and for a longer period than in a sober brain. The brain hits slow down even more, resulting in a relaxed state – but also in slower reactions, uncoordinated movements and less impulse control.

British Psychopharmacologist David Nutt has studied GABA for years, in the hope of developing a healthy alternative to alcohol: a drink that would induce the same **a state of euphoria** – sometimes accompanied by **laughing fits**.

The reason for this is that laughing gas is an NMDA antagonist, explains Radboud university medical center (Radboudumc) Addiction Physician Thomas Knuijver. Normally, NMDA receptors in brain cells attract the signalling agent glutamate, which plays a key role in processing sensory stimuli. But laughing gas blocks these receptors, temporarily preventing glutamate from getting through. Knuijver: "This results in a short-term dissociative effect, comparable to the effect of the drug ketamine, except that with laughing gas, the dissociation period is shorter."

Can frequent use of laughing gas lead to brain damage? "Not as far as I know," says Radboudumc Internist and Clinical Pharmacologist Kees Kramers. However, he does warn that overenthusiastic inhalation may damage the **nerves**. In 2017, doctors in Heerlen described two cases of young people suffering from uncoordinated movements and tingling and numbness in their hands and feet. These symptoms resulted from laughing gas depleting the body of vitamin B12, and disappeared when the two stopped sucking on balloons. The National Institute for Public Health and the Environment (RIVM) warns that inhaling ten or more balloons per session, at a rate of once a month or more, increases the risk of developing this kind of **vitamin deficiency**.

Laughing gas



As early as 1800, British chemist Humphry Davy organised 'laughing gas parties'. A great night out for his visitors, and an opportunity for him to study the effect of the gas. One of his conclusions was that laughing gas acts as a **painkiller**, which is why dentists use it as an anaesthetic. It also **briefly creates**

relaxed feeling by directly stimulating GABA, but without hangovers and other health risks associated with alcohol. His fellow researchers remain sceptical, if only because alcohol stimulates the brain in many other ways than via GABA.

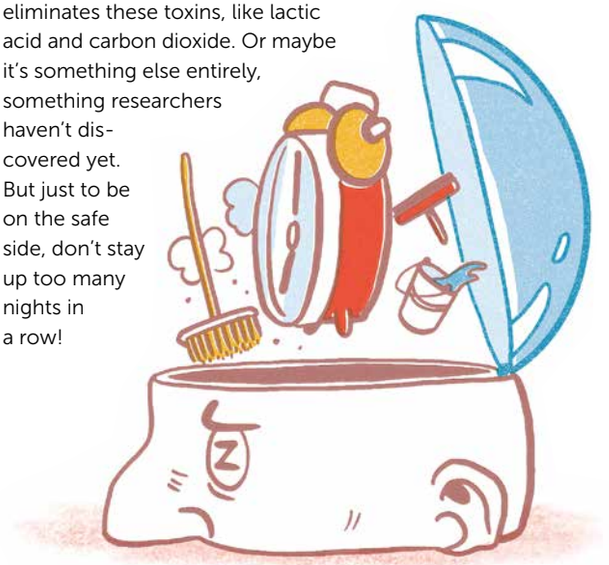
Sleep deprivation

As early as 1959, a radio DJ decided to sit in a glass booth for a good cause. The American Peter Tripp ran a 201-hour radio marathon from Times Square in New York – without any sleep. The first days were easy, but over time, Tripp became **increasingly irritable** and started hallucinating. He suffered from **psychoses** for years afterwards.

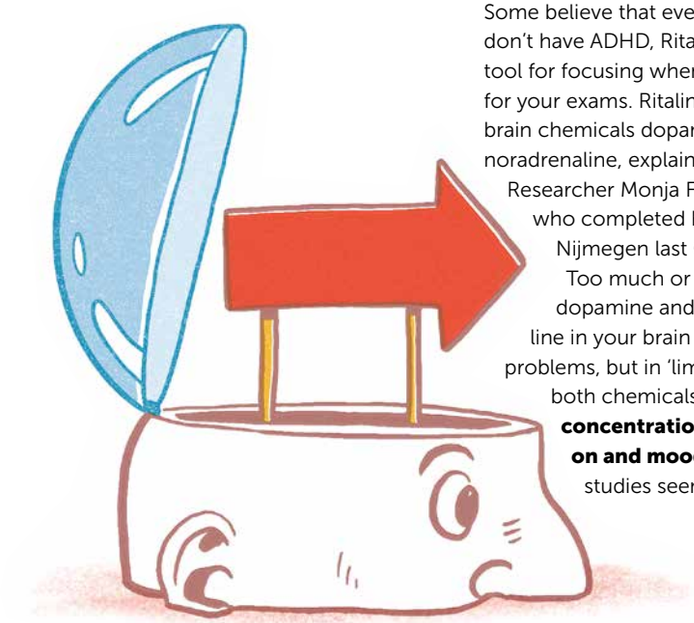
Our brain really needs sleep; this much is clear from the radio experiment. Ultimately, sleep deprivation can even prove fatal, as shown in studies where animals are kept awake for long periods of time. Sleep is as crucial to life as air, water and food, writes Radboud University Professor Emeritus Ton Coenen in his book *Het slapende brein* ('The Sleeping Brain'). But why? Explanations vary. Some researchers say that when we sleep our brains store crucial information about our day in our memory, a kind of nightly tidying up.

Other researchers say the sleeping brain engages in another kind of major clearing out. Coenen describes this theory as follows: "Physical and mental processes lead to an accumulation of **toxins** in the brain." During the night, the brain supposedly breaks down and eliminates these toxins, like lactic acid and carbon dioxide. Or maybe it's something else entirely, something researchers haven't discovered yet.

But just to be on the safe side, don't stay up too many nights in a row!



Ritalin



Methylphenidate – better known under the trade name Ritalin – helps ADHD patients to focus. Some believe that even if you don't have ADHD, Ritalin is a great tool for focusing when studying for your exams. Ritalin impacts the brain chemicals dopamine and noradrenaline, explains Brain Researcher Monja Froböse, who completed her PhD in Nijmegen last October.

Too much or too little dopamine and noradrenaline in your brain leads to problems, but in 'limited' doses both chemicals **improve concentration, motivation and mood**. Some studies seem to indicate that ADHD patients suffer from a shortage in the frontotemporal lobe, an area of the brain involved in concentration and planning. Dopamine and noradrenaline are released via synapses, i.e. contact points between the ends of brain cells, and travel to the next brain cell, which they activate in turn. Froböse: "But the next cell can't absorb all the released chemicals, so the surplus goes back to where it came from." Ritalin blocks this reabsorption, so dopamine and noradrenaline can no longer activate the next nerve cells. Whether Ritalin improves performance depends on the task, says Froböse. "Ritalin makes it easier to ignore distractions, but it **doesn't make you more creative** or flexible." And in people who naturally produce a lot of dopamine, the drug may even have no effect at all.

Nor does Ritalin necessarily motivate people to work hard, as Froböse shows in her PhD research. Test subjects were asked to perform a series of tasks with and without Ritalin, and each time they were given a choice between an easier and a harder version of the task. Ritalin had no effect on performance, but impulsive people, when on Ritalin, were more likely to avoid the difficult tasks. So using Ritalin to help you study may not be such a good idea. Before you know it, you'll be skipping all the difficult chapters.

'A MOMENT OF QUIET CAN IMPROVE CONCENTRATION'

Studying, seeing friends, updating social media – these all battle for position in students' minds. A wellbeing survey conducted by the University in 2017 revealed that half of all students experience intense stress. What can you do to empty your mind?

Text: Joos de Ruiter / **Photo:** Erik van 't Hullenaar

JOREIN HENDRIKSEN (20), PHILOSOPHY, POLITICS AND SOCIETY

"I learnt to meditate during my gap year. During that year, which I spent doing volunteer work in South East Asia, I took meditation lessons in a Buddhist monastery. There I learned a technique I now use every morning: you sit down and focus on your breathing. Every time your thoughts drift away from the present, you allow your breathing to bring you back. It's important not to judge yourself: there's no such thing as a good or bad meditation session, you simply did it, and that's all. Meditation helps me enormously. It lowers my stress and gives me a sense of calm and helps me put things into perspective.

Many people think meditation means sitting on a cushion and trying not to think, or that's it's all New Agey, but it doesn't have to be. Simply walking or drawing – without listening to music – is also a form of meditation. I advise students who experience stress to look for pockets of silence and quiet. When you already have to memorise so much information for your studies, it doesn't help in your spare time to look for distractions that also stimulate your brain. A moment of quiet can improve concentration and teach you to better understand the source of your stress."

‘IT’S SCARY TO THINK THEY’RE WORKING INSIDE YOUR HEAD’

Coen Cieraad suffers from Parkinson’s. The disease makes it increasingly difficult for him to move. Radboud university medical center offers an operation that can relieve the symptoms: deep brain stimulation. *Vox* is invited to attend the brain operation. ‘No, there isn’t enough room here. We run the risk of hitting a ventricle.’

Text: Stan van Pelt / **Photo’s:** Bert Beelen

Beep, beeeeep, beep. A loud screeching sound fills the room. If you didn’t know better, you might think these were alien signals. Yet these aren’t sounds from a planet in some far corner of the galaxy, but from inside our own inner world: the brain. The beeps originate from an electrode that neurosurgeon Saman Vinke (33) is guiding one millimetre at a time into the brain of Coen Cieraad (69).

Cieraad suffers from Parkinson’s disease and on this November morning he’s undergoing what is known as DBS, short for Deep Brain Stimulation. This operation involves inserting two thin wires called electrodes approximately 8 cm deep into the patient’s skull, where they stimulate a small peanut-shaped region of the brain. This area, known as the subthalamic nucleus, plays a key role in movement control, from walking to grip. In Parkinson’s patients, this nucleus is overactive, which makes walking difficult. Small electric impulses help stabilise the subthalamic nucleus.

Coen Cieraad

Sense of smell

It’s been almost twenty years since Cieraad experienced the first symptoms, explains the soft-spoken Apeldoorn inhabitant the day before the operation in the mini-library of the neurology department. In was in the spring of 1999. “The garden was in full blossom and my wife Tineke said: come and smell the flowers! But I couldn’t smell a thing.” An impaired sense of smell is often one of the earliest symptoms affecting a majority of Parkinson’s patients.

Looking back, it was a clear sign, but at the time no one thought of Parkinson’s. Nor did any alarm bells go off when Cieraad started to sway when walking a few years later. In the end, it was the retired engineer’s brother-in-law who finally noticed him walking strangely, which got the ball rolling. “We made a list of all my symptoms and showed it to our GP. All of a sudden, it was clear as day.”

One reason Cieraad was diagnosed so late is that he didn’t suffer from tremor, the ‘classical’ shaking of the hands that affects approximately 50% of Parkinson’s patients. In Cieraad’s case, the disease primarily manifested as slowness and stiffness. “You develop different strategies to deal with it, like jumping up and down to get moving.”

The symptoms are not only uncomfortable; they can be quite dangerous, as Cieraad discovered for himself. Shortly before his diagnosis, he fell down stairs a few times because his legs refused to work. And he once

The OR team makes a scan of Coen Cieraad's head before the operation

almost got run over by a car – stopping moving can be as difficult as starting up.

Brain stem

Parkinson's disease involves the progressive dying off of nerve cells in the substantia nigra, a black-coloured nucleus in the brain stem. This nucleus produces dopamine, a signalling agent that plays a key role in controlling movement, but also in emotion regulation. With too little dopamine, it becomes harder to control hand and foot movements. Patients may also experience changes in cognition, mood and behaviour, such as difficulty planning, slower thinking, depression and reduced initiative.

At first, Cieraad was able to regain his mobility thanks to levodopa, a medication that restores depleted levels of dopamine in the brain. These days he has to take a pill every two hours and wear a medication patch with another drug that's absorbed through the skin. He and his wife plan their day, from mealtimes to visits, around this strict medication regime.

Now the disease has progressed so far that it no longer makes sense to increase the medication dose: the side effects are becoming too severe. Cieraad suffers from dyskinesia – constant physical restlessness, wriggling and shaking. "It's incredibly tiring, but I'm lucky because I don't get it at night." At the same time, the periods when the medication stops working are increasing in frequency and duration. "Then I suddenly feel like an old man." These developments have made him eligible for another treatment option offered at Radboud university medical center (Radboudumc): Deep Brain Stimulation.

Conscious decision

DBS is one of the last options for relieving Parkinson's symptoms without drastic side effects, explains neurosurgeon Vinke (see box on page 21) in an interview with *Vox* two weeks before Cieraad's operation. Vinke is accompanied by neurologist Rianne Esselink, Head of the Nijmegen DBS team.

Besides Esselink and Vinke, the team includes lots of other specialists: a psychiatrist, a social worker, a radiologist and an anaesthetist, as well as neuropsychologists, OR staff and a specialised nurse.

Esselink emphasises that patients and their relatives are deliberately involved in decision-making. "I always say: it's an intervention we perform together; patients and their family are part of the team. For me, optimal care

'MY WIFE SAID SMELL THE FLOWERS. I **COULDN'T SMELL A THING**'

Surgeon Saman Vink does a final check of the electrode

for Parkinson's patients means informing them in detail about the options available." For example, one alternative to DBS is a drug pump that administers levodopa directly into the small intestine. "People who make a conscious decision are usually more satisfied in retrospect – even if the treatment turns out to be disappointing."

Face mask

Tuesday morning, 12 November. In OR 4, Vinke, wearing green surgical gloves, holds a shiny 45 cm electrode from which protrude thin wires. On the tip of the electrode are four tiny dots – two single and two triple electric contact points, eight stimulation points in total.

Fine-tuning of the stimulation strength will only take place two weeks later, once Cieraad has recovered from the operation. Now the electrodes are switched off, and the focus lies on implanting them as precisely as possible. Under full anaesthesia, of course. Up until last summer, Nijmegen patients were awake during DBS to allow the surgeons to control brain functions like speech. The team discontinued this practice when it became apparent that the operation method was so precise that MRI and CT scans sufficed. Plus, it's much more comfortable for patients to be asleep, and operations now only last four hours instead of seven.

8 a.m. "Think of something nice," the anaesthetist tells Cieraad in the OR as she adjusts a face mask with a sedative over his mouth. "You're in safe hands." Vinke – short stature, dark curly hair, open expression – gets to work. He carefully disinfects Cieraad's head and screws on a blue zigzag-shaped frame, straight through the skin and into the cranial bone. He's assisted by his colleague, Ronald Bartels, Professor of Neurosurgery. In principle, one surgeon can do the entire DBS operation, explains Vinke. "But I wouldn't advise it. It's good to be able to double-check everything."

The next step is an MRI scan. The zigzag frame can be seen on the brain scans appearing on a computer screen in the consultation room. It forms a point of reference for attaching the device that will direct the electrodes, explains Vinke. "We use it to create a kind of map of the brain."

Together with Esselink and Bartels, the young neurosurgeon decides where to insert the electrodes to reach the subthalamic nucleus without problems. It's a bit of a puzzle. "No, there isn't enough room here; we run the risk of hitting a ventricle. Can you move it a bit backwards? Yes, now we're a couple of millimetres from it; that's good."

'THINK OF **SOMETHING NICE**, SAYS THE ANAESTHETIST'

Ventricles, filled as they are with cerebral fluid, should definitely be avoided, but so should blood vessels.

A frame serves as a reference for the surgeons

The electrode is inserted into the brain

If things go wrong, the result may be a life-threatening brain haemorrhage. "That's never happened in one of my operations," Vinke immediately reassures us. "It occurs at most in 1% of cases." After ten minutes, Vinke notes the target location ('x: 86.6') and the angles the electrodes have to negotiate.

Vinke has now performed approximately seventy such operations. He acquired his expertise at the National Hospital for Neurology and Neurosurgery in London. "Highly motivated and talented," is how an operation assistant describes him. At Radboudumc, the surgeon was involved in setting up the DBS centre.

A strand of spaghetti

Thirty minutes later, back in the OR. The surgeons attach a metal arc to the zigzag frame, similar to the arc on a globe. Yellow numbers and dashes line the edge. Attached to the arc is a sliding titanium cylinder with a one-millimetre hole in the centre, through which the electrode will be guided with great precision to the right location. Vinke marks with a dot the spot where the electrode will enter Cieraad's skull (top left), before slicing the scalp open all the way to the bone.

"Z 117.2?" "Z 117.2!" Vinke and Bartels check the coordinates one last time.

A drill the size of a large electric toothbrush slowly makes its way through the patient's skull. When it stops, you can see the outer grey-white brain membrane (dura mater) through a hole exactly fourteen millimetres in diameter. A small blood vessel that runs straight across the membrane is cauterised on both sides.

A minute later Vinke slides the electrode into the brain, as cosmic beeps resonate through the OR. The pitch of the sounds helps the surgeon identify which brain areas he's passing through – cerebral cortex, capsula interna, thalamus – before the electrode reaches its destination. A high tone indicates high conductive resistance, which means the electrode is moving through white matter, the connections linking different regions of the

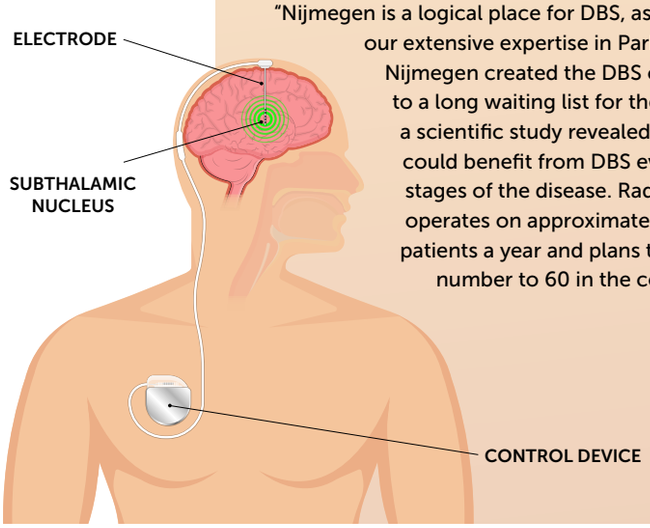
DEEP BRAIN STIMULATION (DBS)

In DBS, the subthalamic nucleus is kept in check by electric impulses, just like in a heart pacemaker. In Parkinson's patients, this region of the brain becomes overactive as a result of a dopamine shortage – leading to slowness and stiffness. Neurosurgeon Vinke: "Think of it as driving a car while constantly hitting the brakes."

Not all patients are eligible for DBS, explains neurologist Rianne Esselink. "Patients must be 75 years old or younger, have been diagnosed at least 4 years previously, and experience fluctuations in medication effectiveness throughout the day, including times when medication doesn't work, and dyskinesia. At the same time, they must still be responsive to medication, since they will need to continue taking it after DBS."

Last year, Esselink and her team started offering DBS at Radboudumc, in close collaboration with the Maastricht University Medical Centre. At the time, the operation was only performed in a few other locations in the Netherlands.

"Nijmegen is a logical place for DBS, as we're known for our extensive expertise in Parkinson's disease." Nijmegen created the DBS centre in response to a long waiting list for the operation after a scientific study revealed that patients could benefit from DBS even in the early stages of the disease. Radboudumc now operates on approximately 40 Parkinson's patients a year and plans to increase this number to 60 in the coming year.



An operating assistant checks whether the CT scanner is available

'THE DISEASE PROGRESSES BUT I GET **A REPRIEVE**'

brain. Cerebral nuclei – grey matter – generate low tones. The electrode's journey causes minimal damage to nerve cells, explains Vinke: "It's a bit like trying to pierce a single strand of spaghetti with a fork: not likely to happen." The patient also suffers relatively little external damage: three small wounds (from 5 cm to 10 cm) are the only reminders of the operation.

A fiddly job

Fifteen minutes after the electrode has been positioned, it's followed by a second one, this time in the upper right-hand area of the skull. Small plastic plugs under the skin are used to close the openings and keep the electrodes in place. The surgeons push down the wires sticking out from Cieraad's head under his skin all the way down to the right clavicle. It's not easy with all the muscles and tendons. "That was hard," Bartels sighs when he finally succeeds after a few minutes.

This fiddling under the skin is essential. It makes for a more aesthetic result and – more importantly – prevents infection. The device stimulating the electric impulses is also implanted in the body. Vinke places it under the chest skin. The stimulator's batteries can be charged remotely, like charging mats for mobile telephones.

We're almost done, but the team still has to check that the electrodes are positioned correctly. To find out, the OR staff bring a still-sedated Cieraad back to the CT scanner.

Bartels colours the electrode dots on the CT scan green and places them over the first MRI. The coloured dots appear at the bottom of the subthalamic nuclei – exactly as planned. Bartels calls Vinke to confirm that there's no need to go back to the OR. It's 12.15 p.m. Cieraad can be moved to the recovery room. The operation was successful.

Fine-tuning

As he leaves the hospital two days later, Cieraad sounds mostly relieved. "It's scary to think they're working inside your head. And what if you're the 1% that goes wrong?" All he feels is some pain on the top of his head, but it's easy to control with paracetamol. He has no recollection of the operation.

But Cieraad knows that the hardest part is still to come: fine-tuning the electric stimulator. In two weeks, he's expected in Nijmegen to start the treatment, which can last up to six months. And even if the DBS is perfectly calibrated, he'll still need his Parkinson's medication, albeit a lower dose than before. "DBS is no magic bullet," Vinke told us earlier.

But Cieraad can expect his quality of life to improve – and that's the most important thing as far as he's concerned. The small overactive nuclei on both sides of his brain can stabilise, without side effects like dyskinesia. Cycling, walking and visiting friends should all become easier than they were. "It's all about winning time. You can't turn back the clock – the disease continues to progress, but I've been given a reprieve."

Three weeks after the operation, Cieraad describes his recovery as "exceeding expectations." His wounds have healed and he has no more pain. The electrodes are switched on. Although the current flow still has to be adjusted correctly ("That's done step by step. It's an intensive process"), Cieraad is already noticing the effects. He finds it easier to move and is less troubled by both stiffness and excessive movement. When it comes to medication, he's now taking a quarter of the dose that he needed before the operation. "Every day I feel glad that I had the operation." ✱

A video report of this brain surgery can be found on voxweb.nl

50,000 PATIENTS

There are currently over 50,000 Parkinson's patients in the Netherlands, according to figures by ParkinsonNet. This national network, originally established in Nijmegen, unites healthcare providers specialising in Parkinson's disease. The number of Parkinson's patients is increasing by approximately 4% a year, partially due to the ageing population. This makes Parkinson's the second most common neuro-degenerative disorder in the Netherlands, after Alzheimer's.
Parkinson's disease cannot be cured, although the symptoms – which worsen over time – can be controlled with medication. The best treatment differs from patient to patient: there's no panacea that works for everyone. The life expectancy of Parkinson's patients is not shorter than average, although they are at increased risk of developing other neurological diseases like dementia.

NEWS FROM THE UNIVERSITY STUDENT COUNCIL AND THE WORKS COUNCIL
www.radboudnet.nl/medezeggenschap
www.numedezeggenschap.nl

POINT TAKEN!

University Student Council

Focus

It's not always easy to really focus on something. With the first week of exams behind us, we probably hardly need to tell you this. Funnily enough, it doesn't just apply to studying. At the University Student Council, we've also had trouble finding our focus during this first quarter. While the average student runs the risk of being distracted by beeping smartphones, slightly too convivial gatherings, or Netflix series, we were distracted by a meeting about study workplaces, a brainstorming session on work pressure among lecturers, a discussion on the social safety memorandum, and a dialogue on language courses.

Humdrum

Don't get me wrong, all these talks were very useful – the analogy with Netflix doesn't really apply, but the daily humdrum sometimes prevents us from devoting time to topics that are really important to us.
Time to change this. This is why we've decided to pick a few topics to focus on, so that we're less easily distracted by things that have lower priority.
This turned out to be easier said than done. Because focusing on one thing always means letting something else go. And that's not so easy to do. But following a productive meeting (might take a few hours, but then you've got something to show for it!), we've figured it out.

USR themes

Where teaching is concerned, USR will focus on the binding study advice (BSA), sustainability in education, and the use of digital resources. With respect to active student life, we'd like the University to encourage students to take part in extracurricular activities and to facilitate this by being more flexible about study obligations and offering more financial compensation. Finally, we will work towards creating a lively, green Campus, and in this context we will focus primarily on facilities like outdoor workplaces, but also room for sports and culture. We'll also work towards creating more student accommodation on Campus.
All in all, enough to do. Now we just have to hope that we can stay focused, because one thing is sure: there's bound to be more distraction coming our way. In fact, we've asked for it ourselves: at our request the previously mentioned social safety memorandum is to be reformulated to better address the needs of students. Very interesting, but not one of our focus points.

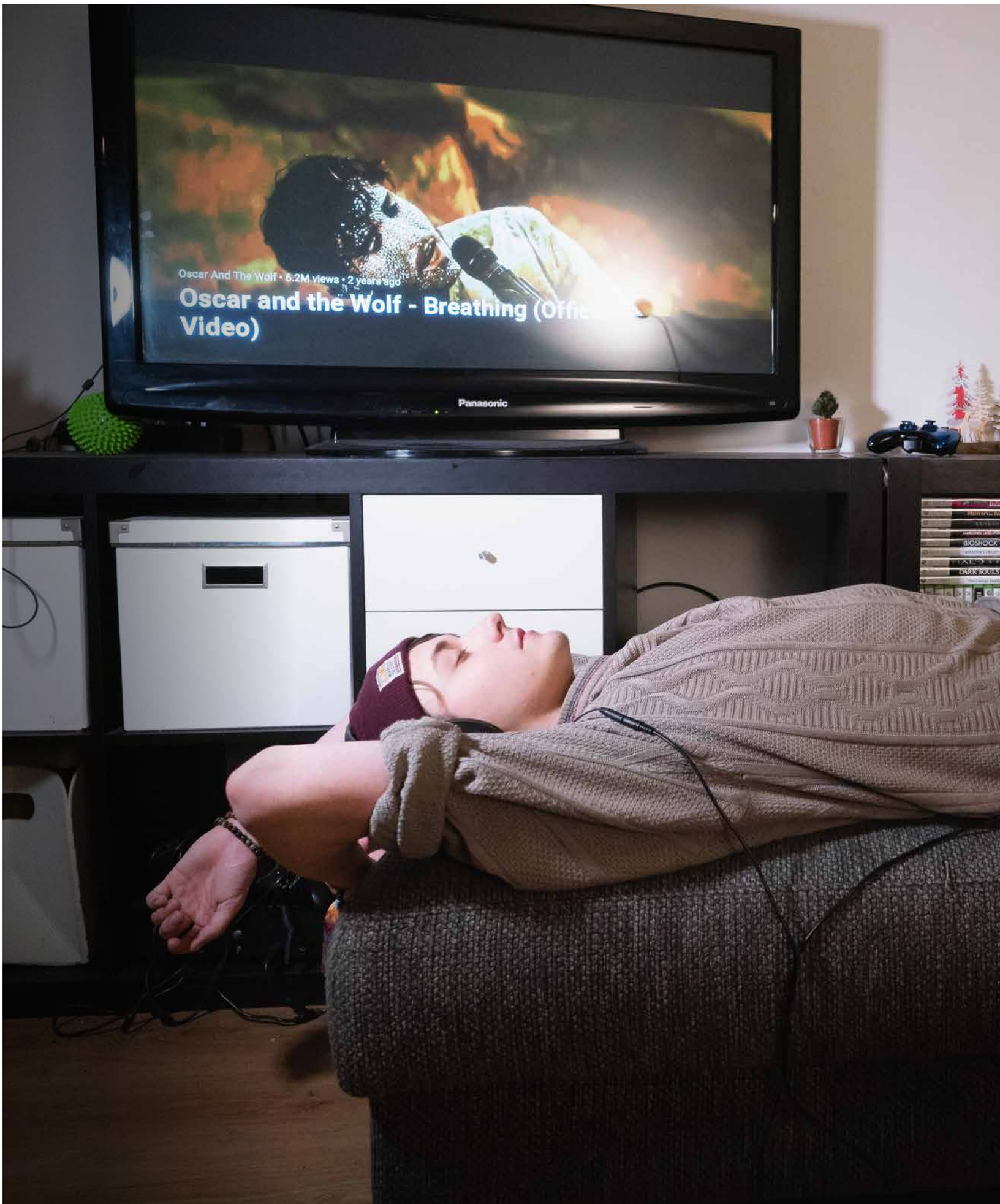
The USR members can be reached at usr@ru.nl, or in their office in TvA1.

Works Council

Social safety

The Works Council (OR) has responded in detail to the new social safety plan presented by the Executive Board. Social safety is a crucial topic affecting the entire university community, and the Works Council is pleased to see that the Executive Board is taking it seriously. The new plan gives a clear definition of unwanted behaviour and makes managers responsible for addressing it. The Works Council appreciates this clarity, but would like to add that communication within the University regarding confidential counsellors and relevant regulations can and must be improved. The Executive Board has agreed to work towards clearer communication on this matter.
In addition, many of the resources work in retrospect, while it's essential to prevent socially unsafe situations. This requires a cultural shift. In the meeting, spokespersons from the Works Council (OR) and the University Student Council (USR) shared sometimes shocking examples of unwanted behaviour they had personally experienced. They showed in a dramatic way that unwanted behaviour can occur among colleagues, between staff members and students, and among students.
Managers should not only learn how to address unwanted behaviour, but also how to prevent socially unsafe situations, and how to use behaviour and norms to create a safe environment and space for discussing problems. This calls for a new University-wide awareness campaign, together with an investigation into how we can improve our organisation so that people are structurally less vulnerable to power abuse. Finally, training is needed so students and employees know how to respond when they witness unwanted behaviour.

Contact: Arnoud Lagendijk, a.lagendijk@fm.ru.nl


Oscar And The Wolf • 6.2M views • 2 years ago
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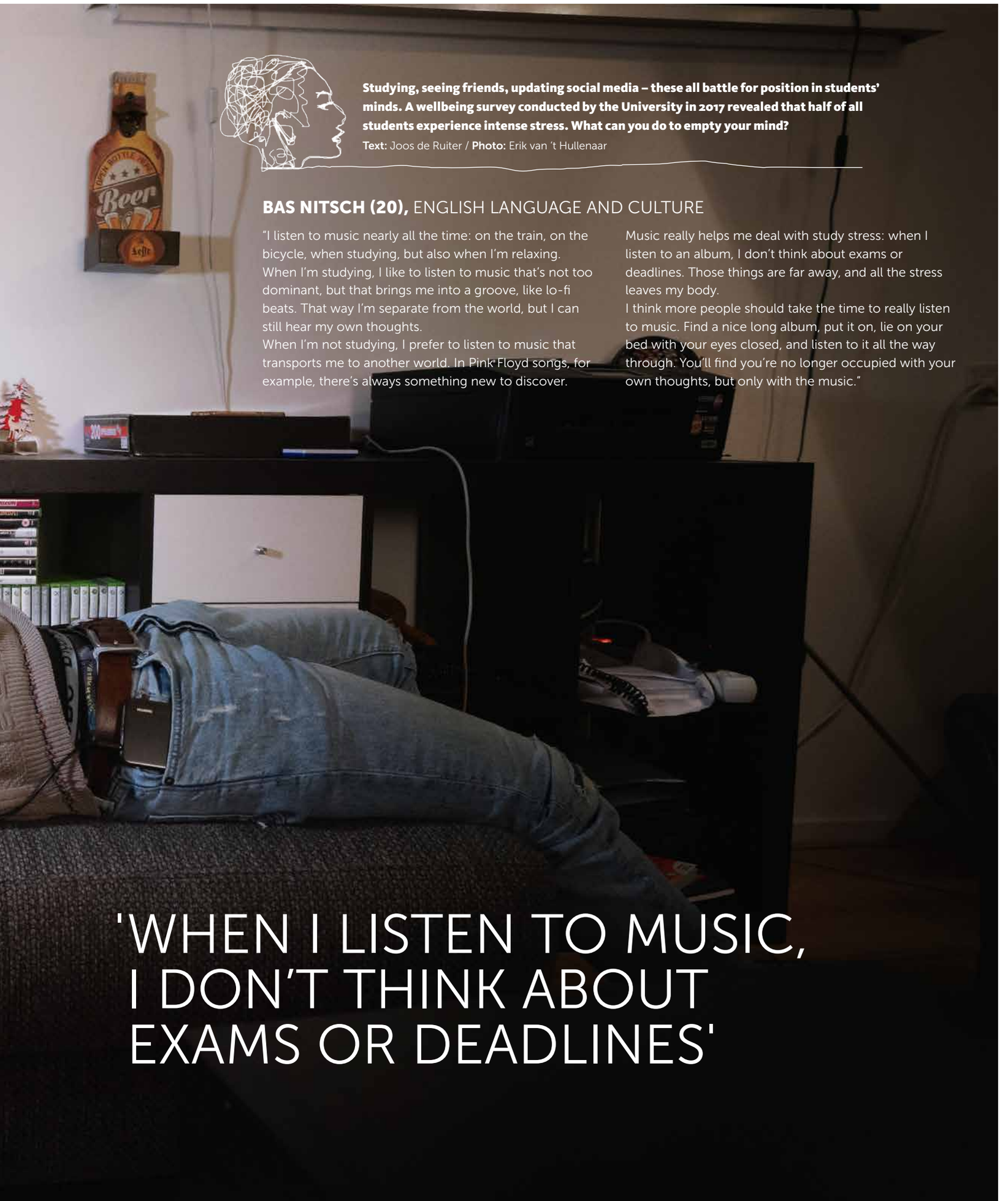


Studying, seeing friends, updating social media – these all battle for position in students' minds. A wellbeing survey conducted by the University in 2017 revealed that half of all students experience intense stress. What can you do to empty your mind?

Text: Joos de Ruiter / **Photo:** Erik van 't Hullenaar

BAS NITSCH (20), ENGLISH LANGUAGE AND CULTURE

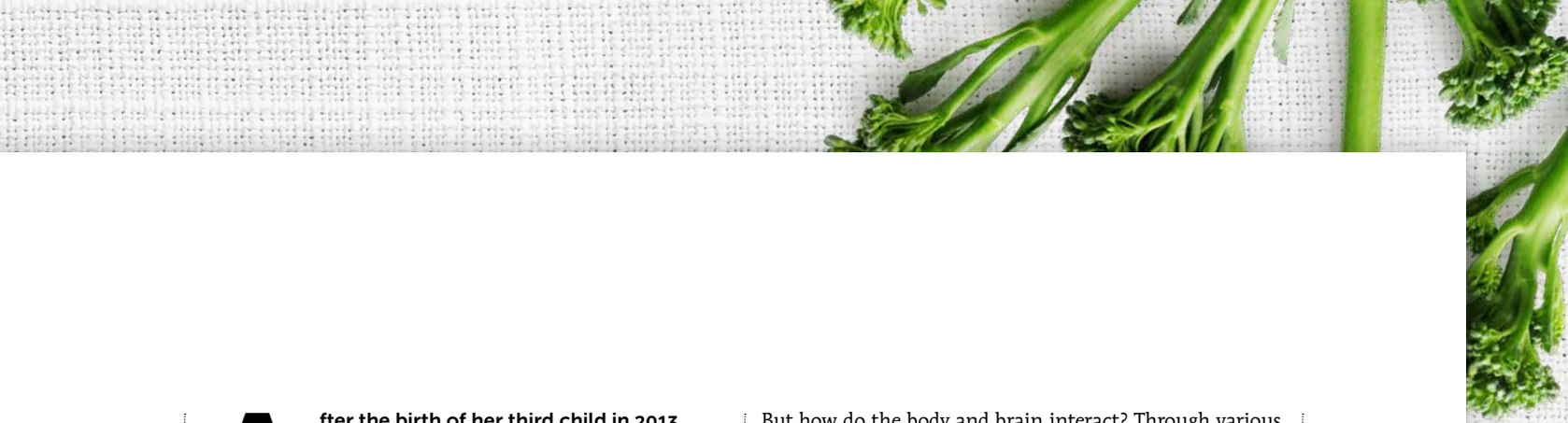
"I listen to music nearly all the time: on the train, on the bicycle, when studying, but also when I'm relaxing.
When I'm studying, I like to listen to music that's not too dominant, but that brings me into a groove, like lo-fi beats. That way I'm separate from the world, but I can still hear my own thoughts.
When I'm not studying, I prefer to listen to music that transports me to another world. In Pink Floyd songs, for example, there's always something new to discover.
Music really helps me deal with study stress: when I listen to an album, I don't think about exams or deadlines. Those things are far away, and all the stress leaves my body.
I think more people should take the time to really listen to music. Find a nice long album, put it on, lie on your bed with your eyes closed, and listen to it all the way through. You'll find you're no longer occupied with your own thoughts, but only with the music."

'WHEN I LISTEN TO MUSIC, I DON'T THINK ABOUT EXAMS OR DEADLINES'

MORE VEGETABLES, FEWER ANTI-DEPRESSANTS

Bad food makes you fat. Everyone knows that. What is not so well known is that diet also impacts our brain and therefore our mental health. Will dietary guidelines allow us to dispense with Ritalin, antidepressants and other drugs in the future?

Text: Mathijs Noij / Photo's: Julie de Bruin, Getty Images



After the birth of her third child in 2013, Sara Bosman developed all kinds of physical symptoms, from joint pain to persistent fatigue. The cause of her symptoms was a mystery: no doctor could give her a diagnosis.

Bosman, who worked as a Clinical Psychologist and Behavioural Therapist in Flanders, decided to investigate the matter herself. "I came across a book by American physician Terry Wahls. An MS patient, she originally ended up in a wheelchair, but was able to overcome her disease on her own." Wahls' solution? She radically transformed her diet and paid careful attention to the food and nutrients she consumed. Six months after starting on her new diet, she had exchanged her wheelchair for a mountain bike. Wahls has since become a symbol of hope for patients with autoimmune disorders like MS.

This story inspired Bosman to switch to a different diet, one focused on vegetables, nuts, and healthy fats from walnut and olive oil, avocados and seeds. "I used to eat a lot of bread and pasta, and like many people, I was addicted to sugar." Within a short period of time Bosman's symptoms melted away like snow, she felt less irritable, her mood improved, and she was motivated to exercise more and start all sorts of projects.

In 2017, having followed an American online course in Nutrition Psychology, Bosman founded the Centre for Nutrition Psychology. Since then she's been teaching courses and using her knowledge of nutrition to help others. "There are quite a few nutrition psychologists out there, but most of them look at how well-being affects people's eating habits. We turn this around: what kinds of foods can you eat to feel physically and mentally well?"

Leaky gut

Bosman is not alone in her belief that food plays an important role in our mental health. A growing number of researchers are convinced that healthy nutrition is an important factor not only for a healthy body, but also for a healthy mind. In their opinion, diet impacts a variety of mental illnesses, from anxiety disorders and dementia to depression and ADHD.

Esther Aarts, neuroscientist at the Donders Institute, knows about these studies and takes them seriously. "Researchers no longer believe that our brain is completely separate from the processes occurring in our body."

But how do the body and brain interact? Through various kinds of processes in our body. An important role is played by the intestines. Aarts explains that a healthy diet contributes to an intestinal wall that remains nicely sealed. "When that's not the case, we say people suffer from a leaky gut, which means bacterial particles can enter the bloodstream through the intestinal lining. This causes inflammation in our body and in our brain."

To combat this inflammation, our body is forced to use substances that are also needed for other physical processes, for example to create important brain chemicals like neurotransmitters. Take serotonin, which stimulates memory, self-confidence, mood and libido. Or dopamine, which makes us feel satisfied and rewarded, for example after a long day of hard work.

'I USED TO EAT A LOT OF BREAD AND PASTA AND I WAS **ADDICTED** TO SUGAR'

People with raised levels of inflammatory markers in their body produce too little of these brain chemicals, and may as a result suffer various negative consequences. Aarts: "We see this, for instance, in people who suffer from depression, but also from obesity or age-related illnesses. Many people who suffer from these illnesses have walked around for a long time with raised levels of inflammatory markers in their blood."

But the gut's influence goes further than this. Aarts mentions Parkinson's disease. Increasingly, research shows that the gut forms a breeding ground for this disease, which results in the accelerated die-off of brain cells. For example, researchers at the Johns Hopkins Hospital in Baltimore injected a protein that is associated with the onset of Parkinson's disease into the intestines of mice. They then observed the effects on the brain: the mice developed symptoms typical of Parkinson's. Apparently, the disease was able to move from the gut, via the nervous system, into the mice's brains.

A spectacular finding, Aarts agrees. At the same time, as is often the case with highly promising new research, the results are made to look more dramatic than they are – as if we have now discovered a cure for Parkinson's.

There are, for instance, high hopes for drinks containing living bacteria that have a beneficial effect on our guts. "We call them probiotics. But it's not yet clear whether everybody benefits from drinking them. We've studied the effect of probiotics on healthy students, and observed no effect on the brain or on behaviour. It was only when students were under stress that probiotics became effective." According to Aarts, it's therefore more likely that people who already experience problems will benefit from probiotics, but even then: not everyone, and not everyone in equal measure.

ADHD

One disorder that is extensively studied in Nijmegen – and for which researchers are specifically focusing on nutrition – is ADHD. At Karakter, the centre for Child and Adolescent Psychiatry, researchers are conducting a large-scale study on children who suffer from ADHD to see how diet can reduce their symptoms.

As early as 2011, researcher Lidy Pelsser concluded in her PhD, which she defended at Radboud University, that 60% of children suffering from ADHD would greatly benefit in the short term from following an elimination diet, in which different foods are systematically eliminated. Karakter's current study, TRACE, builds upon this work, though the researchers are mostly interested in the long-term effects of dietary guidelines and the underlying biological mechanisms.

To this end, researchers compare two diets: a balanced diet and an elimination diet. The latter involves eliminating foods that may trigger ADHD symptoms. After a couple of weeks, these foods are reintroduced into the children's diet one by one, until the symptoms return. This is seen as a sign that a recently added food plays a role in the onset of symptoms. "This can differ per individual child," says researcher Margreet Bierens.

'IT'S **OUTRAGEOUS** TO SEE HOW MANY PEOPLE ARE PRESCRIBED ANTI-DEPRESSANTS'

The children who take part in the study are closely monitored – by means of behavioural observations, physical examinations, brain scans, and analysis of blood and faeces – and the researchers hope this will help them obtain a good idea of all the crucial physical processes and how they are impacted by food. "What works for which child and why? Which diet works better: a balanced diet or an elimination diet? And which diet are children most likely to stick with? These are all questions we hope to answer," says fellow Karakter researcher Annick Bosch.

With the TRACE study, Bosch and Bierens hope to lay the foundations for a more effective and customised treatment of children with ADHD. Researchers note that there's a great demand for it as a growing number of parents are reluctant to give their children medication, and because medication doesn't always have the desired effect. "A change in diet could form a scientifically validated alternative."

Alternative to medication

Sara Bosman confirms that dietary changes can offer an alternative to medication for many people. "It's outrageous to see how many people are prescribed anti-depressants. Don't get me wrong: I'm not against using medication, but only when all other solutions have been ruled out."

NATIONAL NUTRITIONAL GUIDELINES

The first Food Pyramid dates back to 1953 and was intended as a guide in times of food shortages. Cod liver oil was one of the recommended foods. The Pyramid was last revised in 2016, when we were advised to eat more vegetables and less meat, especially red meat. It is healthy to eat a handful of nuts a day, and legumes have been moved to the protein section, alongside meat and fish. Coffee is fine, provided you don't add sugar.

Bosman pleads for what she calls an integrative approach: she doesn't have a ready-made protocol for all patients, but looks instead for underlying mental and physical causes and possible treatments. Every person is different. "One approach might be to combine psychotherapy and lifestyle changes. More exercise, eliminating stress factors, taking a walk in the woods on a regular basis, or a change in diet – all these can contribute to positive change." According to the Flemmish psychologist, only once these adjustments turn out to be inadequate should we consider introducing medication.

This kind of integrative approach may also include food supplements, although we shouldn't expect too much in terms of their effect. Bosman: "We have clever pills containing vitamins and minerals that many people lack, like vitamin D, zinc and magnesium. But in a supplement, these substances are isolated. In food, they come with enzymes to help digestion and absorption in the blood. Also, food may also contain substances that we aren't aware of yet. Ultimately, nature is smarter."

Bosman believes supplements are needed when deficiencies are so severe that people cannot eat enough to compensate for them. Because of these deficiencies, the brain may produce too few brain chemicals like serotonin – with the resulting consequences. And someone with not enough amino acids in their blood will crave sugar (there goes another chocolate bar!). According to Bosman, temporarily raising the level of amino acids with supplements can help break the negative cycle in people's diet.

'WHAT'S GOOD **FOR YOUR HEART** AND GENERAL HEALTH IS ALSO GOOD FOR YOUR BRAIN'

Sugar craving

But what is a healthy diet? According to Aarts, if you stick to the Food Pyramid of the Netherlands Nutrition Centre, you're doing quite well already. "What's good for your heart and general health is also good for your brain," says the neuroscientist. As little processed food as possible, lots of vegetables, fruit and wholemeal products.

Nutrition Psychologist Bosman thinks the government should make its recommendations a bit more radical, or at least customise it to individual needs. "The Food Pyramid is fine for most people, but not for everyone." She believes traditional nutritionists often try to compromise. "They don't want to tell diabetes patients to stop eating bread. And this while adopting a diet that suits them – i.e. one without bread – could often completely eliminate their symptoms."

Esther Aarts agrees nutritional advice should be more customised, but also sees the danger in this for an organisation like the Netherlands Nutrition Centre, because its message can become too complex. "Personalised medicine is a trend. I can imagine nutrition moving in a similar direction. We could make the Food Pyramid more specific for different groups or even for individuals – for example, a child with ADHD who doesn't respond well to a food that's part of a healthy diet for other people."

This is because the science of body, brain and nutrition is still developing. "We used to look primarily at specific nutrients, but now we focus on dietary patterns as a whole and the interaction between all foods. Not to mention the effect of environmental factors." Aarts tells us that she recently applied for a major grant to conduct a study to investigate lifestyle as a whole.

Because we still have a lot more questions than answers. Aarts: "We still know very little about the mechanisms behind the impact of food. Who benefits from a specific treatment, and who doesn't? And why? Can we explain it by looking at the brain? These are questions I'd like to be able to answer." *

'WHEN YOU DANCE, THERE'S NO ROOM FOR OTHER THOUGHTS'

Studying, seeing friends, updating social media – these all battle for position in students' minds. A wellbeing survey conducted by the University in 2017 revealed that half of all students experience intense stress. What can you do to empty your mind?

Text: Joos de Ruiter / **Photo:** Erik van 't Hullenaar

NINA GEURTS (19), PSYCHOLOGY

"I've been dancing hip hop for twelve years now. Hardly a week goes by when I don't dance: I have lessons every week and practice in my room in between. When I'm feeling stressed, dancing helps me. When you dance, you have to really focus on your steps, the group, and the music. There's no room for other thoughts. The day after a dance lesson I'm completely relaxed and I can see things more clearly. Then the stress slowly builds up again. If I can't dance for two weeks I get restless – I really need it. It also gives me a feeling of satisfaction. If I perform a dance exactly as I want, I feel really good. Especially because for me, dancing is a group activity: when we dance well, it's something we've achieved together. I think everyone should have a weekly activity that allows them to focus fully on something they enjoy. It really helps."

COMPUTERS STILL NOT SELF-AWARE

We often hear about doom scenarios where highly advanced killer machines outsmart humanity and dominate the world. How realistic are these scenarios?

Text: Marit Willemsen / **Photo:** Getty Images

A hyper-intelligent robot is not so easy to eliminate, as anyone who has seen a *Terminator* film knows. This science-fiction series – with Arnold Schwarzenegger in the role of killer robot – describes a bloody battle between humans and machines.

And where does it all go wrong? With artificial intelligence (AI). The first film shows the American army developing a self-learning computer system named Skynet. Less than a month later the system becomes self-aware and tries to exterminate mankind.

But Terminator is more than a film franchise with cult status. Since the first film came out in the 1980s, the series has shaped how we perceive artificial intelligence (AI). For the general public, the term is inextricably linked to the image of the homicidal robot, world domination by computers, and a post-human era. And some scientists actually perpetuate this image. In 1993, American mathematician and computer scientist Vernor Vinge wrote an essay, in which he stated that the exponential development of artificial intelligence would lead to systems outsmarting humans as early as 2030. How realistic is this scenario? Will AI ultimately – be it in ten or one hundred years – outwit us?

Deep Blue

"I always say AI refers to computer systems that can do things we thought only humans could do," says Tom Heskes, Professor of Artificial Intelligence at the iCIS (Institute for Computing and Information Sciences) at the Faculty of Science. There is, in fact, no such thing as AI, because as soon as we teach a computer system something 'human', we call it technology. Heskes: "Deep Blue, a chess-playing computer developed about twenty years ago is no longer considered to be AI. And I bet today's AI will simply be called statistics in twenty years' time."

While Heskes represents the technical side of AI, at the AI department of the Faculty of Social Sciences cognition scientist Iris van Rooij investigates how human cognition can be 'captured' in algorithms. "The idea behind artificial intelligence is that you can describe intelligence using formulas or instructions, which you can then shape into a physical form," she says. For example in the form of computers. Or killer robots.

Heskes: "AI is already outperforming people in some tasks." Radiologists in hospitals are assisted in evaluating scans by artificial intelligence via deep learning (see box). AI can recognise metastases at least as well as medical experts. This was shown among others by Nijmegen Professor of Functional Image Analysis Bram van Ginneken two years ago in a publication in the scientific journal *JAMA*.

Holy Grail

Is it inevitable that the development of artificial intelligence leads to the construction of a killer robot? Absolutely not. Everything that is currently possible with AI falls under 'narrow AI', i.e. systems that focus on a single task. Real

intelligence involves much more than this. Because no matter how good a computer is at playing the game Go, it can still only pull off the one trick. “The point is: there’s no self-awareness,” says Professor Marcel van Gerven, Head of the AI Department of the Faculty of Social Sciences. “AI systems are just statistical models that deal with information in a very clever way.”

Cognitive Scientist Van Rooij illustrates the concept of intelligence. “Imagine you want to buy a house. You can translate this decision into a mathematical algorithm that weighs up the pros and cons. But it’s the scientists, not the computer system, who decide which factors are relevant – like location, number of rooms, or a child-friendly neighbourhood. The algorithm itself doesn’t think: How will I decide? Defining the problem is part of our human intelligence. And this is what’s so difficult to capture in an algorithm.”

It’s precisely this aspect of intelligence, self-awareness, that’s required to build a hyper-intelligent killer robot. Or, slightly less evil: a system that thinks like people, one we can genuinely make contact with. This is usually referred to as general AI. “These are AI systems that can – in the right environment – respond to information in an intelligent manner,” explains Van Gerven. “The Holy Grail of AI research,” says Van Rooij.

Are we already capable of creating systems like this? The answer is no. “Researchers are doing their best, but they’ve got no idea how to create a general AI system,” says AI Professor Heskes. However, Van Gerven, Van Rooij and Heskes all believe general AI is in principle possible. Although researchers still have difficulty capturing some aspects of our cognition in formulas, progress is slowly being made. Take curiosity. Van Gerven shows a video of a robot following with its ‘eyes’ a human hand holding a blue cube. “This is curiosity,” says Van Gerven. Registering new information and wanting to know what it is. “Some researchers find the idea of general AI unrealistic,” he says. But even just working towards it is interesting. “It helps us understand how our brain works. And it leads to more robust and more adaptive AI systems.”

Humanoid

What about all the advanced AI systems we read about in the media? Think of Sofia, a robot shaped like a woman’s head which engages in dialogue with enthusiastic presenters on TV. It’s just a voice control system like Siri, but with a face, explains Van Rooij. A similar example is a robot arm that can solve Rubik’s Cubes at incredible speed – she shows us a video. “This is misleading. The robot isn’t solving anything; the solution is pre-programmed.” In summary, says Van Rooij, these are just technological tricks that look like AI to the general public.

How long before we develop general AI? None of the experts want to pin themselves down. You can’t predict this because creating self-awareness in computer systems requires some kind of revolutionary idea.

In the meantime, society already fears the potential excesses of general AI. Think of computers that can program themselves. Heskes gives an example of a potential AI disaster: “Imagine we ask computers to solve worldwide famine, without setting any restrictions. The ‘smart’ computers come up with a solution – exterminate all mankind – and put arms robots to work in automated factories that humans can’t access or control.”

These are the kinds of doom scenarios that the three researchers are tired of. “These scenarios are much less dangerous than the risks with existing AI,” says Heskes. “For example, we can already create swarms of drones that shoot automatically. This danger is far more real than the idea of computers dominating the world.”

Or consider the fact that the data may be biased, says Van Rooij: “Amazon trained systems to select employees based on previous candidate selections. This led to racist and sexist algorithms. Risky, because people think of algorithms as objective.” This is why the Nijmegen AI department is also investigating the social implications.

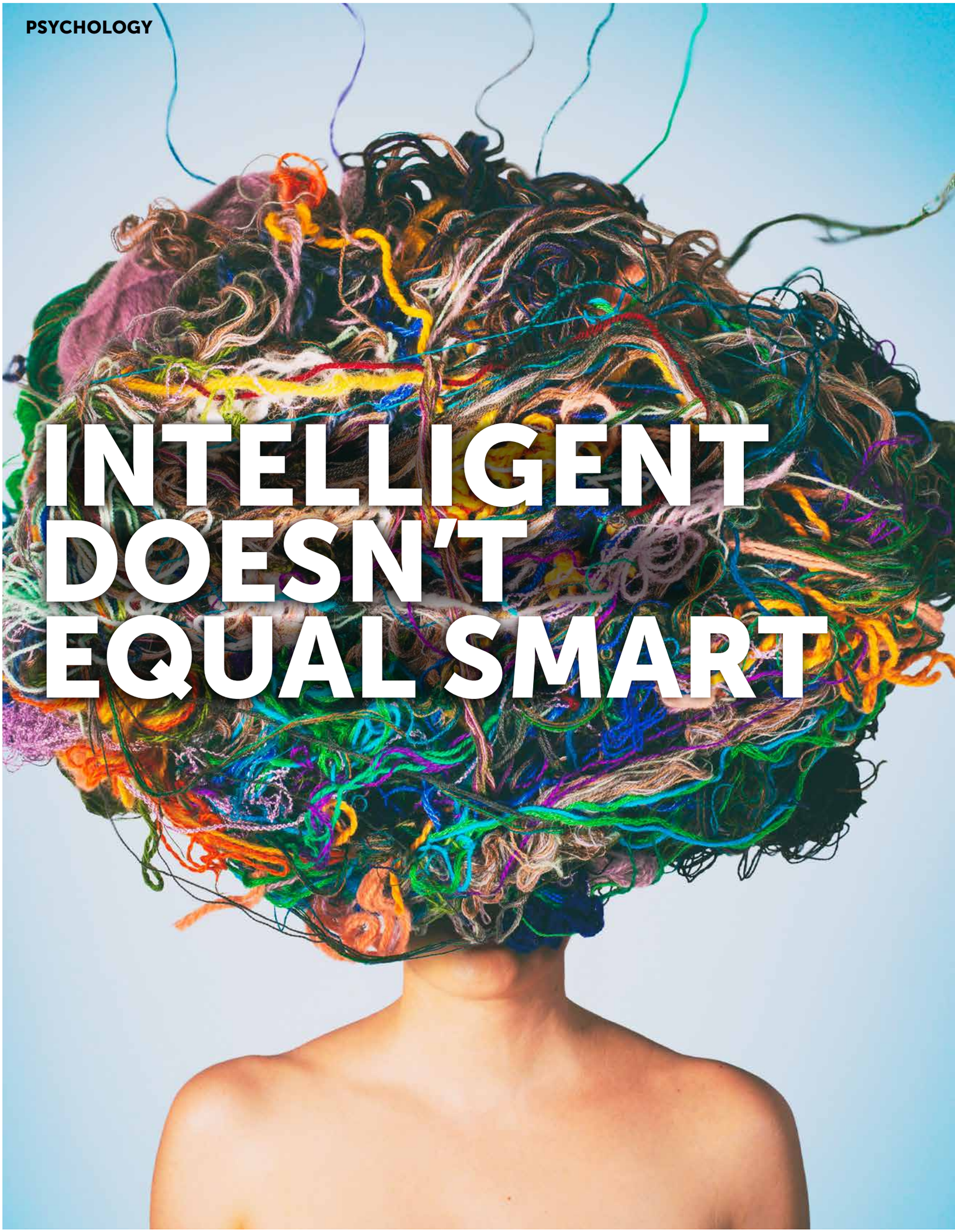
The fear of killer robots is completely unfounded, at least in the near future, says Heskes, putting things in perspective. “The odds are far greater that humanity will succumb to other threats than computer domination. Think of climate change, atomic bombs, or meteorites.” *

MACHINE LEARNING

Machine learning is one of the most popular forms of AI. It was developed in the 1980s – coinciding with the release of the first *Terminator* film. “Machine learning means computers learn when ‘fed’ data,” explains AI Professor Tom Heskes. Think of spam filters: if you mark e-mails as spam, the next time they are sent automatically to the spam folder.

Deep learning is a common form of AI these days and is used, for example, to assess medical scans. This form of machine learning is based on the functioning of the neural networks in our brain. The computer ‘learns’ autonomously which features to pay attention to. Deep learning is popping up all over the place. Think of the face and voice recognition software in your smartphone, or deep fakes, which involve an algorithm that creates realistic fake videos by combining video and other images. Suddenly, there’s former President Obama giving a speech that was in reality given by someone else. Heskes: “Deep fakes can really fool us already.”

'PEOPLE THINK OF ALGORITHMS AS **OBJECTIVE**. THAT’S RISKY'



INTELLIGENT DOESN'T EQUAL SMART

When do we say someone is really intelligent? Although there are many ways to measure intelligence, none are ideal. 'Intelligence is more than a test you complete at a desk.'

Text: Jozien Wijkhuis / **Photo:** Getty Images

In BNN's 2007 *National IQ Test*, singer Bonnie St. Claire scored 52 points. This meant she scored lower than an orangutan, which scored 75 points. The singer herself said her low score was due to a broken voting box and demanded a rectification, arguing that a low IQ would harm her reputation. "Because of this I'm condemned to being seen as a dumb alcoholic blonde for the rest of my life," she told *De Telegraaf*.

Singers are not the only people who attach value to intelligence. The concept plays an important role in our society, from schools and companies to dating sites, where intelligence is a quality people consider desirable in a potential partner. Or think of artificial intelligence, a development that suggests that there is such a thing as human intelligence.

But what is intelligence exactly? Is it getting high grades? According to the Van Dale dictionary, an intelligent person is 'quick on the uptake' and has a high 'mental capacity'. But the question of what falls under these descriptions is not easy to answer, even for researchers. And intelligence is also hard to measure.

Periodic table

"Intelligence is a complex and wide-ranging concept, and everyone has an opinion about it," says Loes van Aken, Lecturer in Clinical Psychology. Which is not to say there are no well-defined theories of intelligence, she emphasises. For example, the Cattell-Horn-Carroll theory, CHC theory for short, which has been developing since 1985, when the three authors first combined their earlier studies into methods for measuring cognitive skills.

"The result looks a bit like a periodic table of elements, the kind that used to hang in your chemistry classroom," says Van Aken. "Every box contains a different component of intelligence. CHC covers how good a person is with language, how fast they process information, how strong their motor skills are, etc. In addition, the system also takes into account reaction speed." Emotions don't yet have a clear place in the CHC model, though they're slowly being included. "It's a model in progress; think of it as the latest state of the art."

Eat fish

Another way to look at intelligence is the IQ test, the best-known intelligence test in the world. You can complete an IQ test in a clinical setting, but also on the Internet or in front of the TV, as in the annual BNN test. The most common variants are the WAIS and the children's version WISC. Both tests are updated on a regular basis; we're currently using WAIS-IV and WISC-V.

'I'LL BE SEEN AS A DUMB ALCOHOLIC **BLONDE** FOR THE REST OF MY LIFE'

The IQ test is not uncontroversial. In 2018, Professor of Public History David Olusoga wrote an opinion article in *The Guardian* with the revealing title *If we were really smart, we'd*

CLEVER FARMERS

Van Dale dictionary describes 'common sense' or 'horse sense' (*boerenslimheid* in Dutch, literally meaning 'farmer's sense', translator's note) as 'cunning' or 'cleverness'. It usually means someone who manages fine in life without diplomas or financial resources. The word also refers to those who oppose the elite: the common man with his simple education versus the rich man in a suit with his privileges and expensive study programmes. For example, an article published in *Historisch Nieuwsblad* entitled *Boerenslimheid tegen Britse overmacht* ('Farmer's common sense against British supremacy') describes how two small Boer Republics in South Africa successfully resisted British rule for many years.

ANYONE CAN FLY

Really clever criminals appeal to our imagination. One example is Frank William Abagnale Jr, an American who defrauded banks of an estimated total of two and a half million dollars in the 1960s. He flew for free to more than 25 countries by impersonating Pan Am pilot Frank Williams, with the help of a stolen uniform and fake flying license. In those days, pilots could fly for free with all airlines. Abagnale then impersonated a paediatrician for a period of eleven months, working as chief resident paediatrician in a hospital, and avoiding discovery by getting interns do his work for him. He was finally arrested and served sentences in France, Sweden and the US. He was later conditionally released in exchange for helping the US government and banks combat fraud. His extraordinary life story inspired the film *Catch me if you can* (2002), with Leonardo DiCaprio in the role of Abagnale Jr.

get over our fixation on the IQ test. The article was written in response to a decrease in IQ scores worldwide and the resulting assumption that we are getting dumber. Olusoga argues that "Although modern IQ tests are much more sophisticated than those developed by [Alfred] Binet in the early 20th century, so many factors have been shown to influence the results – everything from eating fish once a week to simply practising the types of questions in the test." According to critics, IQ is therefore not a meaningful, stable and reliable measure of intelligence.

The test is also problematic when it comes to ethnic and cultural diversity. This is a well-known problem in the US, where Californian schools stopped giving the test to Afro-American children, because it fails to match their experience. In the famous podcast Radiolab Afro-American Psychologist Brandon Gamble gives the example of the question "What should you do if you find a wallet in the supermarket?" The correct answer is "Take it to the shop manager", but Gamble says that he'd never give this answer. "It's the last thing I'd do. Before I know that I'll be accused of something." He argues that this applies to many non-white Americans, including children.

In the Netherlands, we also don't have a good IQ test for people who are, for example, not fully fluent in Dutch, which clearly doesn't mean they have a low IQ. "This doesn't mean the IQ test is completely useless for this group," says Van Aken. "You can ask people to complete the questions without text, using images and sums. But images can also contain invisible cultural biases we're not aware of. We don't have a test of the same quality that works for these groups." In her opinion, this means adjusting the test as best you can for individual cases. "You have to be very careful and precise when interpreting the test results."

Planning

Van Aken uses the IQ test in her work as a psychologist, but she's also done some research on it. "I work as researcher and psychologist at the Vincent Van Gogh Centre (a GGZ institution in the Southern Netherlands, Eds.), where we mostly see people whose treatment has come

'WE HAVE TO **LOOK BEYOND** IQ SCORES'

to a standstill because it's unclear what's going on," she explains. "One of the things we usually do is run an intelligence test."

For her research she compared the IQ test used by psychologists to other neuro-psychological tests, which look for example at a person's ability to plan, or focus on a task.

The IQ test says very little about a person's thought processes, says Van Aken. "Take, for instance, a person who impulsively starts on a task, discovers his method isn't working, starts again, and finally completes the task faultlessly. In some cases, this person would score as poorly as someone who fails to complete the task because he wasted too much time at the beginning. The test rewards those who work fast."

Which is not to say the IQ test is useless, she says. "The test doesn't pretend to measure more than it measures; it's not a test for everything. IQ is not the same thing as intelligence, but it's still the best tool we have for measuring the complex construct that is intelligence. It remains an estimate, though, so we always have to look beyond IQ scores. But despite all these limitations, the IQ test is much better at assessing intelligence than we are."

Social interaction

Assistant professor Leon de Bruin agrees with Van Aken's conclusion. He's an expert in Philosophy of Mind and Cognition, a discipline that attempts to understand the human mind. "People are afraid of artificial intelligence taking over," he explains. "This fear is based on

our belief that intelligence is separate from everything else: from emotion, from our body, from our environment. I don't think that's correct."

He uses the example of students he meets as a teacher. "I sometimes see students who are highly intelligent, but who can't seem to apply their intelligence because of work pressure, depression, or social problems," he says. "Intelligence must be facilitated by environmental factors, which doesn't always happen, for example because of social interaction problems. All this plays a role."

Philosophy shows that people's ideas about intelligence have changed over the centuries, says De Bruin. "For example, look at Aristotle and his concept of *phronesis*, which refers to the ability to know what to do at any given moment, having the know-how to do the right thing in a situation, a kind of practical wisdom." These days we'd use the term 'common sense' to refer to this kind of practical intelligence. "But for Aristotle, *phronesis* also had a moral dimension, which isn't part of our concept of common sense," says De Bruin.

With regard to common sense, Van Aken says: "It's certainly important to be able to adapt to your environment. Navigating situations smoothly, dealing with complex situations, taking responsibility for your problems and solving them, these are all forms of intelligence. It's just difficult to talk about intelligence or cleverness in other ways, because we have no better measuring tool than the IQ test." And that test doesn't measure things like *phronesis* or common sense.

"How we look at intelligence is also linked to what we think of as normal or abnormal," says De Bruin. "Our society requires very different things from us than it did sixty years ago or so. People now have to be good at many more things." He mentions the example of social interaction. "Many people find social interaction difficult, which can result in them appearing less intelligent." Finding ways to deal with this is also a form of intelligence, he says. "To understand how intelligent a person is takes more than a test you can complete at a desk." *

LSD FOR YOUR EQ

Another term that is often heard alongside IQ is EQ, emotional intelligence. Emotional intelligence measures how successful people are at recognising emotions in themselves and others, and how this translates to social success. In the 1950s, the term was sometimes used in dubious ways. For example, a German child psychologist wrote in 1966 that women who rejected the role of mother and housewife lacked emotional intelligence. His proposed remedy? LSD. The term EQ gained respectability after researchers John D. Mayer and Peter Salovey wrote a number of articles about it in the 1990s. However, researchers still debate how measurable EQ is. Many are convinced that a high IQ alone is no guarantee for success, and that a high EQ plays an important role in this context.

COLUMN

Lucy's law

Lucienne van der Geld is a lecturer of notarial law and director of Network Notarissen.

Computer brain

Do you know what I really like about the word 'brain'? The fact that it has so many meanings, both literal and figurative. It can be used to refer to the physical brain, but also to someone who initiates or leads a criminal activity (as in "Who's the brain behind this theft?"). And it can, of course, also be used to mean 'reasoning ability' or 'intelligence'.

Having a brain – in the sense of the ability to think – is not something limited to humans. A computer has a brain too, be it a man-made one. Some prophets even predict that in future instead of people controlling computers, we'll have computers controlling people. A fun topic to get philosophical about. But it's also interesting for the legal experts. Say that in the future cars can navigate traffic autonomously (i.e. without human intervention). Where does that leave liability? If a self-driving car causes an accident, who is liable? And the same can be asked of other applications of 'autonomous computers'. Think of a healthcare robot 'forgetting' to remind a patient to take crucial medication, leading to the patient's death.

The computer brain is not only a playing field for the IT girls and boys. It requires philosophers, and legal and other experts to think through all the implications of the computer brain. A great example in this context is the annual international conference Love and Sex with Robots, which brings together representatives from many disciplines: philosophers, psychologists and AI researchers. As far as I know, no legal experts have as yet taken part ;). High time someone reflects on the legal consequences of marriage to a robot and robot inheritance!

'FOR JIU JITSU YOU HAVE TO BE BOTH VERY CALM AND VERY ALERT'

Studying, seeing friends, updating social media – these all battle for position in students' minds. A wellbeing survey conducted by the University in 2017 revealed that half of all students experience intense stress. What can you do to empty your mind?

Text: Joos de Ruiter / **Photo:** Erik van 't Hullenaar

ROBBERT DIJCKS (21), PSYCHOLOGY

"I've been doing Brazilian Jiu Jitsu for three years now. This South American version of the martial art focuses on chokeholds and locks, to try and get your opponent to surrender. I'm really passionate about it, and I have lessons four or five times a week. As I leave the sports school after a lesson, I become aware that for the past hour and a half all I've thought about was Jiu Jitsu. It really lowers my stress levels. For Jiu Jitsu you need to achieve a certain state of mind: both very calm and very alert. When someone attacks you, you have to be ready for it, but without panicking. You have to find a feeling of calm in the midst of the chaos of a fight and I find this very relaxing. In August, I had a motorcycle accident and as a result of this I can't do any Jiu Jitsu until February. I found this very difficult, especially in the beginning. I noticed that I felt a lot more stressed. I didn't deal with frustration very well. I've now accepted that I simply can't train at the moment and, although I really miss it, this experience is giving me the opportunity to really appreciate all the small steps on my way to recovery."

THE COMPETITION CO

For years now Chinese students have scored high on international performance lists. But they're not better at everything. There's still hope for young Europeans.

Text: Antonia Leise / **Photo's:** David van Haren

Chinese students are the smartest. Slightly smarter than Japanese or Korean students, definitely smarter than the smartest Europeans, and even intellectually superior to their American peers. Or so you are likely to conclude as you leaf through the PISA report, a triennial publication by the Organisation for Economic Co-Operation and Development (OECD) that compares educational performance worldwide.

It was 2009 when Shanghai first took part in the study, which tests fifteen-year olds on reading comprehension, maths and science. The Chinese promptly ended up at the top, a feat they repeated three years later. They surpassed the best European country, Finland, in every category. In maths, Shanghai even performed 20% better than the OECD average. The Netherlands has been hovering around that average for years.

Creativity

You might almost think today's young Europeans are a lost generation, intellectually overshadowed by their Chinese peers. But what does this kind of score on an educational ranking actually say?

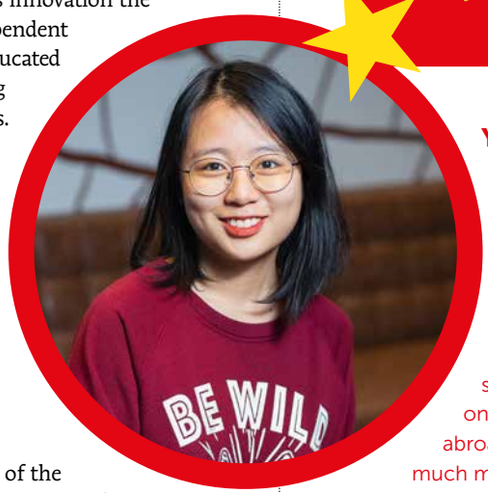
Not much, says Ard Lazonder, Professor of Educational Science at Radboud University, reassuringly. China's standardised education, with its strong focus on cognitive development, may help students excel in PISA scores, he says, but it does so at the expense of other things. "For example soft skills, like teamwork and presentation techniques. These skills aren't paid much attention in Chinese education, whereas European countries really focus on them."

Creativity suffers too, as studies show. For example, in 2012, US researchers concluded in scientific journal On the Horizon that China struggles to produce innovative and creative entrepreneurs. For its innovation the country is highly dependent on students being educated abroad and returning home with new ideas. If China doesn't rigorously reform its education, the researchers conclude, it's unlikely to ever develop the innovation-driven higher education system it dreams of.

But still. Are the excellent PISA scores of the Chinese really only the result of the extreme focus in classrooms on rote learning for tests and multiple-choice questions? No, says New York Times columnist Thomas Friedman. In a 2013 opinion article, he provides another reason for Shanghai's success: the consistency and systematic way in which Chinese lecturers improve their pedagogical skills. For example, they spend a lot more time planning lessons than their American colleagues. Partly thanks to this professional investment, the level of Shanghai secondary schools has gone from 'average' in the early 2000s to 'world-class' today, says Friedman.

So the question of whether Chinese students really are smarter is not that easy to answer. But the doomed vision of young Europeans as cognitively inferior to Chinese pupils and students certainly requires some qualification. ✱

'CHINESE BACHELOR'S STUDENTS USUALLY CHOOSE THE UNITED STATES'



YUNTING LIU (20)
EXCHANGE STUDENT PSYCHOLOGY

"At the Bachelor stage, where I currently am, Chinese students don't usually go abroad for an exchange. A good internship in China is worth more on your CV than a semester abroad. Besides, going abroad is much more expensive and many of the credits aren't transferrable. If people do go abroad, they usually choose the United States because the universities are better known. So there's not much competition if you apply for a university in Europe.

I'd visited Europe twice already before going abroad and I knew I wanted to come here for a longer exchange. I also wanted to go to a country I've never been to before, which is one of the reasons why I chose the Netherlands. Other reasons were the number of courses in English you can take and Radboud's good reputation in the neurosciences.

I'm studying Psychology at my home university, but here I'm focusing more on Artificial Intelligence and Neuroscience courses. Some of these courses are very challenging because of the different focus I'm following here – but I love the topics so much I don't mind. For me, my time abroad is just like a gap year. I've really enjoyed it so far."

MES FROM CHINA

'IT TAKES SOME TIME TO ADJUST TO THE AMOUNT OF ENGLISH'

JINGMENG CUI (22)
STUDENT RESEARCH MASTER BEHAVIOURAL SCIENCES

"I did my undergraduate degree at Peking University in China and graduated with a double major in Chemistry and Psychology. Chinese universities have more polished research programmes in the natural sciences compared to the social sciences, so I decided to go abroad because I wanted to pursue a more research-oriented programme in Psychology. That's how I ended up enrolling for a research master in Behavioural Sciences at Radboud. I chose the Netherlands by weighing the quality of the programme against practical things. It still took a lot of administrative preparation for me to come here and it wasn't easy. It was, however, easier to apply for the university and for the visa than to apply for American universities with programmes that were equally good or suitable for me.
The courses I'm taking at the moment are very manageable. I am, however, required to read more on my own before attending the lectures than I was used to during my undergraduate degree. Also, it takes some time to adjust to the amount of English I have to speak in front of my class in this degree. And the grading system in the Netherlands is stricter. It's almost unheard of for students to get a higher grade than 9."

'DUTCH LECTURERS ARE VERY OPEN'

JIAQI WANG (24)
STUDENT MASTER BIOLOGY

"I came to the Netherlands because my boyfriend is Dutch. We met during an earlier exchange I did in Lyon and after being in a long-distance relationship for a while, I decided to come here for my Master's.
I chose to study in Nijmegen in particular because I found the programme very interesting. I followed an undergraduate degree in Water Supply and Wastewater Engineering back in China, which is quite different from what I'm doing now, Water and Environment.
There are some key differences between the Dutch and Chinese system. The interaction between students and professors for example – Dutch professors really encourage interaction and are very open, whereas the hierarchical structures in China are much more pronounced.
The Netherlands also has a much stronger focus on group work. And while understanding the material is important in China too, it's something the Dutch system really emphasises.
So far, I'm not finding my degree very hard, but I think this is mainly because it interests me so much. I don't know whether you can say Chinese students are smarter, but I do sometimes have the idea that they work harder."

A DISH OF BRAINS

SOFT AND BIT SPONGY

Ask the head chef of restaurant Vesters about ways to prepare calf brains and he'll conjure up a croque monsieur and a dish of lobster, pumpkin purée and pieces of fried chicken skin.

First let's consider the anatomy of the dead animal. In slaughterhouses calf carcasses – the rump and meaty limbs – are traditionally divided into four quarters. These are the large pieces of meat you get on your plate, like steak, ribs, or entrecote. Calf brains, like liver, kidneys and other organs, belong to the 'fifth quarter' less commonly used in the kitchen.

Creutzfeldt-Jakob

And yet brains have appeared on our menu since Antiquity. The Greeks and Romans didn't have access to refrigerated transport. They preserved large pieces of meat by smoking, drying and pickling them. Smaller pieces of organ meat like the liver, kidneys and brains were more difficult to preserve, which made them a status symbol for people who could afford fresh meat. The Roman chef Apicius describes banquets where peacock's tongues and parrot's brains were served as delicacies.

Today, brains are no longer delicacies. Though they make an occasional appearance on restaurant menus in Belgium, France and Italy, in the Netherlands brains are seen as a waste product. Since the BSE scandal in the 1990s, calf brains have a bad reputation. People who ate infected beef risked contracting Creutzfeldt-Jakob disease. I must admit it's one of the reasons I'm not particularly enthusiastic about this assignment, that and being a flexitarian.

It's a pity, says chef Jeroen Vesters, of the restaurant at Groesbeeksedwarsweg that bears his name. He's not one to eliminate meat from our diet, for reasons of professional interest, but also because it's still our best source of protein. He does believe though that if you're going to slaughter an animal, you should use all of it. "Don't turn your nose up at parts that slide less smoothly down your throat," he says. According to Vesters, many people don't know where the meat they eat comes from or which part of an animal went into their cutlet or chops. "I actually think anyone who wants to eat meat should first kill an animal themselves, just to feel what impact it has," he says.

Adagietto

From a culinary perspective, Vesters considers calf brains, which only cost five or six euros a kilo at a specialised butcher, as a challenge to prepare (at our request). "There's only two ways to prepare a filet: well or badly. Organ meats require more imagination and skill." Although he prefers to work with liver or spleen, Vesters still finds calf brains very interesting. "Brains feel different in your hand to kidneys or hearts – it's where personality is formed," he says. "It makes me feel a bit like Frankenstein when I work with them."

In the kitchen of his restaurant, where five chefs are preparing dinner on this Friday afternoon, Vesters is making us a croque monsieur with calf brains. The inspiration for this dish comes from Flemish chef Johan Segers. "When asked in an interview about his favourite food-music combination, he answered 'calf brains in a croque monsieur with a Mahler Adagietto'. This really stayed with me: a beautiful piece of classical music with such a strange but traditionally popular dish."

As Mahler's Fifth Symphony rings through the speakers, I'm served my croque monsieur: a slice of white toast with hot mustard, ham, cheese and small pieces of poached calf brains, the whole drizzled with béchamel sauce and a little bit of grated Manchego ("less pronounced than Parmesan"), and briefly grilled in the oven.

Quite a culinary croque monsieur, as apparent from the taste: a simple but flavourful dish that would be a perfect cure for a hangover. The added value of the calf brains is not so much in their taste – you can hardly taste them in this dish – as in their texture: brains contain a lot of fat, which makes them soft and a bit spongy. If I didn't know there were calf brains in this croque monsieur, I'd think it was just extra cheese. To accompany the croque monsieur, I'm offered a beer from Nijmegen brewery Oersoep called Sexy Motherbocker – a slightly sweet Bockbier with earthy tones to match the cheese in the croque monsieur.

Crunchy

On to the main course: calf brains, pieces of lobster, pumpkin purée, and crispy chicken skin. This beautifully presented 'flavour palette' makes a regular appearance on the menu at Vesters, but with chicken liver instead of calf

The poached brains are fried off in the pan

Jeroen Vesters dresses the croque monsieur with bechamel sauce

Ready to serve: brains, lobster, chicken and pumpkin

brains. In this dish, the flavour of the brains, poached and briefly pan-fried, is more pronounced. On the outside the brain pieces are slightly crunchier and meat-like, but the inside remains very tender, a bit like tofu. The taste reminds me of fried chicken and counterbalances the strong flavour of the lobster and the creamy pumpkin purée.

With its floral nose and light sweetness, a glass of 2017 Chasselas Vieilles Vignes from the Schoffit Domain in the Alsace forms the perfect accompaniment to the dish. And what music should be served with this main course? Jeroen Vesters doesn't hesitate for a second:

'IT MAKES ME FEEL A BIT LIKE **FRANKENSTEIN** WHEN I WORK WITH BRAINS'

David Bowie's Heroes – the version by British heavy metal band Motörhead. "A great contrast to a refined dish."

Conclusion: in both dishes the calf brains don't dominate, but form a subtle element in a delectable composition. The chef passed with flying colours. And did we feel like Frankenstein? Not at all. Because they were not recognisable as such, but subtly woven into the dishes we had almost forgotten we were eating brains. ✱

If you'd like to see chef Jeroen Vesters prepare the calf brains, watch our video on voxweb.nl

CHALLENGE YOUR BRAIN IN NIJMEGEN

TAKE A COURSE AT THE RADBOUD SPORTS CENTRE

Learn to live with more awareness and focus your attention with a mindfulness or meditation course from the Radboud Sports Centre. Learn ancient techniques for dealing with stress and other symptoms. The course description says it all: 'mindfulness is a way of life.' And you don't have to sit on a cushion to meditate: you can lie down and relax or even engage in walking meditation. If you don't have time for a full course, meditation lessons are also offered as ticket hours.

Or you can get your creative juices flowing with one of the cultural courses offered by the Sports Centre in collaboration with Student Life. Learn to play the guitar, take a theatre course or explore the world of stand-up comedy. All courses are concluded with a presentation in Theaterzaal C.

PUB QUIZ

Are you a walking history book, do you know every capital city by heart, or can you list the winners of every cycle tour since 1980? Exercise your brain at a Nijmegen pub quiz! From Monday night at De Kluizenaar to Sunday night in Café van Rijn – every day of the week, there's a quiz in some Nijmegen pub or other. Bring your friends along, order some specialty beer and get your brain working. If you're not so much a generalist as a specialised geek, there's still plenty to choose from, from the Nijmegen Pop Quiz to a film quiz at LUX.

RADBOUD REFLECTS

Attend in-depth lectures organised by Radboud Reflects on philosophy, religion, society, current affairs, and lots more. Every week speakers discuss topics that are unlikely to come up during a coffee break. Should we always be chasing happiness? How do you keep a good relationship? And as a nice little extra: students can attend all lectures for free.

GAME NIGHT

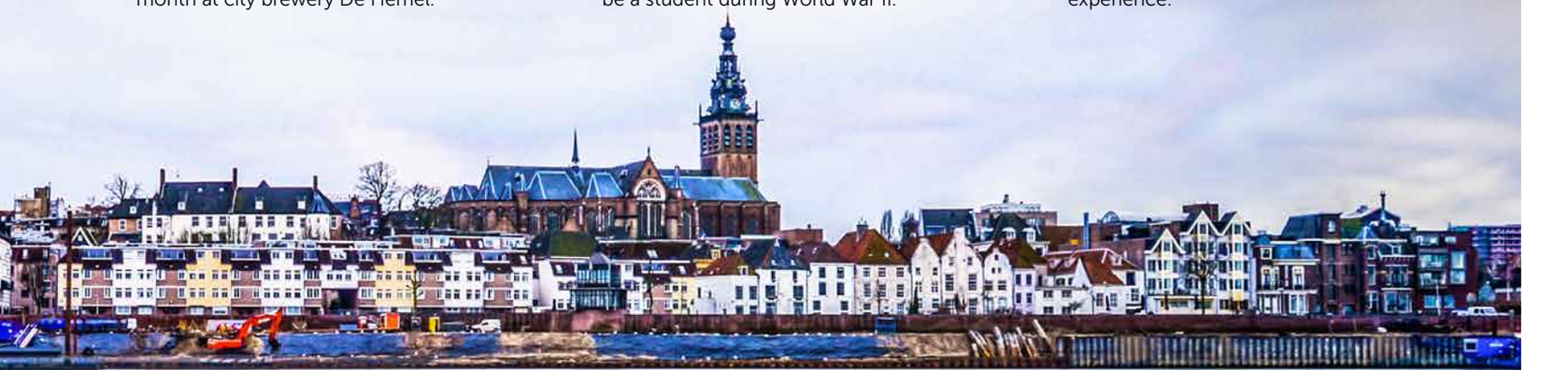
What could be more fun than an old-fashioned game night? Look around in any Nijmegen café, and you'll discover a world of mind games. Are you a tactical master brain, or do you think playing is more important than winning? For fanatical players, there's a board game night every Wednesday at Moenen & Mariken, and every first Thursday of the month at city brewery De Hemel.

ESCAPE ROOM

It may not immediately reduce your stress level, but finding your way out of an escape room does require a lot of creative thinking. As it happens, Nijmegen has quite a lot to offer in this respect: experts rank the Nijmegen escape room De Ramkraak among the top 25 worldwide! And Radboud University even has its own escape room at Museum Het Valkhof. In the University in Resistance escape room you get to experience in a race against the clock what it was like to be a student during World War II.

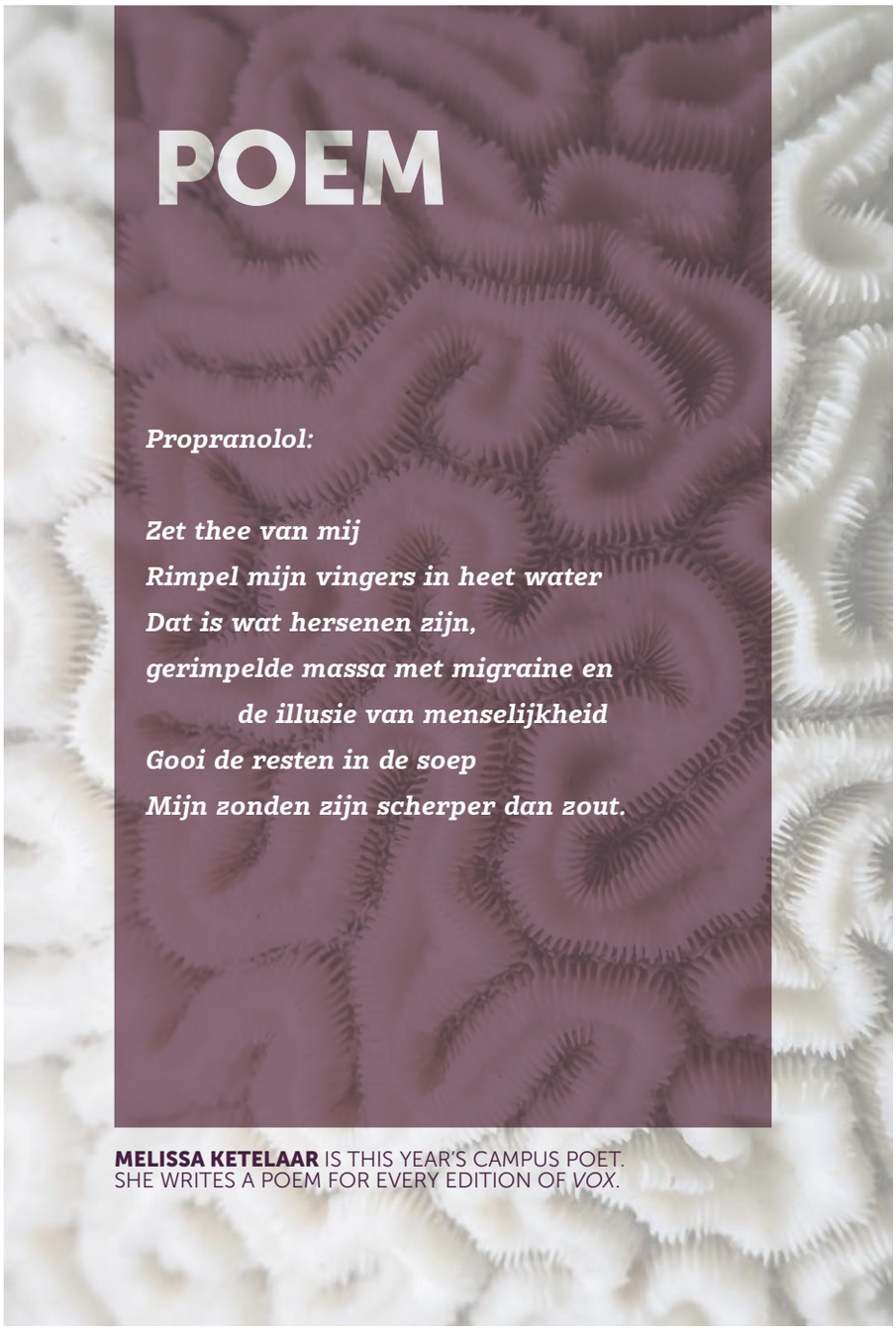
SPEND TIME IN A GRAVE

You're unlikely to have missed it, especially since it made the national news and even the American media: behind the Student Chaplaincy, Pastor John Hacking dug a grave in which you can lie down to think things over. Take your time and spend some time in the grave reflecting on life and death, or thinking about absolutely nothing. As you rise from the grave you will at the very least have gained an interesting experience.



Who doesn't want to keep their brain young and fresh, and ideally prevent dementia? If we are to believe the ads, this requires investing in memory training, vitamin pills and fish oil. Luckily our very own city of Nijmegen is rife with activities for training your little grey cells! *Vox* has six tips to offer, so you can learn something new without spending long days in the University Library.

Text: Tjitse Ozinga / **Photo:** Getty Images



MELISSA KETELAAR IS THIS YEAR'S CAMPUS POET. SHE WRITES A POEM FOR EVERY EDITION OF *VOX*.

COLOPHON

***Vox* is the independent magazine of Radboud University.**

Editorial adress: Thomas van Aquinostraat 1, Postbus 9104, 6500 HE Nijmegen, Tel: 024-3612112
redactie@vox.ru.nl
www.voxweb.nl / @voxnieuws
Editors: Leoni Andriessen, Annemarie Haverkamp (editor in chief), Ken Lambeets, Mathijs Noij, Stan van Pelt, Jozien Wijkhuijs
Proofreading: Lydia van Aert
Columnist: Lucienne van der Geld
Contributors to this issue: Anouk Broersma, Melissa Ketelaar, Antonia Leise, Tjitse Ozinga, Joos de Ruiter, Julia Vosmeijer, Marit Willemsen
Photography: Dick van Aalst, Bert Beelen, Julie de Bruin, David van Haren, Erik van 't Hullenaar, Stan van Pelt, Rein Wieringa
Illustrations: JeRoen Murré, Roel Venderbosch
Design: gloed*communicatie*, Nijmegen
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Tel: 023-5714745
zandvoort@bureauvanvliet.com
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Translation: Radboud in'to Languages, Translation & Editing Department, Nijmegen, Telephone: 024-3616129

AGENDA

ANNOUNCEMENTS OR ITEMS CAN BE SENT TO: REDACTIE@VOX.RU.NL

GENERAL

17 DECEMBER, 7 p.m. Grief support group for students. Have you lost a loved one and do you feel grief is preventing you from resuming your life and studies? The Student Chaplaincy and Student Affairs Office jointly organise a grief support group where you can share your story and learn to deal with your grief. Location: Student Chaplaincy.
26 JANUARY, 11 a.m. Church-on-the-Lap. For the youngest among us (children aged 0 to 4), their parents, grandparents and carers, the Student Chaplaincy organises accessible and experience-oriented worship celebrations. Join us to listen to stories and sing songs. Everyone is welcome! Location: Student Chaplaincy.
16 JANUARY, 7 p.m. Radboud Enrichment – Coincidence, Brexit, Pompeii. Four lecturers talk about a topic they know everything about: Brexit, Pompeii, coincidence, and illustrations in mediaeval books. The evening is free of charge, informal, and open to anyone who's curious! Location: De Lindenberg.

Radboud Reflects

www.ru.nl/radboudreflects

13 JANUARY, 7.30 p.m. Feminism in Judaism and Islam. Religion and feminism don't necessarily go hand in hand. Many see religions as conservative institutions that reduce women to the role of mother and housekeeper. Is this image correct? And if so, how did it come to be like this? Susannah Heschel and Margreet van Es explain how things could be different. Location: Theater C.
16 JANUARY, 7.30 p.m. Entitled to a Green Future? 2019 was marked by climate protests. The message is clear: if governments don't make sustainability a priority right now, future generations will suffer. How can we give them a voice in the political debate? What do we owe them? Do we have any responsibility towards people who haven't been born yet? Join Political Science experts Carolien van Ham and Marcel Wissenburg to discuss our responsibility to preserve a green Earth for future generations. Location: Theater C.

PHOTO: JAAP JORIS VENS

Comedy trio Beperkt Houdbaar will give an end-of-year show for students on 18 December

STAFF

16 DECEMBER, 12.45 p.m. Lunch-break Concert. Enjoy a wonderful concert during your lunch break! The personnel association organises a Monday lunch-break concert once a month. Join us for a free, varied musical performance by outstanding musicians. All Radboud University students and employees are welcome! Location: Aula.
17 DECEMBER, 7.30 p.m. Flower arrangement, Christmas edition. As the holiday season nears, it's time to decorate your home! Join us to create a beautiful Christmas centrepiece, to get in the mood for this beautiful time of year. Location: Tuinwereld Malden.
3 JANUARY, 10 a.m. Climbing and floorball. Together with Radboud Sports Centre, the personnel association organises a sports event for children during the Christmas holidays. Children learn to climb and are playfully introduced to floorball. Participation is free of charge. Location: Radboud Sports Centre.

CULTURE ON CAMPUS

16 DECEMBER, 7 p.m. Creepy Christmas Pub Quiz. Test your knowledge and nerves of steel with scary Christmas questions, while enjoying a delicious cup of hot chocolate milk. Location: Cultuurcafé.
18 DECEMBER, 8 p.m. End-of-year comedy show for students. It's an understatement to say that 2019 was not the best year ever: think of the climate crisis, the nitrogen debate, and the student loan system. Together with comedy trio Beperkt Houdbaar, Culture on Campus reflects on twelve unhappy months. Will you join us in our lament? Location: Theater C.
5 FEBRUARY, 8.30 p.m. Stukafest Nijmegen. Come to the twentieth edition of this remarkable festival. Cycle through the historic centre of Nijmegen and attend performances in three of the twenty participating student houses. The programme varies from dance, theatre and music to literature, cabaret and film. Afterwards, come and have a dance at the closing party in Brebl! Location: Nijmegen centre.

Which laws apply in space?

28 JANUARY, 8 p.m.: Space Wars - Rules of Engagement in a Vacuum. The cosmos is fast becoming militarised. Space is no longer the domain of scientific investigation: satellite orbits and space tourism are turning it into a melting pot of conflicting interests. Legislation is needed to avoid things getting out of hand, but how should it be organised? Legal philosopher Lonneke Peperkamp talks about the challenges of legislation beyond the atmosphere. Location: LUX.
30 JANUARY, 7.30 p.m.: Holocaust Memorial Day – Testimony by Rozette Kats. Rozette Kats, born during World War II, was nine months old when she was forced into hiding. Shortly afterwards, her parents were arrested and deported to Westerbork, where Rozette's brother was born. This didn't prevent the Nazis from deporting them to Auschwitz, where all three were murdered. Come and listen to the powerful story of Rozette Kats, who survived World War II as a very young Jewish girl. Location: Aula.
11 FEBRUARY, 8 p.m. Experience the Apocalypse. Humans have always been fascinated by the Apocalypse: how will the world end? What can we expect? Over the centuries, these questions have been answered in various ways. We may fear climate catastrophes and evil computers, but in the past people had very different fears. Religious scientist Seth Bledsoe offers a historic overview of the interpretation of the Apocalypse, with examples from literature, films and computer games. Location: LUX.