



The bigger picture



university of
groningen

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FROM THE BOARD ROOM

Research Evaluation of BCN

Over the past couple of years, the BCN Research School has been busy with a research assessment evaluation procedure. This assessment was initiated by BCN to take a step back, make a self-evaluation, and get external input for improvement of the program. BCN followed the Strategy Evaluation Protocol (SEP) 2021-2027 and the Groningen Research Assessment Protocol (GRAP) to organize the review. The procedures of this evaluation process were quite exhaustive. BCN had to write a self-evaluation report, which entailed gathering data on enrollment, completion of PhD theses, demographics of the PhD candidates enrolled in BCN, among much other information. BCN also had to look at its Mission and Vision, to identify whether the activities BCN provides to its students work toward fulfilling its mission. The self-evaluation report included a SWOT analysis (Strengths, Weaknesses, Opportunities, and Threats), to help identify areas to focus its future strategy. Writing this evaluation report took a lot of time and contribution from many individuals, and was finalized after a two-year writing and editing process.

As part of the evaluation procedure, BCN needed to define Terms of Reference for the assessment. Standard terms were taken from the SEP, and BCN added specific terms relevant to the research school. These Terms of Reference were then presented to the University Board of Directors as an appendix to the Plan of Action. Additionally, BCN had to propose a three-person, external, independent and impartial assessment committee (also known as the Peer Review Committee (PRC)) to the University Board. The Board of Directors accepted the Plan of Action, Terms of Reference, and the composition of the assessment committee, and officially authorized the start of the formal BCN research assessment.



All in all, over 50 BCN members, from master's students to lecturers and research staff joined together to participate in the site visit.

The assessment committee included Prof. Sonja Kotz from Maastricht University as the committee chair, Prof. Susanne la Fleur from Amsterdam University Medical Centers, and dr. Christos Pliatsikas, from the University of Reading. The assessment committee were tasked to review BCN's self-evaluation report and were then invited to visit Groningen during a two-day site visit. This site visit took place on 16-17 November 2022. The committee conducted formal interviews with the BCN Board, BCN PhD Education Committee, and BCN PhD Council, as well as different sessions focused research, teaching, and PhD activities. Additionally, three different lab tours were arranged to showcase the different facilities and disciplines involved in BCN (Bounce Back Lab at Brain & Cognition - UMCG, Biology (hibernation) at GELIEFS - FSE, and the SPRAAKLAB at CLCG - FA). All in all, over 50 BCN members, from master's students to lecturers and research staff joined together to participate in the site visit. While the site visit was a formal and professional procedure, there was a little bit of a social aspect during a dinner with the BCN Board and the assessment committee.

The committee reported that BCN is "a flagship model of successful interdisciplinary education and research."

After the site visit was completed, the assessment committee was asked to write a report on its evaluation of BCN. Before the report was finalized and sent to the University Board of Directors, BCN was given the opportunity to correct any factual inaccuracies. The final report was submitted just before the winter holidays. The final PRC report and BCN's response will be eventually published online on the University's Research Assessment webpage.

The assessment committee gave BCN a very good assessment. The committee reported that BCN is "a flagship model of successful interdisciplinary education and research." Furthermore BCN has managed to "connect different faculties with different cultures and different financial systems." Overall the committee was "impressed by its achievements." The committee also had recommendations to BCN on how to improve its program. These recommendations are 1) Increase FTE of staff support, 2) Install a dedicated communication and policy manager, 3) Implement an internal and external communication strategy, 4) Showcase achievements more actively, 5) Join with the 'Making Connections' strategy of the University of Groningen, 6) Strive for a more balanced engagement of the five faculties that are affiliated with BCN, 7) Stimulate more senior researchers of all faculties contributing to BCN to participate in research activities, and 8) Foster the Seed Grants.

BCN's next steps after the successful assessment is to send our response of the PRC recommendations to the University Board of Directors and faculty boards. Furthermore, BCN will schedule meetings with the participating faculty deans and institute directors to discuss how to deal with the PRC recommendations. Eventually a new collaboration agreement will be signed between BCN and participating faculties.



The process of the self-evaluation and external assessment has already resulted in some positive improvements with BCN. The Board has worked to formalize a governance structure and define specific portfolios for the board members to focus on and pursue. In the future, BCN will implement a more transparent procedure to appoint its board members. More connection between the Research School and Research Master is now ensured with the addition of the Director of the Research Master as a board member to the Research School.

All in all, we are pleased with the results of the research assessment. BCN will use this tool in its strategy to continue growing and improving, to safeguard a strong and sustainable education and training environment for future neuroscientists.

- BY MICHELLE PENA, BCN POLICY OFFICER
- PHOTOS BY SANDER MARTENS

BITS AND PIECES COLUMN

Brain Model

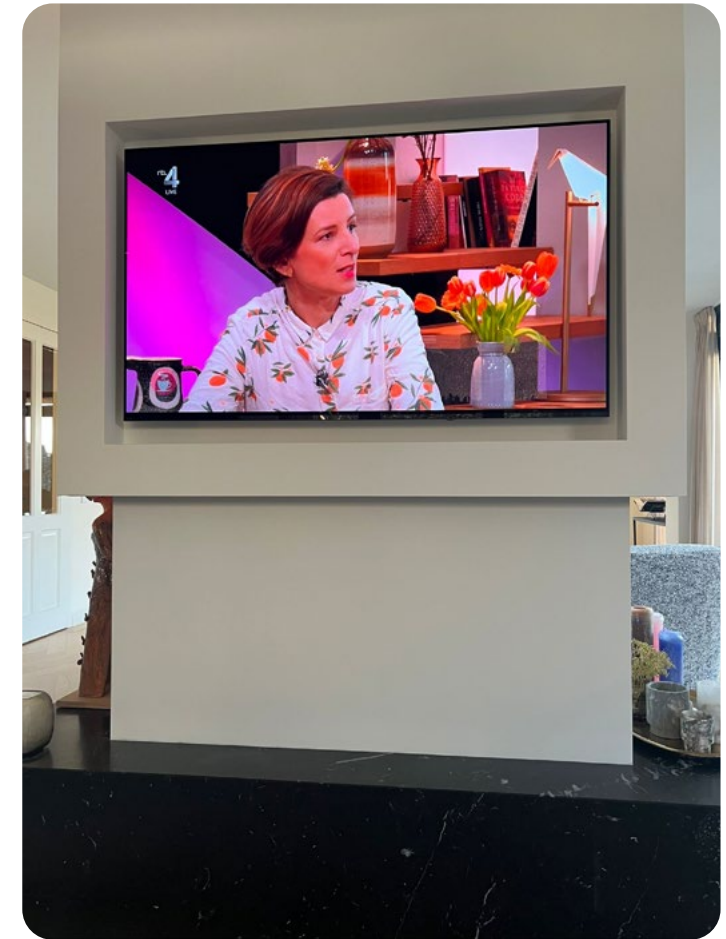
“A badly organized school”. That was my impression of the university when I started my studies. I knew the university was an option to go to after pre-university college. I thought universities trained medical doctors, pharmacists, lawyers, teachers, engineers, economists, and of course, psychologists. That’s basically where my knowledge ended. I was 18 or 19 years old and just started studying psychology. Of course, to become a clinical psychologist.

I think I don’t have to explain that the family and environment I grew up in wasn’t packed with academics. I had one cousin who studied aviation technology and a sister who studied law and was one year ahead of me. Other than my high school teachers, dentist and general practitioner, I did not know anyone who went to university.

It was for the first time it occurred to me that becoming an academic researcher was something for me.

So, I did not know that research was the other big thing of universities. I did not know what the people in these not so attractive offices were doing, let alone did I imagine that they were in fierce competition to stay in and make it to the academic top, of which I also had no idea what it would look like. I did however understand that fashion wasn’t the top priority of people working at the university. It’s clear I did not immediately dream of a career as an academic.

“So, what happened?”, you might think. Well, I loved my studies. I loved studying the books and literature. I loved learning and questioning theories and I liked statistics. And I liked the research projects. Even my Master’s thesis, for which I was terrified since I knew I had to write one. But most of all, I liked the researchers that turned out to fill all those unattractive offices. During my MSc-research I got into contact with professors leading the research of the young ones, the PhD-students and post-docs. Young women. Young men. All very kind, caring, willing to teach me, and occasionally looking quite fashionable. It felt like an environment where I didn’t need to play a role. I could just be me. Question, work hard, joke. It was for the first time it occurred to me that becoming an academic researcher was something for me.



And that turned out to be right. I feel at home as an academic. It’s the role closest to me. I immediately sensed that. I met so many great people. All with different talents. All with different personalities. All these people,



some equally junior, others more senior, had something I admired. Some for being super skilled at some technique. Others for being super skilled in getting their work seen. Or for staying focused on theoretical advancements and

enjoying looping the academic cycle. Or for being very kind and funny AND highly productive and talented at the same time. All helped me find my way in this inner world secretly happening in all those not so attractive offices.

All helped me to find out it's beautiful in there. Full of ideas, inspiration and possibilities to keep learning and keep questioning. And plenty of room to bring your full self.

All of this I realized when I was asked on Dutch National Television about my role models. I don't have one. I have many. Men and women. Junior and senior. Practical and theoretical. Dutch and non-Dutch. First-generation and all-generation academics. With focus on research, teaching, clinical work, or other ways of making impact. They all contributed a little bit to making academia look attractive to me, the academic who didn't really know what a university was. Therefore, I strongly believe we need diversity in academia. To inspire people with different backgrounds. So they get in. So they can stay and make academia more diverse and much more inclusive. Because that's when academia gets better.

Of course, I was wearing my most fashionable blouse on TV. You can't expect people to immediately see the beauty on the inside.

● BY MARIE-JOSÉ VAN TOL

BOOK REVIEW



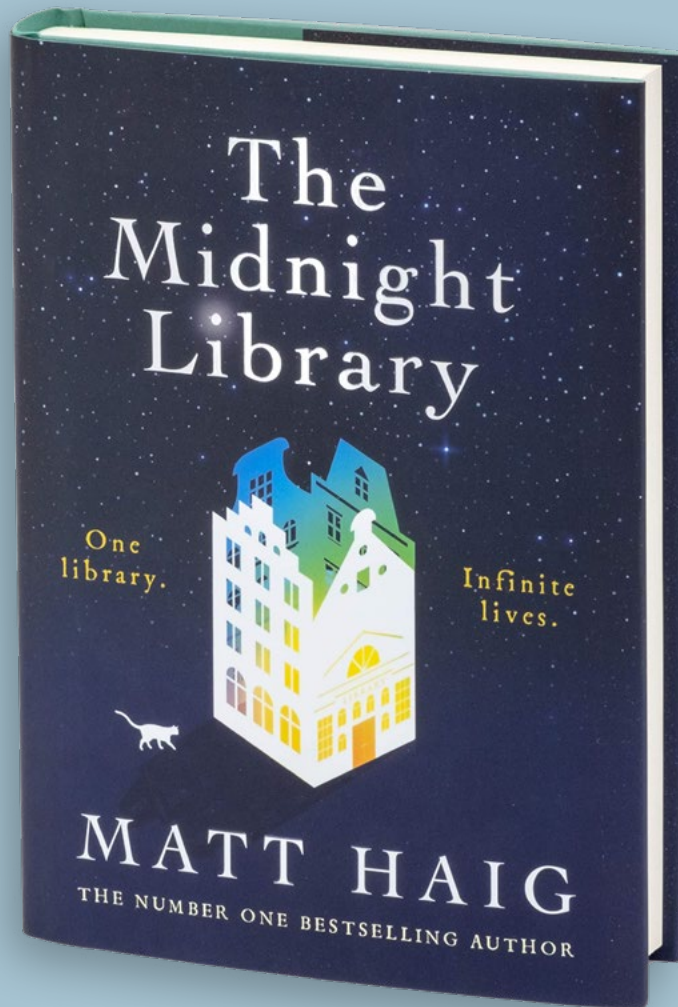
The Midnight Library by Matt Haig

The Midnight Library by Matt Haig is a powerful and thought-provoking novel that explores the power of regret and the potential of second chances. The story centers around Nora Seed, a woman who finds herself trapped in a library between life and death, where she is given the opportunity to live out different versions of her life. Through her journey, readers are taken on a thought-provoking and emotional journey as they explore the power of regret and the potential of second chances.

Readers are taken on a thought-provoking and emotional journey as they explore the power of regret and the potential of second chances.

The novel is structured in a way that allows for the story to build gradually, building tension and emotional stakes as it progresses. The way the story is built makes it impossible for the reader to put the book down, wanting to know what's going to happen next. One of the standout elements of the novel is Haig's writing, which is both poignant and relatable. He is able to convey complex emotions and ideas in a way that is both accessible and impactful. The novel is written in a way that makes it easy for readers to connect with Nora and understand her struggles, which makes the story even more powerful. The author's ability to create a sense of empathy in the reader towards the protagonist is impressive.

Throughout the novel, Haig explores some very deep and meaningful themes. One of the main themes is the power of regret and how it can shape our lives. The novel explores the idea of how our choices can affect the course of our lives and how we can never truly know what might have been. This theme is explored in a way that is both profound and relatable, making it easy for readers to connect with the story on a personal level.



The novel encourages readers to consider the possibilities that life has to offer and to not be held back by fear or regret.

Another theme explored in the novel is the potential of second chances. The idea that we can always choose to make a different decision is something that is often overlooked in life, but Haig explores this in a way that is both uplifting and empowering. The novel encourages readers to consider the possibilities that life has to offer and to not be held back by fear or regret.

Overall, *The Midnight Library* is a novel that is both a page-turner and a thought-provoker, exploring the human condition in a way that is both relatable and impactful. The story is compelling, the themes explored are deep and meaningful, and keeps the reader engaged from start to finish. I highly recommend this book to anyone looking for a thought-provoking and emotional read. It will stay with readers long after the last page is turned.

● BY SOPHIE VAN ZONNEVELD



MINDWISE



The blessing
and the curse
of classifying
neuroimaging
data

Machine learning in cognitive neuroscience

In modern cognitive neuroscience, it has become common practice to apply machine learning techniques to data obtained through neuroimaging. Despite this widespread use, however, there is something amazingly enigmatic about it. On the one hand, there is this organ that for millennia has eluded scholars: billions of neurons connected in myriad ways too complex to comprehend, firing in intricate patterns to communicate and give rise to thought. This firing is then in some capacity picked up by machines that are as advanced as they are noisy. Methods such as the electroencephalogram (EEG) and functional magnetic imaging (fMRI) try their best at capturing neural firing. But the former is too far away to reliably say where activity is coming from, and the latter is too sluggish to say much about when (or in what order) neural processes are happening. And yet, it seems that researchers nowadays just throw these patterns of activity in some mystical machine learning algorithm, and infer what a participant has been thinking about. But what are we really learning from classifying neural data?

Classical neuroimaging research

Classically, cognitive psychology and cognitive neuroscience have followed more or less a similar logic in how they conduct experiments and treat their data. The cognitive psychologist will hypothesize that, say, the mind has more difficulty processing images of green apples than of red apples. They will devise an experiment to test this, and using reaction times and accuracy will infer whether the hypothesis is correct.

Next, the cognitive neuroscientist steps in, and repeats the same experiment in participants who are wearing an EEG cap. By averaging across different trials with red or green apples, the scientist may observe that certain ERP components are consistently less strong with green than with red apples. As such, this difference in neural activity is very likely to be involved in the difference in performance – a result worthy of a scientific publication!

It is worth stressing that this conventional method hinges on two criteria. That is, the differences in neural activity between green and red apples should be somewhat consistent across trials, but also across participants: if in different participants, the neural activity between green and red apples manifests in completely different ways, then there would probably not be an observable, statistically reliable difference in the grand average. The conventional method, and in fact most statistical tests of neuroimaging data, assumes that given different conditions, we will observe systematic differences in the data that are somewhat comparable across different participants.

Machine learning: the great switch-up

One of the greatest tricks employed by most machine learning methods is that they flip the logic of the conventional method on its head. Instead of using the conditions (red or green apples) to say something about the data (a high or a low amplitude measured at the scalp), classifiers will do the opposite: they take the neural data, and try to determine which condition was presented. If they can do so successfully, the classifier is able to tell from a pattern of neural data whether a

participant saw a red or a green apple. In more popular jargon: the algorithm has read your mind.

A core reason for any new technique to become popular in a branch of science is that it yields results. Indeed, classifiers have allowed researchers to point out differences between conditions that had previously proven difficult to find. As it turns out, merely looking at averages and average differences is sometimes too short-sighted. Classifiers allowed researchers to identify whether the brain treats red and green apples differently “in any measurable way”.

Trick or treat?

However, there is something misleading about how many classification results are interpreted. It is quite an intricate issue, but I am sometimes afraid this misconception might have been key to the success and popularity of neural classifiers as an analysis tool. That issue is that classifiers are developed, trained and evaluated separately for data from different participants.

To see why this is relevant, recall the phrase from above about the classical averaging method: if in different participants, the neural activity between green and red apples manifests in completely different ways, then there would probably not be an observable, statistically reliable difference. In the case of separate classifiers per participant, this would be different: now, regardless of the (vast) individual differences in neural data, the classifiers could all consistently say that green and red apples are different. As a result, the

average classification performance might be very high across participants – even if they share hardly any commonalities in neural data.

In fact, this feature of classifiers is often hailed as one of the strengths of the technique. Classifiers are able to mark that there is a difference, without pinpointing what this difference is. Interesting as that may be, it is in a way at odds with the goals of the cognitive neuroscientist – to look for reliable neural correlates of behavior. In fact, a popular topic of discussion at the moment is how to interpret the results of classifiers that are able to accurately decode neural data. What is it they are actually basing this decoding on? And – interestingly – are there any commonalities across classifiers fit to different participants? However, these developments are still in their infancy and are often specific to the exact type of classifier used. Moreover, they are only now slowly gaining popularity, over ten years after classifiers burst on the scene of cognitive neuroscience.

What to learn from all of this?

Does this make classification analyses worthless for our field? Of course not. There are many inferences about neural processing that have been made possible by means of classification analyses: many of these inferences are valuable and would have been impossible with conventional methods. Furthermore, the growing insights that predicting conditions from data can be just as valuable as predicting data from conditions have led to a new appreciation of what can be done with the data we collect. However, when a new

technique garners widespread popularity in a short time span, it is worth critically evaluating where this popularity comes from. This is especially the case when a new technique is promoted as being ‘more sensitive’ – which may sometimes only mean that it produces more (false?) positives.

At the very least, it is worth asking ourselves what it is a classifier really does. If we don’t, we simply end up using tools we don’t understand to make inferences about an organ we don’t understand.

● BY WOUTER KRUIJNE

Originally published by [Mindwise](#).

About the author

Wouter Kruijne is an Assistant Professor in the department of Experimental Psychology. His research covers topics including visual attention, time perception, temporal preparation, episodic memory. He studies these using Computational modeling, Psychophysics, and EEG.



BCN WINTER MEETING

On Thursday, February 2nd, the BCN Winter Meeting for 2023 was held in the Energy Academy in Zernike Campus. The BCN Winter meeting is an opportunity for BCN researchers and students to catch up on current research by presenting their research in posters and attending important lectures that span the coverage of BCN across the different faculties of the University of Groningen. The programme was kicked off by professor Robbert Havekes, who welcomed the attendees and provided facts and numbers regarding the history and impact of BCN across the years. For instance, participants were reminded about the 36-year history of the BCN school and the past 25-year jubilee covered in the former BCN Newsletter.

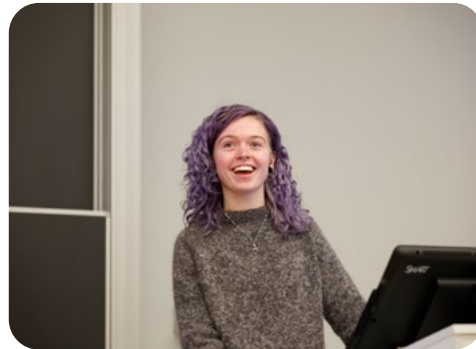
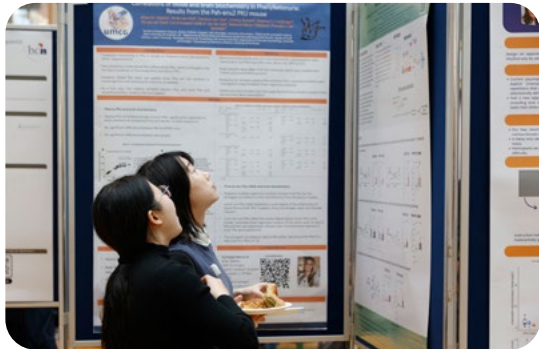
The first half of the morning programme consisted of short talks by professors Benno Haarman from the Faculty of Medical Sciences, Fred Keijzer from the department of Theoretical Philosophy, and professor Simon Verhulst from the Faculty of Science and Engineering. The second half of the morning programme contained short talks by professors Wouter Kruijne and Marije Michel followed by an intermission by the PhD Council and a communication about the BCN Evaluation that recently occurred.



After a lively poster session, the impressive keynote talk by Professor Robert Morris (who conceived the well known water maze test for memory assessment in rodents) was followed by the awards for best posters, seed grants for this year and an update on the work from the seed grants awarded in the previous edition. All in all, this winter meeting was a fruitful opportunity for BCN researchers from all faculties to catch-up and be exposed to the whole array of research that BCN performs within the University of Groningen.

- BY ALEJANDRO MARMOLEJO-GARZA
- PHOTOS BY SANDER MARTENS





BCN SYMPOSIUM SPEAK YOUR MIND



On the 1st of December, BCN PhD and Master students, along with staff members had the opportunity to participate in the BCN symposium entitled “Speak your mind: the role of language processing in detecting and improving cognitive and mental health problems”. The symposium, which took place in Zernike, has been the perfect example of interdisciplinarity within the BCN, touching upon many different topics related to language as a diagnostic and preventative tool in diverse cognitive states.



Marie-José van Tol



Merel Keijzer



Martinica Garofalo



Petra Hendriks



Janine Rook



Alban Voppel

Hereby a recap of this successful day:

In the beginning, **Marie-José van Tol** and **Merel Keijzer** gave an introduction of the day, along with a general presentation about BCN, its history and its goals for the present and the future, such as sparking interdisciplinarity among its members. This was followed by a short quiz about language recognition given by **Martinica Garofalo**, where Italian was humorously mistaken for Norwegian, Portuguese for Korean and Limburgs for Gronings! Everyone had a good laugh about it.

We then had the honor to have the Dean of the Faculty of Arts, **Anthonya Visser**, opening the symposium by remarking the importance of interdisciplinarity and the collaboration between linguistics and other branches of neuroscience. Afterwards, **Petra Hendriks** gave a very interesting keynote lecture about language impairments in children with Autism Spectrum Disorder, such as their difficulties with the comprehension of the personal pronouns “you” and “I” and the theory of mind. Eye-opening!

This was followed by pitches from researchers in their early research career, such as **Janine Rook**, **Alban Voppel** and **Miguel Santín**. It was inspiring to hear about bilingualism as a prevention tool for Alzheimer’s disease, semantic and phonetic markers in schizophrenia-spectrum disorders and linguistic relativity. Also, amazing to see their work integrated among the talks of great Professors!

Later on, **Merel Keijzer** gave a talk about late-life language learning as a preventative and intervention tool for healthy ageing, focusing on the ongoing promising projects of the Bilingualism and Aging lab (BALAB) in Groningen.





Miguel Santín



Kees De Bot

Kees de Bot presented his own “Kees study”: a very interesting turn on language use and processing in a patient with Parkinson’s disease, Prof. de Bot himself.



Wander Lowie



Jenny van Doorn

After **Merel Keijzer**, it was a great honor to welcome **Kees De Bot** among us, accompanied by **Wander Lowie** and **Vass Verkhodanova**. Prof. de Bot is Emeritus Professor of Applied Linguistics at the University of Groningen and former Director of the BCN Research School. His talk increased the attendance numbers in the room, and for a good reason! Together with Prof. Lowie, he presented his own “Kees study”: a very interesting turn on language use and processing in a patient with Parkinson’s disease, Prof. de Bot himself. In a deeply touching but also lighthearted way, he shared with us both his struggles with language and with having Parkinson’s disease, as well as his achievements on a personal level (like winning at fencing and trying to learn Hungarian), despite his diagnosis. Very impressive! We wish to heartfully thank Prof. de Bot for his presence and for sharing his story with us.

After a very “lekker” complimentary (and inclusive!) vegan lunch, **Jenny van Doorn** told us about the latest developments of her projects with social robots working in elderly care and speaking local dialects, such as Gronings. It was interesting to experience what difference a dialect can make for people, and to chip in our opinions on robots with anthropomorphic voices!

This was once again followed by pitches from researchers in their early research career, such as **Joëlle Jagersma**, **Thomas Wilschut** and **Inge R. Holtman**. It was fascinating to hear about the role of ultrasonic vocalizations in behavioral phenotyping of rodent models, the concepts and data behind the adaptive learning system “SlimStampen”, and natural language processing models to study temporal and clinical disease trajectories across different brain disorders.





Joëlle Jagersma



Thomas Wilschut



Inge R. Holtman



Iris Sommer



Daisy Veenstra

After the tea break, it was time for our last speaker, **Iris Sommer**. She gave a very compelling talk about the highly accurate detection of psychiatric disorders and monitoring of treatment effects aided by the use of a natural language processing software. Very promising!

Before we concluded this eventful day, we got surprised by a closing act by **Daisy Veenstra**, “rapping psychologist” and senior communication trainer at the UMCG. In fact, the day could have not ended without acknowledging the arguably most powerful vector of language, music. With few of her texts and a spoken word, Daisy showed us how powerful words can be in breaking taboos, and that it is important to bring awareness and speak about unspoken and unspeakable problems, such as domestic violence and suicidality.

All in all, the BCN symposium was a day that we can look back at with great satisfaction. The public was very involved, asking interesting and critical questions which led to a positive and fruitful discussion. Last but not least, we would like to thank YOU!

All attendees, thank you for joining this symposium, for your interest, fruitful questions and critical remarks. You contributed to make it a day to remember!

- ON BEHALF OF THE BCN PHD COUNCIL,
MARTINICA GAROFALO
- PHOTOS BY SANDER MARTENS



GRAND STUFF

BCN Poster prizes

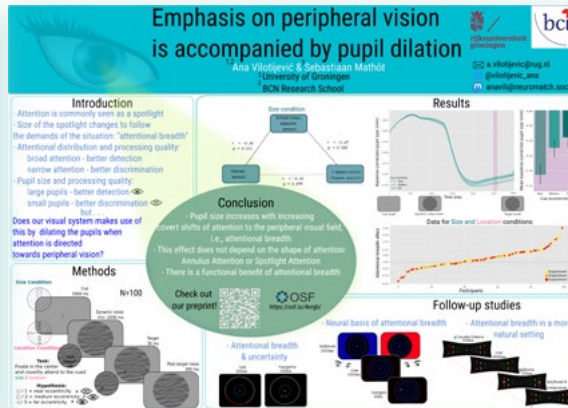
On February 2nd, the 2023 BCN winter meeting took place ([see page 13](#)). The BCN poster prize was awarded to the following three PhD students: Camilla Paraciani, Ana Vilotijevic & Nienke Mekkes. Madhu Brill won the BCN master student poster award.

BCN poster prize

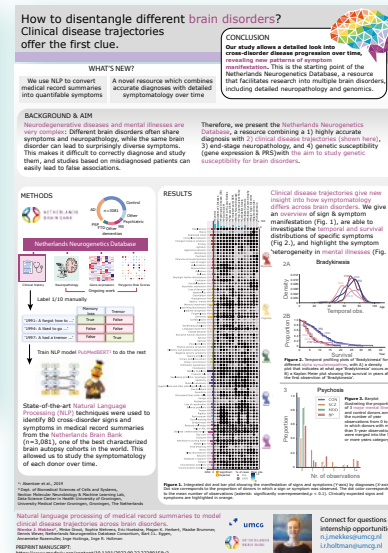
Camilla Paraciani



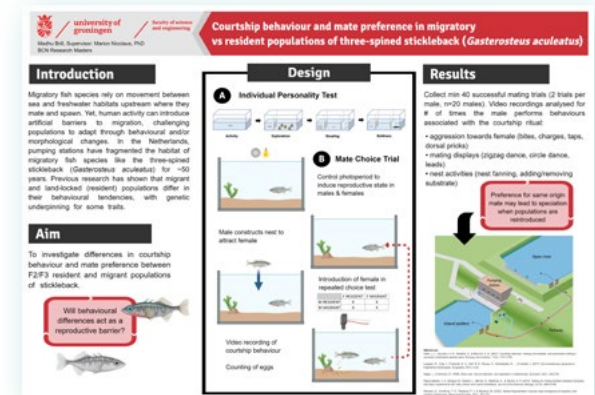
Ana Vilotijevic



Nienke Mekkes



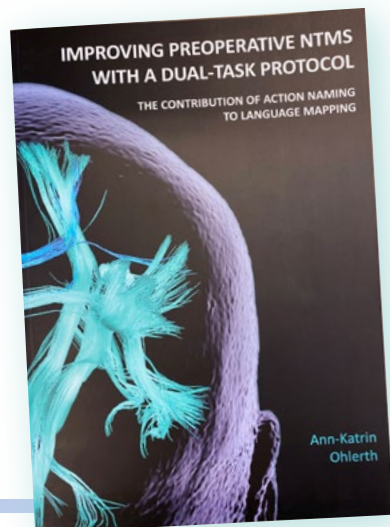
Madhu Brill



Congratulations!

BCN dissertation prize

During the winter meeting, Hanneke Loerts revealed that Ann-Katrin Ohlerth was the proud winner of the 2023 BCN dissertation prize.



BCN seed grants 2022

The following research proposals have been awarded for a BCN seed grant:

Title:

Social cognition and language in patients with brain tumors: putting feelings into words?

Aim:

To determine the overlap between social cognition and language in patients with brain tumors and determine neural determinants of this relationship.

Applicants:

Anne Bunk, Post-doctoral researcher and healthcare psychologist Departments of Neurology and Neurosurgery, subdepartment Neuropsychology, University Medical Center Groningen
Adrià Rofes, Assistant Professor Center for Language and Cognition, Department of Neurolinguistics and Language Development, Faculty of Arts, University of Groningen

Title:

Finding molecular biomarkers for improving sleep quality in intensive care patients.

Aim:

This project will exploit the large variety of sleep patterns found in intensive care unit (ICU) patients to determine serum based molecular biomarkers for sleep quality.

Applicants:

Minqi Yang, Post-doctoral researcher, Hut-lab, Neurobiology, GELIFES, Faculty of Science and Engineering, University of Groningen

Laurens Reinke, Post-doctoral researcher, Department of Critical Care, University Medical Center Groningen
Maarten Hamberg, PhD candidate, Hut-lab, Neurobiology, GELIFES, Faculty of Science and Engineering, University of Groningen

Title:

How does aging mediate vocal control of loudness? A comparative approach to study mechanisms for neural control of vocalization in humans and songbirds

Aim:

Characterize the impact of age on neural control of vocal loudness in humans and songbirds and compare findings across these populations.

Applicants:

Defne Abur, Assistant professor in Computational Linguistics, Faculty of Arts, University of Groningen
Sanne Moorman, Assistant professor at GELIFES, Faculty of Science and Engineering, University of Groningen

Young UG researchers Emma Gerrits and Wouter Huiting to top institutes abroad on Rubicon grants

<https://www.rug.nl/news/2022/07/six-young-ugresearchers-to-top-institutes-abroad-on-rubicon-grants>

Sanne Brederoo receives ZonMw grant

Sanne Brederoo has been awarded with a ZonMw research grant, allowing her to set up her own research line in the next five years at the psychiatry department (UMCG). She will focus on auditory verbal hallucinations, including sub-types, brain mechanisms, and treatment.



The Young Academy Groningen welcomes eight new members

<https://www.rug.nl/about-ug/latest-news/news/archief2022/nieuwsberichten/the-young-academy-groningen-welcomes-eight-new-members>

Helping wheelchair athletes go for gold

Former BCN PhD student Riemer Vegter is currently an assistant professor of Human Movement Sciences at the University Medical Center Groningen (UMCG). In this role, he coordinates the paralympic research lab, where he and colleagues and students test and measure the biomechanics and physiology of wheelchair athletes.

<https://www.rug.nl/news/2022/10/helping-wheelchair-athletes-go-for-gold>

The UMCG starts with the online research project MINDCOG

A number of UMCG researchers, including Marie-José van Tol and Marlijn Besten, have initiated a new online research project to investigate whether mindfulness and positive fantasizing can help prevent the (re-) occurrence of depression.

<https://www.rug.nl/news/2022/11/kan-mindfulness-en-positief-fantaseren-terugval-depressie-voorkomen>

Video & podcast on hallucinations

Franciska de Beer demonstrates how hallucinations can be readily induced (without taking drugs). Check out the video and podcast created for the University of the Netherlands:

<https://www.universiteitvannederland.nl/college/iedereen-hallucineert>

<https://open.spotify.com/episode/3wVZfXOdMV1CugzBGz0U0?si=9cc233c769ef490b>

NEW STAFF WRITER

PENNY HEISTERKAMP



I am Penny, a second-year PhD student from the Faculty of Arts. I do research on writing and second language development. Knowing a language is a superpower: if you are proficient in a language, you have the tools to communicate all your plans and ideas to other speakers. But if you struggle with a language, sharing your thoughts can feel like an impossible task.

This is one reason why people are worried about the use of English as a language of instruction at Dutch universities. They think that Dutch students in English-taught programmes will have a hard time expressing themselves in English because it is their second language. However, we don't really know yet if the use of English has such a negative effect on students' performance.

In my PhD project, I want to figure out how Dutch students in Dutch-taught and English-taught programmes write in Dutch and English. To find this out, I am looking at the texts that students produce in both languages, but also at the writing process, i.e. what is happening while they are writing the texts. I do this by analysing students' keyboard activities and the thoughts they had during writing.

In my free time, I like to watch comedy series, read a good book, sing and sometimes - when I am feeling particularly bold - do a bit of writing myself. Fiction writing, that is, not the academic essays I ask my participants to write...

I'm excited about joining BCN magazine and look forward to learning more about all the projects taking place within our research school.

● BY PENNY HEISTERKAMP

● PHOTO BY SANDER MARTENS



Motor activity recognition using EEG and deep learning

Brain Computer Interface, or BCI, is an emerging field which allows humans to communicate with computing devices without using conventional input systems. This communication in turn allows several applications which assist humans to perform varying tasks. The human brain works with the help of neurons that are connected with other neurons using axons and dendrites. These neurons fire when a specific threshold of potential difference is reached, which results in the activity in our brain. Some electrical signals that go through the brain's protective layer of fatty white substance known as myelin can be captured and analyzed. Cerebral activity can be recorded using EEG, ECoG, or fMRI. Owing to the portability and relatively cheaper cost of EEG recording devices, most BCIs use EEG signals as input to convey the commands to the computer.

The development of several (clinical and non-clinical) applications that help people carry out a variety of tasks has been made possible by BCIs. They have accelerated the development of support systems so that people with hearing loss, vision impairment, or restricted physical movement have more control over their surroundings using neuroprosthetics [1], wheelchairs controlled by the mind [2], and apps on mobile phones that can be opened by just thinking about it [3]. Numerous studies have also been

carried out to categorize imaginary motor movement [4]; nonetheless, Motor Activity Recognition (MAR) is still mainly unexplored. MAR has enormous potential for rehabilitation for diseases affecting movement like Parkinson's and is crucial for controlling one's environment using gestures.

Many such studies have used classical machine learning approaches like support vector machines, linear discriminant analysis, decision trees etc. to analyse the cognitive state using EEG for various BCI applications. Since assumptions are made to extract the features pertinent to that specific application, the issue with these traditional methodologies is that those assumptions may not be valid across all applications, discarding some crucial features during the conventional feature extraction process. However, deep learning-based classifiers try to learn features that may not be possible to extract using traditional feature extraction techniques. We have seen and used so many applications of deep learning in our day-to-day lives, and with chatGPT being the recent conversation on the street it is not a surprising thought to try its efficacy for motor activity recognition.

In a recent work by Dr. Partha Roy, Ilina Tripathi and myself EEG data were gathered from 20 college students between the ages of 17 and 30 (5 females and 15 males) while they performed motor movements. The participants were asked to perform 17 different activities - blinking, boxing (using both hands), chewing, eyes closed, eyes open, moving the hand-out starting from naval in a horizontal direction, moving the hand-in back to the naval in a horizontal direction, closing the fist, opening the fist, pushing, pulling, grasp and drop a 2 litre water filled bottle, grasp and lift a 2 litre water filled bottle, sitting, standing, walking and squatting. The activities performed are basic day-to-day activities that are performed by individuals and no known differences exist between genders and young adults unless they suffer from a motor disease like Parkinson's [5].

We have seen and used so many applications of deep learning in our day-to-day lives with chatGPT being the recent conversation on the street that it is not a surprising thought to try its efficacy for motor activity recognition.

The participants were asked to do one activity one after another and no restrictions were levied upon them to perform the activity in a certain way. This was done to ensure that the data being collected was representative of the different pace and frequency with which people perform these activities in their day-to-day life. Participants performed each activity continuously for 30 seconds while EEG data were being recorded simultaneously using a 32-channel Actichamp EEG recording device.

They proposed a deep learning model, EEG-Transformer that could predict these activities with a high accuracy of 96.687%. This classifier was trained on cross-subject data, leading it to generalize well. However, though these results seem encouraging we should keep in mind that this study worked with a limited sample size of twenty participants for seventeen activities. Further studies with larger sample size need to be done to corroborate these findings for generalization to a wider population and a wider range of activities.

● BY PALLAVI KAUSHIK

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PHD AND OTHER NEWS

Winners BCN Awards

We are proud to announce that the BCN Dissertation Award has been won for the first time by a PhD student of the Arts Faculty. Congratulations Ann-Katrin Ohlerth! If you are curious about who has won this award over the years, take a look in the BCN hall of fame: <https://www.rug.nl/research/behavioural-cognitive-neurosciences/education/phd/bcnawards>.

Emma Gerrits, Laura Kracht and Anouk de Wit were the runners up of the BCN Dissertation Award.

The 3 best posters during the BCN Winter Meeting were made by Camilla Paraciani, Nienke Mekkes and Ana Vilotijevic. You will find the posters in this edition of the BCN Magazine, and on Brightspace.

Courses: Matlab, Statistics, fMRI, Retreat

A few BCN courses are available in the course registration system. We organize these courses only once a year or even less frequently, so don't miss them. Find them here: <https://cursus1.webhosting.rug.nl/gsms/courses/bcn-courses/>

BCN Nothing but the Truth 2023

The date of the BCN Conference is: December 7 & 8. We are organizing a 2-day conference with a lot of speakers and workshops. Block your agenda for those 2 days! As soon as the website is online, I will inform you by email.

FAQ

Can I use the budgets for external courses or conferences for another activity? Unfortunately, that isn't possible. The budget for external courses (600 euro) is meant for courses, like summer schools, workshops, etc., and the budget for conferences (also 600 euro) is meant for

conferences and scientific meetings. Also good to know is that you cannot save the amount for another year, and that the moment the event takes place determines which year's budget will be lowered. Don't forget to send the form in a single pdf file to me, within 3 months after the event took place.

BCN is still looking for instructors of the BCN Project Management Course

We are still looking for instructors, in particular for the Project Management course. A course that will help your PhD student(s) to plan their project and to deal with problems on their path.

Please send me an email if you are interested!

Agenda BCN Activities

- **March 30 and 31**
BCN Retreat
- **April 11**
Start BCN Matlab course
- **Jun 6**
Start BCN fMRI course
- **December 7 and 8**
BCN Conference Nothing but the Truth
- **First Thursday**
BCN Lunch Lectures series

● BY DIANA KOOPMANS



NEWS FROM THE BCN PHD COUNCIL

On December 9th at 7pm in the Pannekoekschip (Schuitendiep 1017, Groningen), the BCN PhD Council and BCN PhD students met for dinner and a very typical Sinterklaas celebration. This was our way to celebrate a fruitful year that had passed and to look forward to the future for prosperity and good outcomes, especially within our PhD tracks. During the opening of the event, the BCN PhD council invited more PhD students to become active members of the council. The evening started with an amazing all-you-can-eat piratenbanket (feast for pirates) which consisted of unlimited pancakes and sweet or savory toppings; a truly rich and tasteful experience. After we finished with the eating, we proceeded to play a typical Dutch game where attendees swap, unwrap, swap again, and steal presents from each other. There were a lot of happy faces.

We hope to see each other in the upcoming networking and social events that the BCN PhD council has prepared for you!

The BCN PhD council is looking for new members!

Do you want to get involved first hand with BCN? Then join the BCN PhD Council! Being part of the BCN PhD Council will give you the unique opportunity to get to know the “behind the scenes” of the BCN PhD Programme, to expand your network, and acquire useful skills for your future career.

You will have the chance to have an impact on different aspects of BCN, such as:

- representing the interests of PhD students of BCN in the BCN/GSMS Education Committees and the BCN Board
- organizing educational and social activities for the PhD community
- working with a motivated and friendly group of council members

> Interested? Scan the QR code!





Doctor or Doctor?

My name is Toon Scheurink, and I started out my study as a Life, Science and Technology student. Perhaps inspired by my father, prof. dr. Anton Scheurink, I chose a career path in biomedical research. After obtaining my bachelor's degree, I continued my studies in the BCN master programme. Neuroscience interested me, and the small classes and good reviews by students were certainly convincing factors. Indeed, the BCN research master provided me with a wonderful time, and some wonderful people. As such, you might be surprised that I am currently performing my clinical rotations in the UMCG.

It was spring 2019, and I was looking at thinly cut rat brains floating in a tube, whirled around by a shaker. Every minute or so I would rinse these with fresh buffer solution, which would take up the better part of my afternoon. This may sound awfully boring, but this part of my BCN minor project was actually somewhat of a meditative experience. Despite not being too perturbed, it did dawn on me that looking at floating rat

"Medical doctors often combine their patient work with research, and this seemed like a thrilling combination to me. I would be able to see the effects of biomedical research firsthand, and experience which patient-related problems still need solving."

brains could very well be a substantial part of my working life as a researcher. Six months of lab work was fun, but 60 years and that boredom might sink in after all.

Around this time, a close friend of mine told me about the pre-master Medicine. Medical doctors often combine their patient work with research, and this seemed like a thrilling combination to me.

I would be able to see the effects of biomedical research first-hand, and experience which patient-related problems still need solving. However, the pre-master is a 1-year crash course, allowing entrance to the master Medicine, which takes another 3 years. This made me hesitate; it would put my student lifetime at a staggering 9 year total. Around me, people were slowly but surely moving on to paid jobs. On the other hand, helping patients seemed inherently rewarding, which did make me very excited. I thought back to the BCN lectures from the neuropathologist and researcher dr. Wilfred den Dunnen, who would bring slices of patient brains to liven up his talks. At least it's a significant step up from rat brains, I thought, as I enrolled for the pre-master Medicine.

Fast forward through a year of memorizing seemingly endless medical factoids and I was ready to start my clinical rotations. Unfortunately, due to the still new COVID pandemic, the UMCG and its master Medicine was in disarray. I was always planning to finish BCN, and this was the perfect opportunity. I did my major project at the HAMLETT study, which is a large randomized controlled trial researching how to best discontinue antipsychotic medication in first-episode psychosis patients. Supervised by prof. dr. Iris Sommer and my former classmate from BCN Franciska de Beer, I had a wonderful time combining patient contact and research.

In fact, I enjoyed it so much that I applied for the BCN PhD grant, in order to continue my work at the Sommer group! I wanted to expand the HAMLETT study with data on the microbiome and research whether our gut bacteria play a role in the effects of

"I wanted to expand the HAMLETT study with data on the microbiome and research whether our gut bacteria play a role in the effects of antipsychotic medication."

antipsychotic medication. Major disappointment: I did not get the grant. But mama didn't raise no quitter, and I applied for a Medicine master PhD grant: the UMCG's own MD/PhD programme. Here, aspiring medical doctors are stimulated to perform research during their rotations, culminating in both a medical doctorate (MD), and a philosophical doctorate (PhD). And this application was more successful, and was awarded.

Now, at the end of my first year of the Medicine master, I am about to start the first year of my PhD. As luck would have it, I will be working with several fellow BCN alumni, still on the border between neuroscience and patient work. Those additional Medicine study years have been flying by. Cannot say I regret a single one of them, both BCN and (bio)Medicine.

Feel free to contact me at a.w.scheurink@umcg.nl, whether it is about HAMLETT, a PhD, (pre-master) Medicine or something else that sparked your interest.

- BY TOON SCHEURINK
- PHOTO BY MYRTHE KLAVER

BCN THESIS DEFENCES

Ups & downs: individual differences in the temporal dynamics of attention

PHD STUDENT

J. Wang

THESIS

Ups & downs: individual differences in the temporal dynamics of attention

PROMOTORS

Prof.dr. A. Aleman

Prof.dr. Y.J. Luo

COPROMOTORS

Dr. S. Martens

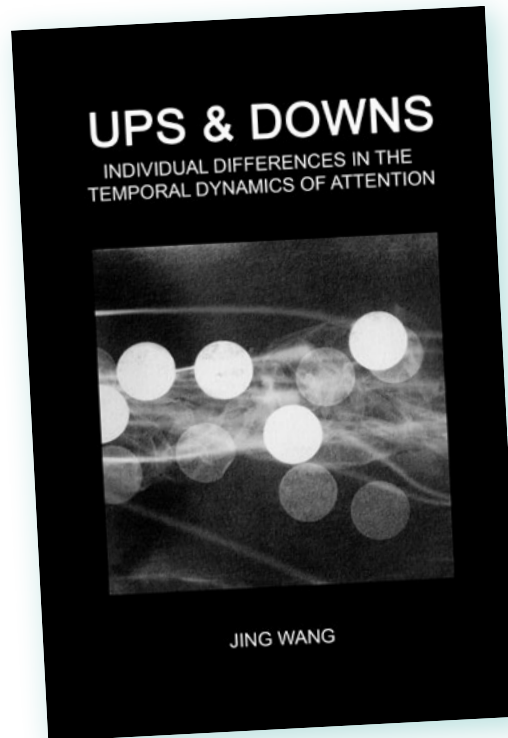
Dr. P. Xu

FACULTY

Medical Sciences

Our attention is known to be intrinsically variable over time, especially when divided over multiple sources of information. Individuals differ in their ability to divide and focus attention on relevant information, so it is important to know which factors play a role in this ability, and whether it can be trained or reflects fundamental limitations that cannot be overcome.

Typically, most people have great difficulty identifying the second of two targets when presented within 500 ms,



a phenomenon known as the attentional blink (AB). We found evidence that the AB can be diminished by training one's ability to time attention, but this learning ability is dependent on emotional disposition (depression) which was reflected in beta-gamma oscillation as measured with EEG. In a subsequent study, it was found that the oscillatory nature of attention can account for individual differences, explaining why some people show a large

attentional blink (i.e. large blinkers) while others show no restrictions whatsoever (non-blinkers). We finally considered the self-relevance of the presented stimuli in the AB task. We revealed a processing advantage for highly self-relevant stimuli, which interestingly came at either a subsequent cost or benefit in temporal attention, dependent on one's mental disposition.

In conclusion, the current thesis could shed new light on the fundamental processing of temporal attention, suggesting that temporal attention is oscillatory and trainable, and can be modulated by depression. Our robust findings have the potential to be helpful in the preliminary screening and diagnosis of depression.

Jing Wang completed her PhD at the University Medical Center Groningen (UMCG) and at the University of Shenzhen, China. She worked at the UMCG at the Department of Biomedical Sciences of Cells and Systems. She defended her thesis on October 26, 2022.

Hidden memories in the sleep-deprived brain The consequences of sleep loss for hippocampal plasticity and memory

PHD STUDENT

Y.G. Bolsius

THESIS

Hidden memories in the sleep-deprived brain

PROMOTORS

Prof.dr. R. Havekes

Prof.dr. M.J.H. Kas

COPROMOTOR

Dr. P. Meerlo

FACULTY

Science and Engineering

Sleep loss has a detrimental impact on brain function, particularly on cognitive processes responsible for storing and retrieving memories with detailed contextual and spatial information. It appears that even a brief period of sleep deprivation may already result in memory deficits such as forgetting where you parked the car last evening. Experimental rodent studies revealed that sleep deprivation hampers memory processing via disturbing critical biological processes in a specific brain region called the hippocampus. However, how sleep

loss impacts the storage and retrieval of contextual and spatial information in the hippocampus remains to a large extent still unknown.

For that reason, Youri Bolsius conducted a series of studies in mice with an emphasis on how sleep deprivation impairs hippocampal memory processing. Bolsius: “We found that sleep deprivation affects connections between brain cells (neurons) in the hippocampus. Furthermore, in contrast to general belief, we demonstrated sleep deprivation does not lead to the loss of information, but rather makes memories stored under sleep deprivation conditions difficult to remember. These findings suggest that the location of your parked car is still stored in your brain but in an inaccessible (i.e., hidden) state, that does not allow you to retrieve the information when you are searching for your car. Using a combination of state-of-the-art approaches, we successfully managed to make these ‘hidden’ memories accessible again. Overall, these findings provided novel insight into the molecular processes responsible for the observed memory impairments after a lack of sleep.”

Youri Bolsius defended his thesis on November 1, 2022.

To prompt or to praise?: Effective components of behavioral parent training for children with attention-deficit/hyperactivity disorder and the role of attachment

PHD STUDENT

R. Hornstra

THESIS

To prompt or to praise?: Effective components of behavioral parent training for children with attention-deficit/hyperactivity disorder and the role of attachment

PROMOTORS

Prof.dr. B.J. van den Hoofdakker

Prof.dr. S. van der Oord

Prof.dr. P.J. Hoekstra

COPROMOTOR

Dr. A.P. Groenman

FACULTY

Medical Sciences

Behavioral parent training (BPT) as treatment for children with ADHD has been found effective in numerous studies. There is little knowledge about the most effective components of these programs, and which components are most effective for whom. Insights into these matters could contribute to more personalized treatment. Therefore, the aim of this thesis

was to examine which components of BPT for ADHD drive intervention effects, and for whom. Techniques focusing on the manipulation of antecedents of behavior (antecedent-based techniques) and contingency management techniques (consequent-based techniques) were found to be key components of BPT for children with ADHD in two meta-regression analyses. To examine the components in isolation, a microtrial was conducted with two sessions of BPT in antecedent-based techniques, two sessions in consequent-based techniques, and a waitlist control-condition. Both types of techniques improved problem behaviors. Antecedent-based techniques appeared to be especially important to target inattention. In a series of replicated single-case experiments no added efficacy of consequent-based techniques on top of antecedent-based techniques, and no effects of antecedent-based techniques alone was demonstrated. Differences between the two experimental studies may be the result of the different designs, timing of the treatment, or medication-use. To explore attachment in relation to ADHD, this thesis examined two samples of children with and without ADHD, using two different methods to measure attachment. Children with ADHD had less secure, and more ambivalent and

disorganized attachment representations relative to their typically developing peers when using a story-stem-task, but these differences were not found using self-report questionnaires. Lastly, findings in this thesis tentatively suggest that techniques are differentially effective based on attachment representation.

Rianne Hornstra studied Psychology at the University of Groningen (RUG). She did her PhD research at Accare (center for child and adolescent psychiatry) in collaboration with the University of Groningen and the Katholieke Universiteit Leuven (joint doctorate). She is currently working as a psychologist and researcher at Accare. She defended her thesis on November 2, 2022.

Nuclear transport in amyotrophic lateral sclerosis: Direct and indirect effects of polyPR and polyGA derail nuclear transport in C90rf72-ALS yeast models

PHD STUDENT

M.F.W. Semmelink

THESIS

Nuclear transport in amyotrophic lateral sclerosis: Direct and indirect effects of polyPR and polyGA derail nuclear transport in C90rf72-ALS yeast models

PROMOTORS

Prof.dr. L.M. Veenhoff

Prof.dr.ir. E.A.A. Nollen

FACULTY

Medical Sciences

Nucleocytoplasmic transport is the active process of nuclear transport receptors bringing molecules across the nuclear envelope through nuclear pores. In this work I measured the kinetics of this transport in a yeast model under stress and with the expression of two proteins – polyPR and polyGA – related to C90rf72 amyotrophic lateral sclerosis (ALS, the nervous system disease). The alteration of transport caused by stress can be clustered in groups, which suggests underlying mechanisms in the

response to these stressors. Although the expression of neither protein impacts the nuclear pores, transport receptors, or transport energy directly, they still have specific and distinct effects on nuclear transport. PolyPR resembles that of cells experiencing reduced nuclear transport receptors, suggesting polyPR impacts the availability of these receptors. Additionally, we tried to find small molecules reducing polyPR toxicity, but found no hits in a small molecule library screen. The effect of polyGA expression resembles that of stress caused by energy maintenance issues, which suggests it causes a general stress which subsequently impacts transport.

Marije Semmelink studied Life Science and Technology at the University of Groningen. After finishing the top Masters of Medical and Pharmaceutical Drug Innovation, she started her PhD research at the Department of Cellular Biochemistry in the European Research Institute for the Biology of Aging, part of the University Medical Center Groningen. She defended her thesis on November 2, 2022.

Non-motor symptoms in dystonia: From prevalence to pathophysiology

PHD STUDENT

E.R. Timmers

THESIS

Non-motor symptoms in dystonia: From prevalence to pathophysiology

PROMOTORS

Prof.dr. M.A.J. de Koning-Tijssen

Dr. T.J. de Koning

COPROMOTOR

Dr. K.E. Niessen-Koning

FACULTY

Medical Sciences

Dystonia is a movement disorder in which patients suffer from involuntary repetitive movements and/or abnormal postures. In addition to the problems with movement, patients also have non-motor symptoms, such as psychiatric symptoms, sleep problems, and fatigue. These non-motor symptoms often remain underexposed, but they do have a great influence on the quality of life. In this dissertation, the non-motor symptoms are investigated in three forms of dystonia: dopa-responsive dystonia (DRD), myoclonus dystonia (M-D) and cervical dystonia. In all these forms of dystonia, non-motor symptoms were more prevalent than in people without dystonia

(57-74% vs. 29%). In addition, we observed that certain psychiatric symptoms were more frequently present in specific forms of dystonia. M-D patients were relatively more likely to suffer from an obsessive-compulsive disorder, whereas DRD patients often had an anxiety disorder. Another important finding is that the non-motor symptoms had a great impact on the patients' quality of life, even more than the movement disorder itself. These results show the need for an adequate and personalised treatment of the non-motor symptoms. The second part of this dissertation focuses on the role of the messenger substance serotonin in the symptoms of dystonia. On different levels, both in the blood and in the brains, we found small changes in the metabolism of serotonin, and moreover, there sometimes appeared to be a correlation with the non-motor symptoms. This shows that serotonin possibly plays a role in the non-motor symptoms. Further research may eventually lead to better treatment options for the patients.

Elze Timmers studied Medicine at the University of Groningen. She combined her Master's degree in Medicine with doing PhD research during an MD/PhD trajectory. She did her PhD research at the Expertise Center for Rare

Movement Disorders at the Department of Neurology of the University Medical Center Groningen. She will start working as a doctor not in training to become a specialist (ANIOS) in Neurology at the Martini Hospital. She defended her thesis on November 2, 2022.

Well begun is half done: Unfolding multiple pathways to school readiness

PHD STUDENT

E. Kamphorst

THESIS

Well begun is half done: Unfolding multiple pathways to school readiness

PROMOTOR

Prof.dr. A.E.M.G. Minnaert

COPROMOTORS

Dr. S. Houwen

Dr. M.H. Cantell

FACULTY

Behavioural and Social Sciences

Ample research stresses the importance of school readiness, namely the value of starting formal schooling with a set of optimally developed skills in different developmental domains. The overall aim of this dissertation was to deepen our understanding of the emergence and



● PHOTO BY JENNE HOEKSTRA

development of school readiness in a community sample of 3 year-old Dutch children.

First, we identified four school readiness profiles, each consisting of a specific pattern of strengths and weaknesses in terms of executive function-, language-, motor-, and socioemotional skills. Profiles

particularly differed in terms of motor competence and first grade school outcomes (the latter being assessed in the follow-up phase of the MELLE-project). Second, we focused on the dynamics of school readiness skills by studying stability and change of individual skills and skill profiles. We found evidence for both stability and change. Change



manifested in different ways, for example a change in only one versus in multiple of the school readiness skills or a change from one to another school readiness profile. Finally, we studied a specific aspect of the home environment in which school readiness develops, namely: mother-child interpersonal coordination. Our results showed this to be a process to which mother and child contribute in their own way, and that varied between mother-child dyads.

Taken together, we have shown that each child's arrival at the school doorstep can take many shapes. Each child arrives at school with a specific set of school readiness skills and teachers can build on the children's relative strengths and weaknesses.

Erica Kamphorst defended her thesis on November 7, 2022.

Underexposed features of CHARGE syndrome: immunological, adrenal, and scapular function

PHD STUDENT

T.Y. Wong

THESIS

Underexposed features of CHARGE syndrome: immunological, adrenal, and scapular function

PROMOTOR

Prof.dr. C.M.A. van Ravenswaaij-Arts

COPROMOTORS

Dr. E.H. Scholvinck

Dr. G. Bocca

FACULTY

Medical Sciences

CHARGE syndrome is a rare and complex genetic condition. Children with this syndrome may have a combination of various congenital defects, developmental, and behavioral problems. Abnormalities such as heart defects, blindness or deafness, receive a lot of attention. This is certainly important, but in this thesis we have focused on less obvious features: the immune system, the adrenal, and shoulder function.

Our studies show that children with CHARGE syndrome may have a reduced



● PHOTO BY IVAN WONG

immune reaction to infections because they have insufficient immune cells. They also have an insufficient response to vaccinations. The thymus is an important organ for the production of immune cells, but we could not confirm to what extent the thymus might play a role in

our findings. We have demonstrated that abnormalities in the adrenal function rarely occur. We also showed that reduced shoulder function, due to abnormalities in the nerves innervating the muscles, could be the only visible sign of CHARGE syndrome.

The results of our research should be included in current guideline(s) to create more awareness among doctors so that patients can receive optimal care, also for underexposed features. For example, we advise to do specific blood tests and to consider revaccinations in patients who have recurrent infections. Standard testing for the adrenal function is not required which may give patients and their parents some relief.

The thesis ends with a message on how important it is that patients, doctors, researchers, and policy makers work together to tackle underexposed issues in rare diseases.

Monica Wong studied Medicine at the University of Groningen. She did her PhD research at the Department of Genetics of the University Medical Center Groningen. She is now working as a Doctor of Society and Health at the GGD Amsterdam. She defended her thesis on November 9, 2022.

From cellular vulnerability to altered circuit activity: A systems biology approach to study amyotrophic lateral sclerosis

PHD STUDENT

M. Koopman

THESIS

From cellular vulnerability to altered circuit activity: A systems biology approach to study amyotrophic lateral sclerosis

PROMOTOR

Prof.dr. C.M.A. van Ravenswaaij-Arts

COPROMOTORS

Dr. E.H. Scholvinck

Dr. G. Bocca

FACULTY

Medical Sciences

The devastating effects of the brain losing its ability to control voluntary body movement are illustrated by diseases such as amyotrophic lateral sclerosis (ALS) - where the nerve cells that allow the brain to effectively communicate with muscles are progressively lost. Most of the ALS research traditionally revolves around the affected nerve cells, known as motoneurons, and aims to rescue their decline in function. Motoneurons are however part of larger networks

in the nervous system and constantly receive, process and transmit signals. Therefore, even the smallest alteration of a single motoneuron will likely leave a mark on its connecting neurons and vice versa. Could it be that solely targeting the function of diseased neurons has unexpected effects in an already (mal) adapted network? To mimic ALS, we used the worm *Caenorhabditis elegans* engineered to express the human gene TDP-43. Dysregulated TDP-43 is considered a uniform hallmark of ALS and its expression in *C. elegans* causes severe paralysis. By developing and combining numerous technology-driven, mostly unbiased screening approaches we show that TDP-43 impedes neuronal function and causes an imbalance between stimulatory and inhibitory signals in the motor circuit. While functional output of repressed motoneurons could be restored via modulation of their activity, these interventions did not result in improved locomotion. Rebalancing the derailed motor circuit dynamics by combining multiple treatments, however, effectively restored movement. Because of the high degree of similarity in genetic alterations and pathology between ALS worms and patients, similar therapeutic strategies may eventually be valuable for ALS patients.

Mandy Koopman studied Biology at the University of Groningen. After completing the Master's in Behavioral and Cognitive Neurosciences, she started her PhD research at the Department of Molecular Neurobiology at the European Research Institute for the Biology of Aging. Koopman is now working as a data scientist at Zilveren Kruis, Achmea. She defended her thesis on November 14, 2022.

Dissecting yeast-dependent population differentiation and spatial segregation in *Drosophila melanogaster*

PHD STUDENT

X. Wang

THESIS

Dissecting yeast-dependent population differentiation and spatial segregation in *Drosophila melanogaster*

PROMOTORS

Prof.dr. J.C. Billeter

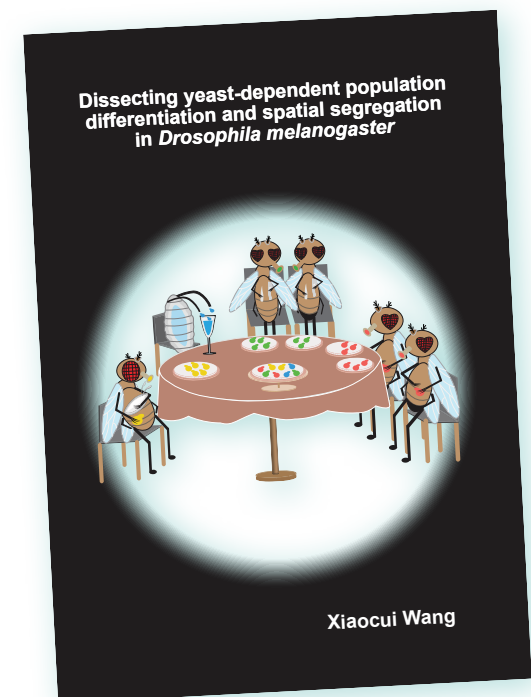
Prof.dr. M.E. Maan

FACULTY

Science and Engineering

Adaptation to different food resources is a major mechanism shaping local adaptation and speciation. Numerous

cases of food-mediated speciation are seen in plant-feeding insects. In her thesis, Xiaocui Wang first formulates seven key questions using insect literature to explore the processes of food-mediated speciation. She then experimentally investigates two critical questions regarding food-mediated population differentiation and assortative mating using the model organism *Drosophila melanogaster* and its essential food resource - yeast.



Wang: “We quantified how different fly strains respond to different yeast species, across multiple yeast-dependent life history traits. We found that fly strains respond differently to different yeast species and different life-history traits are maximized on different yeast species. This suggests that the inconsistency of responses between life-history traits forms a possible limitation to population differentiation. Additionally, we built a system for automated tracking of the mating location of flies in environments containing heterogeneous food patches to dissect food-mediated assortative mating. We discovered that flies generally mate on patches containing yeast and fly pairs exert preferences for mating on certain yeast species over others. Notably, the preference of mating on yeast depends on variables including the presence of multiple yeast species and timing of (re) mating with respect to light cycle. This suggests that some level of assortative mating may result from the preference for mating on food resources, but the strength of such assortative mating may vary with environmental conditions. Together, we present the seven-question framework for understanding food-mediated speciation and demonstrate the constraints of food-mediated population differentiation and assortative mating.”

Xiaocui Wang defended her thesis on November 15, 2022.

Evaluating autophagy in the CNS: implications for multiple sclerosis

PHD STUDENT

C. Misrielal

THESIS

Evaluating autophagy in the CNS: implications for multiple sclerosis

PROMOTORS

Prof.dr. B.J.L. Eggen

Prof.dr. F.M. Reggiori

COPROMOTOR

Dr. M. Mauthe

FACULTY

Medical Sciences

Multiple sclerosis (MS) is a complex auto-immune, neurodegenerative disorder of the central nervous system (CNS), which involves a range of CNS and immune cells. Autophagy is an intracellular degradation process that is essential to maintain cellular homeostasis. Dysregulation of autophagy leads to the accumulation of cytotoxic aggregates and aggravates immune responses. In this dissertation, we exploited primary rat glial cells, MS mouse models, and post-mortem human



● PHOTO BY JENNE HOEKSTRA

MS brain tissue, to gather new insights into the involvement of autophagy in the pathological CNS features over the course of MS. Chapter 2 showed increased mTORC1 activity during the acute phase of EAE development, a model that reflects the autoimmune component of MS, where we proposed that this increase in activity negatively regulates autophagy at both the transcriptional and the translational levels. Chapter 3 uncovered differences

in autophagic activity in glial cells when exposed to an inflammatory stimulus and showed that autophagy participates in myelin phagocytosis by microglia. Chapter 4 revealed the involvement of mTORC1 in the remyelination processes after cuprizone-induced demyelination, whereas autophagy might be involved in cuprizone-induced demyelination. Chapter 5 presents the microglia gene expression signature of macaques, where

we observed the presence of different autophagy-related genes that were more abundantly expressed in microglia/macrophages compared to other CNS cells. Together, the data presented in this thesis contribute to our understanding of the role of autophagy in CNS homeostasis and MS disease. In the long-term, these findings may lead to the identification of promising intervention targets to modulate autophagy in disorders associated with the CNS, including MS.

Chairi Misrielal studied Pharmacy at the University of Groningen. After obtaining her bachelor's degree, she was selected for the Top Master's at the time called Medical Pharmaceutical Drug Innovation (MPDI), now Molecular Medicine and Innovative Treatment. At the end of her Master's degree, she wrote a PhD proposal, which resulted in a funded PhD research. Her PhD research took place at the Department of Biomedical Sciences of Cells and Systems of the University Medical Center Groningen. She is now working as a project manager at ICON in Assen. She defended her thesis on November 23, 2022.

The neurophysiological potential: Translatability and reproducibility of preclinical outcome measures in psychiatric research

PHD STUDENT

R. Kat

THESIS

The neurophysiological potential: Translatability and reproducibility of preclinical outcome measures in psychiatric research

PROMOTOR

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COPROMOTOR

Dr. H. Bruining

FACULTY

Science and Engineering

Animal models are an important source of information for studying the biological mechanisms and complexity of mental disorders. In her thesis, Renate Kat studied which characteristics are most suitable to study psychiatric disorders in animal models.

Kat: 'We sought for characteristics of which the findings in animals apply to patients and which are robust enough to give the same results when tested in different laboratories. Behavioural

changes are important in psychiatric disorders, but turn out to be difficult to study in animal models. In a study where we combined all available data on the behaviour of an autism mouse model, we found that the results were highly inconsistent, although mostly representing the symptoms of patients well. Physiological characteristics have the potential to generate more valuable

results than behaviour, amongst other things because they can be measured in patients and animals in more similar ways. In the same mouse model, we studied brain activity in rest and in response to sensory stimulation. The responses to sensory stimuli also showed inconsistent results, however the characteristics of the brain activity in rest were consistent and in line with earlier findings. The brain



● PHOTO BY JENNE HOEKSTRA

activity of the mice was dominated by inhibitory activity. This was in contrast with the hypothesis of a hyperactive brain in autism, but in line with studies assessing the brain activity of autistic children using the same method. Our results suggest that studying physiological characteristics in psychiatric disorders can lead to more robust findings which translate better between the animal models and patients.'

Renate Kat defended her thesis on November 28, 2022.

Movement disorders and eye movement disorders in late-onset inborn errors of metabolism: An unexplored area

PHD STUDENT

L.H. Koens

THESIS

Movement disorders and eye movement disorders in late-onset inborn errors of metabolism: An unexplored area

PROMOTORS

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Dr. T.J. de Koning

FACULTY

Medical Sciences

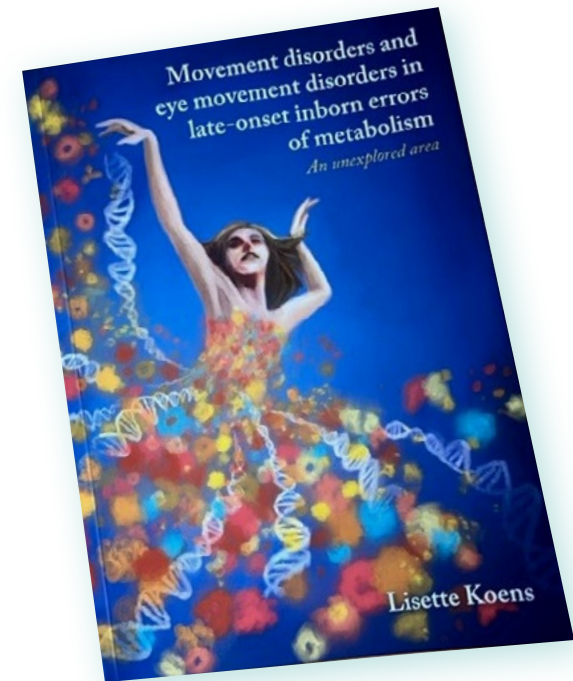


● PHOTO BY MARISKA DE GROOT

This thesis is about late-onset inborn error of metabolism (IEM). IEMs are genetic disorders that cause disturbance of a biochemical process in the body. Some of these disorders are detected through neonatal screening, however, this is not available for the majority. For a long time, these disorders were considered to occur only in children, but after improvement of diagnostic methods, IEMs are found to be present in adolescents and adults as

well. Unfortunately, it often takes a long time before these patients get the right diagnosis, which is a problem because some IEMs are treatable. In this thesis, tools to enhance the recognition of IEMs are provided. First, a new diagnostic approach is presented to improve the detection of late-onset IEMs presenting with a movement disorder, in which clinical phenotyping is the cornerstone. An underlying IEM should be suspected

in patients with movement disorders, psychiatric symptoms, and cognitive impairment. Eye movement disorders are frequent too, and this thesis shows that they can be present early in the disease course and may be very characteristic. To aid non-neurologists to recognize movement disorders, which is important because they can serve as a clue in the diagnosis of an IEM and they impact



● COVER BY ANNA SIEBEN
SIEBEN MEDICAL ART

quality of life, a diagnostic screening tool is presented. To conclude, this thesis contributes to a clearer view of late-onset IEMs. It gives tools to enhance clinical diagnosis and suggestions for improvement of care. Both of these are important in the light of the development of new treatments for IEMs.

Lisette Koens studied Medicine at the University of Groningen, followed by a training to become a neurologist at the University Medical Center Groningen (UMCG). She combined the latter with conducting PhD research on adolescents and adults with a metabolic disorder. She has now graduated as a neurologist and works at the Department of Neurology at the UMCG. She defended her thesis on December 19, 2022.

Corticothalamic processing across the neuropsychiatric spectrum: The role of protocadherin 9 expression in different sensory modalities

PHD STUDENT

B.E. Hornix

THESIS

Corticothalamic processing across the neuropsychiatric spectrum: The role of protocadherin 9 expression in different sensory modalities

PROMOTORS

Prof.dr. M.J.H. Kas
Prof.dr. R. Havekes

FACULTY

Science and Engineering

In summary, the work described in the thesis of Betty Hornix highlights the importance of Pcdh9 in the formation of sensory networks early in life and sensory processing in multiple senses later in life. Furthermore, these findings underscore that Pcdh9 expression in ctx6 CT neurons plays an essential role in sensory networks, and that restoration of Pcdh9 in these neurons can (partially) restore some of the phenotypes seen in various senses.

Hornix: 'Our perception of and response to our environment depends on internal

processing of external information. For example, to interpret a person's mood, it is important to integrate facial expression, voice intonation and body language, among other things. Thus, the interpretation of social cues requires a high level of sensory integration. For this to proceed smoothly, the neuronal networks involved in sensory processing must be correctly developed. However, in many neuropsychiatric disorders, the underlying mechanisms of these processes are altered. We found that sensory processing in several senses (smell, sight, touch and hearing) is impaired in mice lacking the risk gene Pcdh9. Many of these deficiencies could be partially or completely restored by restoring protein expression of Pcdh9 in corticothalamic (CT) neurons in cortical layer 6 (ctx6). This was the case for smell, vision and touch but not for hearing. In addition, we found that in the absence of Pcdh9, mice exhibit long-term social discrimination deficits. This social phenotype could not be overcome by restoring Pcdh9 expression in only the ctx6 CT neurons. In summary, the work described in this thesis highlights the importance of Pcdh9 in the formation of sensory networks early in life and sensory processing in multiple senses later in life. Furthermore, these findings underscore that Pcdh9 expression in

ctx6 CT neurons plays an essential role in sensory networks, and that restoration of Pcdh9 in these neurons can (partially) restore some of the phenotypes seen in various senses.'

Betty Hornix defended her thesis on December 20, 2022.

Determinants of recovery after traumatic brain injury: A neuropsychological perspective on symptoms across the severity spectrum

PHD STUDENT

S.E. Rakers

THESIS

Determinants of recovery after traumatic brain injury: A neuropsychological perspective on symptoms across the severity spectrum

PROMOTORS

Prof.dr. J.M. Spikman
Prof.dr. J. van der Naalt

FACULTY

Medical Sciences

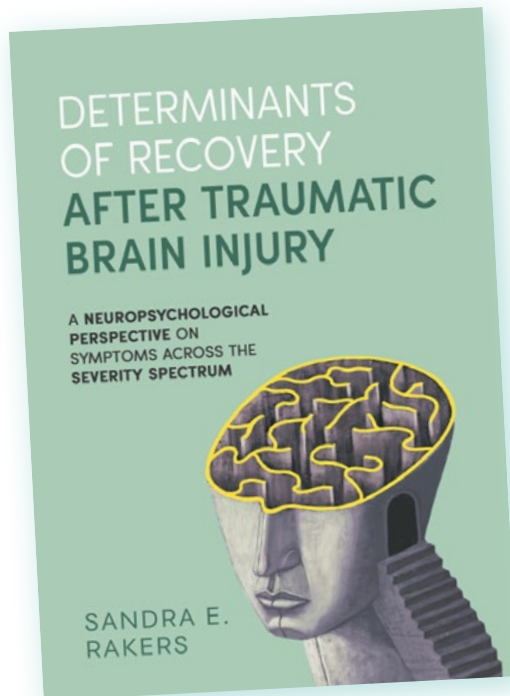
Annually, approximately 85.000 people in the Netherlands sustain a traumatic brain injury, also known as a concussion (mild traumatic brain injury) or a contusion

(moderate to severe traumatic brain injury). There is great variation in the way people recover after a traumatic brain injury.

Sandra Rakers' PhD research focused on further elucidating important factors that can influence recovery. Cognitive functions, fatigue, coping, anxiety, depression, and neuroimaging measures were examined. It turned out that a slower mental pace after a more severe traumatic

brain injury was associated with more cognitive effort and therefore higher mental fatigue. In contrast, in patients with a mild traumatic brain injury, fatigue symptoms were found to be strongly associated with psychological distress and reverting to passive coping strategies. Within the group of patients with a mild traumatic brain injury, different subgroups were present that differed with regard to the factors that influence recovery. The effect of executive disorders on the use of active coping strategies appeared to be limited. Furthermore, neuroimaging measures did not provide a clear explanation for clinical recovery after mild traumatic brain injury. Taken together, patients with mild traumatic brain injury and patients with moderate to severe traumatic brain injury should be approached as separate patient groups and each deserves tailored care.

Sandra Rakers studied Life Science & Technology (in the direction of Biomedical Sciences and Behavioral and Neurosciences) and Clinical Neuropsychology at the University of Groningen. Her PhD research was conducted with Prof. J.M. Spikman and Prof. J. van der Naalt at the Departments of Neurology and Neuropsychology of the University Medical Center



● PHOTO BY SANDER MARTENS

Groningen. She is currently working as a neuropsychologist in training to become a GZ psychologist and after that she will start a training to become a Clinical Neuropsychologist. She defended her thesis on December 21, 2022.

Emotionally painful: Insights in pain-related conditions with anomalies in emotion processing and regulation

PHD STUDENT

T.G. Balducci Garcia

THESIS

Emotionally painful: Insights in pain-related conditions with anomalies in emotion processing and regulation

PROMOTORS

Prof.dr. A. Aleman

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COPROMOTOR

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FACULTY

Medical Sciences

Emotions and pain are inherent to human experience, and both are related. For example, it is known that the intensity of pain can be modified by the emotions experienced. Nevertheless, the relationship between emotions and pain is not fully understood. The aim of this thesis was to add knowledge on emotions and pain in the context of pain-related conditions with anomalies in emotion processing and regulation. First, the prevalence rates of depression, anxiety, and alexithymia in disorders with central sensitization and chronic pain were

summarised. We found high prevalence rates for the three psychological conditions in such disorders. Next, we studied the neural correlates of emotion processing and regulation in fibromyalgia, a chronic widespread pain condition. We found that brain connectivity of regions previously related to pain modulation is affected during the processing and regulation of positive and negative emotional stimuli in fibromyalgia. Furthermore, alterations during resting state related to alexithymia were found. Finally, we studied the intrinsic brain connectivity of areas related to emotion regulation in borderline personality disorder, which is characterised by emotion dysregulation and alterations in pain processing. Our study focused on the interaction with cocaine dependence, a frequent comorbidity. Overall, this thesis contributes to a better understanding of disorders characterised by pain and emotion processing and regulation difficulties, and points at future directions to improve the treatment of patients with such conditions. Additionally, it highlights the importance of acknowledging emotions when treating patients with pain conditions.

Thania Balducci Garcia studied Medicine at the Universidad Nacional Autónoma



● PHOTO BY HENK KEEGSTRA

de México in Mexico City. She conducted her PhD research at the Department of Biomedical Science of Cells and Systems and the Brain and Cognition Institute of the University Medical Center Groningen. She defended her thesis on December 21, 2022.

Myelin imaging: Past, present, and beyond

PHD STUDENT

C.W.J. van der Weijden

THESIS

Myelin imaging: Past, present, and beyond

PROMOTORS

Prof.dr. E.F.J. de Vries

Prof.dr. R.A.J.O Dierckx

COPROMOTOR

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FACULTY

Medical Sciences

In multiple sclerosis (MS) patients, the myelin sheath, which is the protective layer covering nerves, gets damaged. For monitoring of the progression of myelin damage and its repair an accurate direct measurement of myelin density is needed. In this thesis, we show the performances, pitfalls, and practical applications of myelin imaging methods for objectively measuring myelin density. [11C]MeDAS PET scanning is such a method. We demonstrated that [11C]MeDAS PET is a promising method for measuring myelin density as its signal in the brain, spinal cord, and MS lesions corresponded well with the physiological distribution of myelin. Furthermore, with [11C]MeDAS PET a decrease in myelin



● PHOTO BY MONIQUE VAN DER WEIJDEN

density within white matter lesions in MS patients over time could be detected. In addition, we used advanced diffusion MRI techniques and showed it enabled MS lesion characterization beyond traditional

measures. Advanced analysis of brain networks with diagnostic MRI revealed some deterioration of brain regions involved in motor function. We also found that advanced statistical analyses applied

to MRI data could be used to discriminate different MS subtypes.

Kars van der Weijden defended his thesis on January 11, 2023.

From replicability to generalizability: How research practice can shape scientific results

PHD STUDENT

M. Arroyo Araujo

THESIS

From replicability to generalizability: How research practice can shape scientific results

PROMOTORS

Prof.dr. M.J.H. Kas

Prof.dr. R. Havekes

COPROMOTOR

Dr. P. Meerlo

FACULTY

Science and Engineering

Scientific findings are taken as reliable when comparable results can be obtained after replicating the original study with similar methodologies. In this thesis we explored whether using the same experimental protocol in different laboratories can give comparable results; in addition, we also tested how small changes in environmental variables of the protocol could influence the results across laboratories to make them more comparable. From these studies we learned that results become more comparable when the different labs follow

the same protocol than when each lab follows their own protocol for the same task; however, this scenario is not always feasible in animal science. In another study, we summarized findings published in the literature that showed great variability of results among studies that measure the same behavioral construct in rodents. These differences couldn't be explored in relation to the diverse experimental protocols used as few articles had a complete and clear report of their methodology; therefore, another lesson from this thesis is the importance of complete and transparent reporting to accurately assess the replicability of results and the factors that might affect it. A way to improve the planning, performance, and reporting of preclinical studies is by using the openly available guidelines or to use a quality system, such as the one discussed in this thesis. The EQIPD quality system guides the researcher through the scientific process in such a way that promotes research practices that to enhance the quality of their research and thus, the value of it.

Maria Arroyo Araujo defended her thesis on January 17, 2023.

It's about time. Computational and experimental investigations of adaptation to nature's temporal structure

PHD STUDENT

J.M. Salet

THESIS

It's about time. Computational and experimental investigations of adaptation to nature's temporal structure

PROMOTOR

Prof.dr. D.H. van Rijn

COPROMOTOR

Dr. W. Kruijne

FACULTY

Behavioural and Social Sciences

The brain can be conceptualized as a predictive machine that generates predictions in order to act instead of react to an ever-unfolding world. Time is critical to any prediction. Think about an athlete awaiting the start signal: "Ready?" - "Set..." - "Go!". A good start depends on the athlete's estimate of the interval between "Set..." and "Go!".

In my research, I propose that almost all of our behavior is timed, even though we are hardly aware of it. Probably, up to now, you have never considered that while the shower water heats, the brain somehow

keeps track of the time. By using your shower, you form an implicit estimate of when the water is heated up. Based on this estimate, you can prepare to hop under your warm shower at the right time.

How does the brain track such intervals (the time it takes for the water to heat) to anticipate when an event takes place? Because we are so used to thinking about clock-time, we tend to think in terms of 'brain-clocks' that track time. However, this turns out to be an incorrect concept. Research suggests that time is intrinsic to the brain's neural dynamics. My research demonstrates that these dynamics can be tuned through associative memory to time behavior. By interacting with events in our world, we learn to associate their occurrence with certain points in time and adapt behavior accordingly, for example, to take off right after the "Go!" signal.

Josh Salet defended his thesis on January 19, 2023.

● **EVELYN KUIPER-DRENTH, BASED ON PRESS REPORTS OF THE UNIVERSITY OF GRONINGEN**

CHEEKY PROPOSITIONS

*Developing school readiness is comparable to learning to dance. The purpose is not only to learn the choreography but also to enjoy each step along the way.
(adapted from Wayne Dyer)*

Erica Kamphorst

*Boldly go where no one has gone before.
(Captain Kirk, commander of the USS Enterprise)*

Monica Wong

*Finding the right balance between thinking and doing is important for research: doing without thinking is fruitless; thinking without doing is dangerous.
(rephrased from Confucius)*

Xiaocui Wang

Be like the lotus: “trust in the light, grow through the dirt, believe in new beginnings”.

Chairi Misrielal

Sometimes a beer with friends is all it takes to provide another perspective to solve the problem at hand.

Kars van der Weijden

COOL LINKS

> Video

<https://learn.genetics.utah.edu/content/memory/7sins>

On the basis of seven issues with human memory, this murder mystery from the University of Utah shows us how dangerous it is to rely on witness testimonies.

> Video

https://www.ted.com/talks/lera_boroditsky_how_language_shapes_the_way_we_think?language=en

In this video about linguistic relativity, Lera Boroditsky discusses the intriguing relationship between the languages we speak and the thoughts we have.

> Webpage

<https://www.fi.edu/your-brain/interactives/turn-off-your-perception>

This interactive webpage from The Franklin Institute allows you to experience how different parts of the brain influence your vision.

> Article

<https://www.iflscience.com/schizophrenia-linked-to-disrupted-or-missing-12-hour-gene-cycles-in-the-brain-67227>

This fascinating article discusses how the functioning of genes with 12-hour cycles might be different among people with schizophrenia.

> Images

<https://www.the-scientist.com/freeze-frame/caught-on-camera-70769>

Need a break? Take a look at these beautiful images of brains, neurons and other cells as shown on The Scientist.

● BY PENNY HEISTERKAMP

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