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Network connectivity in the ageing brain
An interview with Linda Geerligs

In September, I started working in an office at the Department of Experimental Psychology. My desk was formerly occupied by a young researcher called Linda Geerligs. It was interesting to hear the occasional anecdote about this unknown girl. From these stories I imagined she’d been quite a talented and successful PhD student. When I attended her PhD ceremony in January 2014, this suspicion was confirmed. I saw a modest, eloquent young researcher that answered difficult questions calmly and concisely. Indeed, she received her PhD degree with the distinction ‘cum laude’.

Linda Geerligs’ main research interest is the neuroscience of the healthy aging brain, which she has been investigating throughout her PhD and postdoc research. After completing the BCN research master, she went on to do a PhD at the Department of Experimental Psychology of the University of Groningen, under the supervision of Prof. Monicque Lorist and Prof. Natasha Maurits. This was the time that her interest in the aging brain was triggered. She is currently continuing this line of research as a postdoc at the Cognition and Brain Sciences Unit in Cambridge, for which she received a Rubicon grant from the NWO.

What was your PhD-research about?
The unifying theme of most of my work is the investigation of how brain function changes with age and how these changes are related to cognitive performance in older adults. Initially, I looked at the effects of aging on selective attention. Older adults have more trouble ignoring information that is irrelevant in a given situation (such as background music), which leads to other problems in attention and memory. We found that the communication between the posterior (visual) and frontal parts of the brain played an important role in this ability to suppress irrelevant information.

This finding sparked my interest to study functional connectivity; I wanted to understand more about how different brain regions communicate and cooperate, and how aging affects these processes. In the brain, we can distinguish a number of functional networks; these are brain areas that have high connectivity with each other but limited connectivity to other networks. Each network is involved in specific functions, such as vision, audition or attention. Interestingly, most of these networks can be identified regardless of what people are doing, whether they are actively doing a task, resting or even sleeping. We have shown that these brain networks become less distinct as people age: connectivity within networks decreases with age, but connections between networks increase. In addition, we found indications that this decrease in connectivity within brain networks is related to a decline in cognitive functioning in older adults.

Your PhD project has been described as complex and state-of-the-art. You have used mathematical tools such as graph theory, independent component analysis, and network analysis to answer your questions. Why did you choose to do so? How have these methods allowed you to answer novel research questions?
The inherent complexity of the brain means that it is impossible to capture an informative snapshot of its activity, or interpret what that activity might mean, with any one, singular method. The complex nature of brain activity also means we don’t necessarily know which portions of the activity are relevant or irrelevant to the questions we’re trying to answer. For example, in the past, fluctuations in fMRI signal intensity that are not evoked by a stimulus were generally discarded as noise, but today we know that these fluctuations are related to spontaneous activity in the brain. These new insights into the nature of brain function have led me to develop new methods to analyze the data. I have used graph theory to quantify the structure of functional brain networks and independent component analysis to identify the sources of activity in the brain. I have also used network analysis to study how changes in network structure relate to changes in cognitive function. These methods have allowed me to answer questions that were previously impossible to answer.

> The inherent complexity of the brain means that it is impossible to capture an informative snapshot of its activity, or interpret what that activity might mean, with any one, singular method. <
Many PhD students appear to have moments of despair: “I am never going to finish this in time” or “Who am I to believe that I can make progress in science?”. Have you experienced these feelings too, or has it been easy for you all the way through? I think almost all PhD’s consist of many ups and downs and mine was no exception. A challenge for me was to accept the unpredictability of the scientific process. At times I felt the project was not going anywhere, but usually these moments of frustration occurred right before I found a solution to the problem I was struggling with. I was lucky to have very supportive supervisors who helped me in these difficult periods. Another thing I was struggling with (and still am) is that in applying new methods of data analysis, there is never an optimal approach. There are many choices you make along the way, and there is often no consensus in the literature about which choice is the best. You just have to make the best, most informed choice you can and learn to deal with some ambiguity.

How did you handle these moments of doubt? For me it was important to be able to talk about these issues with my supervisors and colleagues. Also, over time, I have learned to have a little more faith in a good outcome.

Are you proud of what you have achieved? What would you have done differently if you had the choice? That’s a difficult question to answer. In many respects I am proud of what I achieved. When I started my PhD I never thought things would turn out so well. With hindsight, there are many things I could have done better or more efficiently though. Most of all I think I could have benefitted from collaborating more with people who were experts in the techniques I wanted to apply. Even so, I think making mistakes and doing things over are important steps in the process of learning to become an independent scientist, and have enabled me to build up the confidence and skills to tackle the wide range of problems that I encounter in my day-to-day research.

How did you gather the necessary expertise around you to accomplish your goals? Did you network actively or did these contacts come naturally? I was very lucky that Dr. Remco Renken, who is an expert in fMRI data analysis, was willing to get involved in the project. He helped me tremendously in the methodological aspects of my PhD. Also, because of contacts my PhD supervisors had made, I was able to visit a lab in Norway for a month, with a NENS stipend. There, I learned a lot about programming in Matlab, which is a skill that was invaluable in the rest of my PhD and as well as my postdoc. At conferences, I did network actively to get in touch with people from my field who were working on similar topics, and even though these contacts did not result in collaborations at the time, it helped me to gradually build up my network and it was a good skill to develop for future use.

What are you doing at the moment? I am currently working as a postdoc at the Cognition and Brain Sciences Unit in Cambridge, doing research that builds on the findings from my PhD. My postdoc position is part of a larger project on aging, called the Cambridge Centre for Aging and Neuroscience. I am able to use data from across the lifespan of nearly 700 people to get a better understanding of how aging affects brain function and how this relates to cognition. I am currently working on a project investigating whether the effects of aging on the communication between brain regions are dependent on the task that the participants are performing. I am also very interested in looking at the dynamics of brain function. Recent studies have shown that even on the scale of seconds to minutes, there is a lot of variability in the communication between brain regions, so I am looking at how aging affects these temporal dynamics and how this impacts older adults’ cognitive performance.

How has your PhD prepared you for your current research? What skills would you advise other PhD students to acquire? Because my PhD and postdoc research are so closely related, the transition to the current position was not difficult. However, even when the connection between your current and future research is less obvious, there are many transferrable skills that you can develop during any PhD which are important for any future job, such as writing, project management, and presenting yourself and your research. I would encourage other PhD students to find the parts of their project that really interest them and try to develop their own ideas about where they would like to go with their research (as much as possible).
In March this year, John Hoeks was appointed Professor at the Faculty of Arts. His research is about the neural basis of communication, with special focus on persuasive communication and social rules in language. Amongst other methods, he extracts event-related potentials (ERPs) from EEG to study the brain.

During your career, you have done a lot of research on linguistic processing. How did you come to be interested in social rules as a subject of study?
We have been studying language, or rather a multitude of linguistic processes such as syntactic and semantic processing, in isolated sentences. But the speaker of the language is a social animal, and the language he uses is not a freestanding thing that can be studied without taking into account what it is for: Language is a means to an end. Language is very helpful for communication. And we need to communicate in order to survive, and to be able to influence each other’s behaviours by expressing beliefs, wishes, and expectations.

If language should not be viewed as a system separate from its user, how then should we see it?
We should see language as it is incorporated in the brain of a social animal. To put it simply, evolution brought us, mammals, two important brain systems: the limbic system and the frontal
The limbic system governs our drives and motivations. We need hunger, thirst and sexual desire if we want to survive and procreate. However, if we would just grab our object of wanting whenever our limbic system tells us to, we would be in trouble. We need the frontal cortex to regulate and control these drives. In managing our goal-directed behaviour, the frontal system takes into account attitudes, beliefs about whether something would be good for us or not, and social factors such as what our culture or family would think of our behaviour and how it would affect our status.

This control the frontal cortex exerts is very visible in our social linguistic behaviour. You cannot simply express your wishes without keeping in mind who you are talking to. There is a difference between saying ‘Close the door,’ ‘Would you close the door?’, ‘Would you mind closing the door, please?’; and ‘Excuse me, would you be so kind to close the door for me, please?’ How we tailor our speech to the situation we are in is something I find very interesting. At the moment we are studying this using EEG. One of the findings so far is that violations of the expected social format result in a large P600 effect.

**The P600 and N400 are classic language-related ERPs.** A P600-effect is typically found when a grammatical violation is perceived in spoken or written language. If you find a P600 as a result of social rule processing, would this imply we should change our interpretation of the P600-effect?

A few years ago, I did some research that indeed convinced me that we should drastically change our perception of what processes the N400 and P600 represent.

For a long time, the N400 was thought to reflect semantic integration of linguistic input. A large N400 can be seen in the EEG signal when people read a word that is very unexpected in this sentence. However, there have also been cases when an N400 would not show in the signal even when the word in the sentence did not make any sense semantically. With my group I have shown that this and some other empirical oddities can be explained by simply changing the assumption of what the N400 is meant to reflect. I believe that rather than representing semantic interpretation, the N400 is a marker for lexical priming: the preparation for an upcoming word by the context. When we see N400 activity, it is because a word’s meaning is being retrieved from the mental lexicon. When the word is very unexpected, this will be harder, as there was no preliminary activation of this meaning by the context, and the resulting N400 will be larger. This is quite a revolutionary shift from the classical interpretation of the N400 as reflecting semantic integration, to reflecting the process of looking up the meaning of a word.

But if the N400 reflects only meaning retrieval, does that mean we have no clue anymore about how the brain interprets or makes sense of language?

Fortunately, we do have a clue. In the same project we also present an alternative candidate for the role of reflecting integration: the P600. Classically, the P600-effect was related to processing of grammar. A P600 will appear when a grammatical rule is violated, for example when the wrong inflection of a verb is used in a sentence. This is of course still the case, but I see the P600 as showing the effort to build a coherent representation of what is going on, and grammatical violations as making this process more difficult. These assumption changes appear to fit very well with everything we see in the literature – for phenomena we thought we had explained, as well as puzzles that were still open. Therefore, I believe with this work, we have made a fundamental contribution to the field, of which I am quite proud.

**EEG is a great tool to study the time-course of processing, but do we know anything about where in the brain these redefined N400- and P600-processes take place?**

We constructed an anatomical model based upon many reviews of lesion studies and neuroimaging data. In this model we propose the cortical sites that function as network hubs are the neural originators of the N400 and the P600. They are actually two old acquaintances: Wernicke’s and Broca’s areas. Wernicke’s area seems to govern the retrieval of meaning from long-term memory. In a network with parietal and association areas Wernicke does the digging up of the meaning of a word, and sends it to Broca’s area, where sense is being made of the whole input.

In our view, Broca’s area is where the integration of all information takes place, and a coherent representation
is created. You could see Broca’s area as a fruit juicer. It is spinning constantly, trying to produce a smooth mix of juice. If you put a whole pear in it, it will spin with a little more difficulty, making an effort to integrate the pear into the juice. This is the P600-effect, the thing we pick up with our electrodes. But the machine is working continuously, without pause. This also means that the P600 doesn’t necessarily represent processing of a linguistic nature. When Broca tries to make sense of a dialogue, of course it does. But when a coherent interpretation of a non-linguistic situation is worked on, a P600 could reflect the effort to integrate an object into the scene, or an unexpected sound.

Recently, we submitted a paper on a computational model to implement the anatomical model. I think it is really amazing how this re-analysis of the N400 and P600, Wernicke’s and Broca’s areas can explain so many empirical findings that before could not be explained. How well it all seems to fit… It gives me goose bumps.

This is quite fundamental research. I take it that your study of persuasive communication is of a more practical nature.

Yes, another of my research interests is the question how peoples’ behaviour can be influenced to become healthier. This can again be related to the interplay between the limbic system and the frontal cortex. Marketers have an easy job to do. They use communication to try to sell you a specific type of chocolate. Your limbic system already tells you ‘I want chocolate!’ so all the marketers have to do is go with the flow of your limbic system. However, health communication is a much more challenging job. A health advisor may want to tell you that you need to wear a condom when having sex, or that you need to drink less alcohol. Having sex without a condom and drinking alcohol is to many people very rewarding. So convincing people to behave differently on these drives is going to be much harder.

Another example is vegan food. We know that it has all kinds of advantages, for the individual as well as the environment and the global population. Nevertheless, when trying to decide whether or not we should eat animal products, we take into account what other people may think of us. For example, we may have the belief that it is not masculine to not eat meat, and may decide not to eat a vegan meal. I find it a great challenge to try and find a way to persuade people to make more healthy choices.

You are yourself a vegan, and a firm defender of animal rights. Does this play a role in your research?

In line with the frontal cortex theory, I think a person’s beliefs and attitudes will always affect his behaviour. In my case, it is not that animal rights are part of my research, but they do influence my academic behaviour. For example, although I am very enthusiastic about

BCN, I do not visit as many lectures or events as I would like to. The reason is not that I do not find the lectures interesting, but that they very often without warning concern animal testing, which I loathe. It would help if it would be clear beforehand when results based on animal testing are going to be presented, so I can decide whether to attend the event or not. Also, on a more positive note, when I became professor I had my gown tailor-made: it is 100% vegan!

Hoping he will not take offense, I would like to conclude that Professor Hoeks must be a bit like Broca’s area, …or a fruit juicer, succeeding in integrating so many chunks of empirical findings into a coherent interpretation of the workings of the brain. It is clear that he is very passionate about his quest to understand language as part of communication, and communication as part of social beings. And he is excited to be a professor now. He tells me he is only just getting used to seeing this title in front of his name. “Upon being addressed as professor, I experience a little shock. It still surprises me each time!” He agrees with me that there must be quite a large N400 and P600 detectable on the surface of his scalp when he reads ‘Professor Hoeks’. “But it’s fantastic.”

By Sanne Brederoo

Photos by Sander Martens
ECOS-KNAW accredits BCN

Very recently, the quality of education and research of the Research School BCN was evaluated by the Accreditation Committee of Graduate Schools (ECOS - KNAW). ECOS decided to officially recognize BCN as a research school for a period of six years. In addition, as requested by the Boards of the Universities of Groningen and Twente, BCN is also transformed into a national research school in which the research institute MIRA from the University of Twente will participate along with the five faculties of the University of Groningen.

BCN has set itself the target of tuning and streamlining neuroscience-oriented research and educational activities within Groningen and the research institute MIRA. Focal areas of research of the participating research institutes include the ageing brain, imaging and cognition, developmental linguistics, philosophy of cognition, and food and robotics. In the field of education, participating faculties jointly organise Research Master and PhD training programmes. In 2012 BCN received a grant of € 800,000 from the Graduate Programme of NWO. In 2014, BCN’s Research Master programme was again ranked a ‘top programme’ (source: Keuzegids Masters 2014), making it one of the best research masters of the University of Groningen, and the best master in its field in the Netherlands.

In addition to national collaboration, BCN also seeks greater international collaboration. Within the U4 strategic network, BCN is prominently active within the Research Network Ageing Brain. Partly on the initiative of BCN, this research network has become a large international consortium in which, in addition to the U4 partners, the University of British Columbia, the Mayo Clinic, the University of Newcastle upon Tyne, and the University of Copenhagen participate. The consortium includes an international joint PhD network with more than ten joint PhD projects, and the network is also very active within the new framework, Horizon2020, of the EU.

BY MICHEL HOOIVELD AND ERIK BODEKE
Mindwise: The sound of silence

Since I started taking courses outside of the Psychology Department and the Faculty of Behavioral and Social Sciences, I’ve stumbled upon an interesting piece of cultural diversity amongst the faculties of our University.

This peculiarity first occurred to me when I accidentally ended up in a lecture of a course called ‘International Law and Organization’ (don’t ask me why, I must have entered the wrong room and somehow forgot to leave). At the end of the lecture something quite strange happened, though I could not exactly tell what. After a moment of pondering in silence I finally realized what it was. It was the silence itself. Or rather, the absence of applause.

As I looked around I saw people packing their bags and doing other things while they were slowly making their way towards the exit door. More importantly, however, they did not put their hands together for our lecturer. How impolite of these unthankful rogues! Didn’t they appreciate the words of our poor professor, who so passionately explained all the breathtaking aspects of international jurisdiction? But then I looked at him and noticed that he didn’t seem to mind the lack of applause. At all.

It was in that pivotal moment that I realized that I was dealing with a social convention here. Apparently, one simply does not clap in the House of Law. Since then I’ve been paying attention to the way people behave at the end of a lecture. As most of the students in the Department will know, Groningen psychology students usually applaud after their lectures. But after a lecture in philosophy one remains silent, although it depends on which city you are in. I’ve heard from a reliable source that it is completely fine to applaud lecturers at the University of Amsterdam. Unless you are studying Biomedical Science, of course.

I’ve come to the unfortunate conclusion that we, psychology students of Groningen, really do a lousy job at applauding. Most of the clapping I’ve heard at our faculty was pretty damn disappointing. Honestly, it was soft, short, and uninspired. I believe this is becoming a serious problem and we should all make a radical decision to restore the grand gesture of the Applause.

That is why I suggest we applaud as loud and as long as we can, with an occasional cheer thrown into the mix (I would be happy to volunteer). Or we clap just once. One big, loud clap, all at the same time. And then we leave.

\[ \text{Original published on Mindwise, the new blogging platform of the Department of Psychology.} \]

Image by Marcin Wichary, licenced under CC BY 2.0

> We should all make a radical decision to restore the grand gesture of the Applause. <
Mindwise: Facebook’s manipulations

On 17 June, researchers affiliated with Cornell University, the University of California in San Francisco, and Facebook Inc. published a study of emotional contagion. By manipulating the News Feed of Facebook users (N = 689,003), they reduced either the number of positive or negative emotion words users were exposed to. They then measured the number of positive or negative words these same people subsequently used in their own posts, and indeed found evidence for what they suggested is emotional contagion: users in the experimental group who were exposed to fewer positive words than the control group (whose News Feeds were left undisturbed) produced fewer positive and more negative words. The opposite was true for users exposed to fewer negative words. The results are statistically significant, but the effect is tiny.

To most people, more remarkable than the study’s results were the ethics of the experiment. The Facebook users involved did not give informed consent, nor were they debriefed. As Katy Waldman formulated it in Slate: Others have defended the study: it’s simply a part of Facebook’s ongoing effort to improve its service, and at least this time the results were published – open access even. And besides, no harm was done. Reading more or fewer emotion-related words in your News Feed is not going to upset your mental balance. People aren’t made of spun glass, as someone put it.

In my opinion, the question of harm is irrelevant. Even if there is no risk for the participants, informed consent is mandatory in behavioral research. It is, firstly, not up to the researchers to decide whether the experiment is potentially harmful: that is for the participants themselves to decide. Any other arrangement would be paternalistic. And secondly, it is crucial that people participate voluntarily. Granted, there is a provision in the small print of Facebook’s terms of agreement about the company’s right to use user data for research. Moreover, even if they didn’t read the terms of agreement before clicking “accept”, most Facebook users are aware they sold their soul to the company when they signed up. However, it rather stretches the meaning of the term to call this “informed consent” and publishing your findings in the Proceedings of the National Academy of Sciences hardly constitutes “debriefing”. Informed consent forces researchers to consider the interests of their experimental subjects, and the people they study in general. And it works both ways, because informed consent likewise forces the participants to consider the interests of the researchers and think about the subject they study. The fact (if it is a fact) that most participants don’t care (they’re just in it for the credits) is not an argument for not taking informed consent and debriefing seriously, rather the reverse: it means they are not as interested in behavioral research as they should be, and we must try harder to argue for its value.

> The point of informed consent is not to avoid harm, it is to make sure that behavioral research is not just about people, but is done with and for people. <

By Maarten Derksen

Photo by Maarten Derksen
Avril McDonald Memorial Fund

A staggering 81 percent of elementary teachers are women, and to them a fundamental portion of the education of new generations is entrusted. However, those numbers are distinctly different in the academic world, where most of the tenure-track chairs are occupied by men; only 15.7 percent of full-time professors in the Netherlands are female. This is staggering, considering that half of the students and graduates of Dutch universities are female. A steady decline in those numbers is seen with every step on the academic career ladder: from half of the graduates, to 43 percent of PhD candidates, to 31 percent of university teachers, to 18 percent of associate professors which eventually results in 15.7 percent of professors being female.

In 2007 the University of Groningen initiated the Rosalind Franklin Fellowship programme which aims to attract talented female international researchers. In 2010 one of the Rosalind Franklin Fellows passed away unexpectedly. She was a very passionate researcher who excelled in the field of International Law. The Rosalind Franklin Fellowship decided to establish a fund in her name and encourage promising young female scientists: Avril McDonald Memorial Fund. In this way the Rosalind Franklin Fellows and the Avril McDonald Memorial Fund together take it upon themselves to enable the pursuit of an academic career for female students.

All faculties and research areas at the University of Groningen can nominate a master’s student, and each year 3-4 prizes are awarded, with no more than one prize going to each faculty. Students granted the award receive 1.000 euro’s to develop a PhD-proposal which can be submitted to the RUG, NWO or any other body she may choose. Moreover, a Rosalind Franklin Fellow is appointed as a mentor to each grantee during the proposal writing as well as the actual PhD-project.

As part of this, an annual charity fundraising dinner is hosted on the last Friday of the holidays, before the start of the academic year. Great food, musical entertainment and prizes donated by the fellows and local businesses and, of course, good company has made this dinner a great success for the last three years. The Avril McDonald Memorial Fund is a great initiative that helps students to achieve a change in the unequal distribution of ‘robes of office’.

■ BY ELOUISE KOOPS

> Students granted the award receive 1.000 euro’s to develop a PhD-proposal. <

Introducing a new staff writer

> ELOUISE KOOPS

As I very much enjoy reading the BCN Newsletter, I am very pleased to be a staff writer. I will complete my Behavioural and Cognitive Neuroscience research master this summer. In September I will start as a PhD-student at the UMCG in the Audiology research group of Pim van Dijk en Cris Lanting. During my PhD-project I will investigate deviations in frequency-to-place maps in patients with tinnitus and hearing loss. Tonotopic reorganisation, or neuroplasticity, has been proposed to be involved in the aetiology of tinnitus. This reorganisation will be reflected in the altered representation of frequency maps and loudness perception. If we are able to identify deviations in the tonotopic organisation of the human auditory cortex and can relate these changes in the brain to tinnitus, this will be a great step towards the development of specific and efficient methods of treatment for this debilitating symptom. I am under the impression that there is still so much to be learned and that I have only just seen the tip of the iceberg when it comes to the brain and its fascinating functions. I am eager to learn and investigate all that neuroscience has to offer to a greater extent and hopefully contaminate you with my enthusiasm.

■ PHOTO BY SANDER MARTENS

> Students granted the award receive 1.000 euro’s to develop a PhD-proposal. <
Medical Sciences Summer School
Translational Neurosciences - Ageing Brain

> JUNE, 30TH - JULY 9TH, 2014, UMCG

From June 30th to July 9th, 2014, the Summer School Translational Neurosciences - Ageing Brain - was organized at the University Medical Center Groningen (UMCG). Twenty-seven students from all over the world, including students from Turkey, Russia, Mexico, Brazil, Spain and Japan, with a multitude of study backgrounds and research experience, participated in this 10-day long summer school. The organizing committee, consisting of eight medical students and a number of lecturers from the UMCG and elsewhere, looks back on a very stimulating and successful course.

The central theme of this medical sciences summer school was the ageing brain. The educational programme consisted of many interesting lectures and workshops covering different areas of translational neurosciences, i.e. molecular aspects of brain ageing, deep brain stimulation, Alzheimer’s disease and Parkinson’s disease, bird flocking, different imaging techniques, social cognition, neuropharmacology and ethical considerations in regards to brain death and organ donation.
CONTINUATION OF BRAINS ON THE MOVE: BCN PUBLIC EVENT

In general, participating students were of the opinion that the lectures and the workshops – which dealt with the anatomy of the brain, EEG, TMS and EMG, and critical reading workshops – enhanced and broadened their knowledge. One of the highly valued lectures was a lecture on what happens in the brain when we fall in love. In addition, all participants had to send in an abstract of their research (registration requirement), which they presented during the summer school. Finally, all students were asked to write a research proposal (group activity), which they presented on the final day of the course.

Besides a highly interesting and stimulating educational programme, there was an exciting social programme. This provided the opportunity to get to know each other and learn about each other’s cultural backgrounds and student lives. The (culinary) highlight was the international cooking event, where all students prepared delicious meals from their home countries, followed by an international dance session with Salsa, Merengue, Turkish dance and many more.

The student organizing committee tried their best to acquaint the students who participated in the course, to the Groningen/Dutch culture, not only during the World Cup matches of the Dutch football team, but also by serving stew (‘stamppot’) and taking them to ride bicycles on Schiermonnikoog. The Summer School was completed with a sightseeing trip to Amsterdam.

BY AMARINS BRANDSMA AND MICHEL HOOIVELD
PHOTOS AMARINS BRANDSMA AND MICHEL HOOIVELD
They really do smile a lot

After finishing up my master’s degree in Cognitive Psychology in Groningen, I was exploring several options for a PhD position. The plan did not necessarily involve staying, but as it turned out, my next assignment would keep me in Groningen for another seven years. I embarked on an exciting project, for which I recruited patients diagnosed with psychopathy from Forensic Psychiatric Clinics Veldzicht and Dr. S. van Mesdag. Due, in part, to the logistic challenges of bringing high security forensic patients to an MR facility, I was to spend many additional, and may I also say lovely, years in this great city and at the BCN-NeuroImaging Center.

Born in Groningen and raised in the north of the Netherlands, the city worked out well for me from day one. I can still recall one of the first evenings I lived in the city and decided to bike through the city center. It was one of those sweet sultry summer evenings, chairs and tables covering large parts of the Grote Markt, one big buzz of voices and music. I felt I had come home. Nevertheless, when the moment arrived to box the office, I decided it was finally time for me to venture out into the world. I decided it would be nothing too crazy though, but somewhere that seemed culturally similar to what I was used to in the Netherlands. I ended up as a Visiting Fellow at the National Institute of Mental Health in Bethesda, USA.

As it turned out, this was actually a bigger leap than expected, I guess especially for someone born and raised in the north. If you are used to people understanding “t is best binnen te houden” (I could stomach this food) for the compliment that it truly is (your cooking is downright amazing), you feel that Americans are a tough crowd to please. They really do smile a lot, think everything you are up to is amazing, and absolutely love that gorgeous dress on you. In turn, this will make you feel like an emotionally incompetent jerk, because you didn’t say it first or know what to say in reply. Or if you did, you might feel that those were the words of a stranger. Let’s say this can be a bit overwhelming at first.

In truth, I am adjusting really well for a “Stadjer”. If you want to find out just how amazingly well I am integrating, just read this piece again and judge for yourself. I learned that Americans are just very friendly, courteous people. For instance, much less of the elbow works are necessary for getting you on a train, a waiter will check on your wellbeing approximately every 5 minutes and they pack your groceries for you at the supermarket. And honestly, it is actually kind of nice to regularly get a compliment and to give one in return. We northerners can learn something from that. Although I do miss the highly efficient but friendly “moi”, instead of the elaborate greeting ritual that people have going on here.

Anyway, it has been and still is a great experience to be here. The main campus of the National Institutes of Health is very impressive; the scale of things is just a little bit different from what I was used to. By now I am able to find all the important buildings and I hardly ever get lost anymore in the clinical center. I work at the Section on Affective and Cognitive Neuroscience, which is a section within the National Institute of Mental Health. I am still concentrating on the same research topic, although now much more from a developmental perspective. In the lab we see children with Disruptive Behaviour Disorders, such as Conduct Disorder and Oppositional Defiant Disorder, as well as children with Attention Deficit Hyperactivity Disorder. I mainly focus on deficits in emotional processing and the role these play in aberrant stimulus reinforcement learning, but also on processes of decision-making and response control.

I want to thank Sander for allowing me to fill this edition’s Alumnus Column of the BCN Newsletter and for his patience. And if any of you BCN-ers are planning to take pictures of the White House or join a conference nearby, do drop me a line and stop by the NIH as well.

■ BY HARMA MEFFERT
■ PHOTO BY HARMA MEFFERT
How to pick a problem

Choosing a good scientific problem is crucial for both new researchers (e.g. PhD students) and mentors. Having found a good scientific problem can save much time, make people feel motivated, and enable one to find important/novel results. However, scientists are simply expected to be smart enough to figure it out on their own or through the observation of their teachers. In a paper by Alon (2009, Molecular Cell), several principles are put forward to help finding a good scientific problem. For your convenience, we summarized the main points below.

1. Choosing a problem is an act of nurturing
Scientists do not work independently, but work as a unit, usually within a certain lab. The common goal of a lab is usually to publish as much as possible. In contrast, Alon proposed that a lab should be “… a nurturing environment that aims to maximize the potential of students as scientists and as human beings”.

2. There are two dimensions to each problem
Alon suggests that a scientific problem could be considered in terms of feasibility (hard or easy) and interest (knowledge gained from a project), thus clarifying that the kind of questions one is likely to focus on is dependent on the stage of one’s scientific career (see Figure 1.).

3. Take your time
“IT takes time to find a good problem”, Alon says. “In my lab, we have a rule for new students and postdoc: do not commit to a problem before three months have elapsed”. Although this “three months” may vary in different fields, the point is to have a realistic and detailed plan before putting it into action. Planning well beforehand is not wasting time, but instead, saving time.

4. The subjectivity of the interest axis
Interest is always the best teacher. Alon mentions several methods to help identifying our inner interests, by asking for instance, “If I was the only person on earth, which of these problems would I work on?”, “Ideas and questions that come back again and again to your mind for months or years”, and “When asked to describe our research to an acquaintance, how does it feel to describe each project?”. If you find it difficult to decide which topics to work on, give this ‘interest method’ a try!

5. Self-expression
Each of us is a unique individual, with his/her own strengths and weaknesses, personal experiences, and particular interests within but also outside science. This defines how we perceive the world around us, but also gives us a unique filter to select the kind of problems that are worthy of our precious time. It is therefore necessary to reflect on ourselves and find out what we are really interested in. Importantly, “A mentor can help by listening to a student describe what they like both within and outside their scientific life, what moment
made them decide to become scientists, and what scientific work they admire. We sometimes begin to see patterns in what the student is talking about”.

6. The schema of research

Finally, it may be helpful to be aware of ‘the schema of research’ or the different paths scientific exploration can take. Seldom would doing research be a straight line from question to answer. Instead, it is much more likely to move in a meandering way (Figure 2.). According to Alon “The mentor’s task is to support students through the cloud that seems to guard the entry into the unknown. And, with this schema, we have more space to see that problem C exists and may be more worthwhile than continuing to plod toward B”.

Alon’s take-home message in the paper is “Take your time to find among the problems available the one that is most feasible and most interesting to you rather than to others. A good project draws upon your skills to achieve self-expression”. One can only hope that the ever-increasing pressure to publish in high-impact journals in a minimum amount of time (for PhDs within four or even fewer years) leaves enough room for exploration, playful curiosity, and error along the path to find our favourite problems.

For more detailed information, please check out the full text: http://www.sciencedirect.com/science/article/pii/S1097276509006418

BY LIWEN ZHANG

Cool links


> How to write a scientific paper (spoof): http://members.verizon.net/~vze3fs8i/air/airpaper.html

> 3D map of the brain: http://headneckbrainspine.com/web_flash/newmodules/Brain%20MRI.swf

> The Human Connectome Project: Open access data on structural and functional connections in the human brain: http://www.humanconnectome.org/about/project/
“There Goes Nothing above Groningen”

Almost a year ago I arrived in Groningen without quite knowing what to expect. Yes, I was going to study ‘Behavioural and Cognitive Neurosciences’. And yes, I had decided to go and do a master’s all the way up north because, from the info on the RUG website, it seemed like they offered courses focusing on a blend of proximate and ultimate causes of behaviour, which appealed to me. And yes, not unimportantly, Groningen has a reputation of being a friendly, fun student city. But that was all I knew.

First surprise – notice how I’m trying not to make this sound like it’s a bad thing – most of my fellow students in the ‘Animal and Human Behaviour’ track had studied biology in Groningen. Was I a biology student now? Second surprise, all of the second-years had chosen to do their minor projects with animals. Where’s the ‘human behaviour’ in ‘Animal and Human Behaviour’? I don’t want to do animal studies, I love animals, I don’t even eat meat! Also, most second years were going abroad for their major projects. Surely, after going on exchange, traveling to 3 continents and having moved to 7 different rooms since I started studying (it’s 8 now, please don’t think I’m a horrible housemate), I wouldn’t want to leave so soon this time?

Anyway, I decided to stay and see what BCN would be like. The first tour in the Linnaeusborg wasn’t disappointing: professors enthusiastically described the lab facilities, which looked quite new and clean (unlike what I experienced elsewhere – no, I’m not going to say where). I’m glad, though, that no one told me I would be spending about as much time inside of this building as outside by the end of the year. The semester started with an intense five-week chronobiology-themed initiation. It is definitely a way of getting to know your fellow students, who turned out to be awesome people. And to learn a lot about rhythms, waves, sleep and the suprachiasmatic nucleus, of course.

Reading, presentations, lectures, essays, a grant-proposal, and even a debate and an interview filled the rest of the semester. On the way, we gained some practical experience as well. Look at them smiling in the fruit fly lab! Unfortunately, those cute drosophila thwarted our experiment by mysteriously refusing to have sex with beheaded females, not even on a nice plate of food. Wistar rats turned out to be a lot more cuddly and interesting than insects, after I was finally convinced they were not scary. Maybe it was a good idea after all to gain some experience in animal research? Although I wasn’t quite sure who to talk to, as I was still mistaking accomplished professors for animal caretakers.

Because I was fascinated by sleep, memory, and stress, I asked Peter Meerlo to supervise my minor project. As in previous studies, we used a contextual fear conditioning paradigm, and we expected memory consolidation to be disrupted by sleep deprivation. In search of a possible effect of stress hormones, we intended to manipulate the stressfulness of sleep deprivation. And so the 5-month occupation of the ‘BN’rs en Plebs’ room on the 3rd floor of the Linnaeusborg began (yes, shockingly there was also a non-BCN student in there). There, we were loved and hated at the same time, like we were loving and hating our projects (and each other occasionally) at the same time. Days of reading, days in the basement doing behavioural testing, days watching videos scoring behaviour, days collecting brains – something I’d never expected to be so easy. Most of our results were a little puzzling yet interesting; let’s just say we learned that things rarely work out exactly the way you think.

And then, all of a sudden, it seemed like the rest of the Zernike had decided summer holidays had started and even Syb would be serving coffee in a different building. As I’m writing this I’m also putting the finishing touches on my minor thesis. It was an eventful year and I’m quite ready for some rest. Meanwhile, I have to say I’m starting to feel like a researcher and a biologist (a little, at least). Plus I have to admit I’m planning to go abroad in January for my major research project, something that I should have seen coming as well…

> I love animals, I don’t even eat meat! <
Amazing Brain

On Saturday, 14th of June 2014, during the University of Groningen’s Alumni Weekend - Trip down memory lane, BCN organized the event ‘Amazing Brain’ at Forum Images, Groningen. More than 100 alumni and other interested people attended.

‘Amazing Brain’ showcased current research projects at BCN: Eight leading researchers from BCN provided lectures on fascinating aspects of the brain. Jelmer Borst (Artificial Intelligence) started the event with a presentation on the multitasking mind and how our brain copes with multiple tasks at the same time. Natasha Maurits (Neurology) elaborated on her research on combined measurements of muscle and brain activity during exercise. Sjoerd van Belkum (Psychiatry) gave a very interesting presentation on treating depressive patients with pulsed electromagnetic fields. André Aleman (Neuroscience and Psychology) closed the first session with a talk on schizophrenia and hearing voices.

After the break, Iris Hovens (Molecular Neurobiology) gave a presentation on persisting cognitive impairment after a successful surgery. Marc van Dijk (Neurosurgery) informed the audience on the effects of deep brain stimulation in human subjects. The living zebrafish brain and its brain immune cells were discussed by Tjakko van Ham (Cell Biology). Finally, the ‘Amazing Brain’ event was closed with a presentation by Bart Eggen (Medical Physiology) on epigenetics and how our cells remember.

BY MICHEL HOOIVELD
PHOTOS BY MICHEL HOOIVELD
Some problems solve themselves before we even become aware of them. The “Egg-in-leg-problem” is one of this kind: it is a ubiquitous challenge to our perception but escapes the attention of many of us most of the time. But it does not slip under the radars of curious minds with analytical ears and passions for language and science, such as Prof. Anne Cutler, former director of the Max-Planck Institute for Psycholinguistics in Nijmegen, who was the speaker of the May edition of the Auditory Seminars.

Anne Cutler started her talk with a message written in stone: “Only God can turn a mess into a message, a test into a testimony, a trial into a triumph, a victim into a victory”. Something is wrong with this note, she said, and what is wrong are the first two words, or at least the very first one, which insinuates a sense of exclusivity. It is wrong, because we all do, all the time, at least when we communicate in English. What she was talking about was the “egg-in-leg-problem”, which can come with various names. Some refer to it as the “pain-in-champagne”, or the “bee-in-beach”, or the very “mess-in-message”. These terms describe the fact that while listening to speech we cannot know beforehand what the speaker intends to say. We need to keep all options open, and do not just discard mess when hearing message. This means that at some level, and only for a split of a second, we are all aware of the pain, the bee, or the mess, in champagne, beach or message. So how do we deal with this notorious problem?
Prof. Cutler showed us the similarities and regularities between languages that she found, and used, to understand the tools that our perception develops to deal with words embedded in other words. Certain languages, like English, have bigger phoneme repertoires, thus more native sounds that can make a distinction between one word and another. Other languages, like Spanish or Mandarin, have fewer distinctive sounds, and these languages end up having longer words. Longer words imply that more words are embedded in other words, and in fact, an average Spanish word consists of about eight different sounds, and contains at least two other words embedded in itself. An English word is shorter, on average, but still contains one other word in itself.

One trick that languages use to minimize this sort of problem is the use of stress. Stress puts an emphasis on certain parts of the word, and subtly changes the acoustic manifestation of the word and the sounds. Knowing how to use stress gives listeners the tool to disambiguate words very early on, and prevents them from being confused between, for instance, the feeling of satisfaction and the subject matter upon hearing the word content. So this is a neat tool. Can we all use it? No, we cannot. Something in our perception seems to be inherently economic or just lazy. Perception seeks to optimize its functioning while reducing redundancies. We can only use a tool like stress when our native language has a need for it. Whether it has a need for it is something babies figure out in the first years of their lives; this is also when our native language shapes our perception. This leaves listeners of some languages, like French or Polish, deaf to stress. But even English listeners, and English is a language that uses stress heavily, do not perceive stress in all positions. This seems a bit surprising, but the fact that it is true was beautifully presented to us during Anne Cutler’s talk. The audience of this Seminar contained speakers with different native backgrounds. The majority was Dutch, but, as luck would have it, in addition to our speaker there was one more native English speaker in the room. Prof. Cutler played some examples of constructed words that contained stress, in different positions. Our task was to spot two words out of three that had the same stress. We all heard the same, but the Dutch speakers were much better in recognizing the stress. The English speaker was good too, but still he missed out on the words with secondary stress. Unwillingly but convincingly he demonstrated that English listeners do not hear the stress in secondary position. They do not need to, because in English secondary stress always comes with a reduced vowel schwa. So if the vowel schwa already distinguishes one meaning of content from the other meaning of content then why should the English bother about perceiving also the stress? They do not have to, so they do not.

This was a neat demonstration of a scientific result that is replicable on the spot, over and over again. The punch line is that even though we all may hear the same we do not perceive the same in speech. So it goes. Now we know it. Thank you to Prof. Anne Cutler for a very insightful and enjoyable talk, and for the beautiful demonstration that science is no miracle. It is an insight, an un-covery that can be replicated over and over again.

And here, at last, we come to a very important question in science... why bother? Why should we bother about problems that solve themselves? Well, on the risk of repeating myself, we all learned that this problem does not always solve itself. It becomes more grave when we communicate in a language in which we deem ourselves quite fluent, but which is not our native language, and it becomes more important even more when we communicate in noisy surroundings. This is the situation where we may be left with mess, and miss out on the age in message. We may end up understanding something else than what is intended, may drop out of the conversation, or run the risk of becoming the annoying conversation partner with a constant need for repeats. Now imagine how difficult such a situation can be for somebody whose hearing is impaired, or whose hearing device does not transmit the stress or other cues necessary to perceive the intended words. Dropping out of conversations may become the default scenario, which on the long term could disinvite people from communicating in this way. This is one scenario, not a desirable one, and we shall work on minimizing its chances of occurrence.

> Why should we bother about problems that solve themselves? <

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The Wandering Mind

Columns should be provocative, and what topic is more provocative than the role of gender bias in science careers? It never fails to make me climb my soapbox, as some of you can attest. It is a well-known fact that women are underrepresented in science. When I studied physics, two decades ago, there were some 10 women among my 150-student cohort. One in three students made it to the finish; less than that among the women. This was the time of the “boys-network” at work; it is a pervasive cultural stereotype. Similar results have been found over and over. Unequal opportunity is an undeniable fact; and a giant problem!

The University of Groningen has found a solution by initiating a prestigious Rosalind Franklin Fellowship (RFF) programme to promote the advancement of talented international researchers at the highest levels. Another funding round is just about to start. As much as I detest gender bias, I dislike RFF even more.

Foremost, the programme does not fight gender bias; it overtly promotes it! RFF is awarded exclusively to women. I would be interested to see if that is constitutional even, although I am not going to the European Court for Human Rights to test it myself. The argument that exclusion of men is justified to create a level playing field is ridiculous: imagine the outrage if the allied forces had proposed to deport a few million innocent Germans to labour camps during WW2 to compensate for the discrimination that was taking place against jews, gays, and gypsies! Admittedly, that is a blunt example, but it drives home the point that discrimination that was taking place against jews, gays, and gypsies! Admittedly, that is a blunt example, but it drives home the point that one shouldn’t fight discrimination with opposite discrimination. There, the RFF programme loses credibility already: it isn’t contra-bias, it is pro-women! And pro-women is as bad as pro-men. Worse even, since explicit gender-discrimination exceeds implicit gender-bias. But it doesn’t stop there. In my view, the programme achieves the opposite from what it is intended for. Personally, I have not been aware of gender-bias myself when I was a junior researcher. However, since the inception of RFF, and numerous funding schemes like it, that has changed. Whenever I see a woman who made it in science, a tiny devilish voice in the back of my head questions whether she made it merely thanks to some favourable programme. I hate to admit it, and I wish it were different, but that does not improve my otherwise positive opinion about women in science. Some counter-argue that the RFF is very selective and only top-talent is admitted, but it cannot be denied that men have less opportunities to try for it. Assuming that I am not the only one vulnerable to this reasoning, perhaps that is what is causing some of those subliminal sexist views that the aforementioned study exposed? To me, that further suggests that RFF is not diminishing gender-bias, it is perpetuating it!

But what are the alternatives? When darts was dominated by the British, a mailman from The Hague succeeded in winning the Lakeside world championship, which was heavily covered on TV. Nowadays, the Dutch consider darts a sport and are well-represented at the world top. All that did not happen because the Britons granted Barney privileged access to the final. What did not happen because the Britons granted Barney privileged access to the final. What didn’t happen because the Britons granted Barney privileged access to the final. What didn’t happen because the Britons granted Barney privileged access to the final. What didn’t happen because the Britons granted Barney privileged access to the final. What didn’t happen because the Britons granted Barney privileged access to the final. Therefore, the Dutch consider darts a sport and are well-represented at the world top. All that did not happen because the Britons granted Barney privileged access to the final. Therefore, the Dutch consider darts a sport and are well-represented at the world top. All that did not happen because the Britons granted Barney privileged access to the final. Therefore, the Dutch consider darts a sport and are well-represented at the world top. All that did not happen because the Britons granted Barney privileged access to the final. Therefore, the Dutch consider darts a sport and are well-represented at the world top. All that did not happen because the Britons granted Barney privileged access to the final. Therefore, the Dutch consider darts a sport and are well-represented at the world top. All that did not happen because the Britons granted Barney privileged access to the final. Therefore, the Dutch consider darts a sport and are well-represented at the world top. All that did not happen because the Britons granted Barney privileged access to the final. Therefore, the Dutch consider darts a sport and are well-represented at the world top. All that did not happen because the Britons granted Barney privileged access to the final. Therefore, the Dutch consider darts a sport and are well-represented at the world top. All that did not happen because the Britons granted Barney privileged access to the final. Therefore, the Dutch consider darts a sport and are well-represented at the world top. All that didn’t happen because the Britons granted Barney privileged access to the final. Therefore, the Dutch consider darts a sport and are well-represented at the world top.

1 http://www.pnas.org/content/early/2012/09/14/1211286109

BY DAVE LANGERS
BCN Sportsday
Kayaking & drinks

On the 4th of July, a perfect and sunny day, it was time to hop on our Kayaks and to make a ‘diepje om’ around the city center. The canals around our city were created in the 11th (!) century and are still in perfect shape for handling these kinds of activities. The big trip started at ‘Het peddeltje’ near the Groninger museum, and from there we went through the Schuitendiep, Turfsingel, Spilsuizen, Noorderhaven, hoge/lage der A, to end up at Zuiderhaven in front of the main train station again. This trip was not only for pleasure and water fun, it was actually quite tiring and a perfect exercise for the arms, your coordination, navigation skills (yes you can get lost on our canals!), and capabilities to work together (because a bump into the ramparts is easily made). After two hours of sporting and a drink in the sun we felt… rejuvenated!

BY CLAIRE KOS
PHOTOS BY CLAIRE KOS
Financial overview for BCN PhD students

As a BCN PhD student you can apply for financial support for various activities. Here is an overview of activities that are financially supported.

Courses
BCN PhD students can apply for financial support for external courses up to € 600 per calendar year, with the exception of GSS students, who will maximally receive € 540 per calendar year.

Courses include: external scientific courses, workshops, summer and winter schools, master classes and career development courses (costs for the BROK course are also reimbursed, but from a separate budget).

The courses of the BCN Training Programme and GSMS PhD programme are free for BCN PhD students. This means that BCN PhD student are also free to apply for courses organized by GUIDE, SHARE, CRCG and the Kolff Institute.

Application forms: http://www.rug.nl/research/behavioural-cognitive-neurosciences/information/formsbcn
Contact person: Diana Koopmans, d.h.koopmans@umcg.nl

Conferences
BCN PhD students can apply for financial support for visiting conferences, but the maximum costs that will be reimbursed are dependent upon the faculty you belong to.

• BCN PhD students within the Faculty of Arts, Faculty of Philosophy and Faculty of Social Sciences will receive € 750 max per calendar year, with a max of € 1500 during the entire project in case of a 4-year-long project*
• BCN PhD students within the GSS will receive € 675 max per calendar year, with a max of € 1350 during the entire project in case of a 4-year-long project*
• BCN PhD students within the UMCG will receive € 600 max per calendar year.

Congress includes: Congress visits, meetings, conferences, symposia and seminars. BCN will reimburse participation costs for the congress, travel, and accommodation. The following costs will not be reimbursed by BCN: books, food (with the exception of breakfast and conference diners), printing costs for posters.

Application forms: http://www.rug.nl/research/behavioural-cognitive-neurosciences/information/formsbcn
Contact person: Diana Koopmans, d.h.koopmans@umcg.nl

Thesis printing costs
Reimbursement of printing costs for your thesis is as follows:

• UMCG PhD students receive € 250 plus an additional € 200 if you fulfill the criteria of the BCN education programme, plus an additional € 200 if you publish at least 2 articles in Q1 journals, plus an additional € 200 if the thesis is sent to the reading committee within the time set out for your promotion project.
Contact person: Mieke Kapteyn, j.w.kapteyn@umcg.nl

• PhD students from the Faculties of Arts, Philosophy and Social Sciences receive € 250 if they fulfill the criteria of the BCN education programme.
Contact person: Diana Koopmans, d.h.koopmans@umcg.nl

• BCN does not support printing costs for PhD students from the faculty of Natural Sciences, as the Faculty of Natural Sciences already gives financial support for printing costs.
Contact person: Yvonne van der Weerd, Y.van.der.Weerd@rug.nl

BCN-BRAIN Travel Grant
BCN PhD students from the UMCG can apply for a BCN-BRAIN travel grant. This grant reimburses travel and accommodation costs for visits to a laboratory abroad, up to a maximum of € 1000 for visits within Europe and € 1500 for visits outside Europe. This grant is not available for BCN PhD students from other faculties.
Contact person: Michiel Hooiveld, m.h.hooiveld@umcg.nl

* PhD students with a project of less than 4 years receive an amount that is proportional to the duration of their project.

■ By Erin van Buel for the BCN PhD Council
Online course registration
BCN started to use GSMS’s online registration programme for some courses.
This link http://www.rug.nl/research/gradschool-medical-sciences/phd-programme/courses/ gives access to the GSMS courses. Click on Courses, choose BCN courses. To apply for a course, you will have to log in with your RUG P-number (6 digits). If you do not have a P-number, please contact your Personnel Office. The first time you register for a course you will be asked to fill out the complete registration form. Any courses you subsequently register for will use that same information.
For all course registrations: Don’t forget to press the buttons “confirm” and “submit”. If correctly registered, you will immediately receive a standard confirmation email.
If you click on My Courses, the courses you registered for are shown, and it will give you the possibility to unregister.
Later this year the online registration will be linked to Hora Finita. Then you will find the results of the courses you took in Hora Finita as well: http://horafinita.nl

Agenda BCN Activities
September 5, 2014
start BCN Orientation Course”. Other course data: September 19, October 3, 17 and 31, November 14.
September 16, 2014
BCN Mathematics for Neuroscientists
For all these courses: registration by the online registration described above. Note that the mentioned cancellation rules do not apply for these courses.
Check the website for detailed information.

DIANA KOOPMANS
(D.H.KOOPMANS@UMCG.NL)
To-do list or not-to-do list

I love planning stuff. I love color labeling my notes and files, and every morning when I come into my office, the first thing I do is making a to-do list for the day. Or if I felt very enthusiastic the previous day, I might already have a to-do list waiting for me – in which case, I re-evaluate my daily goals. Sometimes, it feels good to have the day planned and my goals clearly set. But on other days it feels like a huge mountain that is waiting to be climbed in only 9 hours. And then I start opening Facebook, news pages or hang around on Buzzfeed until I feel like the mountain is too big to be tackled in just a few hours. I feel frustrated and also a bit angry with myself for not ‘putting on the climbing shoes’ right away and tackling the mountain in little bits, instead of being intimidated by its size. When I get to work, I work into the evening, knowing that I could have been home by now if I had started in the morning.

This all made me think whether I should keep making to-do lists in the first place. Do they really help me feeling like I accomplished something every time I finish a point, or do they just visually scare me and make me feel like it’s too much work and not enough time?

Recently, I talked to a friend about her to-do list strategies. Her answer: ‘Just put EVERYTHING on the list, even breaks and unimportant things that you will do for sure. That way you will feel better about yourself because you will definitely cross off some items’. So I tried that strategy… but I felt like I was cheating on myself. Most days I would tackle all the small stuff, but crossing it off did not really feel like an accomplishment. It just made it even clearer to me that I still did not dare to attempt the bigger, more important ‘mountains’ on time. Apparently, this is a common theme when it gets to to-do lists and is called ‘Structured procrastination’. Right, so at least I am not the only one feeling like that strategy will not work. At the same time, it makes perfect sense now that my apartment was always extra clean when exam periods were about to start….

So I talked to another friend of mine, and explained my dilemma. Her reply: divide the bigger ‘mountains’ into smaller ‘hills’, so they are climbable in shorter periods of time. Sounds great, except for one small problem: then the to-do list is getting longer than my weekly grocery list, and I get panicky about the vast amount of hills I have to conquer. The list turns into a form of torture and I also need to figure out which hill should be tackled first. The result: I got an app that helps to make a to-do list with an extra feature that lets you color coordinate the importance of each item. What is very urgent, what can wait a day or two? Somehow making a to-do list with this app became a little hill itself. After failing to successfully apply any of the above I decided to get rid of the lists, once and for all. Well…kind of. I now write down everything that keeps coming into my mind on a piece of paper, and then get rid of that paper. The ‘dump’ lists are now a way of cleansing my psyche from thinking about the same stuff over and over again. No more mountains, no more hills. Just a short glance and then taking off the climbing shoes and focus on maximum 2 goals I want to accomplish that day. Instead of being tangled up and stressed by all the stuff I have to do in the course of the week, I take my time and focus my energy on just 1 or 2 items a day, and when I go home in the evening with tasks left unfinished, I still know that I did my best. Instead of procrastinating out of fear of failure, I take little breaks to check my mail and the news and then focus back on what I was doing. So, I guess it is all about balance, and as Dr. Seuss said: ‘Step with care and great tact , and remember that Life’s a Great Balancing Act.’ In the end the only single item on my to-do list these days is NOT making one.

BY ANNIKA LUCKMANN
PHOTO BY ANNIKA LUCKMANN
> PROMOTIONS

Neuroinflammation in depression

PROMOVENDUS
N. Dobos
PROEFSCHRIFT
Neuroinflammation in depression
PROMOTORES
Prof.dr. U.L.M. Eisel
Prof.dr. J.A. den Boer
Prof.dr. P.G.M. Luiten
CO-PROMOTOR
Dr. E.F.J. de Vries

Nieuw bewijs dat neuro-inflammatie theorie voor depressie klopt

De neuro-inflammatie theorie, die ervan uitgaat dat depressie een gevolg is van een ontstekingsreactie in de hersenen, klopt waarschijnlijk. Dat concludeert Niki Dobos in haar promotieonderzoek, dat ze uitvoerde met behulp van een muismodel. De resultaten kunnen mogelijk helpen om een nieuwe behandeling te ontwikkelen tegen depressie.

Wanneer ons immuunsysteem wordt geactiveerd, ofwel in het lichaam zelf of in het centrale zenuwstelsel, reageert het lichaam daarop met een ontstekingsreactie. Wetenschappers vermoeden al langer dat de productie van cytokines (ontstekingsfactoren) en activatie van de kynurenine-route (betrokken bij fysiologische functies zoals gedrag en slaap) betrokken zijn bij het ontstaan van depressie. Niki Dobos testte deze hypothese in muizen.

Dobos ontdekte dat het door een ontstekingsreactie veroorzaakte depressieve gedrag van de muizen afhankelijk was van de activatie van het ‘ontstekingsenzym’ Indoleamine 2,3-dioxygenase (IDO). Het depressieve gedrag van de muizen kon worden onderdrukt met een remmer van IDO. Deze resultaten bevestigen dat de neuro-inflammatie theorie van depressie waarschijnlijk klopt, en geven sterke aanwijzingen voor de betrokkenheid van de kynurenine-route en de activatie van IDO. De inzichten zouden de basis kunnen vormen voor een nieuwe, op IDO-remmers gebaseerde benadering van therapie tegen depressie.


Movement and cognition: The relationship between gross motor skills, executive functioning, and academic achievement in children with learning disorders.

PROMOVENDUS
M. Westendorp-Haverdings
PROEFSCHRIFT
Movement and cognition: The relationship between gross motor skills, executive functioning, and academic achievement in children with learning disorders.
PROMOTOR
Prof.dr. C. Visscher
CO-PROMOTORES
Dr. E. Hartman
Dr. S. Houwen

Bewegingsonderwijs belangrijk bij ontwikkelen schoolprestaties speciaal basisonderwijs

Bewegingswetenschapper Marieke Westendorp van het Universitair Medisch Centrum Groningen. Een balvaardigheidprogramma lijkt hun planningsvaardigheden en het probleemoplossend vermogen te verbeteren.

In Nederland gaan circa veertigduizend kinderen naar het speciaal basisonderwijs. Dit biedt onderwijs aan kinderen met leerproblemen. Dit zijn kinderen die extra zorg nodig hebben om zich goed te kunnen ontwikkelen wegens specifieke leerproblemen, gedragsproblemen en/of een verlaagd intelligentie niveau. In zowel het onderwijs aan deze kinderen als het onderzoek naar deze groep ligt de focus op de cognitieve ontwikkeling. Veel minder aandacht is er voor de motorische ontwikkeling, terwijl de motorische ontwikkeling een belangrijke rol speelt in de algemene ontwikkeling van het kind.

In haar onderzoek ging Westendorp na welke relaties er zijn tussen de grove motorische ontwikkeling en cognitieve ontwikkeling (executieve functies en schoolprestaties) van kinderen met leerproblemen in het speciaal basisonderwijs in de leeftijd van 7 tot en met 12 jaar. Het belang hiervan ligt vooral in het ontwikkelen van passend onderwijs voor deze kinderen.
Uit het onderzoek van Westendorp blijkt dat kinderen in het speciaal basisonderwijs slechtere motorische vaardigheden hebben dan hun leeftijdgenootjes in het reguliere onderwijs. Zij ontwikkelen deze wel, maar hebben op 11-jarige leeftijd nog steeds een achterstand van zo'n 3 jaar ten opzichte van hun leeftijdgenootjes. Zij stelt tevens vast dat er een specifiek verband is tussen grove motorische vaardigheden en cognitieve vaardigheden.

Volgens Westendorp is specifieke aandacht voor het oefenen van grove motorische vaardigheden noodzakelijk voor kinderen met leerproblemen in het speciaal basisonderwijs. Zij ging het effect van een balvaardigheidprogramma na. Dit blijkt niet alleen effectief te zijn om de vaardigheden van deze kinderen te verbeteren, maar lijkt ook positieve invloed te hebben op hun executieve functies, in het bijzonder op planningsvaardigheden en het probleemoplossend vermogen.


**Sigma-1 receptor imaging in the brain: Cerebral sigma-1 receptors and cognition: small-animal PET studies using 11C-SA4503**

**PROMOVEN DUS**
N. Kuzhuppilly Ramakrishnan

**PROEFSCHRIFT**
Sigma-1 receptor imaging in the brain: Cerebral sigma-1 receptors and cognition: small-animal PET studies using 11C-SA4503

**PROMOTORES**
Prof.dr. R.A.J.O. Dierckx
Prof.dr. C.J. Nyakas

**CO-PROMOTOR**
Dr. A. van Waarde

Nieuwe tracer om receptoren in de hersenen te bestuderen

Expressie van de sigma-1 receptor in de hersenen kan goed in beeld worden gebracht met behulp van de tracer 11C-SA4503 en microPET. Deze receptor speelt een rol bij verschillende aandoeningen in de hersenen, zoals depressie, angststoorhissen, psychose, schizofrenie, de ziekte van Parkinson, de ziekte van Alzheimer en verslaving. De bevindingen van Nisha Kuzhuppilly Ramakrishnan dragen daarom bij aan een diermodel voor vermindere cognitie en bij de werking van geneesmiddelen bij deze aandoeningen die bijvoorbeeld door pharmaceutische bedrijven worden gedaan.

Kuzhuppilly Ramakrishnan gebruikte de tracer 11C-SA4503 en microPET om veranderingen van sigma-1 receptoren in de hersenen van ratten te bepalen tijdens normale veroudering en in diermodellen voor een vermindere cognitie (beschadiging en slaaponthouding). De promovenda stelde vast dat de diermodellen en de techniek van de tracer en microPET goed bruikbaar zijn om onderzoek te doen naar vermindere cognitie.

Veel geneesmiddelen die werkzaam zijn in de hersenen, zoals haloperidol, donepezil, rimcazol, fluvoxamine, sertraline en clorgyline, hebben een middelmatrice tot hoge affiniteit voor sigma-1 receptoren. Kuzhuppilly Ramakrishnan onderzocht de bezetting van sigma-1 receptoren door geneesmiddelen en bepaalde de mate van receptorbezetting die nodig is om een vermindere cognitie te verbeteren.

Nisha Kuzhuppilly Ramakrishnan (1978) studeerde Farmacie en Farmacologie aan de Rajiv Gandhi University of Health Sciences.
Assessment of serotonergic function by radioligands and microdialysis: Focus on stress-related behaviour and antidepressant efficacy

PROMOVENDUS
A.K.D. Visser

PROEFSCHRIFT
Assessment of serotonergic function by radioligands and microdialysis: Focus on stress-related behaviour and antidepressant efficacy

PROMOTORES
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Gebruik van geavanceerde methodes voor onderzoek naar stress en antidepressiva
Antidepressiva slaan bij lang niet iedereen aan. De bekende antidepressiva SSRI's (serotonine heropnameremmers) zouden wel eens beter kunnen werken in combinatie met een 5HT2C-antagonist, een stof die de bepaalde effecten van serotonine remt. Anniek Visser onderzocht het effect van deze combinatiebehandeling. Zij gebruikte geavanceerde microdialyse technieken, om zo de werking beter te begrijpen en de behandeling van depressie uiteindelijk te kunnen verbeteren.

Depressie hangt sterk samen met stress en de regeling van emoties door signaalstoffen zoals serotonine en dopamine. De meeste antidepressiva zijn erop gericht om de hoeveelheid serotonine in de hersenen te verhogen. SSRI's zorgen er bijvoorbeeld voor dat serotonine, als het eenmaal is aangemaakt, niet direct weer opgenomen wordt door zenuwcellen, maar langer in de hersenen aanwezig blijft. Toch blijken deze antidepressiva bij een groot aantal patiënten niet te werken.

Visser onderzocht mogelijkheden om met behulp van een PET-scan de signaaloverdracht van serotonine in de hersenen te volgen, zonder dat bijvoorbeeld een pijnlijke ruggenmergplunctie nodig is. Met die methode toonde zij aan dat acute stress in ratten niet, zoals eerder gedacht, zorgt voor een verandering in de hoeveelheid van een receptor die vaak in verband gebracht wordt met psychose en depressie. Daarnaast lijkt de PET-scan een goede methode om meer kennis over stress en antidepressiva te verkrijgen.

Monitoring driver’s mental workload for user adaptive aid

PROMOVENDUS
C. Dijksterhuis

PROEFSCHRIFT
Monitoring driver’s mental workload for user adaptive aid

PROMOTOR
Prof.dr. K.A. Brookhuis

CO-PROMOTORES
Dr. L.J.M. Mulder
Dr. D. de Waard

Met een breingestuurde cruise control in de rijsimulator
Chris Dijksterhuis deed onderzoek in de rijsimulator, waarbij de hersenactiviteit van de bestuurder direct werd gekoppeld aan de rijsnelheid. Het idee was dat zo’n breingestuurde cruise control de snelheid zou verhogen als het autorijsnaal saai werd en verlagen als de rijtaak te
De grote uitdaging van zo'n rijondersteuning is dat het automatisch, onmiddellijk en op individueel niveau informatie moet kunnen interpreteren, terwijl dit individu beïnvloed wordt door hetzelfde systeem. Dijksterhuis richtte zijn onderzoek op deze uitdaging, waarbij de focus werd gelegd op mentale inspanning.

De dataverwerking van het systeem functioneerde echter nog niet naar behoren. Dijksterhuis concludeert dat een betrouwbare systeem waarschijnlijk meerdere typen informatie nodig heeft om de interne toestand vast te kunnen stellen, zoals rijgedrag, fysiologie, en subjectieve ervaringen. Vervolgonderzoek zou zich moeten richten op het verbeteren van de monitorbetrovrouwbaarheid door het verlagen van de tijds- en contextafhankelijkheid.

De grote uitdaging van zo’n rijondersteuning is dat het automatisch, onmiddellijk en op individueel niveau informatie moet kunnen interpreteren, terwijl dit individu beïnvloed wordt door hetzelfde systeem. Dijksterhuis richtte zijn onderzoek op deze uitdaging, waarbij de focus werd gelegd op mentale inspanning.

Invoelend vermogen is te trainen
De mens is een sociaal wezen. Om de vele contacten die we iedere dag hebben soepel te laten verlopen, is het van belang om te beginen wat er in de ander omgaat. Bij autistische stoornissen gaat dat bijvoorbeeld mis. Promovendus Ben Meijering onderzocht aan de afdeling Kunstmatige Intelligentie van de Rijksuniversiteit Groningen hoe mensen elkaar leren begrijpen.

Voor pokerspelers is het een essentiële vaardigheid: weten of je tegenstander bluft of niet. Een opgetrokken wenkbrauw kan van alles betekenen. Een goede kaart, of juist een slechte. Of de tegenstander weet dat jij hem observeert en geeft met die wenkbrauw bewust een storend signaal af, om je in de war te maken.


Het tweede kamp denkt dat het een aparte eigenschap is van de hersenen, naast onze vermogens om logisch te denken.

Meijering heeft experimenten uitgevoerd om die twee benaderingen te toetsen. Hij ontwikkelde een spel waarin bij iedere zet twee keuzes mogelijk waren. Twee spelers doen om de beurt een zet. Ze moeten daarbij anticiperen op de volgende zet van hun tegenstander. ‘Dat blijkt in de praktijk heel lastig’, vertelt Meijering. In zijn opzet speelde een proefpersoon tegen een computer. ‘De proefpersoon blijkt maar één zet vooruit te denken.’ Maar wanneer Meijering de proefpersoon de tip gaf zich te verplaatsen in de tegenstander, dan hielden ze meer rekening met de tegenzetten. ‘Dat laat zien dat sociale vaardigheden, bijvoorbeeld onderhandelen, te trainen zijn.’

In een tweede experiment plaatste Meijering een mechaniek in het spel dat automatisch op een logische manier de laatste zet uitvoerde. ‘De menselijke spelers reageerden daarbij verschillend op de situatie met en zonder mechanisme.’ Dit laat volgens hem zien dat de Theory of Mind - nodig om jezelf te verplaatsen in een tegenstander - meer is dan alleen logisch redeneren.

Het vermogen onszelf te verplaatsen in een ander lijkt dus een aparte module te zijn. Dat zegt iets over de werking van ons brein, maar het is ook nuttig voor ontwikkelaars van slimme software. Meijering: ‘Wanneer je nu een fout maakt in een programma krijg je alleen de boodschap: FOUT. Een programma dat zich in kan leven in de gebruiker zal zeggen: Je was er...’
bijna, maar je moet nog even hier aan denken’. Zoiets is veel handiger.’

Dat het inlevingsvermogen trainbaar is, is ook een belangrijke conclusie. Of kinderen met autisme ermee gebaat zijn, durft hij niet te zeggen. ‘Maar stel, je krijgt een nieuwe baan waarin je veel moet onderhandelen. En dat gaat je niet goed af. Misschien heb je de neiging te zeggen “ik kan dit niet” om dan de handdoek in de ring te gooien. Maar mijn onderzoek laat zien dat je met gerichte training je vaardigheden kunt verbeteren.’


Cognitive functioning in adult ADHD: Measurement, treatment and public perception

PROMOVENDUS
A.B.M. Fürmaier

PROEFSCHRIFT
Cognitive functioning in adult ADHD:
Measurement, treatment and public perception

PROMOTOR
Prof.dr. O.M. Tucha

CO-PROMOTORES
Dr. L.I. Tucha
Dr. J. Koerts

Volwassenen met ADHD hebben moeite met plannen
Volwassenen met ADHD hebben beperkingen in alle cognitieve domeinen, zoals aandacht, retrospectief geheugen, prospectief geheugen en executief functioneren. Anselm Fürmaier deed hier onderzoek naar. Het blijkt dat volwassenen met ADHD problemen hebben met het plannen van taken die in de toekomst moeten worden uitgevoerd. Gedragstherapies zouden zich daarom moeten richten op het verbeteren van organisatorische en planningsvaardigheden van patiënten met ADHD zodat hun geheugenfuncties in het dagelijks leven kunnen worden verbeterd.

Fürmaier deed onderzoek naar het cognitief functioneren van volwassenen met ADHD vanuit verschillende perspectieven en met verschillende methoden: (1) objectief neuropsychologisch onderzoek naar het geheugen, (2) zelfrapportages van patiënten met ADHD die zijn gebruikt om cognitieve klachten te inventariseren en de relatie met objectief vastgestelde beperkingen te bepalen, (3) Whole Body Vibration (WBV) om cognitieve dysfuncties bij volwassenen met ADHD te behandelen en (4) een vragenlijst om overtuigingen en attitudes van de bevolking ten opzichte van ADHD te bepalen (stigmatisering). Twee studies toonden stornissen in verschillende aspecten van het geheugen (het discrimineren van bronnen van informatie en het prospectief geheugen) aan bij volwassenen met ADHD. De relevantie van deze componenten van het geheugen werd benadrukt en de implicaties voor het klinische werkveld werden besproken.

De cognitieve klachten van volwassenen met ADHD werden in kaart gebracht door zelfrapportages te verzamelen. Daarnaast werden volwassenen met ADHD onderzocht met objectieve neuropsychologische tests. Geconcludeerd werd dat beide benaderingen niet-redundante informatie opleveren en hun eigen implicaties voor de klinische praktijk hebben. Subjectieve en objectieve assessments van het cognitief functioneren werden ook gebruikt om de effecten van WBV (een trainingsmethode die het volledige lichaam van een individu blootstelt aan vibratie) op het cognitief functioneren te exploreren. De klinische significanctie van de effecten van WBV op het cognitief functioneren werd besproken.

Ten slotte werd een vragenlijst gericht op stigmatisering van volwassenen met ADHD ontwikkeld. Geconcludeerd werd dat speciale onderwijsprogramma’s die de algemene bevolking informeren over ADHD de potentie kunnen hebben om stigmatisering van volwassenen met ADHD te reduceren.
The electrophysiology of language comprehension

PROMOVENDUS
H. Brouwer

PROEFSCHRIFT
The electrophysiology of language comprehension

PROMOTORES
Prof.dr. J.C.J. Hoeks
Prof.dr.ir. J. Nerbonne

Bekende modellen van taalbegrip onderuitgehaald

Ongeveer tien jaar geleden stuitten onderzoekers die gebruik maken van elektroencefalografie (EEG) op resultaten die leken te wijzen op een ‘Semantische Illusie’ bij het begrijpen van taal: zinnen die qua betekenis vreemd zijn, maar verder grammaticaal correct, hadden geen effect op de aan betekenis gerelateerde N400 component in het EEG signaal, maar juist op de aan structuur gerelateerde P600 component. Op basis van deze bevindingen zijn er maar liefst vijf nieuwe modellen van taalverwerking voorgesteld. Al deze modellen claimen dat er niet een enkele verwerkingsroute, maar twee of meer verwerkingsroutes zijn binnen het taalverwerkingsysteem, waarvan bij één route de structuur van een zin volstrekt niet van belang is, maar enkel de betekenis van de woorden waaruit de zin bestaat. In zijn proefschrift laat Harm Brouwer zien dat er een veel simpelere uitleg is voor de ‘problematische’ bevindingen en toont hij met computersimulaties aan dat deze alternatieve uitleg alle relevante data kan verklaren.

in een gen voor het BAG3-eiwit, een eiwit dat de werking van HSP aanstuurt. Een therapie voor ziekten die veroorzaakt worden door eiwitklontering zou dus mogelijk niet gericht moeten worden op HSP zelf, maar op eiwitten die HSP aansturen.


The maternal brain in (pre)eclampsia: Long-term neurocognitive functioning

PROMOVENDUS
I.R. Postma

PROEFSCHRIFT
The maternal brain in (pre)eclampsia: Long-term neurocognitive functioning

PROMOTORES
Prof.dr. J.G. Aarnoudse
Prof.dr. J.M. Bouma
CO PROMOTOR
Dr. A.G.J. van der Zee

Cognitieve problemen na zwangerschapsvergiftiging

Hoewel zwangerschapsvergiftiging altijd werd gezien als een voorbijgaande aandoening bij zwangere vrouwen, ervaren sommige vrouwen nog jaren na een zwangerschapsvergiftiging vergetachtigheid, concentratieproblemen en angstige en depressieve gevoelens. Ineke Postma onderzocht daarom in haar promotieonderzoek of deze klachten inderdaad een gevolg van zwangerschapsvergiftiging kunnen zijn.

Zwangerschapsvergiftiging, ofwel pre-eclampsie, komt in Nederland voor bij 3% van de zwangere vrouwen, in ontwikkelingslanden zelfs bij 15%. Bij zwangerschapsvergiftiging is er sprake van een te hoge bloeddruk en eiwitverlies in de urine. Daardoor krijgen de organen van de vrouw niet genoeg bloed. Als de hersenen betrokken raken en een vrouw stuipen of toevallen krijgt, waarbij ook bewustzijnsverlies optreedt, wordt dit eclampsie genoemd. Eclampsie komt in Nederland slechts bij 0,06% van de zwangerschappen voor, maar draagt bij aan een groot deel van de moedersterfte.

Uit het onderzoek van Postma blijkt dat vrouwen jaren na een zwangerschapsvergiftiging op vragenlijsten meer cognitieve klachten en een slechtere kwaliteit van leven rapporteren dan vrouwen na een normale zwangerschap. Deze cognitieve klachten blijken echter niet naar voren te komen op neurocognitive tests in een gecontroleerde testomgeving. Postma concludeert dat vrouwen na zwangerschapsvergiftiging wel goed kunnen functioneren in een gecontroleerde omgeving, maar in complexe, stressvolle situaties in het dagelijks leven vaker problemen kunnen ervaren.

Tot slot deed Postma onderzoek naar mogelijke veranderingen in de witte stof van de hersenen van vrouwen met en zonder zwangerschapsvergiftiging en relateerde dat aan het cognitief functioneren van deze vrouwen. Zij ontdekte wel een verschil in wittestestveranderingen tussen vrouwen met en zonder zwangerschapsvergiftiging, maar kon geen verband leggen tussen de veranderingen in de witte stof en de gerapporteerde cognitieve klachten.


EVELYN KUIPER-DRENTH, OP BASIS VAN PERSBERICHTEN VAN DE RIJKSUNIVERSITEIT GRONINGEN
> CHEEKY THEOREMS

“Answering the endless question: „why?” of a 2-3 year old toddler poses more challenges than completing a PhD thesis.”
> Nikoletta Dobos

“Sleep deprivation experiments are stressful to both the experimenter and the animals”
> Nisha Kuzhupilly Ramakrishnan

“A PhD trajectory is like a trip with the Dutch Railways: it is always unsure if you’ll make it to the finish in time, but you’ll usually reach your destination one way or the other.”
> Anniek Visser

“Even if the driver’s mental state can be assessed by an adaptive support system with only one percent misclassifications, the system should not be allowed to interfere directly with human’s responsibility of keeping a vehicle safely on the road.”
> Chris Dijksterhuis

“Manchmal ist eine Banane auch eine Banane.” - Peter Fürmaier.
> Anselm Fürmaier

“According to Business Insider, in terms of “best quality of life”, Sweden ranks at 2nd, the Netherlands at 8th and Italy only at the 36th place (M. Willett. The 15 Countries with the Highest Quality Of Life. 28 May 2013. www.businessinsider.com). Considering the respective culinary national specialties pizza, croquets, and rotten herring, quality of the life thus seems to be inversely proportional to taste.”
> Melania Minoia

“Het doel van een promotietraject is een wetenschappelijk gevormd individu, niet een proefschrift.” - PhD-conferentie VSNU
> Ineke Postma

> COLOPHON

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