“A matter of timing”

IN THIS ISSUE
Calculating the sum of language:
- An interview with John Nerbonne 2
Shining light on the pupil:
- An interview with Sebastiaan Mathôt 4
The stopwatch in our brains:
- An interview with Hedderik van Rijn 7
Now what? Life after the defense:
- A double interview with Charlotte Willems and Heleen Hoogeveen 10
The Twente connection,
- an interview with Bart Koopman 12
A doc’s life, How to feel like a top dog 14
Cool links 15
Master Student Column,
- Beyond the single track mind 16
Mindwise, Networks in psychology: more than a pretty picture? 17
Mindwise, To p, or not to p 19
Mindfulness lunch 22
“Go Nuts” for the BCN Retreat:
- Set aside your expectations 23
New staff writers wanted! 25
Grand stuff 26
PhD Column, Putting the “Dr.” in Dr. Dre – Life as a hip-hop linguist 28
PhD and other news 29
Orations 30
Promotions 30
Cheeky propositions 42
Colophon 42
Calculating the sum of language:
An interview with John Nerbonne

On January 27, the department of Alfa-Informatica celebrated its 30th anniversary. Alfa-Informatica Professor John Nerbonne has played a key role in the development and success of the department. After many years of devotion to the study of computational language, John Nerbonne gave his farewell lecture on the day that his department turned 30. Time to learn more about his work!

You have a great interest in research on dialects, or Dialectometry. Could you explain more specifically what Dialectometry is?
Dialectology studies how languages vary geographically, and sociolinguistics how they vary socially. Modern studies typically try to gauge both. Dialectometry adds exact measurement to dialectology, for example by checking what fraction of a list of concepts are realized as the same words. In Groningen we have especially championed the measurement of pronunciation differences using the edit distance, also known as Levenshtein distance. The Levenshtein distance indexes the number of changes that are needed to change one word to another word. For example, the Levenshtein distance between *melk* ‘milk’ (pronounced mElEk in Haarlem) and *molke* (same word in Grou, Friesland) is 3:
- mElEk → molEk (substitution of ‘o’ for ‘e’)
- molEk → molEke (insertion of ‘e’ at the end)
- molEke → molke (deletion of ‘E’ between ‘l’ and ‘k’)
We normally work on phonetic transcriptions rather than orthographics (spellings), and the operations are often associated with different costs, but the example gives you an idea. The focus of the work on dialectometry (six dissertations, including two that won prizes) was methodological, but we have also contributed to theoretical discussions, such as on the diffusion of changes, on the relation between views of dialect landscapes as continua versus partitioned (into areas), and on the relative importance of social and geographic factors.

Which dialects were most interesting to study and why?
This is a tough one. Because of the methodological focus, we have studied dialects of around twenty languages, including Bantu and Turkic languages, and as a linguist, I’m chuffed at that (to borrow a Briticism). However, Dutch remains a big favorite for the incredible density of its variety, and for the opportunity to hear it personally!

Does studying dialectology make you more sensitive to hearing people’s accent/dialect?
Yes, I am definitely more sensitive to others’ accents. I watched the BBC ‘Earthflight’, and found myself paying attention to David Tennant’s Scottish accent almost as much as the incredible videos of birds in flight. It was also fun to listen for Balkenende’s Zeeuws features or the late Cruiff’s Amsterdam’s.

Studying dialectology also makes that one notices one’s own peculiarities a bit more. I come from the East coast of New England, where I might have said “Others notice the differences, and so don’t I”, which lead most people, once they have heard it, to suspect a home between here and Jupiter. If they have listened carefully to that last example, they sometimes try to clarify whether or not I notice the differences.

In addition to dialectology, you have a passion for statistics. What drives this strong interest in statistics?
A lot of the work in dialectology progressed as we discovered and applied more powerful statistical analyses, so there has been no tension in the two, on the contrary. Martijn Wieling’s (2012) dissertation is
> If nothing else, the statistics give us a chance to examine problems from a fresh perspective, and that is usually interesting scientifically. In fact, statistics offers much broader and deeper possibilities.

Personally, after working from the categorical perspective for fifteen years, I experienced the "statistical revolution" in Linguistics and Computational Linguistics as an exciting development, and I have really enjoyed exploring that perspective. My involvement with BCN also began in the mid-nineties, and the interest in statistics dovetailed nicely with that. Whatever the brain is, it is not a discrete processor, but rather one where multiple, imperfect information sources are combined. It was great to experiment with neural nets at that time – with Erik Tjong Kim Sang and Ivo Stoianov (Ph.D. students), and also with the BCN bio-physicists Hans Stavenga and Diek Duifhuis, from whom I also learned a lot.

You have made important contributions to the success of Alfa-Informatica and you have worked at the department for a long time. What is the biggest development of the department that you witnessed?

Lots has happened over the past twenty-five years, but the most important thing with respect to everyday life in the department has been the enormous growth in interest among students, industry and colleagues in our work. The work has not changed much but now about 50 students per year enter the bachelor programme, a large range of companies clamor for graduates, and, perhaps most gratifying, lots of colleagues are interested in collaboration!

So I suppose this will sound arrogant, but I think the big change is that more people now see the opportunities afforded by computational language processing. We worked hard not to "hide our light under a bushel basket", but lots of others should share the credit for showing the potential of computational linguistics.

Where do you see the department of Alfa-Informatica in the future?

This is also not easy, as I do not think the department covers a discipline in the way that Dutch Language and Literature does, or maybe Neuro-Anatomy. However, I am confident that the work with computational methods will continue to grow and flourish. I am cautious only about the organizational form that it is likely to take.

What can BCN learn from Alfa-Informatica (or the humanities in general)?

The humanities is a fantastic source of questions about the human mind. How do people produce and understand language, how do they learn it? How do we recognize allusions, “In the beginning Zwarts created the office and the organization”? How much is needed to recognize other allusions to Genesis 1:1? Why do some words sound unpleasant, like runt, moist, scum, fester or phlegm? And there are many more questions!

Which question that you have never solved do you hope to see answered in the future?

Formulating a question is tough, but, as I see it, we have made enormous progress with respect to the understanding of languages from the perspective of cognitive psychology, a programme due to Chomsky. At the same time, language is a social mechanism and is shaped by the functions it serves socially – allowing people to exchange information, or inviting inferences about speakers based on how they speak, a topic studied in dialectology. I would like to see us make progress toward understanding how the cognitive and social perspectives interact. They interact in simple ways that we have explored in dialectology. For example, we can induce phonetic differences (cognitive) from the distributions of dialect pronunciations (social), and some of the constraints that play a role in spoken word recognition (cognitive) also play a role in which pronunciation differences are socially interpreted (social). Currently, there is no overarching research programme trying to link the two, and I would hope to see that in the future.

References


You started working as an assistant professor in Groningen at the start of this academic year. What did you do before you came here?

When I started university, I began with a bachelor in computer science at the VU (Vrije Universiteit) in Amsterdam. During the bachelor’s programme, I became more interested in psychology and cognitive psychology in particular, so I switched from the computer science programme to psychology and I got the opportunity to do a PhD-project with Jan Theeuwes about visual processing at the VU. In the final stages of my PhD, I went to the cognitive psychology lab of the University of Marseille. I stuck around there for about five years, at first to finish my PhD and later as a postdoc. During my stay in Marseille, I received a Marie Curie grant from the European Union for young researchers, so I could keep working in Marseille for two more years. After five years in Marseille I looked for a new place to work, preferably as an assistant professor. In the meantime, I was in contact with someone from the University of Groningen who was interested in OpenSesame (Hedderik van Rijn) and he mentioned that the University of Groningen was looking to appoint new assistant professors. I’m very happy that I got the job here, since it’s pretty difficult to take the step up from a postdoc position.

You already mentioned OpenSesame and the coincidental role it played in you getting your current position here in Groningen. Can you explain what OpenSesame is?

OpenSesame is an open-source graphic environment in which you can make psychological or neuroscientific experiments. It kind of takes the middle ground between Matlab and Powerpoint. On the one hand you have the option to do real programming like in Matlab. But, on the other hand there is a graphical interface you can use to make your experiment equally good with a click and drag mechanism, just as if you’re preparing a Powerpoint presentation. The goal of OpenSesame is to be an easy-to-use computer programme that also looks visually appealing. This, I think, is one of the points where OpenSesame distinguishes itself from other experimental software. I pay a lot of attention to how the programme looks. The visual design of recent versions OpenSesame is loosely based on the principles of “Material Design” developed by Google. These principles are used, for example, for the Android
software that runs on many phones. Material Design provides a nice outline for how things should look and work in a graphical interface. And the way OpenSesame looks has been improved by using the guidelines laid out by Material Design. Or at least, that’s what I think!

I agree! When I tried out OpenSesame myself I noticed, besides the nice graphics, that it has a lot of flexibility. I was not restricted to make the experiment in a certain way, but I had many options to choose from.

Yes, that is the beauty of open-source software! I can make use of many already existing software packages and incorporate them into OpenSesame without too much trouble. A company that wants to make paid, closed-source software cannot use many of these packages, because they are often only available to be used in other open-source programmes.

OpenSesame has been growing and since you came to Groningen it has gained some traction in the Experimental Psychology department here too and will probably be used more in the future.

What was your motivation to start developing the software?
In the first place, just because I liked it. I still do by the way. Then as I was using it myself, more people in the lab I worked at started using it, even though the first version was really not that good. As more people started using it, the project picked up its own momentum and it became more rewarding for me to keep working on it. About a year after I started developing OpenSesame I opened a forum for users of OpenSesame to post their questions on. The forum has been growing too and recently the ten thousandth comment was posted. I now hire two people to answer questions part-time on the forum because I can’t keep up with it all by myself anymore.

You use pupil dilation measures often in your research. When did your interest in this measure start?
It started gradually. I was doing eye-movement research for my master thesis and did my PhD on visual stability. So, I measured the pupil, but not necessarily pupil-size. At the end of my PhD period, we had collected an enormous database with data of eye-movements and other measures (including pupil size). This data was collected during a task in which participants were searching for a letter in a simple visual scene. This database had an interesting regularity, namely that pupil size was related to the saliency of a part of the scene. The pupil was largest when the participants looked at a very salient part of the scene. Saliency is the sort of interestingness of something; the more a part of a scene stands out compared to its surroundings, the more salient it is. The larger pupil size when people looked at salient parts of the scene could have been caused by the increased mental effort required to look away from very interesting parts of a picture in order to look for the letter.

You created a brain-computer interface that works with pupil dilation. Can you explain how this works?
With this brain-computer interface the user can type words or sentences without moving. It uses the pupillary light response, the basic response of the pupil to dim and bright environments. In an environment with only very little light, the pupil expands or dilates to let more light in. And in bright environments, the pupil shrinks or constricts to reduce blurring caused by the large amount of light. This basic pupil response has been well established. And already quite a long time ago we showed that the pupil also responds even when the total amount of light doesn’t change. Simply paying attention from the corner of your eye to a dark stimulus
is enough to cause dilation of the pupil without actually moving your eyes. The person using the interface picks a letter he or she wants to type and focuses his or her attention on this letter. Subsequently, the background of each letter on the screen oscillates from light to dark. This oscillation of the background causes the pupil to dilate and constrict in a similar rhythm. When the background of the attended letter is brighter, the pupil constricts and when the background of the attended letter is darker, the pupil will dilate. By looking at this rhythm, the computer can figure out which letter you are attending to and you can type entire words using only covert attention. The advantage of this method is that completely paralyzed people can use it to communicate. But the major drawback is that it’s very slow. It takes about 30 seconds to a minute to select one letter.

Open science actively gets your support: OpenSesame is available for free and you also pre-printed some papers. How does pre-printing work exactly and do you recommend other researchers to pre-print their research?

A pre-print is a preliminary version of a paper about something that you are still working on. It’s a nice way to get your data out there. Of course, pre-prints don’t have the same status as other publications. Pre-prints are not peer-reviewed, anybody can basically publish a pre-print, but it still has many advantages. For example, when you are presenting your research at a conference, you usually don’t have anything published at that point, so when someone is interested in your research they can only read your conference abstract. But if you have a pre-printed version of a paper available on the internet, they can read this paper and get a good idea of what you are working on. I have also often heard that people already read the pre-print version and asked good questions about the paper during the conference.

There is data that shows that the final peer-reviewed versions of pre-printed papers are cited more often than papers that were not pre-printed. So, you would have to be crazy not to pre-print! The only thing you have to be slightly careful about is that some journals don’t publish papers that have been pre-printed. They only want completely original work. Obviously, all journals want to be original, but what counts as original differs per journal. Luckily, most journals don’t mind it when a paper has been pre-printed. However, when you have a certain journal in mind that you want to publish in, it’s probably good to check whether they will accept pre-prints. If they don’t, then you should seriously ask yourself: do I want to submit my paper to a journal that has such weird policies?

> You would have to be crazy not to pre-print! <

BY CORNÉ HOEKSTRA
PHOTOS BY SANDER MARTENS
The stopwatch in our brains: An interview with Hedderik van Rijn

Hedderik van Rijn is a professor in the Departments of Experimental Psychology and Psychometrics and Statistics in the Faculty of Behavioural and Social Sciences. His work is a reflection of his passion for research on time and adaptive learning. Recently, he was awarded a prestigious NWO Vici grant for his research project ‘The stopwatch in our brains’.

What drives your fascination for time?

Time fascinates me, because timing is essential to everything we do. Take verbal communication as an example. When I speak, my speech is separated by certain pauses. The length of these pauses is adapted to the speech rate of the person I am talking to. This means that in one way or another, I have to be able to estimate the speech rate of the person I am talking to, otherwise I could never adapt my own speech rate to him or her. Besides communication, more basic processes also draw on people’s temporal cognition.

For example, when you want to take a shower in a hotel, you estimate how long it will take for the water to be warm based on your experiences at home. Although we already know a lot about the basic functioning of other senses, such as the eyes and the ears, we have absolutely no clue about the mechanisms underlying our sense of time. In my research, I investigate the neuroscience of timing by using various techniques such as EEG, MEG, or MRI, but I also study how timing works outside the lab, in more naturalistic situations.
It would be wonderful if we, as a university, could more often identify parts of our research that could be implemented in small projects that are relevant to society.

Are people born with an ‘internal clock’ or does timing need to be learned?
Timing is such a basal property of the human brain that it probably is something innate. There are some nice EEG studies carried out with six-month-old babies, and even babies a few hours old, in which the babies are exposed to short beeps presented at a regular pace. However, certain beeps do not follow the rhythm of the other beeps. The brain responses of these very young babies show that they are already able to detect these temporal irregularities. Thus, it seems that people are born with some form of an internal clock. Yet, an interesting question remains concerning what the individual differences in people’s temporal cognition are. For example, do musicians have better timing skills than people who do not play music?

In studying temporal cognition you use fruit flies as an animal model. Why fruit flies?
There are a lot of theoretical models that explain how timing may work in the brain. By using clinical populations or pharmacological interventions we can of course study the effect of certain neurotransmitters on timing. However, these types of studies are rather complex to carry out. Ideally, you want to screen a large amount of potential manipulations and only apply the most important manipulations on the population you are interested in. The problem is that conducting such screening in studies with patients or higher-order mammals is very costly. As a solution, you could use the enormous toolbox of manipulations that exists for fruit flies to investigate rather quickly whether you can find a certain timing phenomenon in these fruit flies. Subsequently, you can decide which manipulations are actually suitable to use in a study with human subjects.

How do you test timing in humans?
Most tasks that have been used in timing studies are all quite boring lab tasks. In these tasks participants for instance have to estimate how long a certain stimulus was displayed on a computer screen. Thanks to these lab experiments, we already know a lot about the timing mechanisms involved in these simple tasks. However, in my research I am more and more focusing on timing in natural situations. In real life we do not just estimate the duration of one event at a time, but we need to ‘multi-time’. For example, when driving a car we check the rearview mirror, our speed, the pauses in our speech to the other passengers, and how much time has passed since we heard something of our child in the back seat. The existing theories about timing cannot explain how we do this all simultaneously, because these theories assume that we only have one internal clock. Furthermore, current theories believe that the start of an interval that we need to estimate needs to be very explicit, which is not the case in real life. Our internal clock is actually much more flexible in floor temperature is most comfortable. We make sure that the floor in the middle of the box has a comfortable temperature, while the temperature of the floor left and right to the middle is too hot for them. Subsequently, we present the fruit flies with a short or a long tone. With the long tone, the right side of the box will be heated to an uncomfortable temperature, which means that the fruit flies need to move to the left of the box, while the short tone means the opposite. What you want to see is that after a while fruit flies figure out that a long tone indicates that they need to go left to avoid getting their feet burned, whereas a short tone tells them to go right. If you are able to demonstrate this behaviour in fruit flies, you show that fruit flies are able to distinguish between short and long tones, meaning that they have a sense of time.

How do you let fruit flies perform a timing task?
Obviously, fruit flies cannot press a button or respond to a task. However, you can try to manipulate the behaviour of fruit flies in such a way that this behaviour proves that fruit flies have an awareness of time. To do this, we use a box of which we can control the floor temperature. Fruit flies are very sensitive to temperature, so they look for the location where the temperature is most comfortable. We make sure that the floor in the middle of the box has a comfortable temperature, while the temperature of the floor left and right to the middle is too hot for them. Subsequently, we present the fruit flies with a short or a long tone. With the long tone, the right side of the box will be heated to an uncomfortable temperature, which means that the fruit flies need to move to the left of the box, while the short tone means the opposite. What you want to see is that after a while fruit flies figure out that a long tone indicates that they need to go left to avoid getting their feet burned, whereas a short tone tells them to go right. If you are able to demonstrate this behaviour in fruit flies, you show that fruit flies are able to distinguish between short and long tones, meaning that they have a sense of time.
>> CONTINUATION OF THE STOPWATCH IN OUR BRAINS: AN INTERVIEW WITH HEDDERIK VAN RIJN

> The main goal of this Vici project is to develop a new theory that will explain how we can perceive time in realistic settings.

of system in your head that tells you when you have waited long enough before making a decision, which is only possible if you have sense of time. In turn, this implies that all the things that influence your sense of timing, such as recreational drugs, body temperature, or emotions, also influence your capacity to make decisions. In theoretical terms, this means that the higher your level of arousal, the less evidence you collect before making a decision. In daily life the effects of arousal on decision making will probably not be that big. However, we are doing joint projects with the military and police force, and you can imagine that in this context arousal can have a significant impact on the decision making process as they can literally decide over life or death.

Besides investigating temporal cognition, you study the process of adaptive learning. What is adaptive learning?

I believe that as scientists we should think about how we can improve existing theories by adding knowledge from the real world. My work on adaptive learning provides a good example of how ‘real-world knowledge’ can contribute to scientific theories. In studying adaptive learning, we use theories of memory to predict when a student, who is for example studying French vocabulary, is about to forget a certain word. At the exact moment that the student is going to forget a word, we present that word again. Our prediction of the moment of forgetting actually involves a kind of timing, but in a reversed manner because we predict forgetting instead of remembering. Together with a group of BCN students and PhD students, I have been developing this learning system over the past years. Compared to the standard programmes that are developed to train students on the facts-based types of knowledge, our system has shown to improve the performance of students by about 10-20%. At the moment, our system is actually used by about 300.000 high school students. I think this is a wonderful example of how on the one hand science can offer something to society, but on the other hand science gets a lot of data in return which can be used to improve our knowledge of the human memory system. It would be wonderful if we, as a university, could more often identify parts of our research that could be implemented in small projects that are relevant to society. Large issues are usually daunting, but these small contributions to society can already make a difference.

Recently, you have been awarded with an NWO Vici grant for your proposal ‘The stopwatch in our brains’. What will this project investigate in the upcoming years?

The main goal of this Vici project is to develop a new theory that will explain how we can perceive time in realistic settings, as in the driving-a-car example mentioned earlier. I hypothesize that this type of “multi-timing” is driven by how our memory system stores important, recent events. What I am especially looking forward to is having a group that will, at the same time, work on fundamental, theoretical issues, assess the neurobiological basis of timing, and work on testing these ideas in realistic, real-world settings in collaboration with research institutes that tackle practical questions. In all these subprojects, the research will be driven by the computational models that we will build of the internal timing processes, which will overcome the traditional difficulties associated with multi-faceted projects. I am really looking forward to getting started!

■ BY AMÉLIE LA ROI
■ PHOTOS BY SANDER MARTENS
Now what? Life after the defense: A double interview with Charlotte Willems and Heleen Hoogeveen

After your defense, it is time to look for a new job. Charlotte Willems and Heleen Hoogeveen chose to search for a job outside of academia and are both currently working in the field of data science. A PhD project often requires you to work with big datasets and to develop good statistical and analytical skills. Charlotte and Heleen talk about how they ended up in data science, how their PhD helped them and what they would do differently if they could do it all over again.

CHARLOTTE: Hi Heleen!

HELEEN: Hi Charlotte! So, what was your PhD project about?

CHARLOTTE: My PhD was about the role of attention in cognitive information processing. We investigated this with the Attentional Blink.

HELEEN: Sounds interesting! What brought you to this topic?

CHARLOTTE: I studied Neuropsychology and I wrote my thesis about the Attentional Blink. Then, I got the opportunity to do a PhD on the same topic. You also studied Psychology, right? Why did you choose for research instead of the clinic?

HELEEN: Yes, I studied Neuropsychology at the University of Groningen. I did an internship in the clinic, as well as in a research department. I noticed that my curiosity about the brain would be more satisfied in research and I wanted to get experience with other aspects of research, such as setting up an experiment, collecting and analyzing data, project management, writing, etc.

CHARLOTTE: Ah, so research it was! What was the topic of your thesis?

HELEEN: My PhD was a public-private collaboration between the UMCG, University of Wageningen, Friesland Campina, and Nutricia. It was a Top Institute Food & Nutrition (TIFN) project and it was about the role of the brain in taste perception and food choices in younger and older adults.

CHARLOTTE: Was your PhD as you’d expected?

HELEEN: I didn’t really have any expectations, except that I would learn a lot. And you?

CHARLOTTE: I didn’t know what to expect. Although, in hindsight, I had an ‘ideal’ picture in my head of what science would be like. It was different from what I experienced.
HELEEN: What part of science could be more ideal?

CHARLOTTE: I expected that scientists would strive to gain more knowledge and discover the ‘truth’, if something like that exists. But my experience was that it is a competitive world in which publications are more important than finding out how things really work, especially when I compare it to the business community. But the NeuroImaging Center was very nice! My roommates helped me through the difficult times.

HELEEN: Hmm, yes, it still is a debatable issue how science gets ‘rewarded’ or stimulated. What things would you do differently if you could do it all over again?

CHARLOTTE: I’m actually not sure if I would choose to do a PhD if I could do it again. However, I’ve learned a lot, including skills that I’m using right now! If I would do it over again I would look for more collaborations with other researchers. What advice would you give yourself at the start of your PhD?

HELEEN: I really liked that I could create my own project. If I could do it again, I would create a project with more practical implications. It is a shame that you gain knowledge and experience with your team, but that it stops after your PhD.

CHARLOTTE: What really liked were all the courses you could follow! It gave me a lot of opportunities to expand my knowledge.

HELEEN: Yes indeed! And the conferences :). So what did you do after your PhD?

CHARLOTTE: First, I went on a holiday and then I started looking for a job. Luckily, I quickly found a very nice job in IT, as a trainee in business intelligence. And now I’m consultant, which means that I help companies with their data management.

HELEEN: Does it have any resemblance to your PhD or is it very different?

CHARLOTTE: I still use a lot of skills that I learned during my PhD. For example, analyzing, programming, solving problems in a structured way, and critical thinking. But now I’m working in a team and everything goes a lot faster! How was it for you after finishing your PhD?

HELEEN: I was looking for a job in which I could bring research into practice in the field of health. That took quite a long time, but I was quite critical about the job and organisation before I would apply. In March this year I started a position as a Value-Based Healthcare data analyst at the Martini Hospital in Groningen. I work with medical specialists, business intelligence and IT. We analyse data about costs and outcomes of treatments, and compare it to other hospitals. In this way, we want to improve health care.

CHARLOTTE: That sounds interesting. So we are actually working in the same business again! What skills that you learned during your PhD can you use in your current job?

HELEEN: Probably the abstract and analytical thinking, time management and being able to stay calm when things don’t go the way you want them to go.

CHARLOTTE: I think that may be a personality trait of yours! Maybe we can start our own business as data analysts one day :).

HELEEN: Yes, definitely! Nice to talk to you again. We’ll probably meet again!

> I still use a lot of skills that I learned during my PhD. <

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BY MANON VAN ASSELT

PHOTOS (SINGLE PORTRAITS) BY SANDER MARTENS
The Twente connection, an interview with Bart Koopman

Prof. Bart Koopman is the head of the Department of Biomechanical Engineering at the University of Twente. His work focuses on clinical applications of research in areas as diverse as biomechatronics, robotics, and implant mechanics. He supervised more than 300 higher degree research students and has recently joined the BCN board as an external advisory member.

What’s your role in the BCN? Obviously you’re not there in person…
My role is to hold up a mirror and speak up when I see things that are odd or out of place given my experience.

What’s the experience?
I’m a mechanical engineer and currently focus on medical engineering. Of course, I don’t do all the work by myself! We started out as a small group but soon attracted a wide variety of students with different backgrounds, growing the lab to about 70 people, including clinicians and corporate partners. In science the usual preferred approach is to find a niche and just work within it, but we went the other way.

From the outside our work may look extremely diverse, but in essence it’s all about the human locomotor system, especially walking. We started with leg prosthetics. And we entered the field from a mechanical engineering perspective, which means measuring the motion and analyzing the physics of the movement. But we soon realized this did not tell the whole story. You also need to consider the central nervous system and the role of sensory feedback. So we adapted a systems engineering approach and looked at other research groups and started initiating collaborations.

I always believed it is important for our work to have clear applications. If that weren’t my focus, I would have become a physician.

The design part is fun – building new devices and instruments. This has always been very important to our group.

How do you select the research topics to pursue?
I’m very much application-driven, although not everyone in our group is. For example, we receive inquiries from Duchenne Muscular Distrophy (DMD) patients and are now making progress in finding better medication and offering better care for these patients… But the problem that we face now is that even though people live longer, the time is added at the end of the lifespan, which means quality of life is not very high.
Many DMD patients asked for a mechanical support system in the wheelchair to extend their independence and quality of life. Although it may be very interesting to research how people should most efficiently interact with a mechanical device, it’s more motivating to look at the application. So I said, “ok, we’re doing it and we want to make a real quantitative difference in these patients’ lives.”

Do you develop these devices yourself or do they come from the private sector?
It works like this: we have the idea for something totally new, we develop techniques and actual mechanical and control systems to make it happen… and that’s how we arrive at the prototype. Next come in the clinicians and companies. They take over and develop it into something that becomes available to the patient group. In the DMD project, our newest invention was a support mechanism that aides the balance of the arm. When the muscle strength is gone, this device helps reaching a keyboard, or a phone, or a joystick… now there’s a company turning this into a commercial product. That’s the ideal situation. Also for my former students, who often end up working in those spin-off companies.

You have registered a number of patents. Is that important to do?
Actually, no. It’s very costly to file a patent and even more expensive to keep it for a number of years. We had some nasty experiences when a patent we filed was modified ever so slightly and didn’t hold any more, and was used by an external party for profit. Patents are just a means to an end. For example, you can use them to sell a product to a company and get money for your research. But in general, I’d say just stay ahead of your competitors and don’t bother with patents.

Talking about students – there’s literally hundreds that you supervised throughout your career. Why so many?
I think when you work at a university, you have two tasks: provide education and do research. If I would choose one or the other I wouldn’t be a good professor. Since I want the students to experience science hands-on as early as they can, I simply combine the two tasks.

If you were the king of the hill, what would you change about science education?
I’m very pro project-based education. Let people work with real problems and do real research. That’s actually what we see more and more. Students always find it stimulating and gratifying to be able to make something of their own.

Internet courses are becoming popular and often have very acclaimed instructors. But these courses are passive to follow and studying is an active activity. You should be discussing things with other students, building things, discovering what’s important. That’s the spirit I try to foster.

Any advice for future scientists?
I always say, find a mentor that knows how the specific career you want works. Learn from them, and apply their wisdom to your own journey.

BY ALEXANDER PIETRUS-RAJMAN
PHOTOS BY MANON HULSBEEK

>> CONTINUATION OF THE TWENTE CONNECTION, AN INTERVIEW WITH BART KOOPMAN
> A DOC’S LIFE

How to feel like a top dog

The life of a postdoc can be tough. Hard work is frequently repaid by disappointing results, rejected papers and ditto grant applications. Job perspectives are grim. One would almost think: what a dog’s life! But of course it isn’t. Then they would have called it a postdog.

Still, every doc needs to find their own strategies to prevent them from rolling over.

At the end of last year, there was a downpour of disappointments in my mailbox. The final drop: a grant application that was rejected after very positive reviews. In the final round. After a year. I tried all kinds of things to distract myself, but nothing worked. In the hope of finding inner calm, I even signed up for a yoga class. But as I was ushered into downward facing dog position, I realized this was not helping me see the upside.

Back at home, I fired up my laptop and desperately clicked through my emails seeking guidance. But my inbox -full of reports and requests- offered little consolation. So, I went to where no (wo)man dares to go: the junk folder.

In my Hotmail days, my junk folder was no place for the faint-hearted: the ads for Viagra and penis enlargements hit you in the face. But one fine day I got an email account from the university. Now, as it turns out, my junk folder is a true haven for the bruised scientist.

In contrast to my inbox, my junk folder bulges with ego stroking emails. There are emails with pleas to republish my articles (in very peculiar books and magazines). And emails with requests to speak in beautiful places (about obscure subjects). Experiential or academic expertise does not seem to be a prerequisite. The World Pregnancy Summit and American Dental Society would gladly take me on as their keynote speaker, regardless.

The nice thing about these invitations is that they invariably start in an extraordinarily warm-hearted way: “Hope this mail finds you in superior spirits!” or “Hope you are doing well!!” Because well, why would you restrict yourself to one exclamation mark? I can appreciate that kind of enthusiasm. Even more appealing are the sentences that rhyme. Take for instance: “We wish God bless you with health and wealth!” The rhyme just gives it that extra bit of
credibility. My current favourite is this little gem: “We are impressed with the academic influence and prestige of you!” I am thinking about adopting this as my new mantra.

After the outright flattery, a friendly request to send my excellent article to magazine X or brighten up conference Y with my gracious presence usually follows. Then, to top it all off, comes a few more exclamation marks (“A particularly good and healthy day!”) and hopes for the future (“We hope to have a fruitful cooperation with an eminent and efficient figure like you!”).

Fifteen minutes of bathing in these warm emails is all it took me to finally shake off my blues. Because I knew as never before: I am not a postdoc. I am a top dog!

Disclaimer: Entry to a junk folder is at your own risk. The author does not take any responsibility for any encountered material, including viruses or shocking images.

Cool links

> A neuron wrapped around the entire outer layer of the mouse brain may be related to consciousness. http://www.nature.com/news/a-giant-neuron-found-wrapped-around-entire-mouse-brain-1.21539

> Tickling rats until they laugh: ultrasonic vocalizations in rats uncover the neural correlate of ticklishness. http://science.sciencemag.org/content/354/6313/757.full

> Italian surgeon will perform the first full head transplant. Who is the donor here? http://observer.com/2017/04/dr-sergio-canavero-head-transplant/

> Chimpanzees might not be our closest living relative after all. http://www.iflscience.com/plants-and-animals/bonobos-are-a-better-proxy-for-last-common-ancestor-with-humans-than-chimpanzees/

> Like visual illusions? Check this one out! http://www.iflscience.com/brain/this-trippy-optical-illusion-will-mess-with-your-brain/

> The 2017 Mindwise poster is here! Read the story behind the design, download a hi-res copy to use or print, or get a handmade copy by following this link: http://mindwise-groningen.nl/the-mindwise-poster/
> MASTER STUDENT COLUMN

Beyond the single track mind

Interdisciplinarianism has been hailed as the future of science, and rightfully so. It is the key to connecting the extremely specific lines of research that inevitably emerge from a culture of specialization. Without an interdisciplinary approach, the finding that molecular chaperone $x$ interacts with protein $y$ after treatment $z$ would be just a tiny bit of information. However, with an interdisciplinary approach it will be a tiny piece to the much larger puzzle that is being constructed by scientists from all disciplines.

I therefore find the vision of the BCN Research School and Research Master both ambitious and noble. I'm concerned, however, that it will remain only a vision given the current structure of the programme. Despite the BCN's mission to bring together research of different levels, little of this interdisciplinary spirit can be found in the Research Master. It is entirely possible (and not entirely hypothetical) to join the master's programme as an experimental psychologist, take courses related to experimental psychology, perform research supervised by other experimental psychologists and still graduate with a multidisciplinary master's degree.

It took me by surprise to hear that the colloquium, a course which presents a great opportunity to try one's hand at a discipline outside your own, had been reduced to yet another occasion to talk about the minor project. This only increases the tunnel vision that many students can be expected to have by now. If there is no active interaction with research from other fields, how can students be anything but proverbial ships in the night that pass each other at symposia at which they hear synopsized versions of each other's projects?

Of course, the reality isn't quite as bleak as I paint here; students do cross over to do research in fields outside of their background. When this happens, though, it is generally due to the initiative of the student. They take the time to educate themselves, often in part outside of the master's curriculum. This is not, however, unique to the BCN Research Master. The possibility of taking courses from different programmes or even faculties can be found in all kinds of bachelor programmes. The BCN Research Master doesn't do much out of the ordinary in this perspective.

The BCN Research Master should practice what it preaches. Fundamental understanding of the methods of an unfamiliar discipline is gained through collaboration with researchers from that discipline. A course like the 1st year colloquium provides an excellent opportunity to have students from different tracks collaborate on a common topic, each providing their discipline's insights to form a more comprehensive whole than a single student could have created. As it is, the colloquium represents a missed opportunity to reduce stratification between the tracks. For the BCN Research Master to rise to the goals that is has set for itself, its structure needs to be brought up the level of the visionary ideals that it is based on.

■ BY ELEF SCHELLEN

Elef Schellen is a second year C-track student, whose research interests involve top-down effects on perception and cognition and their neural substrates.
Take a piece of paper. Draw a few points, and then connect them. Congratulations: you have drawn yourself a network! More formally, networks are simplified representations of how the elements in a system are interconnected. So, in essence, everything that can be understood as being in relation with something else – and represented using dots connected with lines (i.e., nodes or vertices connected by edges, ties, or links) – can be seen as a network.1

Because networks are so broadly defined, it is no surprise that the field of network research covers all disciplines of science. Recently, it has also extended to psychological science, and especially the study of psychopathology. This provides a new way of thinking about mental disorders.

It had long been assumed that the symptoms of depression, such as sadness and suicidal thoughts, co-occur because they are caused by the same underlying disorder. However, the network perspective suggests a different possibility. Instead of being due to some unobserved common cause (A), the symptoms might co-occur because they are themselves influencing each other directly.2 If I am having sleeping problems (B), then I am also more likely to feelings of sadness (C). This is not because whatever disorder is causing my sleeping problems also makes me sad (A→B, A→C), but because sleeping poorly will itself affect how I feel (B→C).

Consequently, if we want to get a better understanding of psychological disorders, we should refocus on the relation between the symptoms and elucidate the patterns of interactions among symptoms.3 For example: using a network approach, my colleagues and I have created a network of depression symptoms.4,5

This figure illustrates how having the symptom loss of interest leads to another symptom loss of pleasure, which in turn leads to sadness, and – as the downward spiral spreads through the network, and the symptoms come to reinforce each other – the eventual result can be a full-blown depression.
This broader structural perspective is useful. But so too is the analytical toolbox that the network approach affords. For example, centrality analyses answer questions about how important a variable is in a network. A central symptom could be especially interesting for clinicians, as it may give an indication as to which symptom should be intervened upon in order to disrupt a dysfunctional symptom network. Indeed, because the network approach reveals the dynamics of symptom interactions – how the pieces fit together, and reinforce each other – it affords a whole new perspective of psychopathology.

Of course, a big tree attracts the woodsman’s axe. As the popularity of networks has increased, so too has the criticism. Critics point out, for example, that psychopathological networks represent a fundamental overreach: this application, they argue, represents a generalization of methods developed for social networks, where network research partly has its origins. And it’s not clear that the move from one type of network to another is valid.

In social networks, the variables are people. These are really distinct entities, and the relations between them can often be directly observed. For example, co-authoring a paper together provides unambiguous empirical evidence of a connection between two authors. In contrast, psychopathology has to deal with fuzzy variables. So difficult questions arise, such as: How distinct are symptoms such as loss of pleasure and loss of interest really? And if we are unsure whether our symptoms are really different things, does it make sense to separate them and draw lines between them?

Furthermore, the lines that connect variables in a psychopathological network are not given, but have to be inferred from some kind of a dynamic model. And the estimation and interpretation of such models is itself still a topic of debate. Thus, critics argue that researchers are heaping problem upon problem when using psychopathological networks. The result is pretty pictures, but these illustrate relations that we don’t really know how to interpret. So should we throw in the towel and quit doing network research in psychopathology? Well, no. It is important to make a distinction between statistical and conceptual issues. From a statistical point of view, there are still many hurdles to cross. But conceptually, the network idea seems very plausible; it opens up a whole new way of thinking about psychopathology, and enables us to ask new questions. Thus, at least in the latter sense, networks in psychopathology have already provided much more than pretty pictures.

**References**

Mindwise To $p$, or not to $p$

In Psychology, inferential statistics are predominantly conducted through means of the Null Hypothesis Significance Test (NHST). In NHST, statistical evidence is often communicated with the so called p-value. P-values are used to indicate the probability of obtaining a data pattern at least as extreme as the one that was observed, given that the null hypothesis is true.

Let us say, for example, that we are interested in relieving the symptoms of depression. We experimentally compare the effects of a new medication to the effects of a placebo on relieving these symptoms. We find that people in the medicated group have fewer symptoms than people in the placebo group. The between-group difference in this sample is associated with a $p$-value of .12.

This means that if the new medication is just as effective as the placebo (not better), then the probability of observing the difference between the new medicine and the placebo – or a difference even more extreme – is 12%. By convention, this is taken to be insufficient to disprove the null hypothesis. And thus, by convention, we “fail to reject” the null hypothesis: we do not find evidence to reject the notion that the new medication is just as effective as the placebo.

A low $p$-value, typically below .05, is considered “statistically significant”. Such a finding can then be interpreted as evidence against the null hypothesis: the difference is large enough that it was very unlikely to have been produced by chance. Unfortunately, $p$-values are plagued by a series of problems (e.g., Wagenmakers, 2007, van Ravenzwaaij & Ioannidis, 2017). Below, I list what I consider to be the four most pertinent.

Problem 1.

Using $p$-values, researchers are not able to quantify evidence in favor of the null hypothesis. This is because a non-significant $p$-value (by convention, any $p > .05$) can be the result either of evidence in favor of the null hypothesis, or
Don van Ravenzwaaij is a lecturer (Assistant Professor) at the Psychometrics and Statistics Department of Psychology at the University of Groningen. His research interests can roughly be divided into two main strands:

The first pillar of his research has been the advancement and application of response time models to speeded decision making. This work involves both theoretical and applied work in the fields of mathematical psychology, statistics, neurophysiology, intelligence research, social psychology, psychopharmacology, and clinical psychology. Two of his papers in which response time models were applied to the Implicit Association Test and Video Game data have made it to the popular media (see link to Psychology Today article and to APA PeePs article).

The second pillar is about proper use of statistical inference in science. This work includes, but is not limited to, advocating preregistration of experiments, conducting replications, developing the statistics to test replications, promoting the use of Bayesian statistics, and developing flexible decision criteria in statistical inference.

the result of a lack of statistical power (that is, if we had collected more data, the results of our inference would have been statistically significant).

Clinically, it is important to be able to quantify evidence in favor of the null hypothesis: this treatment is good for that problem. But there is an equally important, albeit different, interest in research. To wit: the same experiment might be carried out by twenty different labs, with the one “lucky” one concluding – by chance – that there actually is an effect. Relying solely on \( p \)-values then allows the random accident to be treated as true knowledge, with potentially harmful consequences.

**Problem 2.**

\( p \)-values lead to over-rejecting the null hypothesis. The underlying statistical problem is that evidence is a relative concept, and only considering the probability of the data under the null hypothesis leads to biases in decision making. When this null is the presumption of innocence, people go to jail who should not.

Consider, for instance, the case of Sally Clark, a British solicitor whose two sons died, in separate incidents, in their infancy. She was prosecuted for and initially convicted of their murder. The argument for her guilt was statistical:

the likelihood of two infants in a row dying of Sudden Infant Death Syndrome was calculated to be extremely low (about 1 in 73 million, or \( p < .001 \)). So the null hypothesis was rejected with great confidence. Should it have been?

The prosecution’s statistical expert had not taken into account the probability of the data under an alternative hypothesis: A mother is very unlikely to murder her two infant children. Subsequent calculations then showed this second probability to be even less likely than the former (by a factor of 4.5 to 9; see Hill, 2004 for details).

Clark’s original conviction was overturned, and the expert disgraced, but only after she had already spent four years in prison. She then later died of alcohol poisoning. In reporting on her death, The Guardian quoted a statement from her family: “Having suffered what was acknowledged by the court of appeal to be one of the worst miscarriages of justice in recent years… she was never able to return to being the happy, kind and generous person we all knew and loved.”

In other words, over-reliance on the improbability of one piece of evidence is not merely a problem for researchers. It has real-world implications.
Problem 3.

*P*-values produce results that are not intuitive to interpret. Researchers generally want to use the data to infer something about their hypotheses, such as: What evidence do the data provide for the null hypothesis versus the alternative hypothesis? The *p*-value cannot answer questions like this. They can only give an abstract number that quantifies the probability of obtaining a data pattern “at least as extreme” as the one observed if the null hypothesis were true. This definition proves to be so cryptic that most researchers in the social sciences interpret *p*-values incorrectly (e.g., Gigerenzer, 2004; Hoekstra et al, 2014, see also link).

So if *p*-values are so riddled with problems, why is it that we get taught about *p*-values from our first year statistics courses on?

- Existing text books on statistics for the social sciences explain the state-of-the-art in statistics from two or three decades ago. The reason for this is simple, text books are written by relatively seasoned researchers who have not had the privilege of learning about what are currently state-of-the-art statistical techniques in their own undergraduate degree. As a result, statistical text books are a little “behind the times”.
- Because of the unrepresentative textbook issue, it is difficult to get exposed to different (and better) ways of conducting statistical inference. I myself only learned of these techniques as a PhD-student: there was no room for it in my undergraduate curriculum.
- Finally, the best alternative (Bayesian hypothesis testing, which was used to get Sally Clark acquitted) requires computational power that has not been available on our computers until relatively recently. As a result, better alternatives may have existed in the past, but were never really feasible!

Problem 4.

*P*-values do not allow for optional stopping, based on examining the preliminary evidence. This means that a *p*-value can only be properly interpreted when the sample size for testing was determined beforehand and the statistical inference was carried out on the data of that exact sample size. In practice, additional participants are often tested when “the *p*-value approaches significance”, after which the *p*-value is calculated again.

In clinical trials, this problem takes the form of interim analyses with the potential of early stopping at different points (Mueller, Montori, Bassler, Koenig, & Guyatt, 2007). Alternatively, sometimes testing is discontinued when “an intermediate analysis fails to show a trend in the right direction”. These practices produce a bias against the null hypothesis: if researchers retest often enough, they are guaranteed to obtain a statistically significant result even if in reality the null hypothesis is true!

So, what is this Bayesian hypothesis testing, how does it work? Bayesian hypothesis testing quantifies evidence of two competing hypotheses relative to one another by means of a Bayes Factor (e.g., Kass & Raftery, 1995). The Bayes Factor provides an attractive alternative to each of the four problems I listed above. In a follow-up post, I shall tell you all about it!

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**BY DON VAN RAVENZWAAIJ**

**Relevant Publications**


Mindfulness lunch

On April 6th we organized our latest BCN lunch. This time the lunch was all about mindfulness. Our invited speaker was Marieke van Vugt, a cognitive neuroscientist at the institute of Artificial Intelligence and Cognitive Engineering. Marieke not only studies mindfulness (currently she is just back from a field trip to India to study monastic debate), but she is also an enthusiastic practitioner herself and student of Sogyal Rinpoche.

Once we all gathered in the meeting room, Marieke started right away with a mindfulness exercise. We were instructed to adopt a comfortable position, if possible sitting straight and resting our hands on our knees. Either with our eyes closed or open (depending on one's preference), we were told to just focus on our breathing and to try not to think about anything.

However, this is not as easy as it sounds. We are used to always keeping our mind occupied, and once we have a spare moment to ourselves, we tend to think about all the things we still need to do or that concern us. Therefore, many of us who practiced mindfulness for the first time, had trouble not thinking of anything. Marieke however explained that the key of mindfulness is to be non-judgemental to yourself. We should just try to relax and once we notice that our mind has wandered to for example our agenda, we should just accept it and try to go back to focusing on our breathing.

This key message may be useful for many of us. As stressed, perfectionist PhD students, we may be thinking about work all the time and may have trouble relaxing. So instead of beating ourselves up about it, a different approach can be to acknowledge and leave these thoughts. In the end, they are just thoughts.

After more exercises and discussions about our difficulties, Marieke presented some of her research findings about mindfulness and computational cognitive models. Since it was a BCN lunch, we of course closed off the meeting with food, which was some delicious pizza this time.

If you have any suggestions for a topic for one of our next BCN lunches, or other events we could organize, feel free to contact us: BCNPHDCOUNCIL@list.rug.nl
"Go Nuts" for the BCN Retreat: Set aside your expectations

Dear BCN students,

I’d be dishonest if I said there wasn’t a part of me - okay, all of me - that was dreading the BCN retreat. After all, it would be taking me away from my work for two whole days to a place called Odoorn, which sounds like a city out of a fantasy novel. On top of this, I knew I was to expect a great deal of forced social interactions, a practice I personally find to be awkward and anxiety provoking. So as we boarded the bus at 8:00 am on a sunny Thursday morning, I was already counting down the minutes until we were on our way back.

We arrived at the hotel and the presentations soon began, covering a variety of topics. After a very Dutch lunch of copious amounts of bread, kaassoufflé, and frikandel, we listened to a few more presentations and then arranged the room for “scientific speed-dating.” This I was dreading the most – 5 minutes to give a quick pitch about your research to a stranger and to formulate questions on the fly about their work. But after all of the presentations of the day and about 8-10 “dates,” something began to happen. I suddenly became humbled by the breadth of research that is involved in the BCN community and subsequently by how little I know about so many subjects. As a space nerd, my first thought was to compare this to the reports of many astronauts while they gazed down at Earth. They felt utterly small and overwhelmed by the realization that they as humans were part of a larger picture. When you work day in and day out within your very specific scientific niche, it becomes your bubble within the world. But in reality, as researchers we are all a very small part of a larger picture and quest for knowledge. Of course intuitively we know this, but the reminder is extremely important.

After this we took part in one of two activities: mountain biking or “Go nuts with nuts.” I chose the latter because I couldn’t resist the name. We were walked out to the countryside and played a game that is popular in the area in which each member of the team rolls a ball as far as they can. It was an unexpectedly fun and stressful activity.

– Shane Wright, Behavioural Biology

“The BCN retreat was a great opportunity to see current research beyond my own field of study. The presentations were aimed in such a way that a broad group of PhD students could easily understand and appreciate the current research being done. Additionally, the activities (pub quiz and the question-specific lunch) were both fun as well as extremely informative. I now have information that will help me in the long-run that I didn’t know where to go to obtain before this retreat.”
– Anna Neustaeter, Ophthalmology
can over the course of a specified trail. The team with the fewest throws wins. Despite our overall lack of skill in the game, the day was beautiful and we all enjoyed it.

We returned to the hotel for dinner, bowling, and a pub quiz. I initially sat with some of my colleagues that I see every day, but then decided to move to another group with people that I didn’t know. This ended up being a great decision. Not only did I meet some pretty incredible people, but we even won the pub quiz!

The second day continued with the remainder of the presentations interspersed, as on day one, with coffee, tea, and those spongy BCN cakes we all know and love that appear at every event. We also had an informal lunch during which questions that we had all submitted were discussed in groups. It was then time to depart for Groningen, that moment that I thought I’d be counting down to came surprisingly quickly.

A question I asked myself before the retreat began was, “Why couldn’t it just be in Groningen?” However, after the bowling and pub quiz, and socializing late into the evening, I had my answer: because we all would have gone home. Social interactions with new people in person and not through a screen can be difficult. If we were in Groningen, I can imagine that many of us would have left early or decided to go somewhere else with friends. Being “stuck” in Odoorn led to new connections and even facilitated possible collaborations. Stepping out of your scientific and social comfort zones is necessary for perspective and, consequently, for progress.

For those of you who have yet to attend the retreat, do yourself a favor and throw away whatever preconceived notions you have about what you’ll experience. Accept that it’s okay to spend two days away from your lab or research. Accept that meeting new people can be uncomfortable for you, but probably is for them as well. Accept that you will be listening to some presentations that don’t directly apply to your research but that you CAN learn from them. Accept that this retreat is a required part of the BCN programme and that instead of brushing it off, you can make the most of it. If you do, I can’t promise you will “Go Nuts” for the BCN retreat, but I can promise you will at least learn and enjoy yourself.

“To each others’ research, we are more layman than expert.”
– Ronald Bierings, Ophthalmology

By Allie Loiselie

Photos by Michiel Hooiveld

To each others’ research, we are more layman than expert.”
– Ronald Bierings, Ophthalmology
New staff writers wanted!

Do you enjoy reading the Newsletter? If so, why not join our enthusiastic editorial team and make it even better?

Regardless of whether you’re a master student or PhD student, it’s a great way to expand your network, improve your English writing skills, and be actively involved in BCN.

Interested? Send an e-mail to Sander Martens, sander.martens@gmail.com!

Rubicon scholarship for Olga Sin

Olga Sin (promoted in January 2017) has received a Rubicon scholarship from the NWO. She will go to the Max Planck Institute for Molecular Biomedicine in Münster, Germany. There she will investigate how faulty protein production is related to neurodegenerative diseases.

VICI award for Deniz Baskent and Hedderik van Rijn

Two BCN researchers have received a Vici award from the NWO. Read our interview with Hedderik on page #! http://www.rug.nl/research/behavioural-cognitive-neurosciences/news/vici2016

MS research awarded

The MS Centrum Noord Nederland (Multiple Sclerosis Center North-Netherlands) has received € 464,000 for research on the use of stem cells originating from skin-tissue in MS patients. The Center is a collaboration between the Departments of Cell Biology and Neurosciences at the UMCG.

Dutch Movement Disorders Award for Rodi Zutt

Rodi Zutt has won the Annual Movement Disorders Award. This is the prize for the best scientific article in the field of movement disorders. She was awarded the prize for her article ‘A novel diagnostic approach to patients with myoclonus’, which was published in Nature Review Neurology in 2015.

The research group Computational Linguistics receives two Nvidia GPU’s for research projects

Nvidia Corporation awarded two Titan X Pascal graphic cards (GPU’s), each worth around € 1400 to two members of the Computational Linguistics research group in the Faculty of Arts. One of them is Martijn Wieling. These GPU’s can be used to very quickly make many calculations. http://www.rug.nl/let/organization/actueel/nieuwsberichten-2017/2017-03-15-gpus-martijn-wieling-barbara-plank
Subsidy for Laura Batstra

In cooperation with ‘Muziekschool Wim Venema’ and researcher Marc Conradi, the team of ‘Druk & Dwars’ led by Laura Batstra is starting a project in which class parties for children will be organized and publicized with the goal to avoid social exclusion of children. ‘Stichting Kinderpostzegels’ is financing this initiative. http://www.rug.nl/news/2017/03/subsidie-laura-batstra-klasseonenstjes-tegen-sociale-uitsluiting

Dudoc-Alfa grant

Marjolein Verspoor, Kees de Gloppe and Wander Lowie of the Faculty of Arts have received a Dudoc-Alfa grant award to start of a number of PhD trajectories per September 1, 2017. http://www.rug.nl/let/organization/actueel/nieuwsberichten-2017/2017-04-19-dudoc-alfa-subsidietoekenning-voor-drie-letterenonderzoekers

Young Academy Groningen

Ming Cao (Faculty of Science and Engineering), Sonja Pyott (Faculty of Medical Sciences, UMCG) and Marieke van Vugt (Faculty of Science and Engineering) have been appointed as members of the Young Academy Groningen. The new members will be inducted on September 18, 2017 during an official ceremony. http://www.rug.nl/news/2017/04/young-academy-groningen-welcomes-eight-new-members?lang=en

Hanna van Loo wins Science price

Hanna van Loo, alumna of the Faculty of Philosophy and Medical Sciences, has won the Ramaer Medal and € 5000 for her thesis “Data-driven subtypes of major depressive disorder”. http://www.nvvp.net/website/nieuws/2017/hanna-van-loo-wint-nvvp-wetenschapsprijs-2017

Have you recently received any grants, prizes, or remarkable media coverage? Please let us know (E.T.Kuiper-Drenth@umcg.nl) and we will try to cover it here!
Putting the “Dr.” in Dr. Dre – Life as a hip-hop linguist

Most people are genuinely surprised when they hear that hip-hop music and hip-hop culture are central to my PhD project, which revolves around second dialect acquisition and the connection between language and music. Of course, I can imagine that it might have never crossed their minds that hip-hop could offer valuable insights for the field of linguistics, let alone that a middle class white kid from the Netherlands could be the one researching it. To me, however, it all makes perfect sense. In fact, you could say that the foundations of what would eventually become my PhD project were already established 17 years ago.

Back in 2000, when I was 9 years old, my dad brought home a CD for me: The Marshall Mathers LP by Eminem. I remember vividly how I examined the mysterious album cover, placed the disc in my CD player, and pressed play. As soon as the beat kicked in and Eminem started rapping, my jaw dropped to the floor. I had always loved music, but nothing had ever quite exhilarated me like Eminem’s beats and rhymes. In that moment, hip-hop took a hold of me, and it has never loosened its grip since.

Desperate to understand the lyrics, I set out to improve my English, mostly by listening to as many rap records as I could get my hands on and deciphering their contents. Now, I don’t know whether rap lyrics are necessarily the most appropriate means of learning a second language for a nine-year-old – it certainly expanded my vocabulary in interesting ways – but the fascination with the English language that they sparked in me would eventually make me decide to study English and linguistics at university. There, I realized at some point that it might be a good idea for me to propose a PhD project that combined my two greatest passions in life – hip-hop and linguistics. Not just because that would be fun for me, but because hip-hop could offer a unique perspective on linguistics due to its intricate relationship with language.

There are few examples of contexts where language, music, and personal identity are so deeply connected to each other as they are in hip-hop. To hip-hop enthusiasts, representing where you are from is incredibly important (sometimes life or death), and they use their own regional accents to express their regional hip-hop identity. This got me wondering what might have happened to the accent of Tupac “2Pac” Shakur, the gangsta rapper who was born in New York, later moved to California, and eventually became the leader of West Coast hip-hop during a feud with his native East Coast. Had he consciously tried to manipulate his accent so he could represent the West Coast? All the evidence I have collected so far suggests that he did.

I also study the relationship between language and music and what hip-hop can teach us about this. Currently, I’m looking at regional variation in speech prosody (the melody and rhythm of speech) and whether it informs regional variation in rap flows (the melody and rhythm of rap). If West Coast speech is more melodic and rhythmically free than East Coast speech, would that also mean that West Coast rap flows have more pitch fluctuation and more rhythmic variation? Although the study is still a work in progress, this does indeed appear to be the case, which would suggest that language and music are even more intricately and subtly connected than we previously believed.

By now, you might have deduced that hip-hop and language dictate almost every aspect of my life: the research I conduct, the music that I constantly listen to and make myself (I’m a rapper, spoken word artist, and hip-hop producer on the side), and even my girlfriend, who is a talented hip-hop dancer and linguistic neuroscientist. Because of this, the following quote by rapper Joell Ortiz has always resonated with me: “I wake up hip-hop, go to sleep hip-hop, dream ‘bout hip-hop, ‘cause I am hip-hop.” The beauty of that is that it never really feels like I’m at work when I’m doing my research. The flipside of it is that, at the same time, I am kind of always working. I can’t simply check out the latest Kendrick Lamar album without at some point wondering how his new rap style might impact my theories on speech and rap flows. Or listen to an interview with a rapper without listening to the length of his vowels.

That’s a sacrifice I’m more than willing to make for what is arguably my dream job, though.

■ BY STEVEN GILBERS
■ PHOTO BY MATTHIJS GEERTJES
> PHD AND OTHER NEWS

**Winners of the BCN Poster Awards**
Besides Sanne Booij, the winner of the BCN Dissertation Award and BCN Dissertation Summary Award, Danielle Houwing, Rika Plat and Steven Gilbers celebrated the winning of the BCN Poster Awards 2017. Their posters were selected as the best during the BCN Poster Afternoon on February 16, 2017.

**BCN Orientation Course**
The Orientation Course will start on September 8 for all BCN Research Master students and for new BCN PhD students. Of course, those who haven’t attended yet are welcome. Other course dates are: September 22; October 6 & 20; November 3 & 17, 2017.

**BCN Symposium**
Block off October 12 in your agenda! A committee is working hard to find the best speakers for the BCN Symposium entitled: A Comprehensive Update on Invasive and Non-Invasive Neuromodulation. Keynote speakers include:
– Prof. Peter Brown (University of Oxford) - Adaptive Deep Brain Stimulation (DBS)
– Dr. Freek Hoebeek (Erasmus University) - Cerebellar Neuromodulation
– Prof. Yasim Temel (University of Maastricht) - DBS beyond motor symptoms
– Prof. John Rothwell (University College London) - TMS

**Courses Organized by Other Graduate Schools**
Graduate School GSSE organizes teacher training courses. BCN PhD students can also apply for these courses. Check the website http://cursus.webhosting.rug.nl/gss/courses/ for more courses that might interest you.

**BCN Compulsory Courses**
The BCN Training Programme consists of a compulsory part. That is the reason why you will receive course invitations as long as you haven’t participated in that specific course or activity (or if participation for additional EC’s is possible). Please keep in mind that for PhD students with a project of less than 4 years only the BCN Orientation Course and BCN Course Management Competences in your PhD project are compulsory. If you don’t want to receive the email for a specific course, please inform me.

**Registration for New PhD students**
PhD students with an appointment at the UMCG will have to apply by using this link: https://horafinita.nl/registratie/
The BCN application form from the website can still be used by new PhD students from other faculties.

**Agenda BCN Activities**
June 19, 20, 27, 28 & 29, 2017: 
BCN Statistics Course (compulsory BCN course)
Sept 8 & 22; Oct 6 & 20; Nov 3 & 17, 2017: 
BCN Orientation Course
September 28, 2017:
BCN PI Meeting (for BCN senior members)
October 12, 2017:
October 13, 2017:
Two BCN Master Classes by speakers from the BCN Symposium
October 23, 24, 30 & 31; Nov 1, 2017:
BCN Advanced (non)linear regression techniques in R (optional course)

Application
http://cursus.webhosting.rug.nl/gsms
Please check the website for detailed information.

■ BY DIANA KOOPMANS
**Physically active learning:**

*The effect of physically active math and language lessons on children’s academic achievement*

**PHD STUDENT**

M.J. Mullender-Wijnsma

**THESIS**

Physically active learning: The effect of physically active math and language lessons on children’s academic achievement

**PROMOTORS**

Prof.dr. R.J. Bosker

Prof.dr. C. Visscher

**COPROMOTORS**

Dr. E. Hartman

Dr. S. Doolaard

**FACULTY**

Behavioural and Social Sciences

The main aim of this thesis was to examine the effects of physically active ‘Fit & Vaardig op school’ (F&V) lessons on the academic achievement of socially disadvantaged children (SDC) and children without this disadvantage (non-SDC). SDC have performed worse academically than non-SDC for decades. F&V is a programme developed for elementary school children that integrates physical activity into math and language activities. The intervention lessons were taught in the classroom 3 times a week for 20–30 minutes. For example, words had to be spelled by jumping in place for every mentioned letter.

To examine the effects of the F&V programme, first the F&V programme implementation was evaluated after one pilot year. It appeared that the F&V lessons could be implemented with success in elementary classrooms. Thereafter, the immediate effects of the F&V lessons on academic engagement were examined. The results showed that participation in the F&V physically active math and language intervention positively contributed to the academic engagement of SDC and non-SDC.

Finally, in a two-year randomized controlled trial on 12 elementary schools with 500 children, the effects on academic achievement were examined. After two years, the F&V intervention contributed significantly more to the math and spelling performance of SDC and non-SDC in...
comparison with the control group. This equates to 4 months more learning gains. At a 7–9 month follow-up, when the children no longer participated in the lessons, the gains in math achievement were maintained.

Marijke Wijnsma (1985) did her doctoral research at the Faculty of Behavioural and Social Sciences where she works as a teacher/researcher. It was financed by the project ‘Onderwijsbewijs’ from the Ministry of Education, Culture and Science. She was promoted on January 19, 2017.

Neural correlates of gene-environment interactions in ADHD

PHD STUDENT
D. van der Meer

THESIS
Neural correlates of gene-environment interactions in ADHD

PROMOTORS
Prof.dr. P.J. Hoekstra
Prof.dr. J.K. Buitelaar

COPROMOTOR
Dr. C.A. Hartman

FACULTY
Medical Sciences

The way we respond to our environment partly depends on our genes. So-called gene-environment interactions (GxE) may explain why some children develop attention-deficit/hyperactivity disorder (ADHD) when exposed to a stressful environment, whereas others do not. Knowledge of GxE may therefore not only contribute to a better understanding of this disorder, but also help in the development of prevention or treatment strategies that are tailored to the individual.

In this dissertation, we describe how we investigated the relation between genes, stress and ADHD. We found that genes regulating the activity of the brain’s stress response pathway explain differences between people in their sensitivity to stress. People with specific variants of the serotonin transporter (5-HTT) and the glucocorticoid receptor (NR3C1) genes showed a stronger relation between long-term exposure to stress and symptoms of ADHD. They also had lower brain volume and activity in brain areas important for the ability to control behaviour, which are also relevant for ADHD.

We further found that statistical methods that simultaneously take into account interactions between many genes and stressful experiences are particularly well-suited to predict ADHD severity.

We conclude that the GxE approach is valuable for developing a more nuanced understanding of the influence of genetic and environmental risk factors on ADHD and the brain. Our pattern of results illustrates that the biological systems underlying behaviour are made up of many parts influencing each other, parts that should not be studied in isolation if we wish to truly understand how they work.

Dennis van der Meer (1987) studied molecular neurosciences and neuroimaging at the University of Groningen. His doctoral research was financed by Accare and was carried out in the UMCG within the research programme ANDDI (Abnormal Neurological Development: Early Diagnosis and Intervention) form the research school Behavioural and Cognitive Neurosciences (BCN). He now works as a Research Fellow at the University of Oslo. He was promoted on January 23, 2017.

The cerebral organization of audiomotor transformations in music

PHD STUDENT
R. Harris

THESIS
The cerebral organization of audiomotor transformations in music

PROMOTOR
Prof.dr. K.L. Leenders

COPROMOTOR
Dr. B.M. de Jong

FACULTY
Medical Sciences

The realization of one’s musical ideas at the keyboard is dependent on the ability to transform sound into movement, a process called audiomotor transformation. Using fMRI, we investigated cerebral activations while classically-trained improvising and non-improvising musicians imagined playing along with recordings of familiar and unfamiliar music excerpts. We hypothesized that audiomotor transformation would be associated with the recruitment of dedicated cerebral networks, facilitating aurally-cued performance. Results indicate that while all classically-trained musicians engage a left-hemisphere network involved in motor skill and action recognition, only improvising musicians additionally recruit a right dorsal frontoparietal network dedicated to spatially-driven motor control.

Mobilization of this network, which plays a crucial role in the real-time transformation of imagined or perceived music into goal-directed action, may be held responsible not only for...
the stronger activation of auditory cortex we observed in improvising musicians in response to the aural perception of music, but also for the superior ability to play ‘by ear’ which was demonstrated in a follow-up study. The results of this study suggest that the practice of improvisation promotes the implicit acquisition of hierarchical music syntax, which is then recruited in top-down manner via the dorsal stream during music performance.

Robert Harris (1949) studied piano at the Southern Illinois University (US) where he received his Bachelor of Music diploma in 1970. In 1977, he finished the study of executive musician at the Sweelinck Conservatory in Amsterdam. After having worked at the ‘Stedelijk Muziekpedagogische Academy’ in Leeuwarden, he finished his study in Movement Sciences in 1995 at the University of Groningen. Afterwards, he entered into service of the ‘Prins Claus Conservatory’ as a répétiteur. He carried out his doctoral research within the research line ‘Cerebrale organisatie van beweging’ of the movement sciences workgroup in the department Neurology, UMCG, and the research institute BCN. Funding came from the Hanzehogeschool (Lectorat Learning in Music, Prince Claus Conservatory) and the Gratama foundation. Harris now works as a teacher/researcher at the Prince Claus Conservatory in Groningen. He was promoted on February 6, 2017.
within and between brain networks. Thus, investigation of brain networks involved in the processing of auditory verbal information can inform us how patients with auditory verbal hallucinations use these networks in comparison with patients without them. The studies in this thesis show that these networks do not function optimally. Specifically, the network that processes auditory information appears to be too active. In addition, it is known that patients with negative symptoms demonstrate less activation in frontal brain areas, which are closely connected to many other brain regions. In theory, important networks can be stimulated with Transcranial Magnetic Stimulation (TMS), such that it can reduce symptomatology. Two placebo controlled clinical trials that applied this technique are described in this thesis. In the first study we investigated the efficacy of low frequency stimulation of an area that is involved in the processing of auditory verbal information. Although on average the treatment as well as the placebo groups improved, on a symptom level we did not find differences between the groups. In contrast, at brain level we observed that the active treatment did cause differences. Potentially, optimization of treatment parameters may result in stronger treatment effects. In a second placebo controlled trial, we investigated the effect of high-frequency TMS on negative symptoms of schizophrenia. The group receiving active treatment improved significantly more on a symptom level than the group on placebo. In both trials, we found large inter-individual differences in treatment response. We recommend that future research focuses on the identification of factors related to treatment response, such as demographic variables and brain characteristics (e.g. anatomy and baseline connectivity).

Leonie Bais (1980) received a master’s degree in psychology at the University of Groningen. She did her doctoral research at the Neuroimaging Center (NIC) of the UMCG, within the research programme Interdisciplinary Center Psychopathology and Emotion regulation of the research school BCN. In addition to her work at the Neuroimaging Center, Bais works as a researcher at Lentis (GGz Groningen). She was promoted on February 8, 2017.

Quantification of symptoms of movement disorders employing motion sensors

PHD STUDENT
O.E. Martinez Manzanera

THESIS
Quantification of symptoms of movement disorders employing motion sensors

PROMOTOR
Prof.dr. N.M. Maurits

COPROMOTOR
Dr. J.W. Elting

FACULTY
Medical Sciences

Clinical evaluation plays a fundamental role in the diagnosis and evaluation of a movement disorder. This evaluation depends, at least to some extent, on a human decision process. In the past, rating scales have been developed aiming to homogenize and improve reliability of the evaluation process. In spite of improvements, the evaluation of symptoms of movement disorders using rating scales, like every human-decision-making activity, is influenced by the expertise, experience, attention and skillfulness of the evaluator.

The continuous effort to improve the scales reveals the necessity of reliable objective assessments that do not depend on the evaluator. In this thesis, we employed movement sensors, sensor fusion, signal processing and machine learning to analyse characteristic symptoms of movement disorders. The goal of each chapter was to evaluate a specific method that could overcome some of the disadvantages that are present in current evaluations.

In Chapter 2, we proposed a method to automatically assess tremor from accelerometry signals. In Chapters 3 and 4, we employed IMUs to study the objective assessment of bradykinesia in patients with Parkinson’s disease. Finally, in Chapters 5 and 6, we studied the automatic identification of early-onset ataxia and developmental coordination disorder in young children using inertial measurement units (IMUs), first analysing coordination during the finger-to-nose test and then during gait. The results obtained in this thesis show that quantification of symptoms of movement disorders employing motion sensors can be used to support the diagnosis and monitoring of movement disorders.
In recent years, the neuroinflammation theory, which assumes that bipolar disorder is amongst others caused by an inflammatory response in the brain, has gained attention. In his thesis, Benno Haarman demonstrates by means of positron emission tomography (PET) an actual dysregulation of the immune system in the brain of patients with bipolar disorder. PET is an imaging technique, which is used to examine the function of an organ with radioactive tracers. Haarman compared neuroinflammation-PET images of the brain between patients and healthy persons and showed immune activation in the hippocampus of patients with bipolar disorder. This finding provides an important basis for further research into the disease mechanisms of bipolar disorder.

In the subsequent studies, the relationship between the function of immune cells and the condition of nerve cells with magnetic resonance spectroscopy (MRS) and the effect of lithium, which is often used for treatment of bipolar disorder, on the connecting tracts in the brain with diffusion tensor imaging (DTI) of patients with bipolar disorder were studied. Prior to the imaging research, Haarman investigated the relationship between inflammation-related gene expression in cells of the immune system and psychiatric symptoms with a novel graphical ‘feature-expression heat map’ method he developed. For this achievement he received the Samuel Gershon Award from the International Society for Bipolar Disorders in 2013.

Benno Haarman (1978) studied medicine at the University of Antwerp. He did his research for the research institute BCN-BRAIN, mainly in the mood and anxiety disorders programme in the University Center Psychiatry at the UMC Groningen. The Department of Immunology at the Erasmus MC in Rotterdam and Radiology Morphological Solutions in Berkel and Rodenrijs were also involved. The research was financed by the KP7 of the European Committee. Haarman works as a psychiatrist and Chief ‘behandelzaken’ of the department ‘Stemmings- en Angststoornissen’ and as a researcher on bipolar disorders at the UMCG. He was promoted on March 1, 2017.
The present thesis aimed to address functional brain laterality and symptoms of Attention-Deficit/Hyperactivity Disorder (ADHD) in adults, from a dimensional perspective. The dimensional perspective assumes that ADHD symptoms are normally distributed in the general population and those scoring at the high end of the distribution are at risk of being diagnosed with ADHD. Participants completed questionnaires designed to detect ADHD symptoms in adults. The scores were used to test how severity of ADHD symptomatology is associated with valid behavioural indices of functional brain laterality, interhemispheric interaction speed (using the divided visual field paradigm), state regulation, and error-processing. It appeared that all these behavioural indices as well as scores on the self-reported ADHD scales were, more or less, normally distributed.

Study 1 and 2 showed no (dimensional) associations between ADHD symptoms and interhemispheric interaction speed, right and left hemisphere-functioning. However, there is evidence that attentional processes in adults with the highest scores on inattention scale are related to less optimal right hemisphere-functioning than in adults with the lowest inattention scores. Study 3 and 4 indicated that the higher ADHD scores are, the more defective the regulation of motor activation is (due to less effort allocation). This is particularly true when stimuli are presented to the right visual field at a slower rate. Under such conditions, less optimal error-monitoring was observed. These findings underscore the association between left hemisphere-functioning and both effort allocation and error-processing in ADHD symptomatology. In sum, findings underline the role of atypical brain laterality in heterogeneous ADHD symptoms in adults.

Saleh Mohamed (1983) did his research in the Department of Neuropsychology of the Faculty of Behaviour and Social Sciences, where he will stay as researcher/teacher. It was financed by the Egyptian Ministry of Higher Education. He was promoted on March 6, 2017.
Susceptibility genes for schizophrenia and their functional relationships

**PhD Student**
Z. Luan

**Thesis**
Susceptibility genes for schizophrenia and their functional relationships

**Promotor**
Prof. dr. H.W.G.M. Boddeke

**Co-promotor**
Dr. J.C.V.M. Copray

**Faculty**
Medical Sciences

Our genetic studies showed a significant association of the relevant genes with schizophrenia, and functional examination of schizophrenia-associated SOX11 gene revealed its essential involvement in multiple phases of early-stage neurodevelopment.

Zhilin Luan (1984) studied molecular biology at the University of Beijing. She did part of her research at the Institute of Mental Health at the University of Beijing and part in the Department of Neurosciences at the UMCG, in Groningen. She was promoted on March 13, 2017.

Microglia phenotypes in aging-associated diseases

**PhD Student**
Z. Yin

**Thesis**
Microglia phenotypes in aging-associated diseases

**Promotor**
Prof. dr. H.W.G.M. Boddeke

**Co-promotor**
Dr. B.J.L. Eggen

**Faculty**
Medical Sciences

Due to improvements in public health and medical care, the life span of human beings has elongated considerably over the last decades. Consequently, the occurrence of aging-associated diseases has also increased. Inflammation of the brain increases during aging and could be an important factor in neurodegenerative diseases. Microglia, the local...
immune cells in the brain, are the key cellular mediators of brain inflammation. The aim of this thesis is to explore changes of microglia in aging-associated neurodegenerative diseases. For this purpose, we studied microglia activity in animal models and in human brain samples regarding aging, Alzheimer’s disease (AD), tauopathies, and obesity.

Around the clumps of the protein amyloid beta that appear during AD, we observed very strong immune activity of brain immune cells. We found this in mouse models for AD as well as in the brains of deceased patients suffering from AD. We also observed increased inflammation in the white matter of brain tissue from deceased aged humans and from AD patients. Moreover, in animals fed with high-fat diet, we found an increased number of brain immune cells in the food satiety center of the brain. After application of a low-fat diet combined with limited food intake, we observed reduced inflammation in the white matter of the aging brain. Finally, a new transgenic tauopathy mouse model Tau 58/4 with deteriorating motor dysfunction is reported. These findings suggest microglia phenotypes in aging-associated diseases and provide the prognostic value for detecting the onset and progression of aging-associated diseases.

Zhuoran Yin (1987) studied medicine at Huazhong University of Science and Technology (China). She did her research within the research institute BCN-BRAIN. The research was financed by the Chinese Scholarship Council, Detalplan Dementie and Research Foundation-Flanders (FWO). She now works at the Tongji Hospital in Wuhan. She was promoted on March 13, 2017.

Life events and bipolar disorder: The influence of life events on the onset and course of bipolar disorder

PhD Student
S.M. Kemner
Thesis
Life events and bipolar disorder: The influence of life events on the onset and course of bipolar disorder
Promotors
Prof. dr. W.A. Nolen
Prof. dr. R.S. Kahn
Copromotors
Dr. M.H.J. Hillegers
Dr. N.E.M. van Haren
Faculty
Medical Sciences

In the Netherlands, bipolar disorder (also known as manic-depressive illness) is diagnosed in approximately 2% of the population. The disorder is characterized by alternating periods of raised activity and (manic) mood and periods of reduced activity with lowered (depressed) mood. Bipolar disorder occurs more frequently in families, which is an indication that genes play a role in the development of the disorder. As with most psychiatric disorders, their origin lies in an interaction between genes and environment. Which factors play a role in the development of this disease is still an ongoing quest. In this thesis, four studies explore possible causal factors such as stress, abnormalities in hippocampal volume and activation of the immune system and their interactions with each other. Stress is one of the factors that is often associated with the etiology of psychiatric disorders, as well as with bipolar disorder. In conclusion, the most important finding of this study is the influence that stressful life events have on the onset and course of bipolar disorder. We found evidence that stressful life events influence both the risk of onset of mood episodes as well as the risk of psychiatric submission. The impact of life events was greater on the first mood episode or submission than on any subsequent episodes or submissions. Although more research is...
needed, the above findings contribute to our understanding of the role of stress in bipolar disorder and provide potential tools for (early) intervention.

Sanne Kemner (1984) studied clinical psychology and neuropsychology at the Vrije Universiteit in Amsterdam. She did her doctoral research within the research institute BCN-BRAIN of the University Medical Center Groningen (UMCG). The research was financed by NWO and a European KP7 project. Kemner now works as a marketing manager with the online marketing company Bannerconnect. She was promoted on March 13, 2017.

Towards customized intraocular lenses

PHD STUDENT
T. de Jong

THESIS
Towards customized intraocular lenses

PROMOTOR
Prof.dr. N.M. Jansonsius

COPROMOTOR
Dr. S.A. Koopmans

FACULTY
Medical Sciences

The eye uses two refractive components to focus the light on the retina and let you see: the cornea and the lens. When an eye develops cataract the lens becomes caracarous. It is removed and replaced with a synthetic intraocular lens during a cataract surgery procedure. Only one general intraocular lens was used when this procedure was first developed, whereas nowadays the properties of the lens can be specified to correct the sphere of the eye and in some cases even the cylinder can be compensated, much like with contacts or glasses. However, each eye suffers from some smaller, local defects in the refraction of the light as well, due to the imperfections in the shape of the cornea. In general, these aberrations are of such a small magnitude that it is completely unnoticeable to the patient. A cornea that is damaged due to illness or refractive surgery has aberrations that can heavily affect the comfort and visual performance of the patient. Theoretically, this problem could be solved when a customized intraocular lens is implanted during the cataract surgery procedure, much like the focus of the intraocular lens is already customized for the eye. In this thesis, I present several findings from studies with the goal of developing customized intraocular lenses.

Tim de Jong (1985) studied Technical Physics at the University of Groningen. He did his research within the research institute BCN-BRAIN. The research was financed by ‘Samenwerkingsverband Noord-Nederland’ (SNN). De Jong now works as a Trainee BlueRiq model maker and business engineer at DICTU. He was promoted on March 22, 2017.

Assessment of dyslexia in the Urdu language

PHD STUDENT
S.E.Z. Haidry

THESIS
Assessment of dyslexia in the Urdu language

PROMOTORS
Prof.dr. B.A.M. Maassen
Prof.dr. A. Castles

COPROMOTOR
Dr. W. Tops

FACULTY
Arts

Urdu is spoken by more than 500 million people around the world but still is an under-researched language. The studies presented in this thesis focus on typical and poor literacy development in Urdu-speaking children during early reading acquisition. In the first study, we developed and validated a series of tests to assess reading and reading-related skills in Urdu, resulting in a test battery to diagnose dyslexia. For an in-depth understanding of the nature of typical and impaired reading processes in Urdu, in next two substudies the dual-route model (DRM) was adopted.

In the first substudy, we elaborated on the dual orthography of Urdu due to the presence or absence of short vowel markers or diacritics. We investigated this transparency effect as well as lexicality effects in terms of the DRM by measuring accuracy and speed of reading of (a) words with and without diacritics and (b) words and pseudowords. We found that both the typical and struggling readers preferred the
visual word-recognition route over letter-to-sound conversion.

Our final study addressed the letter-position effect resulting from the fact that in the Urdu orthography many letters change shape according to their position in a word. We found reading accuracy to be higher for words in which migrated letters changed shape as compared to same-shape cognates. This was again true for both the typical and the struggling readers but more so for the latter group.

We conclude that the test battery allows for diagnosing and profiling the reading skills and deficits of typically developing and struggling readers in Urdu.

Sana Haidry (1978) did her research at the Faculty of Arts. She was promoted on April 6, 2017.

Aphasia is a language disorder that is a consequence of acquired brain injury. People with agrammatic aphasia (PWA) have restricted language production, characterized by short and telegraphic sentences. Many PWA have also difficulties understanding some sentences, such as ‘the girl has been chased by the boy’ in English. This sentence is difficult for two reasons. Firstly, it is semantically reversible as ‘boy’ and ‘girl’ can both be the agent of the action of chasing. Secondly, it is a passive sentence, which does not adhere to the most common word order of the language. It is important to investigate sentence comprehension deficits in PWA speakers of languages that differ in terms of their word order variability.

Sana Haidry

PHD STUDENT
M. Arantzeta Perez

THESIS
Sentence comprehension in monolingual and bilingual aphasia: Evidence from behavioral and eye-tracking methods

PROMOTORS
Prof.dr. Y.R.M. Bastiaanse
Prof.dr. D. Howard

COPROMOTOR
Dr. J. Webster

FACULTY
Arts

PHOTO BY NIENKE WOLTHUIS AND TOIVO GLATZ

COVER BY DIGITAL EGGHEADS

PHOTO BY LEHIOI ELORRIAGA
The current project focuses on sentence comprehension in PWA and unimpaired speakers of a highly inflected and free word order language, Basque, and/or a less inflected and flexible word order language, Spanish. It includes a series of studies on bilingual and monolingual speakers in order to consider a) how language-specific properties influence sentence comprehension; b) cross-linguistic transferability of sentence parsing mechanisms in bilingual speakers; c) potential bilingual advantage in sentence comprehension abilities due to enhancement of executive functions, and d) error awareness in sentence comprehension. It combines behavioural (response accuracy and reaction time) and eye-tracking methods.

The results suggest that a) word order is a universal characteristic of sentence comprehension deficits in at least some PWA; b) bilingual speakers do not transfer their abilities to process sentences from the most inflected languages (i.e., Basque) to the less inflected language (i.e., Spanish); c) bilingual PWA do not show an advantage over monolingual PWA; and d) PWA are unaware of their sentence comprehension deficits.

Miren Arantzeta Perez (1982) did her research at the Faculty of Arts. She was promoted on April 6, 2017.

Making the most of human memory: Studies on personalized fact-learning and visual working memory

P H D S T U D E N T
F. Sense
T H E S I S
Making the most of human memory: Studies on personalized fact-learning and visual working memory
P R O M O T O R S
Prof.dr. D.H. van Rijn
Prof.dr. R.R. Meijer
F A C U L T Y
Behavioural and Social Sciences

Rote learning of facts is boring. Here, we present a way to make it more efficient so facts are learned faster. Learners usually need to repeat facts multiple times to learn them well. The optimal timing of these repetitions depends on the facts that are studied and the characteristics of the learner. Learning software that takes such differences into account is called adaptive.

Here, we show that the adaptive system developed in our lab outperforms a flashcard system often utilized by students: on average, students learn more and make fewer errors during learning if they use the adaptive system. This improvement is possible because the system simulates a very simplified version of each learner’s memory and can predict when individual facts are forgotten. We show that parameters estimated during learning can predict test performance but are not related to...
intelligence or working memory capacity (in the tested sample). We also demonstrate that the parameters estimated for one learner are stable over time but differ slightly over materials.

Finally, future developments and improvements of the system are discussed. For example, the adaptive system’s capabilities should be extended to multi-session learning. Gaining access to large amounts of data collected in realistic (educational) settings will be the key to these developments. Collaboration with Noordhoff and HoeGekIsNL? and a UG-funded project called Rugged Learning will provide such data and will enable us to verify and test additional assumptions that should further improve the system.

Florian Sense (1988) did his doctoral research in the Department of Psychometry & Statistics at the Faculty Behavioural and Social Sciences, where he now works as a postdoc. He was promoted on April 20, 2017.

Most 3-year-olds fail at the hide and seek game. For example, they close their eyes as if: “Nobody knows where I am if I do not see them”. When they turn 4, they understand that others can have different beliefs and knowledge, and this theory of mind makes them successful at hide and seek.

Theory of mind is also crucial in more socially complex situations, such as catching others’ lies and keeping a secret. Imagine, a father and his son want to surprise the mother and want to keep secret what they bought for her until her birthday. To keep this as a secret, the son should reason: “Mom should not know that I know what her birthday present will be.” If the son is younger than 6, it is not likely that he will apply this more complex theory of mind reasoning, and probably will reveal information before the mother’s birthday.

Why does this development take another two years? This dissertation combines computational cognitive modeling with empirical research to provide an answer to this question. Simulating children’s minds with a computer programme allowed us to generate a new prediction: 5-year-olds’ development can be accelerated with exposure to complex theory of mind. We trained 5-year-olds with many examples of complex theory of mind. Confirming the prediction, 5-year-olds were able to use complex theory of mind after two weeks of training but also after four months from the training. Coming back to the question, the answer is: “Just lack of experience!”

Florian Sense (1988) did his doctoral research in the Department of Psychometry & Statistics at the Faculty Behavioural and Social Sciences, where he now works as a postdoc. He was promoted on April 20, 2017.

A computational cognitive modeling approach to the development of second-order theory of mind

PHD STUDENT
B. Arslan

THESIS
A computational cognitive modeling approach to the development of second-order theory of mind

PROMOTORS
Prof.dr. L.C. Verbrugge
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Burcu Arslan (1980) did her doctoral research at the University of Groningen in the Department of Artificial Intelligence in the research institute ALICE, with funding from NWO and the ERC. Arslan now works as an Associate Research Scientist at the American company Educational Testing Service. She was promoted on April 21.

EVELYN KUIPER-DRENTH, BASED UPON PRESS REPORTS FROM THE UNIVERSITY OF GRONINGEN
CHEEKY PROPOSITIONS

“Het presenteren van resultaten heeft wat weg van het bereiden van soep voor gasten: wat voor de een dikke soep is, is voor de ander dunne soep. Naast de smaak, is een goede consistentie essentieel.”

> Benno Haarman

“I see winter as the best season to compensate for hot discussion. That is why a defense of a thesis preferably should take place in winter.”

> Saleh Mohamed

“Progression in science requires freedom and opportunity, whereas current career tracks assume predictability.”

> Zhuoran Yin

“What I cannot create, I do not understand.” – Feynman, 1988

> Burcu Arslan

“Het rustgevende effect van yoga, vastgesteld in een niet-gepubliceerde n=1 studie, rechtvaardigt de hypothese dat yoga een uitstekend middel is om hersennetten optimaal te laten samenwerken.”

> Leonie Bais

Alliteration ought to be avoided, always. – Adapted from Frank L. Visco’s ‘How to write good’

> Dennis van de Meer

“Life is what happens to you while you’re busy making other plans.” – John Lennon

> Sanne Kemner

“Grappig bedoelde, onzinige stellingen leiden af van het geleverde werk van de promovendus en zijn dus onwenselijk.”

> Tim de Jong

Subjects

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Editorial Staff

Sander Martens, Editor-in-chief, s.martens@umcg.nl
Michiel Hooveld, m.h.hooveld@umcg.nl
Evelyn Kuiper-Drenth, Copy Editor, BCN Office, 050 363 4734, e.t.kuiper-drenth@umcg.nl
Terrin Tamati, Copy Editor, t.t.tamati@umcg.nl

Staff Writers

Manon van Asselt, manonvanasselt13@hotmail.com
Carin Hoekstra, c.hoekstra.6@student.rug.nl
Elouise Koops, e.a.koops.1@student.rug.nl
Allie Luijesty, a.luijesty@rug.nl
Alexander Pieters-Rajman, alexander.pieters-rajman@hotmail.com
Amelie la Roij, a.la.roij@rug.nl
Timothy Sondij, t.sondij@student.rug.nl

Contributors

Miren Arantzeta Perez
Burcu Arslan
Leonie Bais, l.bais@umcg.nl
Deniz Baskent, d.baskent@umcg.nl
Joanneke Bastiaansen, j.bastiaansen@umcg.nl
Ronald Bierings, r.a.j.m.bierings@umcg.nl
Laura Bringmann, l.f.bringmann@rug.nl
Steven Gilbers, s.s.k.gilbers@rug.nl
Benno Haarman
Sana Haidry
Robert Harris
Heleen Hoogeveen
Tim de Jong
Sanne Kemner
Bart Koopman, h.f.j.m.koopman@utwente.nl
Diana Koopmans, d.h.koopmans@umcg.nl
Evelina Kurtys
Zhilin Luan
Octavio Martinez Manzanera
Sebastiaan Mathot, s.mathot@rug.nl
Dennis van der Meer
Salem Mohamed
Marjke Mullender-Wijnsma
John Neubone, j.neubone@rug.nl
Anna Neustatter, a.neustatter@umcg.nl
PhD council, bcnphdcouncil@list.rug.nl
Don van Ravenzwaaij, d.van.ravenzwaaij@rug.nl
Hedderik van Rijn, d.h.van.rijn@rug.nl
Elef Schellen, e.schellen@rug.nl
Florian Sense

Photos/illustrations

Eman M. M. Adelraheem; BCN PhD council
J. van den Berg; Digital Eggheads;
Lehior Elorriaga; Matthijs Geertjes; Toivo Glatz;
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m.h.hooveld@umcg.nl; Manon Hulsbeek;
Diana Koopmans, d.h.koopmans@umcg.nl;
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