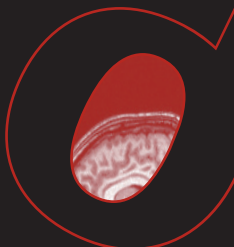


28 January 2010

The Donders Newsletter is published three times a year by the Donders Institute for Brain, Cognition and Behaviour, which consists of research groups at Radboud University Nijmegen and the Radboud University Nijmegen Medical Centre as well as the Max Planck Institute for Psycholinguistics. Its purpose is to keep you informed of developments and important news in the field of neuroscience.

# Donders Institute for Brain, Cognition and Behaviour Newsletter



## The Donders Institute in 2010

Last year (2009) was a period in which the Donders Institute made great progress. In particular, the monthly thematic meetings have become an important platform for scientific exchange and collaboration. There were also a series of excellent, well-attended Donders Lectures. 2010 the Donders Centre for Cognitive Neuroimaging takes over the rotating chairmanship of the board of the Donders Institute, which means that I shall take on this role until 2011 when Peter Hagoort will take over from me.

## The Innovative Research Incentives Scheme

The main topic in this newsletter is the Innovative Research Incentives Scheme ('Vernieuwingsimpuls'), probably the most important funding programme for researchers in the Netherlands. The idea is to promote innovation in academic research. The scheme provides individuals with encouragement, while giving talented, creative researchers the opportunity to conduct independent research. It both promotes the entry of talented researchers to science and helps them to remain in the profession. Excellent researchers (those who are among the top 10-20 per cent of their peer group) can apply for funding under this scheme. Since the Institute was established we have succeeded in obtaining three Veni grants (Nanda Lambregts-Rommelse, Floris de Lange and Mark Roberts), two Vidi grants (Jörgen Bruhn and Christian Fiebach) and one Vici grant (Ivan Toni). The results of the latest Vici round are still to be announced.

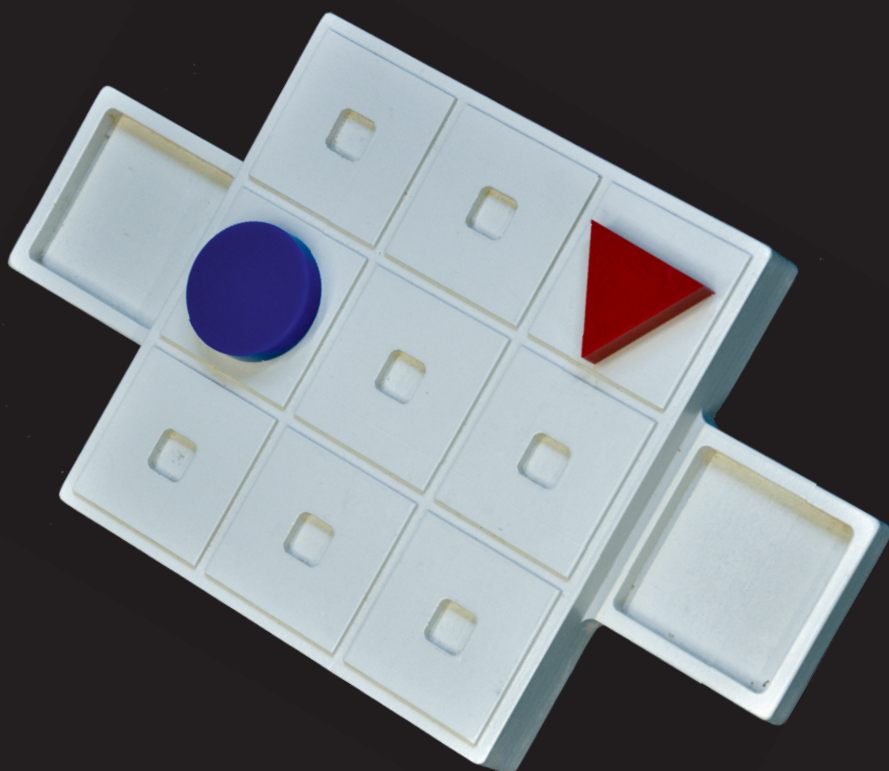
In this newsletter we devote attention to a laureate in each of the three categories: Kirsten Lemhöfer (Veni, 2007), Jörgen Bruhn (Vidi, 2009) and Ivan Toni (Vici, 2008). On the back cover we feature Tildie Stijns, who is already well known to those working at the Donders Centre for Cognitive Neuroimaging.

I would like to thank Stan Gielen and Arjan Vink for their tremendous contribution to the Institute during the last year and I look forward to working with you all in the year ahead.

Best wishes,

David Norris

On behalf of the Board of Directors of the Donders Institute





Veni Kristin Lemhöfer

## 'Sooner or later, language learning stops – but why?'

Having obtained her PhD on word recognition in the multilingual brain, she is now working on the limits of language learning by adults. While much is already known about children who are starting to learn languages, very little is known about adults who have reached a limit in their learning, according to psychologist Kristin Lemhöfer.

As a German national living in the Netherlands, she experiences the limits of foreign language learning on a daily basis. What kind of phenomenon is it that determines that you will never learn certain nuances of a language, however deeply you are immersed in an environment that provides only good examples? Fossilisation is the technical term used by Kristin Lemhöfer, who was born in Bonn and is currently a researcher of language development at the Donders Centre for Cognition. It is inevitable that as an interviewer you pay special attention to the way she speaks. You hear the occasional mistake involving those awkward Dutch articles or a strong verb form, or she uses an expression that a native Dutch speaker would use in a slightly different way. However, her German accent is so slight that, after a few minutes, you no longer notice it.

From her room full of well-tended plants in the Spinoza Building you can just see, through the trees, the Max Planck Institute for Psycholinguistics. It was there that she was able to take the time to write her proposal for a Veni grant and the inspirational research environment at the institute helped her to put her idea into sufficiently persuasive words. 'Writing a proposal is a huge task and it's almost impossible to combine it with teaching or finishing your thesis,' Lemhöfer remarks.

She succeeded in obtaining the grant (created by the NWO to help young researchers achieve their first independent research post). Innovation is an important criterion in the choice of candidates and that's what the proposal is all about.

### When the limits are reached

'There is a huge amount of research on second language learning in children, but little is known about how it works in adults, and the phenomenon of fossilisation has hardly been investigated from a cognitive point of view. We therefore know a lot about the beginnings of language acquisition but hardly anything about what's going on once the limits have been reached,' says Lemhöfer.

She's critical of the psycholinguistic research on adult second language (L2) speakers that has been conducted so far. 'Existing research assumes that second language speakers are actually some kind of defective first language speakers, who process language more slowly and make more mistakes. Researchers often don't realise that there might be qualitative differences in language processing itself between second language and native language speakers, and that second language speakers might not master certain aspects of a language at all.'

### A better approach

For this reason, Lemhöfer does things differently. She first tests the language skills of her research subjects and adjusts the stimulus to their individual mistakes. 'In my project we're looking at whether we can use EEG to find out what the brain does when it receives corrections. How is the linguistic input processed? We want to know at which processing stage there's a blockage. Does the brain register at all that a mistake is being made or when correct input differs from the brain's own interpretation? Or is there



Dr Kristin Lemhöfer  
Donders Centre of Cognition

**'Previous research was based on the assumption that second language speakers are a homogeneous group. That isn't the case – it's always a complete hotchpotch.'**



perhaps a lack of sensitivity at the reception stage for the nuances that the person is unable to master?'

'What is usually done is to present L2 speakers with grammatical mistakes, to see whether their brains react to them in the same way as the brains of native speakers do. But what we don't know is whether a given L2 participant really perceives an objective mistake as a mistake: what if he or she doesn't even master the grammatical rule that is violated? A second point is that most other researchers give the participants a task while making EEG measurements, for example: judge whether this sentence is grammatically correct. That's exactly what I don't want to do, because it directs the participant's attention towards my experimental manipulation and that is not what people naturally do when listening to language. My participants read or listen to sentences and their only task is to understand them.

Alternatively, we use correct sentences containing linguistic features that the test subject keeps getting wrong. To give a simple example: suppose somebody consistently says 'de nummer' incorrectly and then hears 'het nummer'. What happens in the brain in such a case? Does the person notice that there is a difference between what they have heard and what

they themselves would say? If the answer is no, the person clearly has a problem noticing the difference. If the answer is yes, why don't they correct the mistake?'

#### **After Veni**

Although her Veni grant from 2007 still provides her with employment, Lemhöfer is not unconcerned about the future. Not that she wants to downplay her own personal qualities as a researcher, but as the mother of two small children she has to make compromises in order to find time for work and family. This sometimes puts research under pressure and certainly doesn't leave her much spare time to apply for more research money. 'In our group, apart from the professor no one has a permanent appointment. There's fierce competition for grants. Within the Donders Institute – with the MPI and at the NWO.'

So what great discovery does she hope to make before the period of this grant is over? 'Great discovery? Science advances in small steps... However, there's one conclusion in my thesis that I feel is significant and that is that in people who speak three (or more) languages, all of the languages are active in their brain at the same time.'

Then her EEG colleague knocks on the door. It's time to get back to work, as another person is ready to be tested. IR

#### **New arrivals at Donders**

The Veni grant offers researchers who have recently completed their doctorates the opportunity to develop their ideas further for three years. The maximum grant is € 250,000.

Veni winners at Donders Institute or affiliated institutes:

2009

**Frank Eisner** - Adjusting to speakers and their accents  
**Nanda Lambregts-Rommelse** - Heredity of ADHD and autism

**Floris de Lange** - How what you expect to see influences perception

**Mark Roberts** - Understanding of the development of visual skills

2008

**Shirley-Ann Rueschemeyer** - Featuring Action: On the semantic relationship between action and language

2007

**Ellen de Bruijn** - The socially skilled cooperative brain

**Erno Hermans** - How fear influences our perception

**Alexandra Jesse** - Seeing and Hearing Words: How Real Speech Perception Changes Over Time

**Kristin Lemhöfer** - see this article

2006

**Mirjam Broersma** - Relearning a lost language: Speech perception in Korean by adoptees

**Judith Homberg** - A state-of-the-art genetic modifier screen in the rat to identify novel mechanisms mediating serotonin homeostasis and related behavioural abnormalities

**Odette Scharenborg** - Avoiding the ham in hamster: Modelling the use of non-segmental information in human spoken-word recognition

**Atsuko Takashima** - Memory consolidation and reconsolidation in humans: the role of the amygdala and stress hormones on emotional memories

**Thilo Womelsdorf** - The nature of effective neuronal communication: How selective attention determines neuronal interactions to shape our perceptual skills

2005

**Patti Adank** - Auditory and articulatory brain regions in accent adaptation

2004

**Daniëlle van den Brink** - The social cognition of verbal communication and its neural basis: what can be learned from autism?

**Stefan Frank** - A computational model of sentence comprehension: from words to situations

**Sebastiaan Overeem** - Probing paralysis; cataplexy versus the physiological weakness of sleep

2003

**Rick van Baaren** - A social view on mimicry

**Marjtte Jongsma** - It's all in the rhythm - Applying EEG and Evoked Potential measurements to study cognitive processing of temporal patterns.

2002

**Hedwig van Bakel** - Mom, I've got you under my skin. Early parent-child experiences and the development of children's executive processes and prefrontal brain functioning

**Marcel Bastiaansen** - The binding problem for language: oscillatory neuronal dynamics during language comprehension

**Mark Dechesne** - The Existential Underpinnings of the Social: What drives the Mortality Salience-Affiliation Link?

veni vidi vici

Jörgen Bruhn  
Donders Centre of Neuroscience



Vidi Jörgen Bruhn

## ‘Anaesthesiology is actually applied neuroscience’

**Anaesthesiology is one of the most exciting branches of medicine, according to Jörgen Bruhn, an anaesthesiologist at the Radboud University Nijmegen Medical Centre. Bruhn, who has been doing research on the depth of anaesthesia for years, recently received a NWO Vidi grant under the Innovative Research Incentives Scheme to develop this work. Bruhn’s department is now part of the Donders Institute for Brain, Cognition and Behaviour. He has high expectations of collaboration with the Cognitive Neuroscience researchers, which he anticipates will be fruitful for both sides: ‘Donders has the technology and the know-how, while we can offer the clinical application.’**

Imagine being awake under general anaesthesia but unable to move due to the muscle relaxants administered and thus incapable of signalling that you are still conscious! It’s like a scene from a horror film and any patient’s worst nightmare. Unfortunately, this does happen occasionally, though it’s rare. ‘On average one patient in a thousand is awake during an operation under general anaesthesia’, explains Professor Bruhn. ‘In my Vidi project we want to explore how we can detect this directly from the brain. We know that patients who are awake try to move, but we often don’t notice it because of the use of muscle relaxants. However, even an attempt to move will alter the electrical activity in the motor cortex, and that’s visible on the EEG.’

### Fascinating mix

For years Bruhn (Elmshorn, 1966) has been engaged in research exploring the depth of anaesthesia and anaesthetic dosage. ‘This is extremely important for every anaesthesiologist. After all, we determine the dose of anaesthetic for each operation. In doing so we have to take a number of aspects into account. First there is the time spent in the operating theatre. The patient must regain consciousness immediately after the operation, as otherwise the operating theatre is occupied for too long. Then there is the fact that too high a dose has a negative effect on the heart and blood circulation; heart contractions become weaker, so the heartbeat is diminished and blood pressure reduced. These are risk factors, in particular for patients with heart problems. The anaesthetist has to create a stable situation during anaesthesia, keeping the dosage as low as possible, but still sufficient to make sure that the patient is not conscious – and certainly not awake.’

### Interactions between parts of the brain

Anaesthesiologists already use EEG equipment to measure the depth of anaesthesia. But its use is not widespread due to a number of important shortcomings, Bruhn explains. One is that a standard frontal montage does not provide insight into the deeper brain structures involved in consciousness and memory formation. A clear value (derived from the processed EEG) that distinguishes consciousness from unconsciousness is also missing. So frontal cortical

**'Human consciousness is much more complex than we thought. We can estimate the probability of a patient being awake, but certainly not with 100% certainty.'**

#### **Anaesthetics: achieving the correct interaction between components**

Anaesthesiology is a relatively new field. In 1846 the first reasonably successful anaesthetic was used at the Massachusetts General Hospital in Boston. Previously, operations took place without anaesthetic, something that is now completely unthinkable. In the first operations with anaesthetic only one substance was used: ether. Nowadays the procedure for general anaesthesia often includes three components:

- Anaesthetics to render the patient unconscious
- Analgesics to reduce pain – these are morphine-like substances
- Muscle relaxants – these are administered in particular for operations involving intubation (for ventilation) and in abdominal surgery.

One of the most important tasks of the anaesthesiologist is to find the right way to adjust the dosage of these three components for each individual patient. 'That can be pretty complicated,' says Professor Jörgen Bruhn. 'It's not surprising that it takes five years to specialise in anaesthesiology.'

EEG measures the dose-dependent pharmacodynamic effect of anesthetic drugs, but does not as such measure consciousness.

'The problem is that in the case of injected anaesthetics we can only estimate roughly in what concentration they reach the brain – and thus what effect they have on consciousness. What's more, human consciousness is apparently much more complex than we thought. Whether or not someone is conscious is determined not by one single area of the brain but by the interaction of various areas. We can estimate the probability of a patient being awake, but certainly not with 100% certainty. There is no cut-off value – it's a sliding scale.'

#### **Detecting patterns of movement**

Because of the complexity of consciousness, a completely new approach is needed. It could, for example, be based on the observation that all patients try to move when they experience acute surgical pain. Such attempts may help to better detect and prevent awareness. If this movement cannot be executed because of the paralysis caused by neuromuscular blocking agents, the intention might still be detected in the EEG. 'A complete, multi-channel EEG probably contains

all the information we need, but it's very difficult to extract it as this requires advanced analytical methods. The aim of our Vidi project is to develop these methods.'

Brain computer interfacing (BCI) is another fascinating emerging science Bruhn intends to apply. 'Using BCIs, neurologists can already make patterns of movement visible in the motor cortex, but these algorithms can't be transferred one-to-one to an operating theatre scenario. Also, these BCIs don't yet work perfectly. This means that we either have to develop more refined algorithms or adjust existing algorithms so that we can detect patterns of movement in the EEG in such a way that they meet the stringent demands of a reliable intra-operative monitoring system.'

Anaesthesiology is actually applied neuroscience, Bruhn concludes. 'We offer clinical applications for the basic knowledge that the Donders specialists have about information processing in the brain.' It looks like it's going to be a fruitful collaboration for both groups.

#### **Deepening insight at Donders**

The Vidi grant is intended for creative, independent, productive researchers who have spent several years conducting post-doctoral research. The grant gives them the opportunity to develop innovative lines of research and to appoint one or more researchers to assist them in this task. The maximum grant is €800,000 (for a research period of five years).

Vidi winners at the Donders Institute or affiliated institutes:

2009

**Jörgen Bruhn** - see this article

**Christian Fiebach** - Cognitive and neural mechanisms of affective working memory

2008

**Roshan Cools** - Dopaminergic modulation of fronto-striatal activity during cognitive control

**Michael Dunn** - Evolutionary modelling of language change

**Roy Kessels** - Buffering our past: An integrated perspective on working memory and episodic memory

**Annette Schenck** - Mental retardation in fruit flies

2007

**Onno Crasborn** - On the other hand: the linguistic impact of having two symmetrical articulators in sign language

**Gabriele Janzen** - Neural correlates of spatial memory in children and adults

**Bert de Vries** - Genes and mental retardation

2006

**Bastiaan Bloem** - Tackling the complexity of Parkinson's disease

**Jeroen Goossens** - Executive Control Mechanisms for Action and Perception in the Primate Brain

**Asli Özyürek** - Relations between modality and language structure: Insights from comparisons of sign languages and gestures

2005

**Tamas Kozicz** - Characterization of a novel candidate central mechanism in stress adaptation: the Edinger-Westphal urocortin 1 system

2003

**Pascal Fries** - Integrating distributed brain processes

**Ole Jensen** - The role of oscillatory activity in sensory and motor processing

**Pieter Medendorp** - Spatial representations for perception and action in the human brain

**Ivan Toni** - Neural dynamics of movement representations (also see this issue)

**Marcel Verbeek** - Cerebral amyloid angiopathy: a rational therapeutic target for Alzheimer's disease

MT

**veni vidi vici**





*Vici Ivan Toni*

## Moving conversation

**Ivan Toni is not the kind of guy who boasts about his achievements. His personal qualities are nevertheless beyond dispute. First he won a Vidi grant and then a Vici for a project called Communicating Brains. Time for an exchange of views...**

‘Ever since I got my PhD, I’ve been interested in understanding how sensory information can influence our movements. It might look simple: I see a tomato, it’s there in front of me, and I just grasp it. But it’s not that simple. For instance, how does my brain use colour to anticipate the force needed to grasp a red over-ripe tomato, or a green one, without dropping or squashing them? Also, we might think we’re only grasping a tomato, but in fact our actions are strongly influenced by how we moved just a few seconds before and by what we might be doing immediately afterwards. So how does our brain do it?’

Ivan Toni (Cesena, 1967) was trained as a biologist in his home country Italy and then became increasingly interested in cognitive neuroscience. In October 2001 he came to Nijmegen to help establish the F.C. Donders Centre for Neuroimaging that opened a year later. Toni is head of the research group called Intention and Action.

‘More recently, I realized that most of our communicative movements are not, in fact, meant

to change the physical state of the world, but rather to influence the mental state of particular people we’re communicating with. Like grasping the tomato, when we communicate, we move according to a model of reality, a prediction of the consequences of our movements. However, unlike grasping a tomato, human communicative movements are meant to trigger ideas in somebody’s mind. This implies that it’s not sufficient to have a model of the physical consequences of my actions. When I communicate, I also need to avoid confusing what I know with what I think you know, while keeping in mind what I believe we both know. Sounds complicated? That’s because it is.’

### **Efficient and cooperative**

Toni is enthusiastic about the collaborative spirit he has experienced in Nijmegen. Having studied and worked in Bologna and Parma (Italy), Lyon (France), London (UK) and Jülich (Germany), he’s a good judge of differences in research culture.

‘The Donders Institute was created from scratch and it’s still relatively young. If you work at the same place for thirty years it’s not surprising that you become more rigid. The need to share expensive, sophisticated equipment with other research groups, as we do daily in neuroimaging, also plays an important role. Before you

carry out an experiment here it's mandatory to make a case to your colleagues why you should get access to the machines. If you can't convince your colleagues, you're unlikely to be able to convince other scientists. This ensures a fine balance between cooperation and efficiency.'

'Of course we have to make sure we don't lose this spirit as the institute becomes more mature. That's why we started to appoint young Principal Investigators (PIs) a year or two ago. You need such changes in the group dynamics to avoid "groupthink" and scientific navel gazing.'

### Language and communication

A recent example of the way in which this collaborative spirit can create new synergies is a project Toni did with Profs. Peter Hagoort and Stephen Levinson (of the Max Planck Institute for Psycholinguistics). 'We explored the cognitive and cerebral relation between communicative and linguistic abilities. Many years ago, Steve had the idea that there's a fundamental difference between these abilities and various people have elaborated upon it, but it was never experimentally tested. We thought that, although language is often used for communicating, the intention to communicate might be a separate function.'

So what did we do? We designed a test based on the Taboo game. The aim of the game is to get a partner to guess the word on your card without using the word itself. By using different lists of words, we could determine the linguistic difficulty of the game. But we also manipulated the intention to communicate. Some players were told that their partner already knew the word, while others were told they didn't.

What we found was that linguistic difficulty and communicative intent are processed by completely different parts of the brain, as we had predicted. Crucially, the latter function activated a brain area previously involved in judging strangers. Why is this important? Because it shows that planning an effective communicative action involves generating models about what I believe my interlocutor knows and believes. Other scholars believe that human communication is much simpler – that it can be explained by so-called mirror-neurons. Our findings show that human communication is not that simple.'

Dr Ivan Toni  
Principal Investigator at the Donders Centre  
for Cognitive Neuroimaging

***'Many of the communicative movements we make are not meant to change the physical state of the world, but rather the mental state of people around us.'***

### Abstract and wordless

'For my research this is interesting because it sheds light on the way abstract mental models of the other are built during communication. And that is exactly what I want to do in my Vici project. There we're trying to distinguish between communication and language. Actually, I want to study how humans communicate without language.'

And so Ivan Toni finally comes to explain the intriguing game of geometrical red and blue figures on his desk. The players have to show each other what to do with the figures without using words. 'It builds on something we've just published: exactly the same brain areas are involved in planning the communicative movement and in understanding them. Together with Iris van Rooij from the Donders Centre for Cognition, we're now elaborating on that finding. We're building a computer model that can parse and interpret novel communicative actions in this wordless game and we're using MEG in humans to link these computations to specific brain processes.' Some patience will be needed – Toni's project has just left the starting blocks.



### 'Victory' at Donders

The Vici grant is intended for senior researchers with a proven ability to innovate, enabling them to build up their own research teams. The Vici grant is currently worth €1,500,000 (to be spent in five years).

Vici winners at Donders Institute or affiliated institutes:

2009/10  
Still to be announced

2008 **Ivan Toni** - see this article

2006 **Tom Heskes** - Artificial Intelligence, Full of Chances

2005 **Harold Bekkering** - Conceptual knowledge in goal-directed action: Behaviour, brain and development

2005 **Guillén Fernández** - The three dimensions of aversive memories: neurons, hormones and genes

2004 **John van Opstal** - Sound processing in the primate brain: from neuron to cognition and behaviour

2003 **Ardi Roelofs** - Goal referenced control of verbal and nonverbal actions

**veni vidi vici**

IR





## Donders Backbone

As a result of its strong academic profile and ambitious goals, staffing at the Nijmegen-based Donders Institute is extremely dynamic. Postdoctoral researchers and PhD students fly in from around the globe. Technicians, lab

workers and research assistants form the stable backbone of the institute. Like secretary Tildie Stijns, who's been a constant factor since August 1999.

When you visit the Donders Centre for Cognitive Neuroimaging to give an invited lecture Tildie Stijns makes sure everything goes smoothly. Travel arrangements, hotel booking, taxi waiting at the airport. Your host in Nijmegen is reminded of your visit. Relevant contacts are arranged. It's all about making you feel welcome. You might never meet her in real life, as she prefers to do her work behind-the-scenes.

'I used to be a keeper in a handball team. That's the position I like best. Part of the team, but on a somewhat solitary position. It gives you a good overview, you can see any flaws in the organisation and you can minimize the damage.'

She was the first person to be hired by Peter Hagoort and has been his secretary ever since. 'At that time there was nothing, just an empty office at the Max Planck Institute. I think there was a table, but I'm not even sure I had a chair on my first day at work.'

Tildie has continually had to reinvent her job. Establishing the FC Donders Centre for Cognitive Neuroimaging, getting funding, moving to the Trigon building, finding the Principal Investigators, first results coming in, growing bigger, and then merging with the other brain-oriented research groups in Nijmegen to form a large Donders Institute has influenced her work over the years. She loves the professional development that goes with change. Not that she originally



Tildie Stijns

was happy at school. It was neat, people were nice, and I loved learning.'

After high school she went to Groningen to study philosophy and later Spanish language and literature. She didn't graduate. 'It was in the days that the influence of Marxism was strong at university. My upper-class fellow students were busy discussing the liberation of the workers, without having the slightest idea what they were talking about. By the time I had to write my finals I'd lost my motivation – I didn't see what the point was of having an academic degree.'

So there she is, a truly constant factor in the institute. 'Some people suggest I'm the most powerful person at Donders. That's clearly not true. I may be a good secretary, but I know I'm replaceable. If I was really so important, my pay check would look different, don't you think?' she says with a smile. *IR*

## Agenda

29 January 2010, 15:00 - **Formal Donders Colloquium by Susan Sara** (College de France, CNRS), Centre for Cognitive Neuroimaging, Kapittelweg 29, Nijmegen

4 February 2010, 16:15 - **Donders Lecture by Ray Jackendoff** (Tufts University and Santa Fe Institute), Linnaeusgebouw, Heyendaalseweg 137, Nijmegen

19 February 2010, 15:00 - **Formal Donders Colloquium by Bernd Weber** (Neuroeconomics lab Bonn), Centre for Cognitive Neuroimaging, Kapittelweg 29, Nijmegen

1 April 2010, 16:15 - **Donders Lecture by Charles Schroeder** (Nathan S. Kline Institute), Linnaeusgebouw, Heyendaalseweg 137, Nijmegen

6-8 April, 2010, **Toolkit of Cognitive Neuroscience: advanced course in functional neuroimaging data analysis**, Centre for Cognitive Neuroimaging, Kapittelweg 29, Nijmegen

6-8 April 2010, **Toolkit of Cognitive Neuroscience: advanced topics in MR imaging of the brain**, Centre for Cognitive Neuroimaging, Kapittelweg 29, Nijmegen

12-15 April 2010, **Toolkit of Cognitive Neuroscience: advanced data analysis and source modelling of EEG and MEG data**, Centre for Cognitive Neuroimaging, Kapittelweg 29, Nijmegen

3 June 2010, 16:15, **Donders Lecture by Eleanor Maguire** (Wellcome Trust Centre for Neuroimaging, University College London), Linnaeusgebouw, Heyendaalseweg 137, Nijmegen

28 June - 2 July 2010, **Toolkit of Cognitive Neuroscience 2010**, Centre for Cognitive Neuroimaging, Kapittelweg 29, Nijmegen

## Donders Institute Newsletter

Editors: Iris Roggema (i.roggema@communicatie.ru.nl) and Arthur Willemsen (a.willemsen@donders.ru.nl)

Editorial Board: Baziel van Engelen, Ellen de Bruijn, Robert Oostenveld, Iris Roggema, Eric Roubos, and Arthur Willemsen

Journalism: Iris Roggema and Myrna Tinbergen

Translation/language editing: Michael Gould Associates BV

## PhD defences

January 13, 2010 - **de Vrijer, M.** (2010). Multisensory integration in spatial orientation. Radboud University Nijmegen, Nijmegen, the Netherlands.

January 13, 2010 - **Pijnacker, J.** (2010). Defeasible inference in autism: a behavioral and electrophysiological approach. Radboud Universiteit Nijmegen, the Netherlands.

February 18, 2010 - **Treder, M. S.** (2010). Symmetry in (inter)action. Radboud University Nijmegen, Nijmegen, the Netherlands.

February 25, 2010 - **Vergeer, M.** (2010). Perceptual visibility and appearance: Effects of color and form. Radboud University Nijmegen, Nijmegen, the Netherlands.

March 12, 2010 - **Snaphaan, L.J.A.E.** (2010). Epidemiology of post-stroke behavioural consequences. Radboud University Nijmegen Medical Centre, Nijmegen, the Netherlands.

April 1, 2010 - **Levy, J.** (2010). In Cerebro Unveiling Unconscious Mechanisms during Reading. Radboud University Nijmegen, Nijmegen, the Netherlands.

April 1, 2010 - **Horlings C.G.C.** (2010) A Weak balance; balance and falls in patients with neuromuscular disorders. Radboud University Nijmegen, Nijmegen, the Netherlands

Photography: Dick van Aalst, Flip Franssen, photo archives Radboud University, Donders Institute

Graphic design and layout: Sander Hermsen (www.sander-hermsen.nl)

Printing: Thieme Deventer

Archives: www.ru.nl/donders