Helmholtz Herald

Quarterly letter of the Helmholtz Institute

07

april 2010

{Content}:

Cannabis affects brain waves

Cannabis doesn't do working memory much good as both joint-smokers and scientists will agree. But how exactly does THC (the main psychoactive component of cannabis) affect memory? Maybe some answers lay in the electrical activity that can be measured on the scalp (EEG) and that can be seen as a window on brain functioning. Psychoactive substances affect neural communication by mimicking the actions of endogenous neurotransmitters and binding to the receptors, and eventually affect cognition and behaviour. Dr. Koen Böcker, from the Experimental Psychology division of the Helmholtz Institute, showed in a recent paper in the Journal of Cognitive Neuroscience that EEG during working memory tasks is affected by smoking cannabis.

Working memory stores important information for immediate behaviour. For example, when we have to search through several items and decide whether one shown previously is present in the set. When we perform such a memory task, a specific brain wave frequency, the theta waves, increases. In rodents, theta waves are associated with activity in the hippocampus, a brain structure which is involved in memory, but in humans the source of theta waves is unclear. Animal physiology has already shown, that in rodents THC interferes with theta waves. But different species have distinct reactions to THC and Böcker set out to investigate whether THC also affects theta waves and memory performance in humans.

Participants received three different THC doses and a placebo. Because it was important to keep the ecological validity, the THC was mixed with tobacco and the subjects were paced while smoking the joint to prevent a critical overdose. An increase in the THC-dose smoked, resulted both in a decrease in performance on the memory task and a decrease in the EEG theta-wave power. Most importantly these effects were correlated, whereas correlations with other performance measures were not significant. Therefore, Böcker et al. concluded that theta waves are instrumental in working memory functioning, as was previously proposed on the basis of neurocomputational models.

Now we know that THC can disrupt working memory, Böcker thinks that an interesting next step would be to test the potential cognitive improvement of drugs that have a cannabis antagonist effect in the receptors. Unfortunately, such a psychoactive substance is not yet available for testing in humans. Also, it would be interesting to test the specificity of the relationship between the theta waves and working memory at other levels, for instance goal-directed cognitive processing.

How to get a Veni

In 2009, the Helmholtz Institute brought forth four Veni laureates. We celebrate this event by asking this year's winners for some tips and tricks on how to get a Veni.

If you want to start your scientific career in the Netherlands, you can apply for a Veni grant within the first three years after obtaining your PhD. Candidates are selected in two stages. After a first selection round you will receive anonymous reviews of your proposal to which you may reply. In a second round, the most promising candidates are invited for an interview. The eventual grant amounts up to 250.000 euro and supports three years of research (or at least the salary-related costs). According to the NWO, the Veni is awarded to researchers for their 'outstanding and original talent in doing innovative research', with a success rate of 18% in 2009.

1. Know what you do

When you're writing a Veni proposal, you should be very familiar with the methods and the topic of the research proposed for the grant. This means that you should be able to write detailed descriptions of your experiments - all of our Veni recipients agree on this. Moreover, most laureates were already doing experiments in the line of research related to their Veni proposal and advise writing the grant based on the findings of at least one crucial (pilot) experiment that has already been done. If you would like to change subject after your PhD, it might be a good idea to first take up a postdoctoral position on the new subject and only apply for the grant after you have gained expertise in the new field, Tomas advises. He himself changed subject from binocular vision to eye movements during a one year postdoc in Paris.

2. Less is more

Innovation is in the details and in how you spin the proposal, not in wild ideas. Stefan, who uses his expertise on eye movements to study visual perception in patients who suffer a loss in visual awareness in a part of the visual field, deliberately sought a novel way of elaborating on a small area of his PhD research, using the methods that he had developed expertise in. Being realistic and innovative should not be mutually exclusive. In all successful applications, innovation meant looking at a novel problem with well-known methods, or applying new methods to a well-known topic.

3. Go multimedia

NWO reviewers google like anyone else, which means that in selling your research you are not limited by the PDF format required for the submission of your grant proposal. If you create a

Tomas Knapen

"Reviewers will trust the judgment of renowned professors."

Helmholtz heritage:
Physics of Man,
Universiteit Utrecht
Veni partner:
Psychonomics,
Universiteit van Amsterdam
Nr articles at time of proposal: 8
Years after PhD: 1
Website: web.me.com/tknapen/

Project title: 'Keeping track of the world with moving eyes'

Mathijs Raemaekers

"Try again."

Helmholtz heritage:
Functional Biology,
Universiteit Utrecht
Veni partner:
Functional Biology,
Universiteit Utrecht
Nr articles at time of proposal: 13
Years after PhD: 3

Project title: 'Directional anisotropies of motion responses in visual cortex: long range horizontal connections and conscious visual motion perception.'

personal website you can use this site to publish movies of your experiments and results. For instance, Maarten, who studied haptic perception during his PhD project and now investigates visual perception of real and virtual 3D environments, created a personal website where he published demos of his effects. He recalls that not only the interview committee but also the national media responded very positively to this website. In a movie you can show the dynamics of the effect you're investigating, speaking to the curiosity of your audience. Movies are also good for demonstrating the innovative aspects of your research. Whereas the name of a device might mean little to some reviewers, the image of a high-tech robot controlling your experiment appeals to all.

4. Try again

If you've tried before, try again. It will only increase your chances of receiving funding. Three of the four laureates had applied for a Veni or Rubicon grant previously and indicate that they could use their experience to write a better grant this time around. Your strategies in selling the proposal and résumé will only improve, Stefan assures. You do not have make drastic career changes each time. Mathijs, who investigates motion perception with fMRI, was successful with his third Veni proposal after staying in the same lab where he was already working as a postdoc.

5. It's who you know

"The reviewers have to judge you by fairly limited information and on a proposal that is not always in their field. The more they feel unable to make this decision, the more they will rely on the judgment of people they do trust," Tomas remarks. Collaboration with renowned investigators is always an advantage. The expertise and experience of senior investigators will help you at all stages of the application process. They can help you to formulate your grant proposal in such a way that it is broadly appealing, or help you on some technical aspects, but they can also advise you about how to reply to the first reviewer reports. Not only collaborators can be helpful, but also scientist friends from different fields can help you prepare your talk for the broad audience you will meet in the interview round.

6. Enthusiasm / original talent

Enthusiasm about your research topic is crucial at all stages of the application process. Recalling how he kept the motivation up for a third Veni proposal, Mathijs explains that it was his genuine interest in the research that drove him. And when asked how he had come up with the topic for his proposal, Maarten answered that he just dreamt about what he would do with the money from the Veni grant. Furthermore, by showing enthusiasm in the interview round you will inspire the committee and make them believe that you are the 'original talent' they are looking for.

Maarten Wijntjes

"Create a website."

Helmholtz heritage:
Physics of Man,
Universiteit Utrecht
Veni partner:
Industrial Design Engineering,
Technische Universiteit Delft
Nr articles at time of proposal: 6
Years after PhD: 0
Website: www.maartenwijntjes.nl

Project title: 'Natural 3D shape perception and image ambiguities.'

Stefan van der Stigchel

"Use your knowledge."

Helmholtz heritage:
Experimental Psychology,
Universiteit Utrecht
Veni partner:
Experimental Psychology,
Universiteit Utrecht
Nr articles at time of proposal: 24
Years after PhD: 2
Website: www.fss.uu.nl/psn/web/people/personal/stigchel/

Project title: 'Eye can see it! Residual visual processing in the blind field of patients with visual field defects.'

News & agenda

Helmholtz lectures

- April 9, 2010. Irene M. Pepperberg (Brandeis / MIT, USA) Numerical abilities of grey parrots: Comparisons with apes and young children.
- May 21, 2010. Mateo Carandini (UCL, UK) Making waves in visual cortex.
- June 18, 2010. Mark H. Johnson (London, UK) Developing a social brain.

Grants and awards

- Johan Bolhuis (Behavioral Biology, UU) received a grant for a project, entitled 'From songs to synapses: Neural mechanisms of birdsong memory' from the NWO/ALW Open Program.
- Johan Bolhuis (Behavioural Biology, UU) and Richard van Wezel (Psychopharmacology, UU) received a 60 k Euro grant from the Focus & Massa area Brain, Behaviour & Cognition, for their project entitled 'Recording memories: An electrophysiological analysis of birdsong learning'.
- Esther van den Berg (Experimental Psychology, UU), won the 'Gerritzenprijs' for her PhD dissertation entitled 'Type 2 diabetes and cognition: Neuropsychological sequelae of vascular risk factors in the ageing brain'.
- Ignace Hooge (Experimental Psychology, UU) was awarded the Maarten van Son prize for the best teacher.
- Stijn Massar (Experimental Psychology, UU) was awarded a short stay fellowship India and China grant from the Universiteit Utrecht for a project at Peking University, Beijing, China.
- Myrthe Plaisier (Human Movement Sciences, VU) received a travel grant (800 dollar) from the Society for the Neural Control of Movement for attending their Annual Conference.
- Mathijs Raemaekers (Functional Neurobiology, UU) received a Veni grant for a project entitled 'Directional anisotropies of motion responses in visual cortex: Long range horizontal connections and conscious visual motion perception'.

PhD defences

- March 1, 2010. Myrthe Plaisir (Physics of Man, UU) "Haptic perception of multiple objects." (Cum Laude).
- April 14, 2010. Janine Goumans (Neuroscience, EUR) "Three dimensional vestibulo-ocular reflex in humans: A matter of balance."

New people

- Esther van den Berg, assistant professor (Experimental Psychology, UU).
- Tobias Borra, postdoc (Physics of Man, UU) Project: 'Using a multisensory congruency paradigm to obtain attentional control in patients with tinnitus or autism'.
- Ivo Heitland, PhD student (Experimental Psychology, UU) Project: 'Genetic polymorphisms involved in fear conditioning'.
- Hinze Hogendoorn, assistant professor (Experimental Psychology, UU).
- Sanne Moorman, PhD student (Behavioural Biology, UU) Project: 'From songs to synapses: Neural mechanisms of birdsong memory'.
- Devika Narain, PhD student (Human Movement Science, VU) Project: 'Principles of visuomotor interception' (CODDE, Eli Brenner).
- Virjanand Panday (PhD student) and Vonne van Polanen (PhD student) will both be working on the 'The hand embodied' project of Astrid Kappers (Physics of Man, UU).
- Myrthe Plaisier (postdoc), Leonie Oostwoud Wijdenes (PhD student) and Rebekka Verweij (PhD student) will all be working on the Vici project of Jeroen Smeets (Human Movement Science, VU).
- Bas Rokers, postdoc (Experimental Psychology, UU). Project: 'The neural mechanisms underlying motion perception: Guiding behavior in a dynamic 3-dimensional world'.

Workshops

- Serge Dumoulin (Experimental Psychology, Universiteit Utrecht) organizes a workshop on retinotopic mapping at the OHBM 2010 Annual Meeting, in Barcelona, Spain.

Suggestions, ideas & contributions:
helmholtzherald@uu.nl

Colofon:

© Helmholtz Institute 2010
P.O. Box 80125
3508 TC Utrecht
The Netherlands
Phone: +31 30 253 4270/ 4281
Fax: +31 30 253 451
Email: helmholtz@fss.uu.nl
www.phys.uu.nl/~wwwfm/

Editors:
Katinka van der Kooij (k.vanderkooij@uu.nl)
Marijn Struiksma (m.struiksma@uu.nl)
Rita de Sousa (r.sousa@fbw.vu.nl)
Branka Milivojevic (b.milivojevic@uu.nl)

Copy editor:
Ben Harvey (B.M.Harvey@uu.nl)

DTP:
Alyanne de Haan (www.weartdesign.nl)

Print:
Zuidam&Uithof