

Gilles de Hollander

Curriculum Vitae

Date of Birth: 24th November, 1986
E-mail: gilles.de.hollander@gmail.com
Website: <http://www.gillesdehollander.nl>
Researchgate: https://www.researchgate.net/profile/Gilles_De_Hollander
Github: <https://github.com/Gilles86/>

ACADEMIC POSITIONS

- July 2019 - present **Postdoctoral Researcher (Rubicon Laureate)**
Zurich Center for Neuroeconomics (ZNE), Zurich, Switzerland
In Zurich I work on projects where we apply encoding models from sensory neuroscience on decision-making under risk paradigms, using ultra-high field 7T fMRI, to better understand their underlying neural processes. Particularly, we are interested in the interplay between neuromodulatory processes involving noradrenergic, cholinergic and dopaminergic signalling, and stimulus/value representations in parietal and ventromedial cortex.
Supervisor: prof. dr. Christian Ruff
- Computational models of numerosity
 - Ultra-High Field 7 Tesla fMRI
 - Pupil size tracking
- July 2019 - present **Guest Researcher**
Spinoza Centre For Neuroimaging, Amsterdam, the Netherlands
I am also affiliated to the Spinoza Centre for Neuroimaging as a guest researcher, to collaborate with dr. T.H. Knapen and prof. dr. S.O. Dumoulin.
- Cortical depth-resolved ultra high-field 7 Tesla fMRI
 - Multimodal structural imaging
 - Bistable Perception
 - Encoding models for temporal frequency representations in V1.
- July 2017 - July 2019 **Postdoctoral Researcher**
Vrije Universiteit Amsterdam / Spinoza Centre For Neuroimaging, Amsterdam, the Netherlands
in collaboration with the Chinese Academy of Sciences, Beijing, China (PI: Peng Zhang)
Supervisor: dr. Tomas Knapen
- Cortical depth-resolved functional imaging using Ultra-High Field 7 Tesla MRI
 - Binocular Rivalry (binocular stimulus presentation)
 - Pupil size tracking
 - Open-source neuroimaging software development
 - Python package for fitting quantitative MRI models (pymp2rage)

- Python package for linear deconvolution of neural signals in a hierarchical Bayesian Framework using STAN (nideconv)

EDUCATION

2012 - 2018

PhD in Cognitive Neuroscience

(cum laude; corresponding to the top 5% PhD theses in the Netherlands)

Understanding the Human Subcortex using Ultra-High Field MRI and Computational Cognitive Modelling ([link](#))

Universiteit van Amsterdam, the Netherlands

Supervisor: prof. dr. Birte U. Forstmann

During my PhD, I was also a visiting PhD student in the labs of:

- prof. dr. Robert Turner at the Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig, Germany (MRI studies)
- prof. dr. Richard Ivry at Psychology department, UC Berkeley, United States (tDCS study)
- prof. dr. Scott Brown and dr. Frini Karayanidis at The University of Newcastle, Australia (preparation of multimodal open dataset, review article on model-based cognitive neuroscience)

During my PhD I primarily worked on:

- Ultra-High Field 7 Tesla functional and structural MRI of subcortical nuclei, specifically the subthalamic nucleus
- Computational Cognitive Modelling, primarily sequential sampling models (DDM/LBA)
- Computational anatomy using immunohistochemical data
- Quantitative MRI on post-mortem tissue
- Transcranial Direct Current Stimulation
- Software development of Python tools for analysis of functional MRI and post-mortem MRI and microscopy data

2010 - 2012

Research Master in Artificial Intelligence

Universiteit van Amsterdam, the Netherlands

Thesis: An application of Multivariate Pattern Analysis: does the Subthalamic Nucleus code for response caution?

Supervisors: dr. Leendert van Maanen and prof. dr. Birte U. Forstmann

2005-2010

Bachelor of Science *Beta-Gamma*

Interdisciplinary bachelor with focus on how to answer scientific questions that cannot be answered by a single academic discipline in isolation.

Major Artificial Intelligence

Thesis: *The EU Parliament in clouds: An applied study to the usability of word clouds to summarize meetings and the methods to construct them*

Supervisor: dr. Maarten J. Marx

Major Cognitive Neuroscience

Thesis: *Teamwork in autism: Where to represent someone else's actions in a joint spatial compatibility task*

Supervisor: dr. Hans (J.A.) van Hooft

PUBLICATIONS

Number of citations: 457 (Google Scholar)

H-index: 11 (Google Scholar)

In preparation

de Hollander, G.*, Konovalov, A.*, Ruff, C.C., **Neural capacity limitations as a new bridge between neuroscience and economics**. Invited review article for *Neuron*

Failing, M., de Hollander, G., Olivers, C.N. **Neural correlates of positive and negative target templates in visual search are highly similar: an MVPA fMRI study**.

de Hollander, G., Knapen T., **Nideconv: Easy deconvolution of neural signals using the general linear model and flexible basis functions**.

Baretto Garcia, M.*, de Hollander, G.*, Grueschow, M., Polania, R., Woodford, M., Ruff, C.C. **Predicting Risk Attitudes from the Precision of Neural Magnitude Representations**.

2021

Karakuzu, A., Appelhof, S., Auer, T., Boudreau, M., Feingold, F., Khan, A.R., Lazari, A., Philips, C., Stikov, N. Whitaker, K.*, de Hollander, G.* (2021) **qMRI-BIDS: an extension to the brain imaging data structure for multimodal structural MR imaging data**. *medRxiv* 2021.10.22.21265382; doi: <https://doi.org/10.1101/2021.10.22.21265382>

Miletic, S., van Maanen, L., Keuken, M.C., Trampel, R.M., de Hollander, G.*, Forstmann, B.U.* (2021) **No evidence for three functionally specialized subregions in the subthalamic nucleus: A model-based 7 T fMRI study** *bioRxiv* 2021.08.12.456040 doi: <https://doi.org/10.1101/2021.08.12.456040>

Brascamp, J., de Hollander, G., Wertheimer, M. D., DePew, A. N. & Knapen, T. (2021) **Separable pupillary signatures of perception and action during perceptual multistability**. *Elife* 10, e66161

de Hollander, G., van der Zwaag, W. Qian, C., Zhang, P. Knapen, T. (2020) **Ultra-high resolution fMRI reveals origins of feedforward and feedback**

activity within laminae of human ocular dominance columns. *Neuroimage* 228, 117683.

2019

Alkemade, A.*, de Hollander, G.*, Miletic, S*, Keuken, M.C., Balesar, R., de Boer, O., Swaab, D.F., Forstmann B.U.F. (2019) **The Functional Microscopic Neuroanatomy of the Human Subthalamic Nucleus.** *Brain Structure and Function* 224, 3213–3227

Poldrack, R., Feingold, F., Frank, M., Gleeson, P., de Hollander, G., Huys, Q.J.M., Love, B.C., Markiewicz, C., Moran, R., Ritter, P., Turner, B., Yarkoni, T., Zhan, M., Cohen, J.D. (2019) **The importance of standards for sharing of computational models and data.** *Computational Brain & Behavior*, 2, 229–232.

Salzer, Y., de Hollander, G., van Maanen, L., & Forstmann, B. U. (2019). **A neural substrate of early response capture during conflict tasks in sensory areas.** *Neuropsychologia*, 124, 226-235.

Caan, MWA, Bazin, P-L, Marques, JP, de Hollander, G., Dumoulin, SO, Zwaag, W. (2019) **MP2RAGEME: T1, T2*, and QSM mapping in one sequence at 7 tesla.** *Hum Brain Mapping*, 40, 1786– 1798.

2017

Alkemade, A.*, de Hollander, G.*, Keuken, M. C., & Schäfer, A. (2017). **Comparison of T2*- weighted and QSM contrasts in Parkinson's disease to visualize the STN with MRI.** *PLoS ONE* 12(4), e0176130.

Forstmann, B. U., de Hollander, G., Maanen, L. van, Alkemade, A. & Keuken, M. C. (2017) **Towards a mechanistic understanding of the human subcortex.** *Nat Rev Neurosci* 18, 57–65.

de Hollander, G., Keuken, M. C., van der Zwaag, W., Forstmann, B. U., & Trampel, R. (2017). **Comparing functional MRI protocols for small, iron-rich basal ganglia nuclei such as the subthalamic nucleus at 7 T and 3 T.** *Human Brain Mapping*, 38(6), 3226–3248.

Salzer, Y., de Hollander, G., & Forstmann, B. U. (2017). **Sensory neural pathways revisited to unravel the temporal dynamics of the Simon effect: A model-based cognitive neuroscience approach.** *Neuroscience and Biobehavioral Reviews*, 77, 48–57.

2016

de Hollander, G., Labruna, L., Sellaro, R., Trutti, A., Colzato, L. S., Ratcliff, R., Ivry, R. B., Forstmann, B.U. (2016). **Transcranial direct current stimulation does not influence the speed-accuracy tradeoff in perceptual decision-making: Evidence from three independent studies.** *Journal of Cognitive Neuroscience*, 28(9), 1283–1294.

de Hollander, G. (2016). **Combining computational models of cognition and neural data to learn about mixed task strategies.** *Journal of Neuroscience*, 36(1), 1–3.

de Hollander, G., Forstmann, B. U., & Brown, S. D. **Different ways of linking behavioral and neural data via computational cognitive models.** *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging* 1 (2), 101-109.

Karayanidis, F., Keuken, M. C., Wong, A., Rennie, J. L., de Hollander, G., Cooper, P. S., Fulham, W.R., Lenroot, R., Parsons, M., Philips, N., Michie, P.T., Forstmann, B.U. (2016). **The Age-ility Project (Phase 1): Structural and functional imaging and electrophysiological data repository.** *NeuroImage*, 124(Pt B), 1137–1142.

2015 de Hollander, G., Keuken, M. C., & Forstmann, B. U. (2015). **The subcortical cocktail problem; Mixed signals from the subthalamic nucleus and substantia nigra.** *PLoS ONE* 10(3), e0120572.

de Hollander, G., Keuken, M. C., Bazin, P.-L., Weiss, M., Neumann, J., Reimann, K., Wahnert, M., Turner, R., Forstmann, B.U., Schäfer, A. (2014). **A gradual increase of iron toward the medial- inferior tip of the subthalamic nucleus.** *Human Brain Mapping*, 35(9), 4440–4449.

< 2012 de Hollander, G., & Marx, M. (2011). **Summarization of meetings using word clouds.** Presented at the 2011 *IEEE Second International Conference on Multimedia Big Data* (BigMM).

Zwinkels, T.* , de Hollander, G.*, & Aizenberg, T.* (2008). **Knowledge in connection: A cognitively grounded social research approach to understanding change in people's knowledge representations during social interaction.** *International Journal of Interdisciplinary Social Sciences*, 3(7), 71–78.

* Equal contribution

GRANTS/PRIZES

2019 **NVP (Dutch Society for Brain and Cognition) Dissertation Award.** My PhD thesis got elected as the best dissertation in 2018 and 2019 in the field of Brain and Cognition in the Netherlands.

2019 **NWO Rubicon grant (158,000 euros)** to visit the **Laboratory for Social and Neural Systems research** (SNS lab) in Zurich for 2 years, to work on applying encoding models of numerosity on value-based decision-making, together with prof. dr. Christian Ruff (UZH).

OPEN SOURCE ACADEMIC SOFTWARE CONTRIBUTIONS

Maintainer

BIDS extension proposal 1: The Brain Imaging Data Standard (BIDS) is an effort to standardize file and metadata organization for neuroimaging datasets. I am currently the lead on

multimodal structural data	<p>the "Structural acquisitions that include multiple contrasts"-extension. This extension aims to standardize filenames and metadata for multimodal structural images (especially relevant in the context of ultra-high field MRI).</p> <p>https://github.com/bids-standard/bep001</p>
braincoder	<p>braincoder is an easy-to-use Python package that can fit a plethora of encoding models such as population receptive field models to functional MRI data. It can also invert these models to decode stimuli from multivariate brain activation patterns in a Bayesian framework. The package is implemented using Google's Tensorflow-platform, which allows it to exploit high-performance GPUs.</p> <p>https://github.com/Gilles86/braincoder</p>
nideconv	<p>nideconv is a lightweight, easy-to-use Python package that can perform deconvolution of neural signals (e.g., pupil, BOLD fMRI) using the general linear model. It can use different basis functions (e.g., canonical, FIR, Fourier) and also has a hierarchical Bayesian estimation procedure based on STAN. It is the first Python library of its kind and is specifically designed to be very easy-to-use.</p> <p>https://github.com/VU-Cog-Sci/nideconv</p>
pym2rage	<p>pymp2rage is a lightweight, easy-to-use Python package to fit quantitative models to MRI data. It is primarily designed to create unified T1-weighted images from the MP2RAGE sequence, including B1+-correction, but it can also estimate R1/T1, PD and R2*/T2* maps from GRE images (as in MP2RAGE-ME).</p> <p>https://github.com/Gilles86/pymp2rage</p>
pydbm	<p>pydbm is an implementation of the dynamic belief model by Yu (2008), that can be used to model sequential biases in forced-choice decision tasks.</p> <p>https://github.com/Gilles86/pydbm</p>
Contributor	
nipype	<p>nipype is a pipelining engine in Python, tailored for preprocessing of neuroimaging data. It is the main building block of the popular <i>fmriprep</i> preprocessing pipeline project developed by the Poldrack group.</p>
nighres	<p>nighres is a Python package that wraps some of the CBS tools developed by Pierre-Louis Bazin et al. at the Max Planck institute into an easy-to-use Python package and provides software to analyze UHF (7 Tesla and above) structural and functional MRI (e.g., laminar analysis)</p>
nilearn	<p>nilearn is a Python package that facilitates the application of machine learning techniques on MRI data. It also has a rich collection of convenience and plotting tools.</p>
pycortex	<p>pycortex is a Python package developed in the lab of Jack Gallant at the University of California, Berkeley, to visualize cortical maps on 3D renderings in a web-based environment.</p>

INVITED TALKS

- 2021 *Deconvolving neural signals using nideconv*. Invited talk at the University of Reading.
- 2020 *The Data Science of Neuroscience*, Dinner Keynote for DataScience Training of Schmalenbach/PwC
- 2020 *Understanding the Brain Using Computational Cognitive Models and functional MRI*, Cognition Academy - Max Planck Graduate School, Virtual Summer School
- 2019 *A biphasic temporal pattern in pupil size around perceptual switches in binocular rivalry*, Locus Coeruleus Meeting, Otto-von-Guericke Universität, Magdeburg
- 2019 *BIDS-Computational Models Meeting*, Princeton University, Princeton, USA
- 2018 *A biphasic temporal pattern in pupil size around perceptual switches in binocular rivalry*, Anne Churchland lab meeting, Cold Spring Harbor Laboratory, Cold Spring Harbor, USA
- 2018 *BIDS in practice for Ultra-High field structural and functional MRI: how to extend an existing standard*, OpenMR Benelux, Leiden, the Netherlands
- 2018 *Bringing BIDS closer to quantitative MR*, ISMRM virtual meeting
- 2018 *VU-CAS symposium*, Chinese Academy of Sciences, Beijing, China
- 2017 *Foundations of Cognition*, Radboud University, Nijmegen, the Netherlands

CONFERENCE CONTRIBUTIONS

- 2020 Baretto Garcia, M.*, de Hollander, G.*, Grueschow, M., Polania, R., Woodford, M., Ruff, C.C. **Predicting Risk Attitudes from the Precision of Neural Magnitude Representations**. Speaker for oral presentation at *Society for Neuroeconomics virtual Meeting*
- 2019 de Hollander, G., Knapen T.H., **Nideconv: Easy deconvolution of neural signals using the general linear model and flexible basis functions**. Software demonstration presented at *Human Brain Mapping*, Rome, Italy.
- 2019 de Hollander, G., van der Zwaag, W., Qiang, C., Zhang, P, Knapen, T.H. **Multi-center mapping of human ocular dominance columns with BOLD fMRI**. Poster presented at *Vision Sciences Society (VSS) 2019*, St Pete's Beach, Florida, United States.

- 2018 de Hollander, G., van der Zwaag, W., Knapen, T.H. **Submillimeter 7 Tesla fMRI in Primary Visual Cortex during monocular stimulation.** Poster presented at *Human Brain Mapping*, Singapore, Singapore.
- 2016 de Hollander, G., Trampel, R., Forstmann, B.U., van der Zwaag, W. **Submillimeter resolution fMRI in the midbrain: Measuring T2* changes to a stop-task.** Presented at *Annual Meeting of the International Society for Magnetic Resonance*.
- 2016 **The Simon Task modeled with a Fast-Guess process.** Talk presented at the *Annual Meeting of the Society for Mathematical Psychology*, New Brunswick, New Jersey, United States.
- 2015 de Hollander, G., Forstmann, B.U., Brown, S.D. **Explicit modeling of the hemodynamic response function in linking cognitive computational models to fMRI data.** Poster presented at *Society for Neuroscience*, San Diego, United States.
- 2015 **Connecting the dots: Linking brain and behavior in perceptual decision making.** Talk presented at the *Australian Mathematical Psychology Conference*, Newcastle, Australia.
- 2014 **Large cortical networks in small subcortical nuclei?** Talk presented at *Decision Making*, Bristol, United Kingdom.

WORKSHOPS AND SUMMER SCHOOLS ATTENDED

- 2018 Educational course on **Deep Learning** at Human Brain Mapping conference, Singapore, Singapore.
- 2016 Educational course on **Quantitative MRI** for characterising brain tissue microstructure, Leipzig, Germany.
- 2014 Summer school on **Neural Metrics: Quantitative analysis of neural organisation and function**, Nijmegen, the Netherlands.
- 2014 Summer school on **Computational Cognitive Modelling**, Laufen, Germany.
- 2013 Workshop on **MRI analysis with NiPype**, Magdeburg, Germany.

TECHNICAL SKILLS

MRI

functional/structural protocol development, functional MRI analysis, ultra-high field MRI, laminar analysis, MVPA, quantitative MRI, pipeline development (nipype),

Computer science

open source software development, Bayesian probabilistic programming, MCMC sampling (STAN/pymc3), regularized general linear models, Bayesian hierarchical modeling, virtualization (Docker, Singularity), machine learning, computer vision, deep learning, GitHub;

Python (expert), R (proficient), Matlab (proficient), C/C++ (elementary)

Experimental Psychology

Experimental design, forced-choice tasks, computational cognitive modeling (sequential sampling models, reinforcement learning models), eye/pupil tracking, Psychopy, Presentation

TEACHING

2018	Lecture on Reinforcement Learning in Brain Organization and Cognition course, University of Amsterdam
2018	Lecture in Brain Imaging course on k-space and Fourier Analysis , Vrije Universiteit, Amsterdam.
2014 - 2017	Lecture on Model-based Neuroimaging in Summer School on model-based neuroscience, University of Amsterdam.
2016, 2017	Lecture on Machine Learning in Psychology in honors course BSc Psychology, University of Amsterdam.
2012 - 2016	Lectures on functional MRI, multivariate pattern analysis and representational similarity analysis in Introduction to Neuroscientific and Neuroanatomy , University of Amsterdam.
2014	Taught workshop on Python in Neuroscience , University of Amsterdam.
2012	Teaching Assistant Qualitative Reasoning Practical Future Planet Studies, University of Amsterdam.
2009 - 2011	Teaching Assistant Reinforcement Learning Practical Beta-Gamma, University of Amsterdam.

ORGANIZATION

2020-2021	Representative of Rubicon laureates during the Covid crisis. Together with 2 other Rubicon laureates, I wrote an opinion piece on the dire situation of postdocs abroad during the Covid crisis. We also lobbied with the Dutch funding agency NWO, the Dutch ministry of Education and various parliament members to help postdocs abroad with Covid hardship extensions. Partly thanks due to our lobbying the minister of education has moved 20 million euros to help young scientists on short-term contracts. NWO has promised to extend eligible Rubicon projects by approximately 3 months
2013 - 2017	PhD-member advisory board Amsterdam Brain and Cognition Institute.
2016	Organizing committee model-based neuroscience summer school , Amsterdam.
2010 - 2014	Chairman organizing committee Café Scientifique , a bimonthly evening with short popular science talks in club Bitterzoet , Amsterdam.

LANGUAGES

Dutch (mother), English (fluent), German (intermediate, B1-B2), Italian (basic understanding and speaking)

AD-HOC REVIEWER

Cerebral Cortex | Human Brain Mapping | Journal of Cognitive Neuroscience | Journal of Mathematical Psychology | Neuropsychologica | eLife | PLOS Biology | PNAS