# Jesse Geerts

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## Education

**PhD Systems & Theoretical Neuroscience**                                  *2016 - Present*
*Sainsbury Wellcome Centre, University College London (UCL)*                 *London, UK*
Supervised by Prof Neil Burgess

**MSc Brain and Mind Sciences**                                             *2014 - 2016*
*UCL / Ecole Normale Supérieure / Sorbonne Université*              *London, UK / Paris, FR*

**BSc Natural Sciences**
**BSc Neuroscience**                                                       *2010 - 2014*
*University of Amsterdam*                                               *Amsterdam, NL*

## Research Experience

**Sainsbury Wellcome Centre / UCL**                                        *2017 - Present*
*PhD Candidate, supervised by Prof Neil Burgess*                            *London, UK*

My project concerns hippocampal state representations and how these support learning and planning. I focus on trajectory dependent place cell firing and how this relates to hierarchical reinforcement learning.

**Gatsby Computational Neuroscience Unit / UCL**                                  *2017*
*Rotation student, supervised by Prof Maneesh Sahani*                       *London, UK*

During this project, I explored continual learning in Bayesian Neural Networks. By fixing weights with low variance, the goal was to avoid catastrophic forgetting when learning multiple tasks.

**Sainsbury Wellcome Centre / UCL**                                               *2017*
*Rotation student, supervised by Dr Adam Kampff*                            *London, UK*

I worked on electrophysiological recordings using probes with a high density of recording sites, analysed how this density affected spike sorting quality.

**Institut du Cerveau et de la Moelle Epinière / Brain and Spine Institute**       *2016*
*Research Intern, supervised by Dr Jean Daunizeau*                           *Paris, FR*

I developed on a network model and analysed a fMRI dataset of neurological patients that suffered from motor problems.

**Theoretical Neurobiology Group / Wellcome Trust Centre for Neuroimaging**       *2015*
*Masters Student, supervised by Dr Dimitris Pinotsis*                       *London, UK*

This project focussed on laminar differences in cortical local field potential. I co-developed a model for estimating causal effects across cortical layers.

**Department of Brain and Cognition / University of Amsterdam**                    *2014*
*Undergraduate Student Intern, supervised by Dr Simon van Gaal*         *Amsterdam, NL*

I analysed behaviour and EEG of subjects that performed a subconscious cognitive control task.

## Talks and Posters

- March 2019 – <u>Jesse Geerts</u>, Fabian Chersi, Kimberly Stachenfeld, Neil Burgess
  **Modelling hippocampal and dorsolateral striatal contributions to learning across domains**.
  Talk at Cosyne Workshop, Lisbon, Portugal

- January 2019 – <u>Jesse Geerts</u>, Kimberly Stachenfeld, Neil Burgess
  **Using Splitter Cell Representations for Reinforcement Learning**.
  Talk at DeepMind Experimental Neuroscience Meeting, London, UK

- November 2018 – Kimberly Stachenfeld, <u>Jesse Geerts</u>, Neil Burgess, Timothy Behrens, Matthew Botvinick, Sam Gershman
  **Representation learning for exploration and generalization in RL**.
  Talk at SfN 2018 Nanosymposium, San Diego, CA, USA

- June 2018 – <u>Jesse Geerts</u>, Fabian Chersi, Kimberly Stachenfeld, Neil Burgess
  **Modelling hippocampal and striatal contributions to reward-based navigation**.
  Poster at iNav Symposium, Mont Tremblant, QC, Canada

- June 2018 – <u>Jesse Geerts</u>, Kimberly Stachenfeld, Neil Burgess
  **Splitter cells for reinforcement learning**.
  Talk at Data Club, Sainsbury Wellcome Centre, London, UK

## Publications

George Dimitriadis, Joana P. Neto . . . , <u>Jesse P. Geerts</u>, . . . Adam R. Kampff. (2018). **Why not record from every channel with a CMOS scanning probe?**. *BioRxiv.* [DOI]

Matthew G. Phillips, Stephen C. Lenzi, <u>Jesse P. Geerts</u>. (2018). **Cortical predictive mechanisms of auditory response attenuation to self-generated sounds**. *Journal of Neuroscience*, 37(22). [DOI]

Dimitris A. Pinotsis, <u>Jesse P. Geerts</u>, Lucas Pinto, Thomas H.B. Fitzgerald, Vladimir Litvak, Ryszard Auksztulewicz, Karl J. Friston. (2017). **Linking canonical microcircuits and neuronal activity: Dynamic causal modelling of laminar recordings**. *NeuroImage.* [DOI]

Jun Jiang, Camille M. Correa, <u>Jesse P. Geerts</u>, Simon van Gaal. (2018). **The relationship between conflict awareness and behavioral and oscillatory signatures of immediate and delayed cognitive control**. *NeuroImage*, 177, 11–19. [DOI]

## Teaching

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|---|---|
| **Teaching Assistant / PyStarters / SWC, UCL** | *2017 - Present* |
| Pythonic programming course for students and postdocs at the SWC and Gatsby Unit<br>Course website | |
| **Teaching Assistant / Systems & Theoretical Neuroscience / SWC & GCNU** | *2017* |
| Taught by SWC and Gatsby Unit faculty<br>Course website | |
| **Teaching Assistant / Statistics in R / University of Amsterdam** | *2013 - 2014* |
| **Teaching Assistant / Mathematics for Neuroscience / University of Amsterdam** | *2014* |

## Skills

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|---|---|
| **Programming Languages** | Python, R, Matlab, JavaScript, LaTeX |
| **Tools** | TensorFlow, Cython, scikit-learn |
| **Data Analysis Experience** | Eletrophysiology, Behaviour, fMRI, EEG |
| **Languages** | English, Dutch, French, German |

## Awards

- 2016 – **Sainsbury Wellcome PhD Grant** Gatsby Charitable Foundation & The Wellcome Trust, UK

- 2015 – **Descartes Excellence Scholarship** French embassy in The Hague, NL

- 2015 – **Winter School Grant** Berlin School of Mind and Brain, DE

- 2013 – **2$^{nd}$ Place Undergraduate Project Prize** Natural Sciences, University of Amsterdam, NL

## Volunteering & Outreach

**Public Engagement Network / SWC, London, UK** *2017 - Present*
As part of the Public Engagement Network, I have participated in projects presenting neuroscience and the SWC to school children and the wider public.
Project website

**Committee Member / Systems Seminars Series / SWC, London, UK** *2017 - Present*
I co-organise an annual student-led symposium open to all neuroscientists in London.
Event website

**Teaching at BrainCamp / Instituti Atomi, Pristina, Kosovo** *2018*
I took part in a volunteering project teaching introductory neuroscience to gifted young students in Kosovo.
Project website

**Presenter / New Scientist Live Festival, London, UK** *2017, 2018*
I represented the Sainsbury Wellcome Centre at the New Scientist's yearly festival, interacting with a wider audience to make neuroscience more accessible.
Event website

**Committee Member / BetaBreak, Amsterdam, NL** *2011 - 2014*
I co-organised lunch-time events and discussions at the University of Amsterdam.
Organisation website

## Personal

- **Music**. I am passionate about both making and listening to music. I play piano and more recently I have started playing guitar.

- **Running and hiking**. I enjoy sports outdoors. Ideally this takes place in the mountains or by the sea, but more frequently I run through the greener parts of London.

- **Travelling**. I like discovering new places, cultures and languages. In summer, I am also often found in Italy, helping my parents renovate their farmhouse.