

# Jesse Geerts

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## Education

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### PhD Systems & Theoretical Neuroscience

2016 - Present

Sainsbury Wellcome Centre, University College London (UCL)

London, UK

My project is about hippocampal state representations and how these support learning and planning. I focus on a probabilistic version of the successor representation, trajectory dependent place cell firing and how this relates to hierarchical reinforcement learning. 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

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### Sainsbury Wellcome Centre / UCL

2017 - Present

PhD Candidate

London, UK

Supervised by Prof Neil Burgess

### Gatsby Computational Neuroscience Unit / UCL

2017

Rotation student

London, UK

Supervised by Prof Maneesh Sahani

### Sainsbury Wellcome Centre / UCL

2017

Rotation student

London, UK

Supervised by Dr Adam Kampff

### Institut du Cerveau et de la Moelle Epinière / Brain and Spine Institute

2016

Research Intern

Paris, FR

Supervised by Dr Jean Daunizeau

### Theoretical Neurobiology Group / Wellcome Trust Centre for Neuroimaging

2015

Masters Student

London, UK

Supervised by Dr Dimitris Pinotsis and Prof Karl Friston

### Department of Brain and Cognition / University of Amsterdam

2014

Undergraduate Student Intern

Amsterdam, NL

Supervised by Dr Simon van Gaal

## Talks & Posters

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- September 2019 – Jesse Geerts, Kimberly Stachenfeld, Neil Burgess  
**Probabilistic Successor Representations with Kalman Temporal Differences.**  
Poster at CCN, Berlin, Germany

- July 2019 – Jesse Geerts, Kimberly Stachenfeld, Neil Burgess  
**Value, Prediction and Uncertainty in Hippocampus and Striatum.**  
Talk at BCCN UCL Navigation Workshop, Tutzing, Germany
- March 2019 – Jesse Geerts, Fabian Chersi, Kimberly Stachenfeld, Neil Burgess  
**Hippocampal and striatal localisation and navigation strategies.**  
Talk at HBP Neural SLAM Workshop, Paris, France
- March 2019 – Jesse Geerts, Fabian Chersi, Kimberly Stachenfeld, Neil Burgess  
**Spatial reinforcement learning using allocentric and egocentric basis functions.**  
Talk at Cosyne Workshop, Lisbon, Portugal
- January 2019 – Jesse Geerts, Kimberly Stachenfeld, Neil Burgess  
**Using Splitter Cell Representations for Reinforcement Learning.**  
Talk at DeepMind Experimental Neuroscience Meeting, London, UK
- November 2018 – Kimberly Stachenfeld, Jesse Geerts, Neil Burgess, Timothy Behrens, Matthew Botvinick, Samuel Gershman  
**Representation learning for exploration and generalization in RL.**  
Talk at SfN 2018 Nanosymposium, San Diego, CA, USA
- June 2018 – Jesse Geerts, 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 – Jesse Geerts, Kimberly Stachenfeld, Neil Burgess  
**Splitter cells for reinforcement learning.**  
Talk at Data Club, Sainsbury Wellcome Centre, London, UK

## Publications

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

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

Dimitris A. Pinotsis, Jesse P. Geerts, 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, Jesse P. Geerts, 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

[Course website](#)

**Teaching Assistant / Systems & Theoretical Neuroscience / SWC & GCNU** 2017

Taught by SWC and Gatsby Unit faculty

[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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<b>Programming Languages</b>	Python, R, Matlab, C++, JavaScript, $\text{\LaTeX}$
<b>Tools</b>	TensorFlow, Cython, Cuda, scikit-learn
<b>Data Analysis Experience</b>	Electrophysiology, Behaviour, fMRI, EEG
<b>Languages</b>	English, Dutch, French, German

## Awards

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- 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<sup>nd</sup> Place Undergraduate Project Prize** Natural Sciences, University of Amsterdam, NL

## Volunteering, Outreach & Other

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**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](#)

**PyClub / SWC, London, UK** 2017 - Present

I co-organise a pythonic programmatic club at SWC and Gatsby. In this context, I have given tutorials on a variety of coding topics such as testing, plotting libraries and TensorFlow.

[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

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