

# Curriculum Vitae - June 2019

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## Education

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- Oct 2017 – Sep 2018 **Imperial College London, London, UK**  
*Master of Science in Computing (Specialism: Machine Learning - Distinction)*  
*Thesis: „Action Grammars: A Grammar Induction-Based Method for Learning Temporally-Extended Actions“ (Distinguished - 91/100); Supervision: A. Faisal*
- Sep 2016 – July 2017 **Barcelona Graduate School of Economics (UPF/UAB), Barcelona, Spain**  
*Master of Science in Data Science (GPA: 9.04/10.00 - Ranked 2nd out of 25)*  
*Thesis: „Randomized Numerical Linear Algebra for GLMs with Big Datasets“ (10.0/10.0); Supervision: O. Papaspiliopoulos (UPF), I. Kosmidis (UCL)*
- Oct 2012 – Feb 2016 **University of Cologne, Cologne, Germany**  
*Bachelor of Science in Economics (GPA: 1.4/1.0 - Top 5% of Cohort)*  
*Thesis: “The Impact of Skilled-Worker Immigration on the Diffusion of New Technologies” (1.0/1.0); Supervision: S. Prantl*
- Sep 2005 – Jun 2012 **Ernst-Mach-Gymnasium, Hürth, Germany**  
*A-levels (GPA: 1.4/1.0) being 16 years old - Shortening 2<sup>nd</sup>, 9<sup>th</sup>, 10<sup>th</sup> Grade*

## Professional Experience

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- (Start Oct 2019) **Science of Intelligence Excellence Cluster, Berlin, Germany**  
*PhD Project: „Learning of Intelligent Swarm Behavior“*  
*Supervision: Henning Sprekeler (TU Berlin) and Pawel Romanczuk (HU Berlin)*
- Oct 2018 – **Einstein Center for Neuroscience, Berlin, Germany**  
*Structured PhD Studies/Lab Rotations in Cognitive Computational Neuroscience:*  
*1. F. Blankenburg (FU): EEG Study on Mismatch-Negativity in Somatos. Cortex*  
*2. H. Sprekeler (TU): Multi-Agent Reinforcement Learning for Swarm Systems*  
*3. R. Cichy (FU): Eye-tracker for EEG experiments with Infant Participants*
- Apr 2017 – Jul 2017 **Accenture Analytics Innovation Center, Barcelona, Spain**  
*Practicum as part of BGSE Master’s. Contributed to the following projects:*  
*1. Machine Vision: OCR using OpenCV and CNNs built in Keras/TensorFlow*  
*2. Robotics: Prototyped Application for the „Autonomous Deep Learning Robot“*  
*3. Natural Language Processing: Chatbot Application for Telegram and Slack*
- Mar 2014 – Mar 2016 **Center for Macroeconomic Research, Cologne, Germany**  
*Student research assistant to Prof. Helge Braun and Prof. A. Ludwig.*  
*Research on interaction of retirement and unemployment insurance systems.*  
*Teaching Assistant “Introductory Macroeconomics” (Undergraduate Level)*
- Jun 2013 – Aug 2013 **InfraServ GmbH & Co. Knapsack KG, Hürth, Germany**  
*Human Resources and Marketing (Internship)*

## Scholarships and Awards

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- Since Oct 2018 **Einstein Center for Neurosciences Berlin - PhD Scholarship for Conducting Research in Neuroscience** (<https://www.ecn-berlin.de/>)
- Oct 2018 **Best (Applied) MAC/MRes/Specialism Project, Sponsored by Winton Capital at Imperial College London - Department of Computing (600£)**  
([imperial.ac.uk/computing/prospective-students/distinguished-projects/pg-prizes/](http://imperial.ac.uk/computing/prospective-students/distinguished-projects/pg-prizes/))
- Aug 2017 **Publication of Master’s Thesis on UPF/UAB public repositories**  
([hdl.handle.net/10230/33513](http://hdl.handle.net/10230/33513))
- Sep 2016 **Award of 50% tuition fee waiver by the BGSE (UPF/UAB) faculty (9,000€)**
- Jun 2014 **Dean’s Award of the University of Cologne**  
*Award due to being part of best 10% students that study at the WiSo faculty*
- Dec 2012 – Sep 2018 **German National Academic Foundation (ca. 40,000€)**  
*“Studienstiftung des deutschen Volkes” - Scholarship holder*

## Skills

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Languages	<b>German</b> <i>Mother tongue</i>	<b>Italian</b> <i>Basic (A1)</i>	<b>English</b> <i>Fluent (C1)</i>	<b>Spanish</b> <i>Basic (A1)</i>
IT/Computing	<b>Microsoft Office, LaTeX</b> – <i>advanced</i> <b>Python, R, MySQL, Stata, Git, Shell</b> – <i>advanced</i> <b>NumPy, SciPy, scikit-learn, OpenCV, PyTorch, OpenAI Gym</b> – <i>advanced</i> <b>Amazon Web Services, IBM Watson</b> – <i>advanced</i>			

## Selected Open Source Projects

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### **Swarm Multi-Agent Reinforcement Learning** ([github.com/RobertTLange/gym-swarm](https://github.com/RobertTLange/gym-swarm))

OpenAI gym-style environment for cooperative MARL agents. Reward function according to attraction, repulsion, alignment objectives of swarm collectives. Independent DQN implementation in PyTorch.

### **Biologically Plausible Deep Learning** ([github.com/RobertTLange/Bio-Plausible-DeepLearning](https://github.com/RobertTLange/Bio-Plausible-DeepLearning))

Project implements biologically plausible alternatives to backpropagation and analyzes their performance, learning dynamics and hyperparameter robustness. Implemented in plain NumPy and PyTorch.

### **Sequential Bayesian Learning** ([github.com/RobertTLange/SequentialBayesianLearning](https://github.com/RobertTLange/SequentialBayesianLearning))

Modeling of different Bayesian agents who learn the data-generating process of a categorical sequence. Computation of surprise measures and model comparison using Var. Inference. Implemented in pyMC3.

### **UNHCR IOM - Migrant Death Report/News Filter** ([github.com/migrantnewsfilter](https://github.com/migrantnewsfilter))

Application that scrapes migrant death reports from Google News/Twitter feeds and classifies credibility. Models: N-gram Naive Bayes classifiers, GRU-RNN (MXNet) with pre-trained multi-lingual embeddings.

## Poster Presentations & Invited Talks

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- 2019 **EEML Summer School, Bucharest, Romania:** Poster - „Deep MARL for Swarm Behavior“  
**RAAI Conference, Bucharest, Romania:** Poster - „Deep MARL for Swarm Behavior“  
**FENS ENCODS 2019, London, UK:** Talk - „Neural Surprise in Human Somatosensation“  
**7th MindBrainBody Symposium Berlin:** Poster - „Neural Surprise in Human Somatosensation“
- 2017 **École Polytechnique, Paris, France:** DS<sup>3</sup> Poster - „RandNLA for GLMs with Big Datasets“

## Further Education

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- 2019 **EEML Summer School, Bucharest, Romania:** *Deep Learning & Reinforcement Learning*
- 2017 **Universitat Pompeu Fabra, Barcelona, Spain:** *ESSIR - Information Retrieval*  
**École Polytechnique, Paris, France:** *DS<sup>3</sup> - Data Science Initiative Summer School*  
**German National Academic Foundation, Germany:** *Workshop on „Free-Energy Principle“*
- 2016 **London School of Economics, London, UK:** *Methods Summer Programme – „Real Analysis“*  
**Universitat Pompeu Fabra, Barcelona, Spain:** *Bayesian Time Series Methods, Data Science*
- 2015 **London School of Economics, London, UK:** *Methods Summer Programme – “Econometrics”*

## Social Commitment

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- Sep 2016 – July 2017 **Editor-in-Chief of Barcelona GSE Data Science Student Blog**  
([gsedatascience.wordpress.com/author/roberttlange/](https://gsedatascience.wordpress.com/author/roberttlange/))
- Apr 2013 – Jul 2013 **FIB – Studentisches Forum für Integration und Bildung, Cologne, Germany**  
([fib-koeln.de](http://fib-koeln.de)) - Support for children with weak social background

## Further Interests

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- Jan 2018 – Sep 2018 **Part of Advanced Data Science Team at ICL Data Science Society**
- 2016 – **Member of “Kölnischer Kunstverein” (Cologne Art Society)**
- 2013 – **Member of “Freunde des Wallraf-Richartz-Museum und des Museums Ludwig e.V.” (Cologne Museum Society)**
- 2011 – **Member of “Mensa in Deutschland e.V.” (Mensa in Germany)**
- Feb 2008 **Participation in “Magic: The Gathering” Pro Tour in San Diego**
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