# Lucas Weber | Curriculum Vitae

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\* 18th June, 1992 in Kassel, GERMANY

## Post-graduate education

### PhD in Language and Translation Sciences    University Pompeu Fabra (UPF), ES

○ *Group: Computational Linguistics and Linguistic Theory*
*DTCL-Scholarship*    *October 2019 – now*

In my PhD project I investigate the inner processes of neural language models and especially focus on the learning dynamics throughout training. When does the model generalize across new information? When does new information interfere with old knowledge? To answer these questions, I lend from neuroscientific inference methods to take a look into the connectionist black-box.
– *supervised by* **Dr. Elia Bruni**

## Graduate education

### RMSc. Brain and Cognitive Sciences    University of Amsterdam (UvA), NL

○ *Track: Cognitive Science*
*(with distinction ('cum laude') | Grade: 8.07 | upper 12%[1])*    *September 2016–August 2018*

The research-master in Brain and Cognitive Sciences teaches students to integrate insights from different scientific disciplines to enhance our understanding of the human brain and its underlying processing principles. During my studies, I focused on system-neuroscience and the integration of neuroscience and artificial intelligence (AI) research. My main interests lay in vision and language-systems.

**RMSc. Projects**
*Literature Review*

Titled *'Continual Learning in humans and neuroscience-inspired AI'*, this review concentrated on the problem of catastrophic forgetting in sequentially learning artificial neural networks (ANN). It investigated how this problem is prevented in biological neural networks and suggested potential solutions in ANNs on multiple levels of analysis.
– *supervised by* **Dr. Elia Bruni** *at the Institute for Logic, Language and Computation, UvA*

*Research Project I*

Titled *'The role of recurrent processing in figure/ground segmentation and object completion in natural stimuli'*, my first research project examined the functionality of the ventral visual stream in the human cortex by collecting and analyzing EEG- and behavioural-data. It focused on the role of feedback-connections in the process of visual object detection.
– *supervised by* **ass.-Prof. Dr. Steven Scholte** *at the Department of Psychology, UvA*

**University of Cambridge, UK**

*Research Project II*                                    *January–September 2018*

Titled *'Object Representations in Deep Convolutional Neural Networks and Their Behavioural Implications'*. During my research project at the University of Cambridge, I fitted deep convolutional neural networks onto the human ventral visual stream and predicted human visual decision-making behaviour based on the networks inner object-representations. Subsequently, I integrated word-embeddings into the models, created through co-occurrence statistics from the British national corpus. During this project, I obtained hands-on experience in training large-scale neural network architectures using high-performance computational clusters and got greater understanding of the inner functionality of convolutional neural networks, natural language processing and multi-modal integration.

– supervised by **Dr. Tim C. Kietzmann** *at the MRC-CBU, University of Cambridge;*
**Prof. Dr. Nikolaus Kriegeskorte** *at the Zuckerman Institute, Columbia University in the City of NY*

## Undergraduate education

**BSc. Psychology**                                    **University of Vienna, AT**

○ *Focus: Cognitive and Biological Psychology, Methodology*
(Grade: 1.89 | upper 12%[2])                              *2013–2016*

During my studies in Vienna, I chose my courses to serve my interest in methodology and quantifiable science. I proposed a research project on the coding principle of polarity correspondence and wrote my bachelor's thesis on the biologically grounded 'fraternal birth order effect'.

**University of Groningen, NL**

*Exchange Semester*                                    *2016*

During my exchange-semester at the University of Groningen my course-choice focused on programming (R), human-machine interaction, social psychology and cognitive neuroscience.

## Extra-curricular education and activities

### Massive Open Online Courses

**Machine Learning**

○ *taught by adj.-Prof Dr. Andrew Ng (Stanford University)*                  *2017*
This course teaches the use of different machine learning approaches. It covers, among others, multivariate linear regression, logistic regression, neural networks, support vector machines, unsupervised methods like K-means and how to handle large-scale datasets.

**Neural Networks for Machine Learning**

○ *taught by Prof. Dr. Geoffrey Hinton (University of Toronto)*                  *2017*
This course teaches basic knowledge on learning algorithms and optimization. Further, it introduces various model architectures: feedforward neural networks, recurrent neural networks, Hopfield nets and (restricted) Boltzmann machines.

**Deep Learning Specialization**

○ *taught by adj.-Prof. Dr. Andrew Ng (deeplearning.ai)*                  *2017*
This specialization includes **5 courses**, teaching how to build deep neural networks in tensorflow and keras, tune hyperparameters, regularize algorithms, organize deep learning projects. The models used in this course range from feedforward, convolutional neural networks to recurrent and recursive neural networks.

According to the Dutch organisation for internationalisation in education (Nuffic)
According to en.wikipedia.org/wiki/Academic_grading_in_Austria

### Mathematics for Machine Learning Specialization

*taught by Prof. Dr. David Dye and Dr. Samuel J. Cooper (Imperial College London)*     *2018*

This specialization contains **3 courses**, teaching linear algebra, multivariate calculus and the application of both fields in principal component analysis (PCA).

### Databases and SQL for Data Science

*taught by Rav Ahuja (IBM)*     *2018*

This course gives an introduction to databases. It covers relational database concepts, basics in SQL-language and Python database-APIs. It does so, by providing hands-on tasks using real-world datasets operating on IBM-cloud databases.

### Natural Language Processing

*taught by multiple teachers (NRU HSE of Moscow)*     *2018*

This course covers practical approaches to a multitude of NLP tasks like sentiment analysis, summarization, dialogue state tracking and conversational agents. The course discusses traditional as well as state-of-the-art deep learning approaches, taught in various practical assignments.

### Practical Reinforcement Learning

*taught by multiple teachers (NRU HSE of Moscow)*     *2018*

This course covers basic to advanced reinforcement learning methods and how to apply them in practical assignments, from virtual game environments to NLP tasks.

### Mathematics for Computer Science

*taught by Prof. Dr. Albert R. Meyer (MIT Open Course Ware)*     *2019*

This course covers fundamental concepts of mathematics (definitions, proofs, sets, functions, relations), discrete structures (graphs, state machines, modular arithmetic..) as well as discrete probability theory.

### NLP with Deep Learning

*taught by Prof. Dr. Chris Manning (Stanford University)*     *2019*

This course covers state-of-the-art machine learning for natural language processing.

### Writing in the Sciences

*taught by Dr. Kristin Sainani (Stanford University)*     *2019*

This course covers the Dos and Don'ts in academic writing, applied to real world examples and informed by established research-journal editors.

## Teaching-experience

**Graduate teaching assistance**     **Institute for Interdisciplinary Studies, UvA, NL**
*2017*

Alongside my studies, I helped teaching the master-course *'Foundations of Neural and Cognitive Modelling'*, which comprised lectures on the dynamical systems approach to modelling, all basic types of neural network architectures and learning algorithms.

**Language courses for international scholarship-holders**     **Goethe-Institut e.V., DE**
*2014–2017*

During my summer holidays, I supervised and assisted in the teaching of international PASCH-scholarship-holders aged 14 to 17 attending a summer-school in Germany for multiple successive years.

## Technical and Personal skills

- **Programming:** Python (incl. Tensorflow, Keras, Pytorch), Matlab, R, SQL
- **Languages:** High proficiency: German (native), English (fluent), Dutch (fluent)
  Basic proficiency: Spanish (basic), French (basic), Chinese Mandarin (basic), Latin ('großes Latinum')
- **Others:** LaTeX, high-performance computing