Dieuwke Hupkes

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EMPLOYMENT

European Lab for Learning an Intelligent Systems (ELLIS), UvA — **Amsterdam**
Postdoc & Scientific manager of ELLIS Amsterdam — *June 2020 - Present*

ILLC, University of Amsterdam — **Amsterdam**
Temporary lecturer — *January 2020 - June 2020*

ILLC, University of Amsterdam — **Amsterdam**
PhD Student in the Language in Interaction Consortium — *July 2015 - January 2020*

- Advisor: Dr. Willem Zuidema & Prof. Dr. Rens Bod
  Topic: Interpretability and hierarchical compositionality in neural networks

Facebook AI Research — **Paris**
Research Intern — *January - April 2019*

- Advisors: Diane Bouchacourt and Marco Baroni
  Topic: Assessing compositionality of languages emerging in referential games

ILLC, University of Amsterdam — **Amsterdam**
Research Assistant — *February 2014 - June 2015*

- Under supervision of Dr. Willem Zuidema
  Topic: Neural models of parsing

CREATE, University of Amsterdam — **Amsterdam**
Pre-PhD fellowship — *February 2014 - June 2015*

- Under supervision of Prof. Dr. Rens Bod
  Topic: Part-of-Speech tagging of 17th century Dutch

EDUCATION

University of Amsterdam — **Amsterdam**
Doctorate degree — *July 2015 - June 2020*

University of Amsterdam — **Amsterdam**
Master of Logic — *September 2011 - December 2013*

University of Edinburgh — **Edinburgh**
Exchange Semester — *Fall 2012*

University of Amsterdam — **Amsterdam**
Preparation year — *Sept 2010 - June 2011*

University of Amsterdam — **Amsterdam**
Bachelor of Science in Physics and Astronomy — *2006 - 2010*

RESEARCH INTERESTS

- Computational and cognitive models of natural language processing

- Hierarchy and compositionality in artificial neural networks
- Learning biases
- Statistical parsing, syntax
- Neurocomputational models of language (processing)
- language emergence

TEACHING EXPERIENCE

I obtained the Dutch Basic Teaching Qualification (UTQ/BKO) at the University of Amsterdam.

As main lecturer/coordinator

Taaltheorie en Taalverwerking *March-June 2020*
Bsc Artificial Intelligence

Human(e) AI *March-June 2020*
Elective IIS course

As PhD (co)Advisor

Lucas Weber *October 2019 – now*
Co-supervision with Elia Bruni

As thesis supervisor

Jeroen Taal – Bsc Artificial Intelligence *April 2019 – now*
Pruning of neural language models for Dutch

Hugh-Mee Wong – Bsc Artificial Intelligence *April 2019 – now*
What do neural language models learn about Dutch syntax?

Oskar van der Wal – Msc Artificial Intelligence *Aug 2019 – now*
What can we learn from multi-agent referential games?

Oscar Ligthart – Msc Artificial Intelligence *Aug 2019 – now*
Consistency and structure in emergent languages

Jaap Jumelet – Msc Artificial Intelligence *Jan 2019 – Feb 2020*
The interpretability of neural language models

Gautier Dagan – Msc Artificial Intelligence *Jan – Aug 2019*
Co-Evolution of Language and Agent in Referential Games

Dennis Ulmer – Msc Artificial Intelligence *Jan – Aug 2019*
Recoding latent sentence representations

Diana Rodriguez Luna – Msc Artificial Intelligence *Jan – July 2019*
Language emergence in multi-agent referential games
In collaboration with Facebook AI Research

Kris Korrel – Msc Artificial Intelligence *Jan – Nov 2018*
From sequence to attention
In collaboration with Facebook AI Research

Sanne Bouwmeester – Msc Artificial Intelligence *Jan – Oct 2018*
Analysing seq-to-seq models in goal oriented dialogue: generalising to disfluencies

Krstó Proroković – Master of Logic *Jan – Nov 2018*
Learning to decide a formal language: a recurrent neural network approach
In collaboration with Facebook AI Research

Anand Kumar Singh – Msc Artificial Intelligence *Jan – Aug 2018*

Pondering in artificial neural networks
In collaboration with Facebook AI Research

Ujjwal Sharma – Msc Artificial Intelligence *Jan – Aug 2018*
Interpreting decision-making in interactive visual dialogue

Rezka Aufar Leonandya – Msc Artificial Intelligence *Jan – Aug 2018*
Learning to follow instructions
In collaboration with Facebook AI Research

Lucas Weber – Msc Brain and Cognitive Science *Jan – Jun 2018*
Continual learning in humans and neuroscience-inspired AI

Philip Bouman – Bsc Artificial Intelligence *Jan – Aug 2018*
Modelling fonts with convolutional neural networks

As supervisor of individual or group projects

Curriculum learning for improved compositionality *Feb 2020 - now*
Msc AI student Michael Neely

Generalised contextual decomposition for transformer models *Feb 2020 - now*
Msc AI student Tom Kersten

XAI: A conceptual framework for interpretability methods *Jun 2019 - now*
Msc Brain and Cognitive Science student Lewis O'Sullivan

The compositionality of neural networks *Jun 2018 - Dec 2019*
Msc AI students Verna Dankers and Mathijs Mul

Syntactic Awareness in Language Models: Recurrence vs Self-Attention *Jun 2019*
Msc AI students Sander Bos, Lorian Colthof, Bryan Guevara and Vivian van Oijen

Unsupervised Grammar Induction in Emergent Languages *Jun 2019*
Msc AI students Silvan de Boer and Oskar van der Wal

On the Realisation of Compositionality in Neural Networks *Jun 2018*
Msc AI students Joris Baan, Jana Leible, Mitja Nikolaus, David Rau, Verna Dankers, Santhosh Rajamanickam and Dennis Ulmer

Analysing Subject-Verb agreement with Diagnostic Classification *Jun 2018*
Msc AI students Mario Giulianelli, Jack Harding and Florian Mohnert

What do language models encode? *Jun 2018*
Msc AI student Jaap Jumelet

Learning compositionality in Neural Networks *Jan 2018*
Master of Logic students Federico Schiaffino, Haukur Pál Jónsson, Max Rapp, Flavio Tisi and Yuan-Ho Yao

Guest lectures

- **Natural Language Processing 2** *April 2020*
- **Statistical Methods for Natural Language Semantics** *May 2019*
- **Foundations of Neural and Cognitive Modelling** *November 2018*
- **Cognitive Models of Language and beyond** *March 2018*
- **Natural Language Processing 1** *Dec 2017*
- **Cognitive Models of Language and Music** *Mar 2017*

As teaching assistant

Natural Language Processing 1 *Oct-Dec 2017*
Msc Artificial Intelligence, Master of Logic

Gomputational Semantics and Pragmatics *Sept-Oct 2016*
Msc Artificial Intelligence, Master of Logic

Evolution of Language and Music *Feb-Apr 2016, Oct-Dec 2016*
Bsc Psychobiologie

Foundations of Neural and Cognitive Modelling *Oct-Dec 2015*
Msc Artificial Intelligence, Master of Logic, Msc Brain and Cognitive Science

Unsupervised Language Learning *Feb-Apr 2014, Feb-Apr 2015*
Msc Artificial Intelligence, Master of Logic

Automata and Formal Languages *Apr-Jun 2013, Apr-Jun 2012*
Bsc Artificial Intelligence

Biomechanics *Feb-Jun 2013*
Bsc bewegingswetenschappen (human motion sciences)

Logica *Jan 2012, Jan 2013, Jan 2014*
Bsc Beta Gamma

AWARDS AND FELLOWSHIPS

Honorary mention for best paper award, CoNLL2019 *November 2019*
Analysing neural language models: contextual decomposition reveals default reasoning in number and gender assignment

Research Internship *January 2019*
With Marco Baroni, at Facebook AI Research

Best Paper Award, BlackboxNLP 2018 *August 2018*
Under the hood: using diagnostic classifiers to investigate and improve how language models track agreement information

Scholarship for Doctorate Studies *June 2015*
With Willem Zuidema, in the Language in Interaction Consortium

Pre-PhD fellowship *June 2015*
With Rens Bod, within CREATE

SERVICES

Organisation

BlackboxNLP 2020 - Analyzing an interpreting Neural Networks **Virtual**
EMNLP workshop on analysing and interpreting neural networks *November 2020*

Compositionality in Brains and Machines **Leiden**
Workshop at the Lorentz workshop on compositionality *August 2019*
Role: Lead organisor with Willem Zuidema and Marco Baroni. Tasks including writing workshop proposal, designing the workshop programme, inviting participants, being contact person for the Lorentz center and leading discussions during the workshop.

BlackboxNLP 2019 - Analyzing an interpreting Neural Networks **Florence**
ACL workshop on analysing and interpreting neural networks *August 2019*
Role: Co-organisation with Yonatan Belinkov, Grzegorz Chrupala and Tal Linzen. Tasks including sending out workshop calls, assigning reviewers, selecting papers, maintainance of workshop website and chairing sessions during the workshop.

Grammar, Computation and Cognition **Amsterdam**
SMART workshop in honour of the scientific legacy of Remko Scha *December 2017*
Role: Co-organisation with Willem Zuidema.

Reviewing

- TACL
- Gecko
- CoNLL
- EMNLP
- BlackboxNLP 2019, BlackboxNLP 2020

Area Chair

- EACL2020, interpretability track
- BlackboxNLP 2019, BlackboxNLP 2020

Other

- PhD council ILLC, University of Amsterdam
- PhD council Faculty of Science, University of Amsterdam

TALKS & PANELS

Upcoming

- *October 31, 2020*, Neural networks as explanatory models of language processing, ILCC Seminar at the University of Edinburgh, *Edinburgh* (virtual talk)

Past

- *August*. TBA. Keynote speaker at the workshop Computational and experimental explanations in semantics and pragmatics, *Utrecht*. – Post-poned because of COVID19
- *November*. TBA. Keynote speaker at EurNLP, *Paris*. – Post-poned because of COVID19
- *September 17, 2020*, Neural networks as explanatory models, AllenNLP, *Seattle* (virtual talk)
- *November 15, 2019*. Syntax in neural language models: a case study *University of Utrecht, Utrecht*
- *October 9, 2019*. Subject verb agreement in neural language models – how, when and where? *Johns Hopkins University, Baltimore*
- *October 1, 2019*. What do they learn? Neural networks, compositionality and interpretability. *Computational Cognition workshop, Osnabruek*.
- *September 3, 2019*. Guest speaker and panelist at the public event When fake looks all too real: the technology behind Deep Fake, *SPUI25, Amsterdam*.
- *August 1, 2019*. Blackbox NLP, **panel moderator**.
- *June 18, 2019*. The typology of emergent languages. *Interaction and the Evolution of Linguistic Complexity, Edinburgh*.
- *May 6*. The compositionality of neural networks: integrating symbolism and connectionism. *CS&AI / SIKS workshop on analyzing and interpreting neural networks for NLP, 's-Hertogenbosch*.
- *April 18*. The compositionality of neural networks: integrating symbolism and connectionism. *Invited internal talk at Saarland University, Saarbrücken*.
- *March 14*. On neural networks and compositionality. *Invited internal seminar at École normale*

supérieure, Paris.

- *July 18, 2018*. Visualisation and 'diagnostic classifiers' reveal how recurrent and recursive neural networks process hierarchical structure. *IJCAI, Stockholm*.
- *June 12, 2018*. Learning compositionally through attentive guidance. *Invited internal seminar at the University of Copenhagen.*
- *May 9, 2017*. Processing hierarchical structure with RNNs. *Dagstuhl seminar on Human-like neural-symbolic computing.*
- *December 7, 2017*. The grammar of neural networks. *SMART workshop Grammars, Computation & Cognition, Amsterdam.*
- *December 15, 2017*. Hierarchical compositionality in recurrent neural networks. *Invited internal seminar at Rijksuniversiteit Groningen.*
- *May 25, 2016*. POS-tagging of Historical Dutch. *LREC, Portoroz*.
- *November 22, 2016*. How may neural networks process hierarchical structure? Insights from recursive and recurrent networks learning arithmetics. *Logic Tea at the University of Amsterdam.*
- *June 8, 2015* Using Parallel Data to improve Part-of-Speech tagging of 17th century Dutch. *DH Benelux, Antwerp.*

PUBLICATIONS

In prep

- Hupkes D., Rodriguez Luna D., Ponti E.M. and Bruni E. Internal and External Pressures on Language Emergence: Least Effort, Object Constancy and Frequency.
- Dubois Y., Dagan G., Hupkes D., and Bruni E. Location Attention for Extrapolation to Longer Sequences. *To appear at ACL2020*.
- Dagan, G., Hupkes, D. and Bruni E. Co-evolution of language and agent.

Published

- Hupkes D., Dankers V., Mul M. and Bruni E.(2020). The compositionality of neural networks: integrating symbolism and connectionism. *JAIR*
- Jumelet J., Zuidema W. and Hupkes D. (2019). Analysing Neural Language Models: Contextual Decomposition Reveals Default Reasoning in Number and Gender Assignment. *CONLL 2019*. **Honourary mention**
- Baan J., Leible J., Nikolaus M., Rau D., Ulmer D., Baumgärtner T., Hupkes D. and Bruni E. (2019). On the Realization of Compositionality in Neural Networks. *BlackboxNLP, ACL 2019*.
- Ulmer D., Hupkes, D. and Bruni, E (2019). Assessing incrementality in sequence-to-sequence models. *Repl4NLP, ACL 2019*.
- Korrel K., Hupkes D., Dankers V., and Bruni E. (2019) Transcoding compositionally: using attention to find more generalizable solutions. *BlackboxNLP, ACL 2019*.
- Lakretz Y., Kruszewski G., Desbordes T., Hupkes D., Dehaene S. and Baroni M. (2019) The emergence of number and syntax units in LSTM language models. *NAACL 2019*.
- Hupkes D., Singh A.K., Korrel K., Kruszewski G. and, Bruni E (2019). Learning compositionally through attentive guidance. *CICLing 2019*.
- Leonandya R., Bruni E., Hupkes D. and Kruszewski G (2019). The Fast and the Flexible: training neural networks to learn to follow instructions from small data. *IWCS*.

- Hupkes D., Veldhoen S., and Zuidema W. (2018). Visualisation and 'diagnostic classifiers' reveal how recurrent and recursive neural networks process hierarchical structure. *Journal of Artificial Intelligence Research*.
- Giulianelli, M., Harding, J., Mohnert, F., Hupkes, D. and Zuidema, W. (2018). Under the hood: using diagnostic classifiers to investigate and improve how language models track agreement information. *BlackboxNLP 2018, ACL*.
  Best paper award.
- Zuidema W., Hupkes D., Wiggins G., Scharf C. and Rohrmeier M. (2018). Formal models of Structure Building in Music, Language and Animal Song. In *The Origins of Musicality*.
- Jumelet, J. and Hupkes, D. (2018). Do language models understand anything? On the ability of LSTMs to understand negative polarity items. *BlackboxNLP 2018, ACL*.
- Hupkes, D., Bouwmeester, S. and Fernández, R. (2018). Analysing the potential of seq2seq models for incremental interpretation in task-oriented dialogue. *BlackboxNLP 2018, ACL*.
- Hupkes D. and Zuidema W. (2017) Diagnostic classification and symbolic guidance to understand and improve recurrent neural networks. *Interpreting, Explaining and Visualizing Deep Learning, NIPS2017*.
- Veldhoen S., Hupkes D. and Zuidema W. (2016). Diagnostic Classifiers: Revealing how Neural Networks Process Hierarchical Shructure. *Cognitive Computation: Integrating Neural and Symbolic Approaches, NIPS2016*.
- Hupkes D. and Bod R (2016) POS-tagging of Historical Dutch. *LREC2016*.

LANGUAGES

Dutch:	Mothertongue	French:	Basic Knowledge
English:	Fluent	Russian:	Basic Knowledge
Italian:	Good command	German:	Basic Knowledge
Spanish	Basic command	Frysian:	Understanding

ET CETERA

I'm part of a competitive pole dance duo, we participated twice in the national championships, placing 1st and 2nd. In 2018, we also participated in the World Championship and arrived at place 10 of the world ranking. `https://instagram.com/duo_polenotti`.