

Dieuwke Hupkes

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EMPLOYMENT

Facebook AI Research

Research Scientist

Paris

December 2020 - Present

European Lab for Learning an Intelligent Systems (ELLIS), UvA

Scientific manager of ELLIS Amsterdam

Amsterdam

July 2020 - Present

IvI, University of Amsterdam

Postdoc

Amsterdam

July 2020 - December 2020

ILLC, University of Amsterdam

Temporary lecturer

Amsterdam

January 2020 - June 2020

- Courses: Linguistics and Language Processing & Human(e) AI

ILLC, University of Amsterdam

PhD Student in the [Language in Interaction](#) Consortium

Amsterdam

July 2015 - January 2020

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

Facebook AI Research

Research Intern

Paris

January - April 2019

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

ILLC, University of Amsterdam

Research Assistant

Amsterdam

February 2014 - June 2015

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

CREATE, University of Amsterdam

Pre-PhD fellowship

Amsterdam

February 2014 - June 2015

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

EDUCATION

University of Amsterdam

Doctorate degree

Amsterdam

July 2015 - June 2020

University of Amsterdam

Master of Logic

Amsterdam

September 2011 - December 2013

University of Edinburgh

Exchange Semester

Edinburgh

Fall 2012

University of Amsterdam

Preparation year

Amsterdam

Sept 2010 - June 2011

University of Amsterdam

Bachelor of Science in Physics and Astronomy

Amsterdam

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.....

Tom Kersten – Msc Artificial Intelligence October 2020 – now

The interpretability of neural language models

Sylke Goosen – Msc Artificial Intelligence October 2020 – now

Investigating neural language models

Jeroen Taal – Bsc Artificial Intelligence April 2020 – June 2020

Pruning of neural language models for Dutch

Hugh-Mee Wong – Bsc Artificial Intelligence April 2020 – June 2020

What do neural language models learn about Dutch syntax?

Oskar van der Wal – Msc Artificial Intelligence Aug 2019 – Aug 2020

The grammar of emergent languages

Oscar Ligthart – Msc Artificial Intelligence Aug 2019 – May 2020

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 <i>Analysing seq-to-seq models in goal oriented dialogue: generalising to disfluencies</i>	Jan – Oct 2018
Krstó Proroković – Master of Logic <i>Learning to decide a formal language: a recurrent neural network approach</i> In collaboration with Facebook AI Research	Jan – Nov 2018
Anand Kumar Singh – Msc Artificial Intelligence <i>Pondering in artificial neural networks</i> In collaboration with Facebook AI Research	Jan – Aug 2018
Ujjwal Sharma – Msc Artificial Intelligence <i>Interpreting decision-making in interactive visual dialogue</i>	Jan – Aug 2018
Rezka Aufar Leonandya – Msc Artificial Intelligence <i>Learning to follow instructions</i> In collaboration with Facebook AI Research	Jan – Aug 2018
Lucas Weber – Msc Brain and Cognitive Science <i>Continual learning in humans and neuroscience-inspired AI</i>	Jan – Jun 2018
Philip Bouman – Bsc Artificial Intelligence <i>Modelling fonts with convolutional neural networks</i>	Jan – Aug 2018
As supervisor of individual or group projects.....	
Overgeneralisation in neural sequence to sequence models <i>Msc AI student Anna Langendijk</i>	Feb 2020 - now
Generalised contextual decomposition for transformer models <i>Msc AI student Tom Kersten</i>	Feb 2020 - now
XAI: A conceptual framework for interpretability methods <i>Msc Brain and Cognitive Science student Lewis O’Sullivan</i>	Jun 2019 - now
The compositionality of neural networks <i>Msc AI students Verna Dankers and Mathijs Mul</i>	Jun 2018 - Dec 2019
Syntactic Awareness in Language Models: Recurrence vs Self-Attention <i>Msc AI students Sander Bos, Lorian Colthof, Bryan Guevara and Vivian van Oijen</i>	Jun 2019
Unsupervised Grammar Induction in Emergent Languages <i>Msc AI students Silvan de Boer and Oskar van der Wal</i>	Jun 2019
On the Realisation of Compositionality in Neural Networks <i>Msc AI students Joris Baan, Jana Leible, Mitja Nikolaus, David Rau, Verna Dankers, Santhosh Rajamanickam and Dennis Ulmer</i>	Jun 2018
Analysing Subject-Verb agreement with Diagnostic Classification <i>Msc AI students Mario Giulianelli, Jack Harding and Florian Mohnert</i>	Jun 2018
What do language models encode? <i>Msc AI student Jaap Jumelet</i>	Jun 2018
Learning compositionality in Neural Networks <i>Master of Logic students Federico Schiaffino, Haukur Pál Jónsson, Max Rapp, Flavio Tisi and Yuan-Ho Yao</i>	Jan 2018
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
- Computational 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 2021 - Analyzing an interpreting Neural Networks** November 2021
EMNLP workshop on analysing and interpreting neural networks
- BlackboxNLP 2020 - Analyzing an interpreting Neural Networks** Virtual
November 2020
EMNLP workshop on analysing and interpreting neural networks
- Compositionality in Brains and Machines** Leiden
August 2019
Workshop at the Lorentz workshop on compositionality

Role: Lead organiser 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

ACL workshop on analysing and interpreting neural networks

Role: Co-organisation with Yonatan Belinkov, Grzegorz Chrupala and Tal Linzen. Tasks including sending out workshop calls, assigning reviewers, selecting papers, maintenance of workshop website and chairing sessions during the workshop.

Florence
August 2019

Grammar, Computation and Cognition

SMART workshop in honour of the scientific legacy of Remko Scha

Role: Co-organisation with Willem Zuidema.

Amsterdam
December 2017

Reviewing

- ICLR – Outstanding reviewer
- TACL
- Gecko
- CoNLL
- EMNLP
- BlackboxNLP 2019, BlackboxNLP 2020
- Cognitive Systems Research
- Computational Linguistics

Area Chair

- EACL2020, interpretability track
- NAACL2021, interpretability track
- BlackboxNLP 2019, BlackboxNLP 2020

Other

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

TALKS & PANELS

- *March 17, 2021*, Kunnen we kunstmatige intelligentie nog doorgronden? Studium Generale, *Utrecht* (virtual talk)
- *February 11, 2021*, Compositionality decomposed: how do neural networks generalise? Women@CL, *University of Cambridge* (virtual talk)
- *February 5, 2021*, Compositionality decomposed: how about natural data? *Rijksuniversiteit Groningen* (virtual talk)
- *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**
- *October 31, 2020*, Neural networks as explanatory models of language processing, ILCC Seminar at the University of Edinburgh, *Edinburgh* (virtual talk)
- *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.....

- L. Weber, J. Jumelet, E. Bruni and D. Hupkes (2021) [Language modelling as a multi-task problem.](#) *accepted for EACL 2021*
- G. Dagan, D. Hupkes and E. Bruni (2021) [Co-evolution of language and agent.](#) *accepted for EACL 2021*

Published.....

- O. van der Wal, S. de Boer, E. Bruni and D. Hupkes (2020). [The Grammar of Emergent Languages.](#) *EMNLP 2020.*

- Hupkes D., Rodriguez Luna D., Ponti E.M. and Bruni E. (2020). [Internal and External Pressures on Language Emergence: Least Effort, Object Constancy and Frequency.](#)
- Dubois Y., Dagan G., Hupkes D., and Bruni E. (2020). [Location Attention for Extrapolation to Longer Sequences.](#) *ACL2020.*
- 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 Structure.](#) *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.