

# Dieuwke Hupkes

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## EMPLOYMENT

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

*Postdoc & Scientific manager of ELLIS Amsterdam*

**Amsterdam**

*July 2020 - Present*

### 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

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### 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

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- 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

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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*

**Silke 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](#)

<b>Sanne Bouwmeester – Msc Artificial Intelligence</b> <i>Analysing seq-to-seq models in goal oriented dialogue: generalising to disfluencies</i>	Jan – Oct 2018
<b>Krstó Proroković – Master of Logic</b> <i>Learning to decide a formal language: a recurrent neural network approach</i> <a href="#">In collaboration with Facebook AI Research</a>	Jan – Nov 2018
<b>Anand Kumar Singh – Msc Artificial Intelligence</b> <i>Pondering in artificial neural networks</i> <a href="#">In collaboration with Facebook AI Research</a>	Jan – Aug 2018
<b>Ujjwal Sharma – Msc Artificial Intelligence</b> <i>Interpreting decision-making in interactive visual dialogue</i>	Jan – Aug 2018
<b>Rezka AUFAR Leonandya – Msc Artificial Intelligence</b> <i>Learning to follow instructions</i> <a href="#">In collaboration with Facebook AI Research</a>	Jan – Aug 2018
<b>Lucas Weber – Msc Brain and Cognitive Science</b> <i>Continual learning in humans and neuroscience-inspired AI</i>	Jan – Jun 2018
<b>Philip Bouman – Bsc Artificial Intelligence</b> <i>Modelling fonts with convolutional neural networks</i>	Jan – Aug 2018
<b>As supervisor of individual or group projects.....</b>	
<b>Overgeneralisation in neural sequence to sequence models</b> <i>Msc AI student Anna Langendijk</i>	Feb 2020 - now
<b>Generalised contextual decomposition for transformer models</b> <i>Msc AI student Tom Kersten</i>	Feb 2020 - now
<b>XAI: A conceptual framework for interpretability methods</b> <i>Msc Brain and Cognitive Science student Lewis O’Sullivan</i>	Jun 2019 - now
<b>The compositionality of neural networks</b> <i>Msc AI students Verna Dankers and Mathijs Mul</i>	Jun 2018 - Dec 2019
<b>Syntactic Awareness in Language Models: Recurrence vs Self-Attention</b> <i>Msc AI students Sander Bos, Lorian Colthof, Bryan Guevara and Vivian van Oijen</i>	Jun 2019
<b>Unsupervised Grammar Induction in Emergent Languages</b> <i>Msc AI students Silvan de Boer and Oskar van der Wal</i>	Jun 2019
<b>On the Realisation of Compositionality in Neural Networks</b> <i>Msc AI students Joris Baan, Jana Leible, Mitja Nikolaus, David Rau, Verna Dankers, Santhosh Rajamanickam and Dennis Ulmer</i>	Jun 2018
<b>Analysing Subject-Verb agreement with Diagnostic Classification</b> <i>Msc AI students Mario Giulianelli, Jack Harding and Florian Mohnert</i>	Jun 2018
<b>What do language models encode?</b> <i>Msc AI student Jaap Jumelet</i>	Jun 2018
<b>Learning compositionality in Neural Networks</b> <i>Master of Logic students Federico Schiaffino, Haukur Pál Jónsson, Max Rapp, Flavio Tisi and Yuan-Ho Yao</i>	Jan 2018
<b>Guest lectures.....</b>	
○ <b>Natural Language Processing 2</b>	April 2020
○ <b>Statistical Methods for Natural Language Semantics</b>	May 2019
○ <b>Foundations of Neural and Cognitive Modelling</b>	November 2018
○ <b>Cognitive Models of Language and beyond</b>	March 2018

- **Natural Language Processing 1** Dec 2017
- **Cognitive Models of Language and Music** Mar 2017

**As teaching assistant**.....

<b>Natural Language Processing 1</b>	Oct-Dec 2017
<i>Msc Artificial Intelligence, Master of Logic</i>	
<b>Computational Semantics and Pragmatics</b>	Sept-Oct 2016
<i>Msc Artificial Intelligence, Master of Logic</i>	
<b>Evolution of Language and Music</b>	Feb-Apr 2016, Oct-Dec 2016
<i>Bsc Psychobiologie</i>	
<b>Foundations of Neural and Cognitive Modelling</b>	Oct-Dec 2015
<i>Msc Artificial Intelligence, Master of Logic, Msc Brain and Cognitive Science</i>	
<b>Unsupervised Language Learning</b>	Feb-Apr 2014, Feb-Apr 2015
<i>Msc Artificial Intelligence, Master of Logic</i>	
<b>Automata and Formal Languages</b>	Apr-Jun 2013, Apr-Jun 2012
<i>Bsc Artificial Intelligence</i>	
<b>Biomechanics</b>	Feb-Jun 2013
<i>Bsc bewegingswetenschappen (human motion sciences)</i>	
<b>Logica</b>	Jan 2012, Jan 2013, Jan 2014
<i>Bsc Beta Gamma</i>	

## AWARDS AND FELLOWSHIPS

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<b>Honorary mention for best paper award, CoNLL2019</b>	November 2019
<i>Analysing neural language models: contextual decomposition reveals default reasoning in number and gender assignment</i>	
<b>Research Internship</b>	January 2019
<i>With Marco Baroni, at Facebook AI Research</i>	
<b>Best Paper Award, BlackboxNLP 2018</b>	August 2018
<i>Under the hood: using diagnostic classifiers to investigate and improve how language models track agreement information</i>	
<b>Scholarship for Doctorate Studies</b>	June 2015
<i>With Willem Zuidema, in the Language in Interaction Consortium</i>	
<b>Pre-PhD fellowship</b>	June 2015
<i>With Rens Bod, within CREATE</i>	

## SERVICES

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**Organisation**.....

<b>BlackboxNLP 2020 - Analyzing an interpreting Neural Networks</b>	<b>Virtual</b>
<i>EMNLP workshop on analysing and interpreting neural networks</i>	
	November 2020
<b>Compositionality in Brains and Machines</b>	<b>Leiden</b>
<i>Workshop at the Lorentz workshop on compositionality</i>	
	August 2019
<b>Role:</b> 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, maintainance 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
- TACL
- Gecko
- CoNLL
- EMNLP
- BlackboxNLP 2019, BlackboxNLP 2020

## Area Chair.....

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

## Other.....

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

## TALKS & PANELS

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### Upcoming.....

- *December 4, 2020*, 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**

### Past.....

- *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

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In prep.....

- Dagan, G., Hupkes, D. and Bruni E. [Co-evolution of language and agent](#).

Published.....

- van der Wal O., de Boer S., Bruni E. and Hupkes D. (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

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DUTCH:	Mothertongue	FRENCH:	Basic Knowledge
ENGLISH:	Fluent	RUSSIAN:	Basic Knowledge
ITALIAN:	Good command	GERMAN:	Basic Knowledge
SPANISH	Basic command	FRYSIAN:	Understanding

## ET CETERA

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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](https://instagram.com/duo_polenotti).