

# Marek Rei

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## Experience

### **Senior Lecturer in Machine Learning, Imperial College London**

October 2023 - current

Researching representation learning, transfer learning and language modelling for natural language understanding. Applying the technologies in the areas of education, healthcare and business analytics. Lecturing Natural Language Processing, along with Introduction to Machine Learning, one of the largest courses in the department. Supervising/co-supervising 5 PhD students and a number of Master's students on their research projects.

### **Visiting Researcher, University of Cambridge**

October 2019 - current

Researching neural machine learning algorithms for automated error detection, error correction, exercise creation and language proficiency scoring. Collaborating on the Automated Language Teaching and Assessment (ALTA) project.

### **Lecturer in Machine Learning, Imperial College London**

October 2019 - October 2023

Researching representation learning, transfer learning and language modelling for natural language understanding.

### **Co-founder and Chief Scientific Officer, Transformative AI**

October 2016 - October 2023

Researching machine learning algorithms for the early prediction of cardiac arrest in critical care patients. The system is continuously analysing ECG signals in order to detect ventricular tachyarrhythmias before they occur. We have received investor funding, as well as substantial grants from Innovate UK and the Wellcome Trust.

### **Affiliated Lecturer, University of Cambridge**

October 2018 - October 2019

My research is on machine learning and advanced neural network architectures, with a focus on representation learning, transfer learning, language modeling and multi-objective optimization. I teach courses on machine learning and data science to both undergraduate and MPhil students, and I supervise projects for the Advanced Computer Science degree.

### **Senior Research Associate, University of Cambridge**

July 2016 - October 2019

Working on machine learning and natural language processing, structured prediction and multi-task learning. My work contributes to the ALTA project – an industry collaboration with Cambridge Assessment, with the goal of creating innovative new technologies for language learning and teaching. Supervising MPhil and undergraduate students for their course projects, and teaching as part of the MPhil course on Advanced Computer Science.

**Research Associate, University of Cambridge**

November 2014 - July 2016

Performed research on machine learning algorithms for automated language analysis. Among other things, I developed a general-purpose neural structured prediction framework, and an online representation learning algorithm for improved language modeling.

**Visiting Lecturer, University of Tartu**

March 2015 - June 2015

As a visiting lecturer, I created and delivered a new course on machine learning and language modeling. The lectures cover topics such as n-gram language modeling, smoothing techniques, language model evaluation, neural network language models, recurrent models, backpropagation, gradient descent, representation learning, and an overview of current state-of-the-art methods for language modeling.

**Language Research Engineer, SwiftKey**

November 2012 - November 2014

I was a member of the Research team, working on future technologies and prototyping new solutions. One of my main projects was the neural network version of SwiftKey, which was released to very positive reviews. Since then, SwiftKey has been acquired by Microsoft, largely based on the strength of its technology.

**Supervision Tutor, University of Cambridge**

January 2011 - March 2012

I organized tutoring sessions for undergraduate students in the subject of Information Retrieval. This involved regular tutorials in small groups, and providing them with theoretical and practical assignments.

**Public Relations Manager, Board of European Students of Technology**

September 2007 - July 2008

Organizing BEST General Assembly 2008 - an international student congress with representatives from 76 universities. Handled relations with the media, companies and universities, and designed various promotional materials. Worked in a core team of 5 people together with over 40 volunteers.

**Software Analyst, Webmedia**

June 2007 - August 2007

Internship as a software analyst. Worked on enhancing a self-service system for a mobile service provider, designed and performed usability tests and quality control, wrote specifications and created a prototype for a new user interface.

**Project manager, Board of European Students of Technology**

October 2006 - May 2007

Main organizer of Key to the Future (Võti Tulevikku) 2007, a national career project for graduates in Estonia with 74 participating companies. As the project manager I led a core team of 5 people plus many volunteers, and was involved in every aspect of the project.

**Software Developer, Movies.ee**

June 2006 - April 2007

Developed a custom-built content management system for managing movies, actors, news, galleries, con-

tests and live cinema timetables.

### **Software Developer at Geomedia**

February 2006 - June 2006

Developed software for conducting large-scale population surveys.

## Education

### **PhD, University of Cambridge**

2009 - 2013

My thesis is about minimally supervised dependency-based methods for natural language processing, under the supervision of Prof Ted Briscoe. I worked on topics such as distributional and semantic similarity, speculation detection, entailment detection, and unsupervised parse reranking. I applied various machine learning techniques and developed systems that achieved state-of-the-art performance.

### **MPhil, University of Cambridge**

2008 - 2009

MPhil in Computer Speech, Text and Internet Technologies. Covered topics such as speech recognition, speech synthesis, parsing, discourse, dialogue systems, machine translation and question answering.

### **BSc, Tallinn University of Technology**

2005 - 2008

Bachelor's Degree in Computer Science from the Tallinn University of Technology. Specialised in Network Applications and Logic, graduated *cum laude*.

## Membership

I am a member of the following organizations:

Member of the Scientific Board at the Estonian Centre of Excellence in Artificial Intelligence (EXAI)

Member of the Association for the Advancement of Artificial Intelligence (AAAI)

Member of the Association for Computational Linguistics (ACL)

Member of the Special Interest Group on Representation Learning (SigREP)

Member of the Special Interest Group on NLP and Education (SigEDU)

Member of the AI4Health Training Board at Imperial College London

Member of the AI Network at Imperial College London

Member of the Leonardo Centre for Sustainable Business

## Organization

I helped organize the following events:

Senior Area Chair for the 63rd Annual Meeting of the Association for Computational Linguistics (ACL 2025)

Area Chair for the 31st International Conference on Computational Linguistics (COLING 2025)

Area Chair for the 62nd Annual Meeting of the Association for Computational Linguistics (ACL 2024)

Area Chair for the 18th Conference of the European Chapter of the Association for Computational Linguistics (EACL 2024)

Member of the Estonian Science Agency (ETAG) steering committee for ICT target evaluation (2023)

Area Chair for the 2023 Conference on Empirical Methods in Natural Language Processing (EMNLP 2023)

Area Chair for the 61st Annual Meeting of the Association for Computational Linguistics (ACL 2023)

Senior Area Chair for the 2022 Conference on Empirical Methods in Natural Language Processing (EMNLP 2022)

Organizer of the 10th Conference on Automated Knowledge Base Construction (AKBC 2022)

Area Chair for the 2021 Annual Conference of the North American Chapter of the Association for Computational Linguistics (NAACL 2021)

Organizer of the 2020 Workshop on Representation Learning for NLP (RepL4NLP 2020)

Area Chair for the 58th Annual Meeting of the Association for Computational Linguistics (ACL 2020)

Area Chair for the 57th Annual Meeting of the Association for Computational Linguistics (ACL 2019)

Area Chair for the Eighth Joint Conference on Lexical and Computational Semantics (\*SEM 2019)

Organizer of the 2019 Workshop on Representation Learning for NLP (RepL4NLP 2019)

Organizer of the Workshop on Machine Translation and Natural Language Processing at Makerere University 2018

## Awards, Grants and Scholarships

UKRI AI Centre for Doctoral Training in Digital Healthcare (AI4Health CDI). Co-investigator. EPSRC. 2024-2033

Gemma Academic Program GCP Credit Award, 2024

EU-Horizon-RIA grant for Combatting Diet Related Non-Communicable Disease through Enhanced Surveillance (CoDiet). Co-investigator, 2023-2027

Young IT Scientist of the Year, Presidential Award. Estonia, 2021

Nominated for the President's Award for Excellence in Education, by the Imperial College Department of Computing, 2021

King's College Junior Research Fellowship, 2017-2021

Cambridge-Africa Alborada Research award, 2017-2018

Best Paper Award for Research Inspired by Human Language Learning, CoNLL 2018

Language Sciences Research Incubator Fund, 2017  
EPSRC Doctoral Training award, 2009-2012  
Cambridge European Trust award, 2009-2012  
Computer Laboratory Local Industry Fund, 2009-2012  
Churchill College Studentship, 2009-2012  
EPSRC Collaborative Training award, 2008  
Cambridge European Trust award, 2008  
Estonian Academy of Sciences research award, 2008  
AS Elion Scholarship, 2007

## Lecturing

The courses I have created and lectured:

*Introduction to Machine Learning*, Imperial College London, 2024 Spring  
*Natural Language Processing*, Imperial College London, 2024 Spring  
*Introduction to Machine Learning*, Imperial College London, 2023 Autumn  
*Introduction to Machine Learning*, Imperial College London, 2023 Spring  
*Natural Language Processing*, Imperial College London, 2023 Spring  
*Introduction to Machine Learning*, Imperial College London, 2022 Autumn  
*Introduction to Machine Learning*, Imperial College London, 2022 Spring  
*Introduction to Machine Learning*, Imperial College London, 2021 Autumn  
*Introduction to Machine Learning*, Imperial College London, 2021 Spring  
*Introduction to Machine Learning*, Imperial College London, 2020 Autumn  
*Introduction to Machine Learning*, Imperial College London, 2020 Spring  
*Interpreting the Black Box: Explainable Neural Network Models*, University of Cambridge, 2019  
*Data Science: Principles and Practice*, University of Cambridge, 2018  
*Constructing and Evaluating Word Embeddings*, University of Cambridge, 2017  
*Constructing and Evaluating Word Embeddings*, University of Cambridge, 2016  
*Machine Learning for Language Modelling*, University of Tartu, 2015

## Supervision

Students whom I supervise for their thesis or course project:

**Developing more robust NLI models that generalise better to other unseen datasets**

Joe Stacey

*PhD, Imperial College London.*

**External Tool Use for Complex Problem Solving with Language Models**

Lisa Alazraki

*PhD, Imperial College London.*

**Planning and Reasoning with Large Language Models**

Nikolai Rozanov

*PhD, Imperial College London.*

**Noise Reduction for Robust Language Processing Models**

Zhenhao Li

*PhD, Imperial College London, to finish in 2025.*

*Co-supervisor, together with Prof Lucia Specia.*

**Improving Robustness for Black-box Large Language Models**

Aran Ubhi

*MSc in Computing (AI & ML), Imperial College London, 2024.*

**Temporal Multi-modal Modelling of Document Sequences**

Cindy Huang

*MSc in Computing (AI & ML), Imperial College London, 2024.*

**Improving the Robustness of Large Language Models to Prompt Perturbations**

Aryan Agrawal

*MSc in Advanced Computing, Imperial College London, 2024.*

**Generative Neural-led Visual Dialog**

Nihir Vedd

*PhD, Imperial College London, 2024.*

*Co-supervisor, together with Prof Lucia Specia.*

**Predictive Temporal Modelling of Document Sequences**

Mireia Hernandez Caralt

*MSc in Artificial Intelligence, Imperial College London, 2023.*

**Conditioning Language Generation on Future Downstream Impact**

Jorge Gallego Feliciano

*MSc in Advanced Computing, Imperial College London, 2023.*

**Editing Pre-trained Language Models for Domain Adaptation**

Joon Jeon

*MSc in Computing (AI & ML), Imperial College London, 2023.*

**Removing model biases by directly editing model parameters**

Joy Liu

*MSc in Computing (AI & ML), Imperial College London, 2023.*

**Pre-trained Generative Language Models for Unsupervised Grammatical Error Correction**

Yulong Lin

*Computer Science Tripos (Part III), University of Cambridge, 2023.***Being Right for the Right Reasons: Using Auxiliary Datasets During Training to Create More Robust NLP Models**

Marine De Backer

*MSc in Advanced Computing, Imperial College London, 2022.***Capturing the Gap in Pre-trained Language Models**

Hangyu Li

*MSc in Advanced Computing, Imperial College London, 2022.***Entity Relation Extraction within the Telecommunications Domain**

Alba Espinosa Rastoll

*MSc in Artificial Intelligence, Imperial College London, 2022.***ICD Coding with Transformers**

Clarence Ng

*MSc in Computing (AI & ML), Imperial College London, 2022.***Finding the Needle in a Haystack: Zero-shot Rationale Extraction for Long Text Classifiers**

Kamil Bujel

*MEng in Mathematics and Computer Science, Imperial College London, 2022.***Hierarchical Models for Grammatical Error Correction**

Stuart Mesham

*MPhil in Advanced Computer Science, University of Cambridge, 2022.**Co-supervision with Christopher Bryant and Zheng Yuan.***Multi-level Optimization in Transformer Models**

Tom Taylor

*MSc in Computing (AI & ML), Imperial College London, 2021.***Sustainability Initiative Detection in Company Reports**

Mircea-Dan Hirlea

*MSc in Artificial Intelligence, Imperial College London, 2021.***Pre-training Contextual Language Decoders**

Jordan Clive

*MSc in Computing (AI & ML), Imperial College London, 2021.***Temporal Modelling in Electronic Health Records for Diagnosis Prediction**

Ziyue Xu

*MSc in Computing (AI & ML), Imperial College London, 2021.***Capturing Outliers with Neural Episodic Memory**

Michael Tanzer

*MSc in Computing (AI & ML), Imperial College London, 2020.***Twice-cooked Contextual Embeddings**

Sun Whang

*MSc in Artificial Intelligence, Imperial College London, 2020.*

**Unsupervised Error Detection**

Simone Primarosa

*MPhil in Advanced Computer Science, University of Cambridge, 2020.**Co-supervising together with Dr Chris Bryant.***Supervised Interpretability for Text Classification**

Kamil Bujel

*MEng in Mathematics and Computer Science, Imperial College London, 2020.***Joint modelling of compositionality, metaphor and emotion**

Verna Dankers

*Master's dissertation, University of Amsterdam, 2019.**Supervising in collaboration with Dr Ekaterina Shutova and Dr Martha Lewis.***Joint Text Classification on Multiple Levels with Multiple Labels**

Miruna Pislari

*MPhil in Advanced Computer Science, University of Cambridge, 2019.***Few-Shot Learning in Distributional Semantics**

Jeroen Van Hautte

*MPhil in Advanced Computer Science, University of Cambridge, 2019.**Supervising in collaboration with Dr Guy Emerson.***Language Modelling for Neural Error Detection**

Samuel Bell

*MPhil in Advanced Computer Science, University of Cambridge, 2018.***Neural Architectures for Visual Question Answering**

Joshua Wong

*Computer Science Tripos, University of Cambridge, 2018.***Supervised Attention for Neural Error Correction**

Gladys Tien

*MPhil in Advanced Computer Science, University of Cambridge, 2018.**Supervising in collaboration with Dr Zheng Yuan.***Domain Adaptation for Neural Named Entity Recognition**

Stefan Hosein

*MPhil in Advanced Computer Science, University of Cambridge, 2017.***Hybrid Language Modeling for Text Prediction**

Devan Kuleindiren

*Computer Science Tripos, University of Cambridge, 2017.***Convolutional Neural Networks for Automated Essay Assessment**

Youmna Farag

*MPhil in Advanced Computer Science, University of Cambridge, 2016.***Predicting Word Difficulty for Lexical Acquisition**

Shushan Arakelyan

*MPhil in Advanced Computer Science, University of Cambridge, 2016.*



## Publications

### **Distilling Robustness into Natural Language Inference Models with Domain-Targeted Augmentation**

Joe Stacey and Marek Rei

*In Findings of the 62nd Annual Meeting of the Association for Computational Linguistics (ACL 2024)*

### **Prompting open-source and commercial language models for grammatical error correction of English learner text**

Christopher Davis, Andrew Caines, Øistein Andersen, Shiva Taslimipoor, Helen Yannakoudakis, Zheng Yuan, Christopher Bryant, Marek Rei and Paula Buttery

*In Findings of the 62nd Annual Meeting of the Association for Computational Linguistics (ACL 2024)*

### **Continuous Predictive Modeling of Clinical Notes and ICD Codes in Patient Health Records**

Mireia Hernandez Caralt, Clarence Boon Liang Ng, Marek Rei

*In Proceedings of the Biomedical Natural Language Processing Workshop (BioNLP 2024)*

### **Did the Neurons Read your Book? Document-level Membership Inference for Large Language Models**

Matthieu Meeus, Shubham Jain, Marek Rei and Yves-Alexandre de Montjoye

*The 33rd USENIX Security Symposium (2024)*

### **DiffuseDef: Improved Robustness to Adversarial Attacks**

Zhenhao Li, Marek Rei and Lucia Specia

*ArXiv (2024)*

### **Inherent Challenges of Post-Hoc Membership Inference for Large Language Models**

Matthieu Meeus, Shubham Jain, Marek Rei, Yves-Alexandre de Montjoye

*ArXiv (2024)*

### **Predicting cell type-specific epigenomic profiles accounting for distal genetic effects**

Alan E Murphy, William Beardall, Marek Rei, Mike Phuycharoen and Nathan G Skene

*bioRxiv (2024)*

### **When and Why Does Bias Mitigation Work?**

Abhilasha Ravichander, Joe Stacey and Marek Rei

*In Findings of the 2023 Conference on Empirical Methods in Natural Language Processing (EMNLP 2023).*

### **The alignment of companies' sustainability behavior and emissions with global climate targets**

Simone Cenci, Matteo Burato, Marek Rei and Maurizio Zollo

*Nature Communications (2023)*

### **Competitive Pressure and Emission Reduction: Unravelling the Link**

Simone Cenci, Hossein Asgharian, Lu Liu, Marek Rei and Maurizio Zollo

*SSRN (2023)*

### **On the application of Large Language Models for language teaching and assessment technology**

Andrew Caines, Luca Benedetto, Shiva Taslimipoor, Christopher Davis, Yuan Gao, Oeistein Andersen, Zheng Yuan, Mark Elliott, Russell Moore, Christopher Bryant, Marek Rei, Helen Yannakoudakis, Andrew Mullooly, Diane Nicholls and Paula Buttery

*In Proceedings of the AIED 2023 Workshop on Empowering Education with LLMs (AIED LLM 2023).*

### **Logical Reasoning for Natural Language Inference Using Generated Facts as Atoms**

Joe Stacey, Pasquale Minervini, Haim Dubossarsky, Oana-Maria Camburu and Marek Rei

*ArXiv (2023)*

**Modelling Temporal Document Sequences for Clinical ICD Coding**

Clarence Ng, Diogo Santos and Marek Rei

*In Proceedings of the 17th Conference of the European Chapter of the Association for Computational Linguistics (EACL 2023).***An Extended Sequence Tagging Vocabulary for Grammatical Error Correction**

Stuart Mesham, Christopher Bryant, Marek Rei and Zheng Yuan

*In Findings of the 17th Conference of the European Chapter of the Association for Computational Linguistics (EACL 2023).***Finding the Needle in a Haystack: Unsupervised Rationale Extraction from Long Text Classifiers**

Kamil Bujel, Andrew Caines, Helen Yannakoudakis and Marek Rei

*ArXiv, 2023.***Logical Reasoning with Span-Level Predictions for Interpretable and Robust NLI Models**

Joe Stacey, Pasquale Minervini, Haim Dubossarsky and Marek Rei

*In Proceedings of the 2022 Conference on Empirical Methods in Natural Language Processing (EMNLP 2022).***Multimodal Conversation Modelling for Topic Derailment Detection**

Zhenhao Li, Marek Rei and Lucia Specia

*In Findings of the 2022 Conference on Empirical Methods in Natural Language Processing (EMNLP 2022).***Control Prefixes for Parameter-Efficient Text Generation**

Jordan Clive, Kris Cao and Marek Rei

*In Proceedings of the Second Workshop on Generation, Evaluation & Metrics (GEM 2022).***Probing for targeted syntactic knowledge through grammatical error detection**

Christopher Davis, Christopher Bryant, Andrew Caines, Marek Rei and Paula Buttery

*In Proceedings of the 26th Conference on Computational Natural Language Learning (CoNLL 2022).***An Analysis of Corporate Sustainability Behaviour Through the Lens of Empirical Fitness Landscapes**

Simone Cenci, Marek Rei and Maurizio Zollo

*SSRN pre-print under review, 2022.***Business sustainability behaviour and alignment with climate targets**

Simone Cenci, Matteo Burato, Marek Rei and Maurizio Zollo

*Research Square pre-print under review, 2022.***Guiding Visual Question Generation**

Nihir Vedd, Zixu Wang, Marek Rei, Yishu Miao and Lucia Specia

*In Proceedings of the 2022 Conference of the North American Chapter of the Association for Computational Linguistics - Human Language Technologies (NAACL-HLT 2022).***Memorisation versus Generalisation in Pre-trained Language Models**

Michael Tanzer, Sebastian Ruder and Marek Rei

*In Proceedings of the 60th annual meeting of the Association for Computational Linguistics (ACL 2022).***Supervising Model Attention with Human Explanations for Robust Natural Language Inference**

Joe Stacey, Yonatan Belinkov and Marek Rei

*In Proceedings of the Thirty-Sixth AAAI Conference on Artificial Intelligence (AAAI 2022).***Visual Cues and Error Correction for Translation Robustness**

Zhenhao Li, Marek Rei and Lucia Specia

*In Findings of the Association for Computational Linguistics: EMNLP 2021.*

**GiBERT: Introducing Linguistic Knowledge into BERT through a Lightweight Gated Injection Method**

Nicole Peinelt, Marek Rei and Maria Liakata

*In Findings of the Association for Computational Linguistics: EMNLP 2021.***Zero-shot Sequence Labeling for Transformer-based Sentence Classifiers**

Kamil Bujel, Helen Yannakoudakis and Marek Rei

*In Proceedings of the 6th Workshop on Representation Learning for NLP (RepL4NLP 2021).***How Metaphors Impact Political Discourse: A Large-Scale Topic-Agnostic Study Using Neural Metaphor Detection**

Vinodkumar Prabhakaran, Marek Rei and Ekaterina Shutova

*In Proceedings of the 15th International Conference on Web and Social Media (ICWSM 2021).***Contextual Sentence Classification: Detecting Sustainability Initiatives in Company Reports**

Dan Hirlea, Christopher Bryant, Maurizio Zollo and Marek Rei

*ArXiv, 2021.***Seeing Both the Forest and the Trees: Multi-head Attention for Joint Classification on Different Compositional Levels**

Miruna Pislari and Marek Rei

*In Proceedings of the 28th International Conference on Computational Linguistics (COLING 2020).***Grammatical error detection in transcriptions of spoken English**

Andrew Caines, Christian Bentz, Kate Knill, Marek Rei and Paula Buttery

*In Proceedings of the 28th International Conference on Computational Linguistics (COLING 2020).***Grammatical Error Correction in Low Error Density Domains: A New Benchmark and Analyses**

Simon Flachs, Ophelie Lacroix, Helen Yannakoudakis, Marek Rei and Anders Søgaard

*In Proceedings of the 2020 Conference on Empirical Methods in Natural Language Processing (EMNLP 2020).***Multidirectional Associative Optimization of Function-Specific Word Representations**

Daniela Gerz, Ivan Vulić, Marek Rei, Roi Reichart and Anna Korhonen

*In Proceedings of the 58th annual meeting of the Association for Computational Linguistics (ACL 2020).***Verbal Multiword Expressions for Identification of Metaphor**

Omid Rohanian, Marek Rei, Shiva Taslimipour and Le An Ha

*In Proceedings of the 58th annual meeting of the Association for Computational Linguistics (ACL 2020).***Bad Form: Comparing Context-Based and Form-Based Few-Shot Learning in Distributional Semantic Models**Jeroen Van Hautte, Guy Emerson and Marek Rei *In Proceedings of the Second Workshop on Deep Learning for Low-Resource NLP (DeepLo 2019).***Modelling the interplay of metaphor and emotion through multitask learning**

Verna Dankers, Marek Rei, Martha Lewis and Ekaterina Shutova

*In Proceedings of the 2019 Conference on Empirical Methods in Natural Language Processing and 9th International Joint Conference on Natural Language Processing (EMNLP-IJCNLP 2019).***Semi-Supervised Bootstrapping of Dialogue State Trackers for Task-Oriented Modelling**

Bo-Hsiang Tseng, Marek Rei, Pawel Budzianowski, Richard Turner, Bill Byrne and Anna Korhonen

*In Proceedings of the 2019 Conference on Empirical Methods in Natural Language Processing and 9th International Joint Conference on Natural Language Processing (EMNLP-IJCNLP 2019).***Neural and FST-based approaches to grammatical error correction**

Zheng Yuan, Felix Stahlberg, Marek Rei, Bill Byrne and Helen Yannakoudakis

*In Proceedings of the 14th Workshop on Innovative Use of NLP for Building Educational Applications (BEA 2019).*

**Context is Key: Grammatical Error Detection with Contextual Word Representations**

Samuel Bell, Helen Yannakoudakis and Marek Rei

*In Proceedings of the 14th Workshop on Innovative Use of NLP for Building Educational Applications (BEA 2019).*

**CAMsterdam at SemEval-2019 Task 6: Neural and graph-based feature extraction for the identification of offensive tweets**

Guy Aglionby, Christopher Davis, Pushkar Mishra, Andrew Caines, Helen Yannakoudakis, Marek Rei, Ekaterina Shutova and Paula Buttery

*In Proceedings of the International Workshop on Semantic Evaluation 2019 (SemEval 2019).*

**A Simple and Robust Approach to Detecting Subject-Verb Agreement Errors**

Simon Flachs, Ophélie Lacroix, Marek Rei, Helen Yannakoudakis and Anders Søgaard

*In Proceedings of the 17th Annual Conference of the North American Chapter of the Association for Computational Linguistics (NAACL 2019).*

**Jointly Learning to Label Sentences and Tokens**

Marek Rei and Anders Søgaard

*In Proceedings of the Thirty-Third AAAI Conference on Artificial Intelligence (AAAI 2019).*

**Advance Prediction of Ventricular Tachyarrhythmias using Patient Metadata and Multi-Task Networks**

Marek Rei, Josh Oppenheimer and Marek Sirendi

*In Proceedings of the NeurIPS Workshop on Machine Learning for Health (ML4H 2018).*

**Sequence Classification with Human Attention**

Maria Barrett, Joachim Bingel, Nora Hollenstein, Marek Rei and Anders Søgaard

*In Proceedings of the SIGNLL Conference on Computational Natural Language Learning (CoNLL 2018).*

*\*Special award for the best paper on research inspired by human language learning and processing\**

**Scoring Lexical Entailment with a Supervised Directional Similarity Network**

Marek Rei, Daniela Gerz and Ivan Vulić

*In Proceedings of the 56th Annual Meeting of the Association for Computational Linguistics (ACL 2018).*

**Zero-shot Sequence Labeling: Transferring Knowledge from Sentences to Tokens**

Marek Rei and Anders Søgaard

*In Proceedings of the 16th Annual Conference of the North American Chapter of the Association for Computational Linguistics: Human Language Technologies (NAACL 2018).*

**Variable Typing: Assigning Meaning to Variables in Mathematical Text**

Yiannos Stathopoulos, Simon Baker, Marek Rei and Simone Teufel

*In Proceedings of the 16th Annual Conference of the North American Chapter of the Association for Computational Linguistics: Human Language Technologies (NAACL 2018).*

**A Supervised Similarity Network for Metaphor Detection**

Marek Rei, Luana Bulat, Douwe Kiela and Katia Shutova

*In Proceedings of the 2017 Conference on Empirical Methods in Natural Language Processing (EMNLP 2017).*

**Neural Sequence-Labeling Models for Grammatical Error Correction**

Helen Yannakoudakis, Marek Rei, Øistein E. Andersen and Zheng Yuan

*In Proceedings of the 2017 Conference on Empirical Methods in Natural Language Processing (EMNLP 2017).*

**Artificial Error Generation with Machine Translation and Syntactic Patterns**

Marek Rei, Mariano Felice, Zheng Yuan and Ted Briscoe

*In Proceedings of the 12th Workshop on Innovative Use of NLP for Building Educational Applications (BEA 2017).***Auxiliary Objectives for Neural Error Detection Models**

Marek Rei and Helen Yannakoudakis

*In Proceedings of the 12th Workshop on Innovative Use of NLP for Building Educational Applications (BEA 2017).***An Error-Oriented Approach to Word Embedding Pre-Training**

Youmna Hussein, Marek Rei and Ted Briscoe

*In Proceedings of the 12th Workshop on Innovative Use of NLP for Building Educational Applications (BEA 2017).***Detecting Off-topic Responses to Visual Prompts**

Marek Rei

*In Proceedings of the 12th Workshop on Innovative Use of NLP for Building Educational Applications (BEA 2017).***Semi-supervised Multitask Learning for Sequence Labeling**

Marek Rei

*In Proceedings of the 55th Annual Meeting of the Association for Computational Linguistics (ACL 2017).***Attending to Characters in Neural Sequence Labeling Models**

Marek Rei, Sampo Pyysalo and Gamal K.O. Crichton

*In Proceedings of the 26th International Conference on Computational Linguistics (COLING 2016).***A Joint Model for Word Embedding and Word Morphology**

Kris Cao and Marek Rei

*In Proceedings of the 1st Workshop on Representation Learning for NLP (RepL4NLP 2016).***Compositional Sequence Labeling Models for Error Detection in Learner Writing**

Marek Rei and Helen Yannakoudakis

*In Proceedings of the 54th Annual Meeting of the Association for Computational Linguistics (ACL 2016).***Automatic Text Scoring Using Neural Networks**

Dimitrios Alikaniotis, Helen Yannakoudakis and Marek Rei

*In Proceedings of the 54th Annual Meeting of the Association for Computational Linguistics (ACL 2016).***Sentence Similarity Measures for Fine-Grained Estimation of Topical Relevance in Learner Essays**

Marek Rei and Ronan Cummins

*In Proceedings of the 11th Workshop on Innovative Use of NLP for Building Educational Applications (BEA 2016).***Online Representation Learning in Recurrent Neural Language Models**

Marek Rei

*In Proceedings of the 2015 Conference on Empirical Methods in Natural Language Processing (EMNLP 2015).***Looking for hyponyms in vector space**

Marek Rei and Ted Briscoe

*In Proceedings of the Eighteenth Conference on Computational Natural Language Learning (CoNLL 2014).***Parser lexicalisation through self-learning**

Marek Rei and Ted Briscoe

*In Proceedings of the 2013 Conference of the North American Chapter of the Association for Computational Linguistics (NAACL-HLT 2013).*

#### **Unsupervised Entailment Detection between Dependency Graph Fragments**

Marek Rei and Ted Briscoe

*In Proceedings of the 2011 Workshop on Biomedical Natural Language Processing (BioNLP 2011).*

#### **Combining Manual Rules and Supervised Learning for Hedge Cue and Scope Detection**

Marek Rei and Ted Briscoe

*The 14th Conference on Natural Language Learning (CoNLL 2010).*

Note 1: In the areas of ML and NLP, most top-level publishing happens through conferences instead of journals. ML/NLP conferences only publish full-length peer-reviewed papers.

Note 2: Between 2012-2014 I was working as a researcher in SwiftKey. Research from that period was not published due to confidentiality restrictions, but a section of it has been made available as a patent.

## Book Chapters

#### **Intelligent Information Access from Scientific Papers**

Ted Briscoe, Karl Harrison, Andrew Naish-Guzman, Andy Parker, Marek Rei, Advait Siddharthan, David Sinclair, Mark Slater and Rebecca Watson

*Current Challenges in Patent Information Retrieval, edited by Mihai Lupu, Katja Mayer, John Tait and Anthony J. Trippe, 2011.*

## Patents

Patent applications for which I am the named inventor:

#### **Improved Artificial Neural Network for Language Modelling and Prediction**

Customised neural network structure for increasing the efficiency of language models, based on my research in SwiftKey.

*London, United Kingdom, 2016*

#### **Prediction of Cardiac Events**

Machine learning system for predicting cardiac events in patients and using it to guide their medical care, based on my research for Transformative AI.

*London, United Kingdom, 2017*

## Theses

#### **Minimally Supervised Dependency-based Methods for Natural Language Processing**

PhD thesis, University of Cambridge

*Supervised by Ted Briscoe*

*Cambridge, United Kingdom, 2013*

#### **Adaptive Interactive Information Extraction**

MPhil thesis, University of Cambridge

*Supervised by Ted Briscoe*

*Cambridge, United Kingdom, 2009*

**Audio-visual Speech Synthesis**

Bachelor's thesis, Tallinn University of Technology

Supervised by Einar Meister

Tallinn, Estonia, 2008

**Invited Talks****What Makes AI Tick: A Look Inside Large Language Models**

*Baltic FinReg Summit. June 2024*

**Sequential Modelling of Patient Records**

*Speinshart Symposium on Large Health Models. March 2024*

**Interpretable Architectures and Guided Attention for Neural Language Models**

*University of Oxford. November 2023*

**Encoders: The Art of Packing Text into Vectors**

*ESSCaSS Tartu Summer School. August 2022*

**Memorisation versus Generalisation in Language Models**

*University of Cambridge, UK. May 2022*

**Memorisation versus Generalisation in Language Models**

*Polish Natural Language Processing Group, UK. Nov 2021*

**Multidirectional Associative Optimization of Function-Specific Word Representations**

*University of Cambridge, UK. June 2020*

**Inductive Transfer Learning for Neural Models**

*Ajou University, South Korea. July 2019*

**Application of Deep Learning in NLP**

*RANLP Summer School on Deep Learning in NLP, Bulgaria. August 2019*

**How to Pay Attention: Learning to Transfer Knowledge between Sentences and Tokens**

*University of Cambridge, UK. May 2019*

**Inductive Transfer Learning for Neural Models of Natural Language**

*Imperial College London, UK. March 2019*

**Semi-supervised and Zero-shot Methods for Sequence Labeling**

*TU Darmstadt, Germany. November 2018*

**Language Modelling and Machine Translation**

*University of Makerere, Uganda. June 2018*

**Human Interpretability of Machine Learning Models**

*University of Tartu, Estonia. May 2018*

**Understanding and Assessing Language with Neural Network Models**

*Grammarly, Ukraine. March 2018*

**Neural Architectures for Sequence Labelling**

*Grammarly, Ukraine. March 2018*

**Auxiliary Objectives for Neural Sequence Labelling Models***University of Copenhagen, Denmark. November 2017***Sequence Labeling Models for Error Detection in Learner Writing***Machine Learning for Further Language Learning, summer school in Chania, Greece. July 2017***Neural Architectures for Sequence Labelling***Apple Cambridge. June 2017***Neural Architectures for Sequence Labelling***University College London. May 2017***Neural Architectures for Sequence Labelling***University of Cambridge. May 2017***Character-based and Multi-task Learning for Neural Sequence Labeling***University of Sheffield. March 2017*

## Program Committee

I am part of the program committee for the following conferences and workshops:

The Conference on Neural Information Processing Systems (NeurIPS 2024)

The 41st International Conference on Machine Learning (ICML 2024)

The 2024 International Conference on Learning Representations (ICLR 2024)

The Conference on Neural Information Processing Systems (NeurIPS 2023)

The 2023 International Conference on Learning Representations (ICLR 2023)

The Third Workshop on Generation, Evaluation & Metrics (GEM 2023)

The 39th International Conference on Machine Learning (ICML 2022)

The Conference on Neural Information Processing Systems (NeurIPS 2022)

The 2022 International Conference on Learning Representations (ICLR 2022)

Joint CDT Conference on AI for Healthcare (CAI4H 2022)

The 2021 Conference on Empirical Methods in Natural Language Processing (EMNLP 2021)

The Conference on Neural Information Processing Systems (NeurIPS 2021)

The Joint Conference of the 59th Annual Meeting of the Association for Computational Linguistics and the 11th International Joint Conference on Natural Language Processing (ACL-IJCNLP 2021)

The 3rd Workshop on NLP for Conversational AI (NLP4CONVAI 2021)

The 2021 International Conference on Learning Representations (ICLR 2021)

The 2020 Conference on Empirical Methods in Natural Language Processing (EMNLP 2020)

The Conference on Neural Information Processing Systems (NeurIPS 2020)

The Second Workshop on Knowledge Extraction and Integration for Deep Learning Architectures (DeeLIO 2020)



The Thirty-Fourth AAAI Conference on Artificial Intelligence (AAAI 2020)  
The 37th International Conference on Machine Learning (ICML 2020)  
The SIGNLL Conference on Computational Natural Language Learning (CoNLL 2020)  
The Conference on Neural Information Processing Systems (NeurIPS 2019)  
The 2019 Conference on Empirical Methods in Natural Language Processing (EMNLP-IJCNLP 2019)  
The SIGNLL Conference on Computational Natural Language Learning (CoNLL 2019)  
The 14th Workshop on Innovative Use of NLP for Building Educational Applications (BEA 2019)  
The 1st Workshop on NLP for ConvAI (NLP4CONVAI 2019)  
The 5th Workshop on Noisy User-generated Text (W-NUT 2019)  
The 22nd Nordic Conference on Computational Linguistics (NoDaLiDa 2019)  
The 36th International Conference on Machine Learning (ICML 2019)  
The 2nd Learning from Limited Labeled Data Workshop (LLD 2019)  
The 3rd Workshop on Evaluating Vector Space Representations for NLP (RepEval 2019)  
The Second Workshop on Fact Extraction and Verification (FEVER 2019)  
The Workshop on Structured Prediction for NLP (SPNLP 2019)  
The Workshop on Deep Learning Approaches for Low Resource Natural Language Processing (DeepLo 2019)  
The 56th Annual Meeting of the Association for Computational Linguistics (ACL 2018)  
The SIGNLL Conference on Computational Natural Language Learning (CoNLL 2018)  
The Conference on Computational Linguistics (COLING 2018)  
The 13th Workshop on Innovative Use of NLP for Building Educational Applications (BEA 2018)  
The Seventh Joint Conference on Lexical and Computational Semantics (\*SEM 2018)  
The 3rd Workshop on Representation Learning for NLP (RepL4NLP 2018)  
The First Workshop on Fact Extraction and Verification (FEVER 2018)  
The Workshop on Figurative Language Processing (FigLang 2018)  
Workshop on Deep Learning Approaches for Low Resource Natural Language Processing (DeepLo 2018)  
Workshop on Subword and Character Level Models in NLP 2018 (SCLeM 2018)  
Workshop on Figurative Language Processing 2018 (FigLang 2018)  
The Sixth Joint Conference on Lexical and Computational Semantics (\*SEM 2017)  
The 12th Workshop on Innovative Use of NLP for Building Educational Applications (BEA 2017)  
Workshop on Evaluating Vector Space Representations for NLP 2017 (RepEval 2017)  
Workshop on Subword and Character Level Models in NLP 2017 (SCLeM 2017)  
Workshop on Evaluating Vector Space Representations for NLP 2016 (RepEval 2016)  
The 11th Workshop on Innovative Use of NLP for Building Educational Applications (BEA 2016)

## Additional Reviewing

In addition to the program committees above, I review for the following journals and publishers:

ACL Rolling Review

MIT Press

The AAAI Conference on Artificial Intelligence (AAAI)

Journal of Natural Language Engineering (JNLE)

Special Issue of the Natural Language Engineering: Informing Neural Architectures for NLP with Linguistic and Background Knowledge

Artificial Intelligence Journal

International Journal of Artificial Intelligence in Education (IJAIED)

Cambridge Language Sciences Symposium

## Programming Skills

Main experience: Python, PyTorch, Tensorflow, Theano, Java, JavaScript, PHP, SQL, HTML, CSS

Limited experience: C++, C, Android, Clojure, Perl, JSP, Lisp, Prolog, Haskell