# MILOŠ STANOJEVIĆ

SENIOR RESEARCH SCIENTIST AT GOOGLE DEEPMIND

## RESEARCH INTERESTS

- Syntactic Parsing
- Formal Language Universals
- Incremental Sentence Processing
- Unsupervised Learning
- Machine Translation

## WORK EXPERIENCE

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| Nov 2021 – now | **Senior Research Scientist** <br> *Google DeepMind* <br> Language Team, London, UK |
| Nov 2017 – Oct 2021 | **Research Associate** <br> *University of Edinburgh* <br> with Prof. Mark Steedman <br> School of Informatics, Edinburgh, UK |
| July 2017 – Oct 2017 | **Internship** <br> *Nuance Communications (now part of Microsoft)* <br> with Prof. Edward Stabler <br> Natural Language and AI group, Sunnyvale, US |

## EDUCATION

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| 2013 – 2017 | **Ph.D. Natural Language Processing** <br> *University of Amsterdam, Netherlands* <br> topic: Permutation Forests for Modeling Word Order in MT <br> supervised by Prof. Khalil Sima'an and Dr. Wilker Aziz |
| 2011 – 2013 | **Mgr. Mathematical Linguistics** <br> *Charles University in Prague, Czechia* |
| 2010 – 2011 | **M.Sc. Human Language Science and Technology** <br> *University of Malta, Malta* |
| 2006 – 2010 | **B.Sc. Electrical Engineering** <br> *University of Niš, Serbia* |

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| **arXiv 2024**<br>**in ARR review** | **Multipath parsing in the brain**<br>*arXiv preprint*<br>Berta Franzluebbers, Donald Dunagan, **Miloš Stanojević**, Jan Buys, John Hale |
| **EMNLP System**<br>**Demonstrations**<br>**2023** | **SynJax: Structured Probability Distributions for JAX**<br>*Empirical Methods in Natural Language Processing System Demonstration*<br>**Miloš Stanojević** and Laurent Sartran |
| **Cognitive Science**<br>*journal* **2023** | **Modeling structure-building in the brain with CCG parsing and large language models**<br>*Cognitive Science — journal*<br>**Miloš Stanojević,** Jonathan Brennan**,** Donald Dunagan, Mark Steedman, John Hale |
| **Neurobiology of**<br>**Language**<br>*journal* **2023** | **Neural correlates of long-distance dependencies in Chinese and English**<br>*Neurobiology of Language — journal*<br>Donald Dunagan, **Miloš Stanojević**, Maximin Coavoux, Shulin Zhang, Shohini Bhattasali, Jixing Li, Jonathan Brennan, John Hale |
| **EMNLP 2022** | **Unbiased and Efficient Sampling of Dependency Trees**<br>*Conference on Empirical Methods in Natural Language Processing*<br>**Miloš Stanojević** |
| **TACL**<br>*journal* **2022** | **Transformer Grammars: Augmenting Transformer Language Models with Syntactic Inductive Biases at Scale**<br>*Transactions of the Association for Computational Linguistics — journal*<br>Laurent Sartran, Samuel Barrett, Adhiguna Kuncoro,<br>**Miloš Stanojević**, Phil Blunsom, Chris Dyer |
| **Computational**<br>**Linguistics**<br>*journal* **2021** | **Formal Basis of a Language Universal**<br>*Computational Linguistics — journal*<br>**Miloš Stanojević** and Mark Steedman |
| **EMNLP 2021** | **A Root of a Problem: Optimizing Single-Root Dependency Parsing**<br>*Conference on Empirical Methods in Natural Language Processing*<br>**Miloš Stanojević** and Shay B. Cohen |
| **IWCS 2021** | **Computing All Quantifier Scopes with CCG**<br>*International Conference on Computational Semantics*<br>**Miloš Stanojević** and Mark Steedman |

**CMCL 2021**    [Modeling incremental language comprehension in the brain with Combinatory Categorial Grammar](#)
*Workshop on Cognitive Modeling and Computational Linguistics*
**Miloš Stanojević**, Shohini Bhattasali, Donald Dunagan, Luca Campanelli, Mark Steedman, Jonathan Brennan, John Hale

**CASE 2021**    [Modality and Negation in Event Extraction](#)
*Workshop on Challenges and Applications of Automated Extraction of Socio-political Events from Text*
Sander Bijl de Vroe, Liane Guillou, **Miloš Stanojević**, Nick McKenna and Mark Steedman

**ACL 2020**    [Max-Margin Incremental CCG Parsing](#)
*Annual Meeting of the Association for Computational Linguistics*
**Miloš Stanojević** and Mark Steedman

**IWPT 2020**    [Span-Based LCFRS-2 Parsing](#)
*The 16th International Conference on Parsing Technologies*
**Miloš Stanojević** and Mark Steedman

**CUNY 2020**    [Predictive Processing of Coordination in CCG](#)
*CUNY Human Sentence Processing Conference*
**Miloš Stanojević**, John Hale and Mark Steedman

**ACL 2019**    [Wide-Coverage Neural A* Parsing for Minimalist Grammars](#)
*Annual Meeting of the Association for Computational Linguistics*
John Torr, **Miloš Stanojević**, Mark Steedman and Shay B. Cohen

**FG 2019**    [On the Computational Complexity of Head Movement and Affix Hopping](#)
*Conference on Formal Grammar*
**Miloš Stanojević**

**NAACL 2019**    [CCG Parsing Algorithm with Incremental Tree Rotation](#)
*Conference of the North American Chapter of the Association for Computational Linguistics*
**Miloš Stanojević** and Mark Steedman

**CMCL 2019**    [The active-filler strategy in a move-eager left-corner Minimalist Grammar parser](#)
*Workshop on Cognitive Modeling and Computational Linguistics*
Tim Hunter, **Miloš Stanojević** and Edward Stabler

**CogACLL 2018**    [A Sound and Complete Left-Corner Parsing for Minimalist Grammars](#)
*Workshop on Cognitive Aspects of Computational Language Learning and Processing*
**Miloš Stanojević** and Edward Stabler

✉ *milosh.stanojevic@gmail.com*      ⌂ *HTTPS://STANOJEVIC.GITHUB.IO/*

**PROPOR 2018**  **[SICK-BR: a Portuguese corpus for inference](#)**
*International Conference on Computational Processing of the Portuguese Language*
Livy Real, Ana Rodrigues, Andressa Vieira e Silva, Beatriz Albiero, Bruna Thalenberg, Bruno Guide, Cindy Silva, Guilherme de Oliveira Lima, Igor CS Câmara, **Miloš Stanojević**, Rodrigo Souza, Valeria de Paiva

**PhD Thesis 2017**  **[Permutation Forests for Modeling Word Order in Machine Translation](#)**
*University of Amsterdam 2017*
**Miloš Stanojević**

**EMNLP 2017**  **[Neural Discontinuous Constituency Parsing](#)**
*Conference on Empirical Methods in Natural Language Processing*
**Miloš Stanojević** and Raquel G. Alhama

**ACL 2017 short paper**  **[Alternative Objective Functions for Training MT Evaluation Metrics](#)**
*Annual Meeting of the Association for Computational Linguistics*
**Miloš Stanojević** and Khalil Sima'an

**LACL 2016**  **[Minimalist Grammar Transition-Based Parsing](#)**
*Logical Aspects of Computational Linguistics*
**Miloš Stanojević**

**COLING 2016**  **[Hierarchical Permutation Complexity for Word Order Evaluation](#)**
*International Conference on Computational Linguistics*
**Miloš Stanojević** and Khalil Sima'an

**COLING 2016**  **[Universal Reordering via Linguistic Typology](#)**
*International Conference on Computational Linguistics*
Joachim Daiber, **Miloš Stanojević** and Khalil Sima'an

**WMT 2016**  **[Examining the Relationship between Preordering and Word Order Freedom in Machine Translation](#)**
*Conference on Machine Translation*
Joachim Daiber, **Miloš Stanojević**, Wilker Aziz and Khalil Sima'an

**WMT 2016**  **[Results of the WMT16 Metrics Shared Task](#)**
*Conference on Machine Translation*
Ondřej Bojar, Yvette Graham, Amir Kamran and **Miloš Stanojević**

**WMT 2016**  **[Results of the WMT16 Tuning Shared Task](#)**
*Conference on Machine Translation*
Bushra Jawaid, Amir Kamran, **Miloš Stanojević** and Ondřej Bojar

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| **EMNLP 2015** | **Reordering Grammar Induction**<br>*Conference on Empirical Methods in Natural Language Processing*<br>**Miloš Stanojević** and Khalil Sima'an |
| **PBML 2015** | **Evaluating MT systems with BEER**<br>*The Prague Bulletin of Mathematical Linguistics*<br>**Miloš Stanojević** and Khalil Sima'an |
| **WMT 2015** | **BEER 1.1: ILLC UvA submission to metrics and tuning task**<br>*Workshop on Machine Translation*<br>**Miloš Stanojević** and Khalil Sima'an |
| **WMT 2015** | **Results of the WMT15 Metrics Shared Task**<br>*Workshop on Machine Translation*<br>**Miloš Stanojević**, Amir Kamran, Philipp Koehn and Ondřej Bojar |
| **WMT 2015** | **Results of the WMT15 Tuning Shared Task**<br>*Workshop on Machine Translation*<br>**Miloš Stanojević**, Amir Kamran and Ondřej Bojar |
| **SSST 2014** | **Evaluating Word Order Recursively over Permutation-Forests**<br>*Workshop on Syntax, Semantics and Structure in Statistical Translation*<br>**Miloš Stanojević** and Khalil Sima'an |
| **WMT 2014** | **BEER: BEtter Evaluation as Ranking**<br>*Workshop on Machine Translation*<br>**Miloš Stanojević** and Khalil Sima'an |
| **EMNLP 2014 short paper** | **Fitting Sentence Level Translation Evaluation with Many Dense Features**<br>*Conference on Empirical Methods in Natural Language Processing*<br>**Miloš Stanojević** and Khalil Sima'an |
| **WMT 2012** | **Selecting data for English-to-Czech machine translation**<br>*Workshop on Machine Translation*<br>Aleš Tamchyna, Petra Galuščáková, Amir Kamran, **Miloš Stanojević**, Ondřej Bojar |

## Contributions to the community

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| Reviewing for conferences: | ARR, ACL, NAACL, EMNLP, EACL, CoNLL, AAAI |
| Reviewing for journals: | TACL, CL, NLE, LREC, MT, LM |
| Organizing shared tasks: | Workshop on Machine Translation - Metrics task in 2015 and 2016 |
| | Workshop on Machine Translation - Tuning task in 2015 and 2016 |

## Supervision and Mentorship

*2022*
**DeepMind**
*scholar mentor*

Mukhtar Mohamed – now MSc student at University of Edinburgh
**Part of DeepMind's scholars programme.**

*2021*
**University of Edinburgh**
*MSc thesis*
*main supervisor*

Seth Aycock – now PhD student at University of Amsterdam
**Target-side CCG Supertag Prediction Improves Machine Translation**

*2019*
**University of Edinburgh**
*BSc project*
*main supervisor*

Chiehmin Wei – now MSc student at Cornell
**Zero-Shot and Universal Parsing with Multilingual Contextualized Embeddings**

*2018 – 2019*
**University of Edinburgh**
*PhD thesis*
*co-supervisor*

John Torr – now RS at Apple Research, Cambridge
**Wide-Coverage Statistical Parsing with Minimalist Grammars**

## Teaching

2012/2013 summer
*University of Amsterdam*

TA **Statistical Structure in NLP**

2013/2014 winter
*University of Amsterdam*

TA **Elements of Language Processing**

2014/2015 summer
*University of Amsterdam*

TA project course on **Monte Carlo Inference for PCFG**

2015/2016 summer
*University of Amsterdam*

TA **Natural Language Processing 2**

2016/2017 summer
*University of Amsterdam*

TA **Natural Language Processing 2**

## INVITED TALKS

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| *University of Amsterdam* <br> *Netherlands, 2023* | **Syntactic Structures and Large Language Models** |
| *University of Cambridge* <br> *Cambridge, UK, 2023* | **The role of syntax in the world of large language models** |
| *UCL* <br> *London, UK, 2023* | **What is the relation of Syntactic Parsing, Language Universals, Brain Activity and Large Language Models?** |
| *ETH Zürich* <br> Zürich, Switzerland, 2022 | **Testing Syntactic Theory on all Marr's Levels of Analysis** |
| *Mathematics of Language* <br> Montpellier, France, 2021 | **CCG Combinators in Brain Activity and Linguistic Universals** |
| *DeepMind* <br> London, UK, 2021 | **Integrating Deep Learning with Deep Syntax** |
| *Nuance NL & AI lab* <br> Sunnyvale, USA, 2017 | **Learning Reordering Grammars** |
| *Rich Parsing Workshop* <br> Amsterdam, 2016 | **Minimalist Grammar Transition-Based Parsing** |
| *MT Marathon* <br> Prague, Czechia, 2015 | **Discriminative Training for Statistical Machine Translation** |

## SCHOLARSHIPS

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| 2010 - 2012 | **Erasmus Mundus scholarship** |
| 2004 - 2010 | **Scholarship from the Ministry of Science and Technological Development of Serbia** <br> awarded for taking part in international mathematical competitions |
| 2002 - 2004 | **Scholarship from the Ministry of Education of Serbia** <br> awarded for taking part in international mathematical competition |