

Aaron M. Mueller

CONTACT INFORMATION	Center for Language & Speech Processing Johns Hopkins University 3400 N. Charles St., Hackerman 319 Baltimore, MD 21218-2608 (U.S.A.)	<i>E-mail:</i> amueller@jhu.edu <i>Website:</i> aaronmueller.github.io <i>Code:</i> github.com/aaronmueller
RESEARCH INTERESTS	<ul style="list-style-type: none">• Multilingual natural language processing• Computational psycholinguistics• Machine translation	
EDUCATION	Johns Hopkins University , Baltimore, MD Ph.D. student, Computer Science. M.S.E., Computer Science. GPA: 3.9/4.0. <i>Advisors:</i> Mark Dredze, David Yarowsky. University of Kentucky , Lexington, KY B.S., Computer Science. Honors. B.S., Linguistics. Honors. GPA: 4.0/4.0. <i>Summa cum laude</i> . <i>Thesis:</i> Neural Machine Translation for Canadian French.	Present May 2020 May 2018 May 2018
INDUSTRY EXPERIENCE	Amazon , Santa Clara, CA <i>Applied Scientist Intern</i> Manager: Saab Mansour <ul style="list-style-type: none">– Research in pre-training methods for improving goal-oriented dialogue agents.– Resulted in state-of-the-art few-shot intent classification performance (>30% 1-shot gains) and an ACL submission (under review). Raytheon BBN Technologies , Cambridge, MA <i>Research Intern</i> Supervisors: Roger Bock, Ilana Heintz <ul style="list-style-type: none">– Implemented convolutional neural machine translation models rivaling our prior seq2seq model’s performance with over 20% faster training and over 50% faster inference.– Research in low-resource Ukrainian/Russian-English word alignment and entity linking.	May 2021 – August 2021 May 2019 – August 2019
PUBLICATIONS	REFEREED <ol style="list-style-type: none">1. Aaron Mueller, Mark Dredze. “Fine-tuning Encoders for Improved Monolingual and Zero-shot Polylingual Neural Topic Modeling.” In <i>Proceedings of the North American Chapter of the Association for Computational Linguistics (NAACL)</i>, 2021.2. Aaron Mueller, Zach Wood-Doughty, Silvio Amir, Mark Dredze, Alicia L. Nobles. “Demographic Representation and Collective Storytelling in the Me Too Twitter Hashtag Activism Movement.” In <i>Proceedings of the Association for Computing Machinery (ACM) on Human-Computer Interaction (HCI)</i>, vol. CSCWI, 2021.3. Aaron Mueller*, Matthew Finlayson*, Sebastian Gehrmann, Stuart Shieber, Tal Linzen, Yonatan Belinkov. “Causal Analysis of Syntactic Agreement Mechanisms in Neural Language Models.” In <i>Proceedings of the Association for Computational Linguistics (ACL)</i>, 2021. [*Equal contribution]4. Aaron Mueller*, Alexandra DeLucia*, Xiang Lisa Li, João Sedoc. “Decoding Methods for Neural Narrative Generation.” In <i>Proceedings of the Workshop on Generation Evaluation and Metrics (GEM) at Association for Computational Linguistics (ACL)</i>, 2021. [*Equal contribution]5. Aaron Mueller, Garrett Nicolai, Panayiota Petrou-Zeniou, Natalia Talmina, Tal Linzen. “Cross-linguistic Syntactic Evaluation of Word Prediction Models.” In <i>Proceedings of the Association for Computational Linguistics (ACL)</i>, 2020.6. Aaron Mueller, Garrett Nicolai, Arya D. McCarthy, Dylan Lewis, Winston Wu, David Yarowsky. “An Analysis of Massively Multilingual Neural Machine Translation for Low-Resource Languages.” In <i>Proceedings of the Language Resources and Evaluation Conference (LREC)</i>, 2020.	

7. Arya D. McCarthy, Rachel Wicks, Dylan Lewis, **Aaron Mueller**, Winston Wu, Oliver Adams, Garrett Nicolai, Matt Post, David Yarowsky. “The Johns Hopkins University Bible Corpus: 1600+ Tongues for Typological Exploration.” In *Proceedings of the Language Resources and Evaluation Conference (LREC)*, 2020.
8. Garrett Nicolai, Dylan Lewis, Arya D. McCarthy, **Aaron Mueller**, Winston Wu, David Yarowsky. “Fine-grained Morphosyntactic Analysis and Generation Tools for More Than One Thousand Languages.” In *Proceedings of the Language Resources and Evaluation Conference (LREC)*, 2020.
9. Marten van Schijndel, **Aaron Mueller**, Tal Linzen. “Quantity Doesn’t Buy Quality Syntax with Neural Language Models.” *Empirical Methods in Natural Language Processing (EMNLP)*, 2019.
10. Arya D. McCarthy, Winston Wu, **Aaron Mueller**, Bill Watson, David Yarowsky. “Modeling Color Terminology Across Thousands of Languages.” *Empirical Methods in Natural Language Processing (EMNLP)*, 2019.
11. **Aaron Mueller***, Yash Kumar Lal*. “Sentence-Level Adaptation for Low-Resource Neural Machine Translation.” In *Proceedings of the Workshop on Technologies for Machine Translation of Low-Resource Languages (LoResMT) at Machine Translation Summit (MTSummit)*, 2019. [*Equal contribution]

UNDER REVIEW

12. **Aaron Mueller**, Jason Krone, Salvatore Romeo, Saab Mansour, Elman Mansimov, Yi Zhang, Dan Roth. “Label Semantic Aware Pre-training for Few-shot Text Classification.” In submission to *Association for Computational Linguistics (ACL)*, 2022.
13. **Aaron Mueller**, Robert Frank, Tal Linzen, Luheng Wang, Sebastian Schuster. “Coloring the Blank Slate: Pre-training Imparts a Hierarchical Inductive Bias to Sequence-to-sequence Models.” In submission to *Association for Computational Linguistics (ACL)*, 2022.

NON-REFEREED

14. **Aaron Mueller**, Mark Richard Lauersdorf, Kevin McGowan, Ramakanth Kavuluru. “Neural Machine Translation for Canadian French.” *Undergraduate thesis*, 2018.

- INVITED TALKS – **Aaron Mueller**. “Syntactic Agreement in Neural Language Models: How Well and Where Do They Perform Subject-Verb Agreement?” At Mila – Québec Artificial Intelligence Institute, Language & Understanding Group (Montréal, QC). March 22, 2021. Virtual talk.
- **Aaron Mueller***, Sebastian Gehrmann*. “Causal Mediation Analysis for Analyzing Neural Networks.” At Google Fairness & Interpretability Research Group (New York, NY). March 17, 2021. Virtual talk. [*Equal contribution]
- **Aaron Mueller**. “Causal Analysis of Syntactic Agreement Mechanisms in Neural Language Models.” At Johns Hopkins University, Center for Language & Speech Processing Seminar (Baltimore, MD). February 12, 2021. Virtual talk.

- RESEARCH PRESENTATIONS – **Aaron Mueller**. “Québec French and Language Technology.” 2018 Betts & Rowland Scholar Awards Ceremony, Lexington, KY, April 4, 2018.
- **Aaron Mueller**, Katherine Keith, Abram Handler, Su Lin Blodgett, Brendan O’Connor. “The Identification of Civilians Killed by Police with Supervised Entity-Event Extraction.” UMass Amherst Research Experience for Undergraduates (REU) Showcase. Amherst, MA. August 9, 2017.
- **Aaron Mueller**, Raphael Finkel, Hilaria Cruz. “Documenting and Promoting the Chatino Language and Orthography.” Juried Presentation in Satisfaction of the Requirements of the Gaines Fellowship. Lexington, KY. February 21, 2017.
- **Aaron Mueller**, Huda Khayrallah, Winston Wu, David Yarowsky. “A Lemma-Based Approach for English-Uyghur Statistical Machine Translation.” Refereed Abstract at the *9th Annual Conference of the Illinois Language and Linguistics Society (ILLS9)*. Urbana, IL. March 31, 2017.
- **Aaron Mueller**, Mark Richard Lauersdorf. “Lexical and Semantic Shifts in the Linguistic Construction of Social Gender: A Corpus-Based Analysis of Written U.S. English.” Poster. Refereed Abstract at the *9th Annual Toronto Undergraduate Linguistics Conference (TULCON9)*. Toronto, ON. March 5, 2016.

ACADEMIC RESEARCH EXPERIENCE **New York University**, New York, NY
Center for Data Science
Visiting Academic
 Advisor: Tal Linzen

August 2021 – Present

- Behavioral and causal probing into the (morpho)syntactic representations and abilities of neural language models and sequence-to-sequence models.

Johns Hopkins University, Baltimore, MD

Center for Language & Speech Processing

Research Assistant (Natural Language Processing)

August 2018 – Present

Advisors: David Yarowsky, Mark Dredze

- Research in neural machine translation, natural language generation, and massively multilingual NLP.

University of Kentucky, Lexington, KY

Institutional Research & Advanced Analytics

Research Assistant (Machine Learning)

May 2018 – August 2018

Supervisors: Nathan Jacobs, Craig Rudick

- Implemented deep LSTMs to learn student and course profiles for grade prediction.
- Designed various ordinal loss functions.

University of Massachusetts Amherst, Amherst, MA

Statistical Social Language Analysis Lab

Research Assistant (Natural Language Processing)

May 2017 – August 2017

Supervisor: Brendan O'Connor

- Research in entity-event extraction.
- Integrated entity mention and relation systems into pre-existing sentence-level entity-event extraction model. Also integrated document-level information (e.g., noun coreferences) as features.

University of Kentucky, Lexington, KY

Linguistics Department

Juried Project

August 2016 – May 2017

Jurors: Hilaria Cruz, Raphael Finkel, Phil Harling

- Preservation and revitalization project for a low-resource indigenous language—Chatino—spoken natively by approximately 40,000 individuals.
- Trained ASR systems with Sphinx.
- Created and publicized Chatino language-learning resources, including open-source speech data, a speech corpus, and a website.

Johns Hopkins University, Baltimore, MD

Center for Language & Speech Processing

Research Assistant (Natural Language Processing)

May 2016 – August 2016

Advisors: David Yarowsky, Mark Dredze

- Research in statistical machine translation for low-resource languages.
- Implemented a lemma-based English-Uyghur translation model, built a morphological generator for Crimean Tatar, and created parsers to extract translation tables from foreign editions of Wiktionary.

FELLOWSHIPS AND AWARDS

National Science Foundation Graduate Research Fellow

2018 - 2023

Gaines Fellow

2016 - 2018

Two-year fellowship awarded to undergraduates based on academic performance, ability to conduct research, an interest in public issues, and a desire to enhance understanding of the human condition through the humanities. Requires the completion of a juried project, a thesis project, and a seminar in the humanities. (\$5,000)

Patterson Scholar

2014 - 2018

Awarded to University of Kentucky students who have earned National Merit semifinalist standing or better. (\$80,000+)

Raymond F. Betts Scholar

2017

Awarded to rising seniors conducting thesis research. Used funds to study Québec French in Montréal and Québec City during winter of 2017–2018. (\$2,500)

Goldwater Scholarship (Honorable Mention)

2017

Phi Beta Kappa

2017

Linguistics Research Award

2016

Awarded to a University of Kentucky undergraduate to facilitate a year-long research project in linguistics.

	Used funds for a quantitative sociolinguistics project examining semantic shifts in gendered words in U.S. media over 200 years. (\$500)	
	National Merit Semifinalist	2014
TEACHING	Johns Hopkins University , Baltimore, MD <i>Teaching Assistant</i> – Machine Learning: AI System Design & Development.	Spring 2020
SKILLS	Programming: – Languages (expert): Python – Languages (proficient): C++, HTML, CSS, Javascript, Bash – Machine Learning Toolkits: PyTorch (incl. HuggingFace, fairseq, sockeye), NLTK, Scikit-learn, numpy – Version Control: DVCS (Git, Bitbucket) – Development Environments: Vim, Emacs, VSCode, PyCharm Linguistic Tools: Praat, AntConc, QGIS, Audacity.	
LANGUAGES	English (native language), French (B2, Canadian). Experience with Chatino, Uyghur, and Finnish through research.	
INTERESTS AND HOBBIES	– Music: guitar (classical, electric), bass, banjo, synthesizer, MaxMSP, Ableton Live. – Athletics: cold-weather/snow hiking, swing dance, contra. – Hobbies: natural language learning, reading (philosophy, politics), city exploration. – Cooking: Thai, French, German, Southern.	