

# 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.)	E-mail: amueller@jhu.edu Website: aaronmueller.github.io Code: github.com/aaronmueller
RESEARCH INTERESTS	<ul style="list-style-type: none"> <li>• Multilingual natural language processing</li> <li>• Computational psycholinguistics</li> <li>• Machine translation</li> <li>• Endangered and low-resource languages</li> </ul>	
EDUCATION	<p><b>Johns Hopkins University</b>, Baltimore, MD</p> <p>Ph.D. student, Computer Science. August 2018 - Present</p> <p>M.S.E., Computer Science. May 2020</p> <p>GPA: 3.9/4.0.</p> <p><i>Affiliation:</i> Center for Language and Speech Processing.</p> <p><i>Advisors:</i> Mark Dredze, David Yarowsky.</p> <p><b>University of Kentucky</b>, Lexington, KY</p> <p>B.S., Computer Science. Honors. May 2018</p> <p>B.S., Linguistics. Honors. May 2018</p> <p>GPA: 4.0/4.0. <i>Summa cum laude.</i></p> <p><i>Thesis:</i> Neural Machine Translation for Canadian French.</p> <p><i>Advisors:</i> Ramakanth Kavuluru, Mark Richard Lauersdorf.</p>	
RESEARCH EMPLOYMENT	<p><b>BBN Technologies</b>, Cambridge, MA</p> <p><b>Analytics &amp; Machine Intelligence</b></p> <p><i>Speech, Language, &amp; Multimedia Research Intern</i> May - August 2019</p> <p>Supervisors: Roger Bock, Ilana Heintz</p> <ul style="list-style-type: none"> <li>– Research in neural machine translation, word alignment, and entity linking.</li> <li>– Funded by DARPA's Active Interpretation of Disparate Alternatives (AIDA) program.</li> </ul> <p><b>University of Kentucky</b>, Lexington, KY</p> <p><b>Institutional Research &amp; Advanced Analytics</b></p> <p><i>Research Assistant (Machine Learning)</i> May - August 2018</p> <p>Supervisors: Nathan Jacobs, Craig Rudick</p> <ul style="list-style-type: none"> <li>– Designed a system that, given a student's prior performance, predicts their future course grades.</li> <li>– Implemented deep LSTMs and employed NLP techniques to learn student and course profiles.</li> <li>– Designed an ordinal grade-based loss function to improve system performance.</li> </ul> <p><b>University of Massachusetts Amherst</b>, Amherst, MA</p> <p><b>Statistical Social Language Analysis Lab</b></p> <p><i>Research Assistant (Natural Language Processing)</i> May - August 2017</p> <p>Supervisor: Brendan O'Connor</p> <ul style="list-style-type: none"> <li>– Collaborated with graduate students and faculty to improve an entity-event extraction system.</li> <li>– Given news articles, used distant supervision to extract the names of American citizens who have been killed by police.</li> <li>– Integrated entity mention and relation systems into pre-existing sentence-level model.</li> <li>– Integrated document-level information (e.g., noun coreferences) as features to improve our system.</li> </ul> <p><b>University of Kentucky</b>, Lexington, KY</p> <p><b>Linguistics Department</b></p> <p><i>Juried Project</i> August 2016 - May 2017</p> <p>Jurors: Hilaria Cruz, Raphael Finkel, Phil Harling</p> <ul style="list-style-type: none"> <li>– Preservation and revitalization project for a low-resource indigenous language—Chatino—spoken natively by approximately 40,000 individuals.</li> </ul>	

- Trained an automatic speech recognition system with Sphinx.
- Promoted and created 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 - August 2016

Supervisor: David Yarowsky

- Collaborated with graduate students and faculty to create statistical machine translation systems 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.
- Funded by DARPA's Low-Resource Languages for Emergent Incidents (LORELEI) program.

#### 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 scholarships. (\$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 Scholar**

2014

#### PUBLICATIONS

1. **Aaron Mueller**, Garrett Nicolai, Panayiota Petrou-Zeniou, Natalia Talmina, and Tal Linzen. *Cross-Linguistic Syntactic Evaluation of Word Prediction Models*. Association for Computational Linguistics (ACL), 2020.
2. **Aaron Mueller**, Garrett Nicolai, Arya D. McCarthy, Dylan Lewis, Winston Wu, and David Yarowsky. *An Analysis of Massively Multilingual Neural Machine Translation for Low-Resource Languages*. Language Resources and Evaluation Conference (LREC), 2020.
3. Arya D. McCarthy, Rachel Wicks, Dylan Lewis, **Aaron Mueller**, Winston Wu, Oliver Adams, Garrett Nicolai, Matt Post, and David Yarowsky. *The Johns Hopkins University Bible Corpus: 1600+ Tongues for Typological Exploration*. Language Resources and Evaluation Conference (LREC), 2020.
4. Garrett Nicolai, Dylan Lewis, Arya D. McCarthy, **Aaron Mueller**, Winston Wu, and David Yarowsky. *Fine-Grained Morphosyntactic Analysis and Generation Tools for More Than One Thousand Languages*. Language Resources and Evaluation Conference (LREC), 2020.
5. Marten van Schijndel, **Aaron Mueller**, and Tal Linzen. *Quantity Doesn't Buy Quality Syntax with Neural Language Models*. Empirical Methods in Natural Language Processing (EMNLP), 2019.
6. Arya D. McCarthy, Winston Wu, **Aaron Mueller**, Bill Watson, and David Yarowsky. *Modeling Color Terminology Across Thousands of Languages*. Empirical Methods in Natural Language Processing (EMNLP), 2019.

	7. <b>Aaron Mueller*</b> and Yash Kumar Lal*. <i>Sentence-Level Adaptation for Low-Resource Neural Machine Translation</i> . Machine Translation Summit (MTSummit) Workshop on Technologies for Machine Translation of Low-Resource Languages (LoResMT), 2019. [ <b>*Equal contribution</b> ]
SELECTED PRESENTATIONS	<p><b>Aaron Mueller</b>. <i>Québec French and Language Technology</i>. 2018 Betts &amp; Rowland Scholar Awards Ceremony, Lexington, KY, April 4, 2018.</p> <p><b>Aaron Mueller</b>, Katherine Keith, Abram Handler, Su Lin Blodgett, and Brendan O'Connor. <i>The Identification of Civilians Killed by Police with Supervised Entity-Event Extraction</i>. 2017 UMass Amherst Research Experience for Undergraduates (REU) Showcase, Amherst, MA, August 9, 2017.</p> <p><b>Aaron Mueller</b>, Raphael Finkel, and Hilaria Cruz. <i>Documenting and Promoting the Chatino Language and Orthography</i>. Juried Presentation in Satisfaction of the Requirements of the Gaines Fellowship, Lexington, KY, February 21, 2017.</p> <p><b>Aaron Mueller</b>, Huda Khayrallah, Winston Wu, and David Yarowsky. <i>A Lemma-Based Approach for English-Uyghur Statistical Machine Translation</i>. 9th Annual Conference of the Illinois Language and Linguistics Society (ILLS9), Urbana, IL, March 31–April 1, 2017.</p> <p><b>Aaron Mueller</b> and Mark Richard Lauersdorf. <i>Lexical and Semantic Shifts in the Linguistic Construction of Social Gender: A Corpus-Based Analysis of Written U.S. English</i>. Poster. 9th Annual Toronto Undergraduate Linguistics Conference (TULCON9), Toronto, ON, March 4–6, 2016.</p>
TEACHING EXPERIENCE	<p><b>Johns Hopkins University</b>, Baltimore, MD</p> <p><i>Teaching Assistant</i> January - May 2020</p> <ul style="list-style-type: none"> <li>– Machine Learning: AI System Design &amp; Development, Mathias Unberath. Spring 2020.</li> </ul>
ADDITIONAL EXPERIENCE	<p><b>Chellgren Center for Undergraduate Excellence</b>, Lexington, KY</p> <p><i>Student Outreach Team</i> August 2017 - May 2018</p> <ul style="list-style-type: none"> <li>– Promoted the Office of Undergraduate Research and the Chellgren Fellowship.</li> <li>– Organized panel discussions, workshops, and lectures on abstract writing, research poster design, and academic presentations.</li> <li>– Led the review committee for our Showcase of Undergraduate Scholars, an annual conference where University of Kentucky undergraduates present their research to other students and faculty.</li> </ul> <p><b>UK Special Collections Research Center</b>, Lexington, KY</p> <p><i>Archiving Intern</i> September 2015 - May 2016</p> <ul style="list-style-type: none"> <li>– Created a diachronic corpus of Lexingtonian architectural documentation which includes zoning ordinances and Lexington Planning Committee meeting minutes.</li> <li>– Made accessible an archival collection that highlights Lexington's architectural history.</li> <li>– Cooperated on a multiformat project that layered GIS technology, city government data, archival photos, and digital humanities tools.</li> </ul>
VOLUNTEER SERVICE	<p><b>Amnesty International</b> 2012 - Present</p> <ul style="list-style-type: none"> <li>– International organization dedicated to the protection of human rights worldwide.</li> <li>– Member of Amnesty International at Johns Hopkins and Washington, D.C.</li> <li>– <i>Founder</i> and former <i>Co-President</i> of Amnesty International at the University of Kentucky.</li> <li>– Organize fundraisers and informational events: concerts featuring local bands, panel discussions on contemporary issues, faculty debates, petitions, protests, and more.</li> <li>– Attendee at Amnesty's national Human Rights Conference.</li> </ul> <p><b>Oxfam International</b> 2014 - Present</p> <ul style="list-style-type: none"> <li>– International organization dedicated to poverty eradication, disaster relief, and political advocacy for those facing harsh living conditions and injustice worldwide.</li> <li>– Member of Oxfam in Washington, D.C.</li> <li>– <i>Founder</i> and former <i>Co-Coordinator</i> of Oxfam at the University of Kentucky.</li> <li>– Plan awareness-raising, fundraising, and petitioning events for Oxfam's GROW campaign with a distinct focus on food inequality in impoverished and war-stricken countries.</li> </ul>

### **Society for the Promotion of Undergraduate Research**

2014 - 2017

- University-of-Kentucky-based organization founded to assist undergraduates in finding research opportunities and in bettering their research.
- *Co-President* and former *Director of Events*.
- Plan and execute the Showcase of Undergraduate Scholars.
- Plan research workshops to help undergraduates improve their abstracts, presentations, and papers.
- Organize faculty panel discussions, promotional events, and information sessions on getting involved in undergraduate research and on scholarship and summer research opportunities.
- Merged with the Student Outreach Team in May 2017 (joined upon merge).

### COMPUTING SKILLS

#### Computer Programming:

- Languages: Python, C, C++, Java, HTML, CSS, Javascript, MATLAB, R, UNIX shell scripting.
- Machine Learning Toolkits: TensorFlow, Sockeye, Keras, PyTorch, OpenNMT.
- Version Control: DVCS (Git, Bitbucket).
- Development Environments: Vim, Emacs, Eclipse.

#### Linguistic Tools:

Praat, AntConc, QGIS, Audacity.

#### Desktop Editing and Productivity Software:

- $\text{\TeX}$  ( $\text{\LaTeX}$ ,  $\text{\BibTeX}$ ).
- GIMP, Inkscape.
- Microsoft Office, G Suite, OpenOffice.org, LibreOffice

### LANGUAGES

English (native language), French (B2; Canadian). Experience with Chatino and Uyghur 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.