

COLEMAN HALEY

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EDUCATION

Bachelor of Science, Computer Science

Aug. 2016 – May 2020

Johns Hopkins University. GPA: 3.80

Secondary Major: Cognitive Science; Minor: Linguistics.

RESEARCH & PROFESSIONAL EXPERIENCE

Microsoft Research

Remote

Contractor (Aquent L.L.C.)

Oct. – Dec. 2020

Advise on morphological parsing solutions for segmentation in a machine translation project. Extend translation model to Inuktitut to show model's promise for morphologically rich languages.

Neuro-Symbolic Computation Lab (dir. Paul Smolensky)

Baltimore, MD

Research Assistant

Mar. 2019 – Present

Develop novel Tensor Product Representation-based vectorial embeddings of symbolic structure which are substantially more efficient for syntactic tree embedding than prior methods. Extend this to allow for arbitrary symbolic computation over representations.

Phonology Lab (dir. Colin Wilson)

Baltimore, MD

Research Assistant

Sept. 2017 – Present

Develop an interpretable morphology learning neural network for diverse morphological typologies. Use semantic information to improve unsupervised morphological segmentation.

Jelinek Memorial Workshop on Speech and Language Technology (JSALT)

Montréal, CA

Undergraduate Researcher

June–Aug. 2019

Developed linguistically-motivated morpheme representations for neural language modelling and machine translation of low-resource languages with highly complex morphology (polysynthetic languages).

International Business Machines

San Jose, CA

Cognitive Software Development Intern

May – Aug. 2018

Create a visualization tool for evaluation metrics over time in a PDF-to-text-to-semantic-labels machine learning pipeline.

PUBLICATIONS & PRE-PRINTS

1. **Haley, C.** and Wilson, C. Deep neural networks easily learn unnatural infixation and reduplication patterns. In *Proceedings of the Society for Computation in Linguistics*, Volume 4.
2. Park, H. H.; Zhang, K. J.; **Haley, C.**; Steimel, K.; Liu, H.; and Schwartz, L. Morphology Matters: A multilingual language modelling analysis. To appear in *Transactions of the Association for Computational Linguistics*, 2021. <https://arxiv.org/abs/2012.06262>
3. **Haley, C.** and Smolensky, P. Invertible Tree Matrix Embeddings using a Cryptographic Role Embedding Scheme. In *Proceedings of the 28th International Conference on Computational Linguistics*, 2020. <https://www.aclweb.org/anthology/2020.coling-main.328/>
4. **Haley, C.** This is a BERT. Now there are several of them. Can they generalize to novel words? In *Proceedings of BlackboxNLP 2020*, 2020. <https://www.aclweb.org/anthology/2020.blackboxnlp-1.31/>
5. Schwartz, L.; Tyers, F.; Levin, L.; Kirov, C.; Littell, P.; Lo, C.; Prud'hommeaux, E.; Park, H. H.; Steimel, K.; Knowles, R.; Micher, J.; Strunk, L.; Liu, H.; **Haley, C.**; Zhang, K.; Jimmerson, R.;

Andriyanets, V.; Muis A. O.; Otani, N.; Park, J. H.; and Zhisong, Z. 2020. Neural Polysynthetic Language Modelling. Pre-print, 2020. <https://arxiv.org/abs/2005.05477>

**TEACHING
EXPERIENCE**

| | |
|---|--|
| Artificial Intelligence <i>Course Assistant</i> | Johns Hopkins University Spring 2020 |
| Natural Language Processing <i>Course Assistant</i> | Johns Hopkins University Fall 2019 |
| Introduction to Algorithms <i>Course Assistant</i> | Johns Hopkins University Spring 2019 |
| Data Structures <i>Course Assistant</i> | Johns Hopkins University Fall 2017, Fall 2018 |

**AWARDS,
HONORS,
& GRANTS**

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| Provost's Undergraduate Research Award \$3000 grant awarded for proposal for interpretable morphology learning neural networks (PI: Colin Wilson). 30% acceptance rate. | 2019 – 2020 |
| Dean's List Awarded to students with a term GPA of at least 3.5 at JHU. Cancelled in Spring 2020 due to COVID-19. | Fall 2016–Fall 2017, Fall 2018–Fall 2019 |
| Michael R. Bloomberg Scholar Scholarship for Johns Hopkins students demonstrating exceptional merit and financial need. | 2016 – 2020 |

OUTREACH

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| President, Omega Psi Inc. National undergraduate cognitive science honor society. Create chapter retention and recruitment strategies. Work with chapters to refine and adapt honors membership requirements and build resources for honors members. | 2019 – Present |
| Marketing Director, Out in STEM (oSTEM) at JHU Create and design resources for LGBTQ+ college students navigating professional settings. Organized and promoted a university-wide charity drag show. | Dec. 2016 – Dec. 2019 |
| Head of Design, HopHacks Design promotional materials and create a consistent style for all communications for a biannual student-run hackathon. Contribute to the development and design of the organizational website. | Dec. 2017 – Dec. 2019 |
| Editor, Charm City Stories Build website and art submission system with Django backend and integrated with AWS S3 for submission storage for a narrative-medicine-themed art and writing magazine. | Sept. 2017 – Apr. 2019 |

SKILLS

Technologies: Python, PyTorch, C++, JavaScript, React, Java, C, Go, Django, SQL, HTML, CSS.
Languages: English (native), Japanese (high intermediate), German (intermediate).

COURSEWORK

Natural Language Processing: Natural Language Processing, Machine Learning: Linguistic and Sequence Modeling, Machine Translation.
Linguistics: Phonology I, Semantics I, Semantics II, Syntax I, Computational Psycholinguistics.
Computer Science: Algorithms, Machine Learning: Data to Models, Object- Oriented Software Engineering, Automata and Computation Theory, Artificial Intelligence, Machine Learning: AI Systems Design.
Mathematics: Probability and Statistics, Linear Algebra, Introduction to Abstract Algebra.