# 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. 2020 – Present
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 representations of symbolic structure which are substantially more efficient for syntactic tree representation 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* — Sept. 2017 – Present
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. 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.*
2. **Haley, C.** and Smolensky, P. Invertible Tree Matrix Embeddings using a Cryptographic Role Embedding Scheme. *To appear at COLING 2020*
3. **Haley, C.** This is a BERT. Now there are several of them. Can they generalize to novel words? *To appear at BlackboxNLP 2020.*
4. 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. Neural Polysynthetic Language Modelling. Pre-print. `https://arxiv.org/abs/2005.05477`

## TEACHING EXPERIENCE

**Artificial Intelligence** — Johns Hopkins University
*Course Assistant* — Spring 2020

**Natural Language Processing** — Johns Hopkins University
*Course Assistant* — Fall 2019

**Introduction to Algorithms** — Johns Hopkins University
*Course Assistant* — Spring 2019

**Data Structures** — Johns Hopkins University
*Course Assistant* — Fall 2017, Fall 2018

## AWARDS, HONORS, & GRANTS

**Provost's Undergraduate Research Award** — 2019 – 2020
*Awarded for proposal for interpretable morphology learning neural networks (PI: Colin Wilson).*

**Michael R. Bloomberg Scholar** — 2016 – 2020
*Scholarship for Johns Hopkins students demonstrating exceptional merit and financial need.*

**Omega Psi Honors in Cognitive Science** — Spring 2018
*Awarded by the national undergraduate cognitive science society.*

## OUTREACH

**President, Omega Psi Inc.** — 2019 – Present
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.

**Marketing Director, Out in STEM (oSTEM) at JHU** — Dec. 2016 – Dec. 2019
Create and design resources for LGBTQ+ college students navigating professional settings. Developed a recruitment strategy that increased club participation by more than 100%. Organized and promoted a university-wide student drag show for charity.

**Head of Design, HopHacks** — Dec. 2017 – Dec. 2019
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.

**Editor, Charm City Stories** — Sept. 2017 – Apr. 2019
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.

## 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, Probabilistic Graphical Models, Object- Oriented Software Engineering, Automata and Computation Theory, Artificial Intelligence, Machine Learning: Systems Design.
**Mathematics:** Probability and Statistics, Linear Algebra, Introduction to Abstract Algebra.