Allen Schmaltz, Ph.D.

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https://allenschmaltz.github.io

Reexpress AI, Inc.

Founder & Software Engineer, January 2022-present

Research Interests

My research in Artificial Intelligence at Reexpress AI initially focused on three themes, all in the context of large-scale deep neural networks:

INTROSPECTION: Inductive (architecture) biases amenable to decomposing networks into human-understandable parts

UPDATABILITY: Hybrid parametric/non-parametric neural structures and methods for *local, end-user* modification of networks

UNCERTAINTY: Statistical methods and HCI interfaces for uncertainty quantification

Given the significance of AI, and its rapid deployment in real-world settings despite insufficient understanding of its statistical behavior, I founded Reexpress AI to focus on a depth-first, straight-shot effort to bring this research agenda to a conclusion and—in effect—solve the output verification problem for neural network models.[1]

This line of research successfully concluded with a new understanding of the statistical behavior of high-dimensional objects and the development of SDM activation functions, SDM calibration, and SDM networks, as detailed in the paper **Similarity-Distance-Magnitude Universal Verification**.

My current work at Reexpress focuses on scaling SDM estimators and SDM networks for applications in automated software development and data science.

Research Papers[2]

Artificial Intelligence

Allen Schmaltz. 2025. **Similarity-Distance-Magnitude Universal Verification**. arXiv preprint arXiv:2502.20167. Code.

Allen Schmaltz and Danielle Rasooly. 2022. **Introspection, Updatability, and Uncertainty Quantification with Transformers: Concrete Methods for AI Safety**.

December 2022, *ML Safety Workshop*, 36th Conference on Neural Information Processing Systems (NeurIPS 2022). Poster.

Allen Schmaltz and Danielle Rasooly. 2022. **Approximate Conditional Coverage & Calibration via Neural Model Approximations**. arXiv preprint arXiv:2205.14310.

[1] The Reexpress effort has been prescient and objectively years ahead of other contemporaneous research groups and efforts working toward AGI, which have primarily been focused on the impact of scaling, which is a necessary but not sufficient element for real-world applications. Importantly, unlike other approaches, SDM networks provide a practicable, statistically-informed path for building *controllable* AGI systems. See my blog post "The Determinants of Controllable AGI" for a high-level overvew.

[2] See https://allenschmaltz.github.io/papers for selected paper summaries.

Spotlight talk, July 2022, *Workshop on Distribution-Free Uncertainty Quantification at the Thirty-ninth International Conference on Machine Learning (ICML 2022)*, Baltimore, Maryland.

Allen Schmaltz. 2021. **Detecting Local Insights from Global Labels: Supervised & Zero-Shot Sequence Labeling via a Convolutional Decomposition**. *Computational Linguistics*. https://doi.org/10.1162/coli_a_00416. Online Appendix. Code. FAQ. *The 2021 Conference on Empirical Methods in Natural Language Processing*: Presentation video; Slides; Poster.

Natural Language Processing

Allen Schmaltz. 2019. **Learning to Order & Learning to Correct**. Harvard University, Ph.D. dissertation, Computer Science.

Allen Schmaltz, Yoon Kim, Alexander Rush, and Stuart Shieber. 2017. **Adapting Sequence Models for Sentence Correction**. In *Proceedings of the 2017 Conference on Empirical Methods in Natural Language Processing*, pages 2807-2813, Copenhagen, Denmark, September. Association for Computational Linguistics. https://www.aclweb.org/anthology/D17-1298. (Appendix) (.bib)

Allen Schmaltz, Alexander M. Rush, and Stuart Shieber. 2016. **Word Ordering Without Syntax**. In *Proceedings of the 2016 Conference on Empirical Methods in Natural Language Processing*, pages 2319-2324, Austin, TX, USA, November. Association for Computational Linguistics. https://aclweb.org/anthology/D16-1255. (.bib)

Allen Schmaltz, Yoon Kim, Alexander M. Rush, and Stuart Shieber. 2016. **Sentence-Level Grammatical Error Identification as Sequence-to-Sequence Correction**. In *Proceedings of the 11th Workshop on Innovative Use of NLP for Building Educational Applications*, pages 242-251, San Diego, CA, USA, June. Association for Computational Linguistics. https://www.aclweb.org/anthology/W16-0528. (.bib)

Medicine and Public Health

Allen Schmaltz and Andrew L. Beam. 2020. **Sharpening the Resolution on Data Matters: A Brief Roadmap for Understanding Deep Learning for Medical Data**. *The Spine Journal*. https://doi.org/10.1016/j.spinee.2020.08.012.

Andrew L. Beam, Benjamin Kompa, Allen Schmaltz, Inbar Fried, Griffin Weber, Nathan P. Palmer, Xu Shi, Tianxi Cai, and Isaac S. Kohane. 2020. **Clinical Concept Embeddings Learned from Massive Sources of Multimodal Medical Data**. In *Proceedings of the Pacific Symposium on Biocomputing (PSB) 25*, pages 295-306. arXiv:1804.01486.

Public Policy

Allen Schmaltz. 2018. **On the Utility of Lay Summaries and AI Safety Disclosures: Toward Robust, Open Research Oversight**. In *Proceedings of the Second ACL Workshop on Ethics in Natural Language Processing*, pages 1-6, New Orleans, LA, USA, June. Association for Computational Linguistics. https://aclweb.org/anthology/W18-0801. (.bib)

Quantitative Social Science

Wenxin Jiang, Gary King, Allen Schmaltz, and Martin A. Tanner. 2019. **Ecological Regression with Partial Identification**. *Political Analysis*. https://doi.org/10.1017/pan.2019.19.

Technical Reports

Allen Schmaltz and Andrew Beam. 2020. **Coarse-to-Fine Memory Matching for Joint Retrieval and Classification**. arXiv preprint arXiv:2012.02287.

Allen Schmaltz and Andrew Beam. 2020. **Exemplar Auditing for Multi-Label Biomedical Text Classification**. arXiv preprint arXiv:2004.03093.

Software[3]

REEXPRESS MODEL-CONTEXT-PROTOCOL (MCP) SERVER. 2025. Video overview. Code.

Research code for SDM activation functions, SDM calibration, and SDM networks. 2025. Code.

See publication **Similarity-Distance-Magnitude Universal Verification**.

REEXPRESS RE-SEARCH demo.

The first publicly available example of AI-assisted search with uncertainty-aware test-time conditional branching. Active from August 2024-February 2025 as a web application.[4]

REEXPRESS ONE. Source code for original November 2023 release.

On-device macOS application for uncertainty-aware, LLM-driven high-dimensional data analysis.

Quick Start Guide. Reference. Tutorial Series.

Data

OPENVERIFICATION1. 2025. Data.

The first large-scale, open-source dataset for research on the topic of LLM output verification (i.e., binary classification of instruction-following).

Recent Talks[5]

Artificial Intelligence

Detecting Local Insights from Global Labels: Supervised & Zero-Shot Sequence Labeling via a Convolutional Decomposition. November 7, 2021. *The 2021 Conference on Empirical Methods in Natural Language Processing* (virtual). (presentation video; slides; poster).

Coarse-to-Fine Memory Matching for Joint Retrieval and Classification. April 5, 2021. *UMass BioNLP group seminar: Data meets Healthcare*, University of Massachusetts (Amherst and Lowell). (presentation slides)

Medicine and Public Health

Exemplar Auditing for Multi-Label Biomedical Text Classification. April 27, 2020. *Junior Investigators Advanced Biomedical Computation (ABC) Series*, Brigham and Women's Hospital (BWH) Program in Precision Medicine and the BWH Division of Computational Pathology. (presentation slides)

[3] See individual publications for additional research codebases.

[4] REEXPRESS RE-SEARCH has been superseded by the REEXPRESS MCP SERVER, which can be combined with a web-search client/API.

[5] Selected/Representative. Additional talks with public presentation materials that may be of general interest are available at https://allenschmaltz.github.io/presentations.

Natural Language Processing

Word Ordering Without Syntax. November 2016. *The Conference on Empirical Methods in Natural Language Processing*, Austin, TX. (presentation video)

Research Notes

Allen Schmaltz. August 2025. **Research Note: Similarity-Distance-Magnitude Estimators Answer the Right Question**. Research note. Code.

Academic Appointments

Department of Epidemiology, Harvard T.H. Chan School of Public Health

Postdoctoral Research Fellow, July 2019-June 2022

Education

Ph.D., Computer Science, Harvard University, September 2013-May 2019

S.M., Computer Science, Harvard University, May 2014

Employment

Institute for Quantitative Social Science (IQSS) at Harvard University (Cambridge, MA)

Research Assistant, Gary King's group, January 2017-May 2019

Rakuten Institute of Technology, Boston (MA)

Research Scientist Intern (part-time), May 2016-June 2017

Disney Research, Boston (Cambridge, MA)

Research & Development Lab Associate (part-time), Hanspeter Pfister's group, October 2014-May 2015

University of Southern California-Information Sciences Institute (Marina del Rey, CA)

Visiting Research Assistant, The Natural Language Group, Kevin Knight's group, June 2014-August 2014

Institute for Quantitative Social Science (IQSS) at Harvard University (Cambridge, MA)

Research Fellow, Mercè Crosas's Data Science group, May 2013-August 2013

Disney Research, Boston (Cambridge, MA)

Research & Development Lab Associate, Jonathan Yedidia's group, May 2012-August 2012

Berlitz Japan, Inc. (Tokyo, Japan)

English Language Instructor, October 2007-June 2008

The Landrum Company (Columbia, MO)

Web Design Intern, June 2002-January 2004

Teaching

Harvard University

Computer Science 51: Introduction to Computer Science II

Teaching Fellow, Spring Semester 2016

Computer Science 282r: Decision-Making Under Uncertainty

Teaching Fellow, Spring Semester 2015

Computer Science 187: Computational Linguistics

Head Teaching Fellow, Spring Semester 2013 and Fall Semester 2014

Government 50: Introduction to Political Science Research Methods

Teaching Fellow, Fall Semester 2012

Fellowships/Grants

IQSS Research Grant ($2,000), Harvard University, 2014-2015

US Department of Education Group Projects Abroad Scholarship (for IUC), 2009-2010

Mitsubishi UFJ Foundation Scholarship (for IUC), 2009-2010

The Center for East Asian Studies Summer Fellowship ($8,000), Stanford University, 2009

Foreign Language and Area Studies (FLAS) Fellowship with Japan Fund supplement (tuition and stipend), Stanford University, 2008-2009

Languages[6]

Japanese

Inter-University Center (IUC) for Japanese Language Studies (Yokohama, Japan), September 2009-June 2010

FALCON Japanese Language Program at Cornell University (Ithaca, NY), June 2006-May 2007

Chinese

International Chinese Language Program (ICLP) at National Taiwan University (Taipei, Taiwan), March-June 2006

Princeton in Beijing Chinese Language Program (Beijing, China), June-August 2005

German

Courses in high school and at Northwestern University

[6]No longer actively maintained.

Additional Education

Ph.D. student, Department of Government, Harvard University, September 2010-August 2013

Completed required coursework and qualifying exams

Discontinued for Ph.D. in Computer Science

M.A., East Asian Studies, Stanford University (Stanford, CA), September 2008-September 2010

B.A., Political Science, Northwestern University (Evanston, IL), 2006

Academic Service

Administration

Member of organizing committee, Machine Learning for Health (ML4H) workshop at the Conference on Neural Information Processing Systems (NeurIPS), 2020

Poster Session Chair for "Language Models, Text Mining, and Crowd Sourcing", Conference on Empirical Methods in Natural Language Processing (EMNLP), Copenhagen, Denmark, 2017

Reviewing

AAAI Conference on Artificial Intelligence (AAAI), 2018

ACM Conference on Health, Inference, and Learning (CHIL), 2020, 2021

ACM Transactions on Computing for Healthcare, 2020

Annual Conference of the North American Chapter of the Association for Computational Linguistics: Human Language Technologies (NAACL HLT), 2018[7]

Annual Meeting of the Association for Computational Linguistics (ACL), 2017, 2018, 2019

Clinical Natural Language Processing workshop at the Conference on Empirical Methods in Natural Language Processing (EMNLP), 2020

Conference on Empirical Methods in Natural Language Processing (EMNLP), 2018

Conference on Neural Information Processing Systems (NeurIPS), Workshop Proposals, 2022

International Joint Conference on Natural Language Processing (IJCNLP), 2017

Machine Learning for Health (ML4H) workshop at the Conference on Neural Information Processing Systems (NeurIPS), 2019, 2020

Scientific Data (Nature Research), 2020

Transactions of the Association for Computational Linguistics (TACL), 2017 (as a secondary reviewer)

Workshop on Innovative Use of NLP for Building Educational Applications (BEA), 2017, 2019

Blog

Resolute Resolutions

Last updated: August 13, 2025

[7]Nominated as an outstanding reviewer by the area chairs