NATHANIEL WEIR

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EDUCATION

2019–2024 **Johns Hopkins University**
Ph.D. in Computer Science
Advisor: Benjamin Van Durme
Thesis: *Compositional Neuro-Symbolic Reasoning over Natural Language*

2019–2021 **Johns Hopkins University**
M.S.E. in Computer Science
Advisor: Benjamin Van Durme

2015–2019 **Brown University**
Sc.B. in Applied Mathematics & Computer Science, *magna cum laude* with Honors (GPA: 3.95/4)
Advisors: Ugur Cetintemel, Carsten Binnig, and Ellie Pavlick
Thesis: *Bootstrapping Generalization in Neural Text-to-SQL Semantic Parsing Models*

RESEARCH INTERESTS

Neuro-Symbolic Reasoning, Logical Verification, Natural Language Inference, Large Language Models, Knowledge Grounding, Explainable AI, Information Retrieval, Question Answering

RESEARCH EXPERIENCE

Fall 2024 – Present **Amazon Web Services**
Applied Scientist II

Fall 2019 – Summer 2024 **Center for Language and Speech Processing at Johns Hopkins University**
PhD Researcher
Research includes retrieval-augmented, language model-based neuro-symbolic reasoning, constrained language generation, and improving robustness of question answering models.

Summer 2023 – Winter 2023 **Allen Institute for Artificial Intelligence**
PhD Research Intern Aristo Reasoning Team
Mentor: Peter Clark
Researched extracting and reasoning over generalizable scientific microtheories from language models. Also led projects on code-based instruction tuning and abductive situational reasoning.

Summer 2022 **Microsoft Semantic Machines**
PhD Research Intern
Mentor: Harsh Jhamtani
Worked on knowledge-constrained dialogue generation. Published a benchmark dataset of real video game dialogue trees annotated with granular ontology constraints.

Summer 2021 **Microsoft Research – Montreal**
PhD Research Intern Deep Learning and Language Team
Mentors: Harm Van Seijen, Xingdi Yuan and Marc-Alexandre Ct
Explored hierarchical language-based planning in embodied agents. Published a benchmark testing for learning compositional tasks in a Minecraft-like domain.

Spring 2017 – May 2019 **Brown University**
Undergraduate Researcher
Researched domain adaptation methods for text-to-SQL neural semantic parsing.

PREPRINTS

2026 Andre He, **Nathaniel Weir**, Kaj Bostrom, Allen Nie, Darion Cassel, Sam Bayless, Huzefa Rangwala. ReSyn: Autonomously Scaling Synthetic Environments for Reasoning Models.

2026 Kate Sanders, **Nathaniel Weir**, Sapana Chaudhary, Kaj Bostrom, Huzefa Rangwala. Generating Data-Driven Reasoning Rubrics for Domain-Adaptive Reward Modeling.

2026 Jiefu Ou, Sapana Chaudhary, Kaj Bostrom, **Nathaniel Weir**, Shuai Zhang, Huzefa Rangwala, George Karypis. MaxCode: A Max-Reward Reinforcement Learning Framework for Automated Code Optimization.

2026 Vikash Singh, Darion Cassel, **Nathaniel Weir**, Nick Feng, Sam Bayless. VERGE: Formal Refinement and Guidance Engine for Verifiable LLM Reasoning.

PUBLICATIONS

2026 Sam Bayless, Stefano Buliani, Darion Cassel, Byron Cook, ..., **Nathaniel Weir**, Michael W. Whalen, Jianan Yao. A Neurosymbolic Approach to Natural Language Formalization and Verification. CAV 2026.

2026 Yu Feng, **Nathaniel Weir**, Kaj Bostrom, Sam Bayless, Darion Cassel, Sapana Chaudhary, Benjamin Kiesl-Reiter, Huzefa Rangwala. VeriCoT: Neuro-symbolic Chain-of-Thought Validation via Logical Consistency Checks. ICLR 2026.

2025 Zhengping Jiang, Jingyu Zhang, **Nathaniel Weir**, Seth Ebner, Miriam Wanner, Kate Sanders, Daniel Khashabi, Anqi Liu, Benjamin Van Durme. Core: Robust Factual Precision Scoring with Informative Sub-Claim Identification. Findings of ACL 2025.

2025 **Nathaniel Weir**, Bhavana Dalvi Mishra, Orion Weller, Oyvind Tafjord, Sam Hornstein, Alexander Sabol, Peter Jansen, Benjamin Van Durme, and Peter Clark. From Models to Microtheories: Distilling a Model's Topical Knowledge for Grounded Question Answering. ICLR 2025.

2025 Dongwei Jiang, Jingyu Zhang, Orion Weller, **Nathaniel Weir**, and Benjamin Van Durme, Daniel Khashabi. SELF-[IN]CORRECT: LLMs Struggle with Refining Self-Generated Responses. AAAI 2025.

2024 **Nathaniel Weir***, Muhammad Khalifa*, Linlu Qiu, Orion Weller, and Peter Clark. Learning to Reason via Program Generation, Emulation, and Search. NeurIPS 2024.

2024 **Nathaniel Weir**, Kate Sanders, Orion Weller, Shreya Sharma, Dongwei Jiang, Zhengping Zhang, Bhavana Dalvi Mishra, Oyvind Tafjord, Peter Jansen, Peter Clark, and Benjamin Van Durme. Enhancing Systematic Decompositional Natural Language Inference Using Informal Logic. EMNLP 2024.

2024 Kate Sanders, **Nathaniel Weir**, and Benjamin Van Durme. TV-TREES: Multimodal Entailment Trees for Neuro-Symbolic Video Reasoning. EMNLP 2024.

2024 **Nathaniel Weir**, Ryan Thomas, Randolph d'Amore, Kellie Hill, Benjamin Van Durme, and Harsh Jhamtani. Ontologically Faithful Generation of Non-Player Character Dialogues. EMNLP 2024.

2024 **Nathaniel Weir**, Peter Clark, and Benjamin Van Durme. NELLIE: A Neuro-Symbolic Inference Engine for Grounded, Compositional, and Explainable Reasoning. IJCAI 2024.

2024 Xinrui Zou, Ming Zhang, **Nathaniel Weir**, Benjamin Van Durme, and Nils Holzenburger. Reframing Tax Law Entailment as Analogical Reasoning. Jurix Special Workshop on AI, Law and Philosophy.

2024 Orion Weller, Marc Marone, **Nathaniel Weir**, Dawn Lawrie, Daniel Khashabi, and Benjamin Van Durme. "According to ..." Prompting Language Models Improves Quoting from Pre-Training Data. EACL 2024.

2024 Orion Weller, Aleem Khan, **Nathaniel Weir**, Dawn Lawrie, and Benjamin Van Durme. Defending Against Poisoning Attacks in Open-Domain Question Answering. EACL 2024.

2023 **Nathaniel Weir**, Xingdi Yuan, Marc-Alexandre Ct, Matthew J. Hausknecht, Romain Laroche, Ida Momennejad, Harm van Seijen and Benjamin Van Durme. One-Shot Learning from a Demonstration with Hierarchical Latent Language. AAMAS 2023.

2021 Jiefu Ou*, **Nathaniel Weir***, Anton Belyy*, Felix Yu, and Benjamin Van Durme. InFillmore: Frame-Guided Language Generation with Bidirectional Context. StarSem 2023.

2020 **Nathaniel Weir**, João Sedoc, and Benjamin Van Durme. COD3S: Diverse Generation with Discrete Semantic Signatures. EMNLP 2020.

2020 **Nathaniel Weir**, Adam Poliak, and Benjamin Van Durme. Probing Neural Language Models for Human Tacit Assumptions. CogSci 2020 **Oral Presentation.**

2020 **Nathaniel Weir**, Prasetya Utama, Alex Galakatos, Andrew Crotty, Amir Ilkhechi, Shekar Ramaswamy, Rohin Bhusan, Nadja Geisler, Benjamin Hattasch, Steffen Eger, Ugur Cetintemel, and Carsten Binnig. DBPal: A Fully Pluggable NL2SQL Training Pipeline. SIGMOD 2020.

2018 Fuat Basik, Benjamin Hattasch, Amir Ilkhechi, Arif Usta, Shekar Ramaswamy, Prasetya Utama, **Nathaniel Weir**, Carsten Binnig and Ugur Cetintemel. DBPal: A Learned NL-Interface for Databases. SIGMOD 2019 Demo.

2017 Prasetya Utama, **Nathaniel Weir**, Carsten Binnig, and Ugur Cetintemel. Voice-based Data Exploration: Chatting with your Database. SCAI 2017.

AWARDS

2021 - 2024 **NSF Graduate Research Fellowship**

2019 **CRA Outstanding Undergraduate Researcher Award, Honorable Mention**

2019 **SIGMOD Undergraduate Research Competition, 2nd place**

2019 **Brown Computer Science Senior Award**

2019 **Sigma Xi Electee**

2019 **Brown CS Undergraduate Research Symposium, 3rd Place**

2018 **Randy F. Pausch CS Undergraduate Summer Research Award, $10,000**

2017 **Karen T. Romer Undergraduate Teaching and Research Award, $3,500**

PRESENTATIONS

Neuro-Symbolic Entailment Tree Search in the Era of Retrieval-Augmented LLMs

07/2024 Talk Microsoft Research
04/2024 Talk Amazon Web Services
03/2024 Talk Kensho

Ontologically Faithful Generation of Non-Player Dialogues

07/2023 Talk DialDoc Workshop at ACL 2023

Language Models as Proposal Functions in a Neuro-Symbolic Expert System

05/2023 Talk Massachussetts Institute of Technology
05/2023 Talk Brown University

One-Shot Learning from a Demonstration with Hierarchical Latent Language

06/2023	Poster	AAMAS 2023
03/2022	Talk	9th Mid-Atlantic Student Colloquium on Speech, Language and Learning

Probing Neural Language Models for Human Tacit Assumptions

03/2020	Poster	8th Mid-Atlantic Student Colloquium on Speech, Language and Learning

DBPal: A Fully Pluggable Natural Language Interface to Databases

01/2019	Talk	North East Database Day @ MIT
10/2018	Talk	IBM AI Systems Day @ MIT
01/2018	Demo	North East Database Day @ MIT

TECHNICAL SKILLS

Languages Python (expert), R, Bash, Prolog, C/C++, SQL, Java, MATLAB, Scala

Tools PyTorch, HuggingFace Transformers, Claude Code, AWS, Kiro, LangChain, fairseq, faiss, vLLM, DeepSpeed, MySQL, Jupyter, RStudio, NLTK, Mechanical Turk

TEACHING EXPERIENCE

Teaching Assistant, Johns Hopkins University

Fall 2022 CS 601.470/670: Artificial Agents. Instructor: Benjamin Van Durme (co-taught)

Teaching Assistant, Brown University

Fall 2018 CSCI1570: Design and Analysis of Algorithms. Instructor: Paul Valiant

Spring 2018 CSCI0220: Discrete Structures and Probability. Instructor: Caroline Klivans

Spring 2017 CSCI0220: Discrete Structures and Probability. Instructor: Caroline Klivans

SERVICE

Reviewing:
ACL Rolling Review (2022, 2023, 2024, 2025, 2026), ICLR 2025, 2026, NeurIPS 2024, EMNLP 2023, KnowledgeNLP-AAAI23 ICLR 2021 (Secondary), ACL 2020 (Secondary), AKBC 2020 (Secondary)

Committees:
JHU CS Ph.D. Admissions Committee (2021-2024)
JHU CLSP Application Support Program for underrepresented students (2022-2023)

MENTORING

- Shreya Sharma (JHU MS, 2023-2024)
- Dongwei Jiang (JHU MS, joint with Orion Weller, 2023-2024)
- Sandipan Majhi (JHU MS, 2023)
- Jingyu Zhang (JHU BS, 2022-2023)
- Xiao Ye (JHU MS, 2022)
- Chenyu Zhang (JHU BS, 2020-2021)
- Jiefu Ou (HKUST BS, 2020-2021)
- Wei Liu (UIUC BS, 2020)