

# Siyang Wu

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## EDUCATIONAL BACKGROUND

Sep/2024 - Jun/2026 University of Chicago

Chicago, IL, USA

- Master Science in Data Science, Overall GPA: 3.92/4.00

Jan/2021 - Jun/2024 University of Michigan | Ann Arbor

Ann Arbor, MI, USA

- Degree: B.S. in Data Science with High Distinction, Overall GPA: 3.98/4.00

## PUBLICATION

- Siyang Wu, H. Bao, N. Kunievsky, and James A. Evans. *Automatically Advancing LLM Expertise in Technology Judgment*. arXiv preprint: <https://arxiv.org/abs/2505.12452>.
- Siyang Wu\*, H. Bao\*, S. Li\*, Ari Holtzman, James A. Evans. *Mapping Overlaps in Benchmarks through Perplexity in the Wild*. arXiv preprint: <https://arxiv.org/abs/2509.23488v1>.
- Siyang Wu, Z. Sun. *How Do Language Models Generate Slang: A Systematic Comparison between Human and Machine-Generated Slang Usages*. EMNLP 2025 Findings, to appear. arXiv preprint: <https://arxiv.org/abs/2509.15518>.
- H. Bao, Siyang Wu, J. Choi, Y. Mao, and James A. Evans. *Language Models Surface the Unwritten Code of Science and Society*. arXiv preprint: <https://arxiv.org/abs/2505.18942>.

## RESEARCH EXPERIENCE

**Credibility Alignment of LLM**

Jun/2025 - Current

RA, Supervised by Prof Bryon Aragam, Booth, University of Chicago

- Introduced a black-box, post-hoc method to assess LLM confidence via behavioral robustness, quantifying the output gap between semantically equivalent perturbed and unperturbed prompts as a reference-free proxy for confidence. It mitigates overconfidence and repetition bias and extends naturally to long-form, open-ended generation, overcoming key limitations of prior methods.
- Demonstrated that behavioral robustness under premise perturbations yields strong alignment between estimated credibility and correctness, offering a principled foundation for credibility assessment in black-box LLMs.

**Language Models Surface the Unwritten Code of Science and Society**

Nov/2024 - May/2025

RA, Supervised by Prof James Evans, Knowledge Lab, University of Chicago

- Proposed a conceptual framework using LLMs as diagnostic tools to reveal tacit norms and implicit biases—the “unwritten code”—that govern human evaluation in science and society.
- Designed an iterative self-hypothesis generation algorithm where LLMs compare peer-reviewed papers to extract and amplify hidden evaluative heuristics underlying scientific judgment, distinguishing normative priors (rigor) from posterior heuristics (storytelling, contextualization).
- Demonstrated that human reviewers and LLMs share explicit priors but diverge in implicit posteriors—revealing how unspoken storytelling and positioning cues drive peer-review outcomes, extending to domains such as hiring and admissions.

**Automatically Advancing LLM Expertise in Technology Judgment**

Sep/2024 - Jan/2025

RA, Supervised by Prof James Evans, Knowledge Lab, University of Chicago

- Introduced a novel patent differentiation benchmark of 1.3 million computer-science patents, testing LLMs’ ability to detect subtle conceptual distinctions between semantically similar inventions.
- Developed a self-questioning framework that decomposes LLM errors into *missing* vs. *unused* knowledge, showing that models often possess—but fail to apply—relevant internal understanding.
- Demonstrated that structured self-generated questions and scientific retrieval significantly improve model reasoning and conceptual accuracy, and that smaller models’ questions are better queries guide for larger models’ reasoning through scalable introspection.

**Mapping Overlaps in Benchmarks through Perplexity in the Wild**

June/2025 - Oct/2025

RA, Supervised by Prof James Evans; Prof Ari Holtzman, Knowledge Lab; Conceptualization Lab, University of Chicago

- Developed a large-scale meta-evaluation framework connecting *benchmark semantics, performance, and perplexity signatures* to reveal true overlaps across 88 LLM benchmarks.
- Introduced the concept of benchmark signatures, sets of salient in-the-wild tokens whose perplexity patterns predict benchmark performances, and reveal essential functions of the benchmarks test for.
- Demonstrated that *signature-level analysis* robustly distinguishes benchmark functions and mitigates biases from benchmark families and question formats, offering new insights into the LLM capability space and benchmark validity.

### **Comparison between Human vs. Machine Slang generation**

**Jan/2025 - Apr/2025**

*RA, supervised by Prof Zhewei Sun, Research Professor, Speech&Language Group, TTIC*

- Introduced the first systematic comparison between human and machine-generated slang usages. Designed a unified evaluative framework to assess linguistic alignment between human-attested slang and LLM-generated slang across three dimensions—characteristics, creativity, and informativeness.
- Built a paradigm of how to collect machine-generated slang usages, which enables reproducible analyses of LLMs' internal knowledge of informal and creative language, filling a major gap in computational sociolinguistics.
- Developed quantitative metrics for morphological and semantic creativity. Proposed new measures to operationalize linguistic creativity and evaluate how LLMs coin and reuse slang terms compared to human speakers.

### **3D Handpose Parametrization and Reconstruction**

**May/2023 - Sep/2023**

*RA, supervised by Prof Matt Reed, The University of Michigan Transportation Institute*

- Implemented an end-to-end pipeline for parametrizing 3D hand scans and reconstructing 3D hand models based on dual quaternion parameters/Joint location representation.
- Developed an 8-way tree structure for voxel sampling, improving time complexity from  $O(n^3)$  to  $O(\log n)$ .
- Fabricated hand pose simulation training dataset for supervised learning and data augmented hand pose set to 4 thousand to improve the robustness and generalization of the model.
- Designed and built a novel, light-weight model (7k parameters) with Keras/TensorFlow for a dual-quaternion matrix regression task.

## **EXTRACURRICULAR EXPERIENCE**

### **UBC Ovarian Cancer Subtype Classification and Outlier Detection (69<sup>th</sup>/1346)**

**Dec/2023 - Jan/2024**

- Classified five types of ovarian cancer from microscopy scans of biopsy samples.
- Segmented and preprocessed images, including resizing and staining, to prepare data for further analysis.
- Inferred with ensemble learning by ResNeSt-200e, Efficientnet-V2, SEResNeXT-101d under multi-instance-learning framework.

### **Kaggle Competition Large Language Model Science Exam (93<sup>rd</sup>/ 2663)**

**Aug/2023 - Oct/2023**

- Link: <https://www.kaggle.com/siyangwu1234>
- Built a large-scale RAG system achieving 0.905 MAP@3 on the Kaggle private test leaderboard.
- Generated embeddings with GTE-base and indexed via FAISS for efficient retrieval.
- Expanded dataset to 320K MCQs using external science texts and fine-tuned DeBERTa-V3-Large (304M) through a LangChain-based GPT-3.5 pipeline.

## **INTERNSHIP**

### **Research Intern at Financial Technology Dept of China Life Insurance Group**

**Jun/2024 - Sep/2024**

- Developed and evaluated multimodal agentic systems by integrating open-source TTS and ASR models (FishSpeech, FunASR) into an automated reasoning-action loop.
- Engineered an end-to-end orchestration pipeline with foundation model, deepseek-v3, parses incoming text into structured JSON tasks, enabling autonomous scheduling and workflow execution through the WeCom API.
- Designed deployment and performance-monitoring protocols with benchmarking and documentation to ensure reliability and reproducibility across multimodal components.

### **Data Analyst at Inspur Group**

**Jun/2019 - Jul/2019**

- Conducted a survey investigating labor hours of workers and collected a clean dataset.
- Processed and analyzed collections of datasets with linear regression, inferring expected labor hours at each position.
- Generated optimization scheme and gave a presentation to the workshop chief.

## **OTHER INFORMATION**

- **Computer Skills:** C++, Python, MySQL, R, MATLAB, JavaScript (familiar); Docker (Beginner)
- **Languages:** Chinese (native), English (proficient)