Tianyi Niu

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EDUCATION

University of North Carolina at Chapel Hill, Chapel Hill, NC August 2024 – May 2026

- Master of Science in Computer Science

University of North Carolina at Chapel Hill, Chapel Hill, NC August 2020 – May 2024

- Bachelor of Science in Computer Science (Highest Honors), Bachelor of Arts in Linguistics
- Thesis: *Priming: Multi-Stage Pretraining using Formal Languages with Ascending Complexity*
- Overall GPA: 3.96/4.0, Highest Distinction, Dean's list (all semesters offered)

PREPRINTS

All drafts and manuscripts are available upon request via email.

- **Tianyi Niu**, Justin Chih-Yao Chen, Yue Zhang, Elias Stengel-Eskin, Mohit Bansal. *CasCal: Consensus-Aware Skill Clustering and Aggregation for LLMs. In progress, 2025.*
- Rajeev Ambati*, **Tianyi Niu***, Shashank Srivastava. *Socratic Students: Teaching Language Models to Learn by Asking Questions*. *In progress, 2025.*
- Anika Sharma, **Tianyi Niu**, Shashank Srivastava. *Adversarially Probing Cross-Family Sound Symbolism in 27 Languages*. *In progress, 2025.*
- **Tianyi Niu**, Jaemin Cho, Elias Stengel-Eskin, Mohit Bansal. *RotBench: Evaluating Multimodal Large Language Models on Identifying Image Rotation*. Arxiv preprint, 2025.

PUBLICATIONS

- Jane Xing, **Tianyi Niu**, Shashank Srivastava. *Chameleon LLMs: User Personas Influence Chatbot Personality Shifts*. Proceedings of the 2025 Conference on Empirical Methods in Natural Language Processing (EMNLP), 2025.
- Brandon Prickett*, **Tianyi Niu***, Katya Pertsova. *Probing Neural Network Generalization using Default Patterns*. Proceedings of the The 22nd SIGMORPHON workshop on Computational Morphology, Phonology, and Phonetics (SIGMORPHON), 2025.
- Saif Khairat, **Tianyi Niu**, John Geracitano, Zhaoqiang Zhou. *Performance Evaluation of Popular Open-Source Large Language Models in Healthcare*. Proceedings of the 23rd International Conference on Informatics, Management, and Technology in Healthcare (ICIMTH), 2025.
- Saif Khairat, John Geracitano, **Tianyi Niu**, Kaushalya Mendis. *Acceptability of Academic Large Language Model for Patient Seeking Health Information*. Proceedings of the 23rd International Conference on Informatics, Management, and Technology in Healthcare (ICIMTH), 2025.
- **Tianyi Niu**. *Priming: Multi-Stage Pretraining using Formal Languages with Ascending Complexity*. Carolina Digital Repository, 2025 (*Undergraduate thesis*). https://doi.org/10.17615/nen2-9e70

INTERNSHIPS

Large Language Model Research and Development Intern May 2024 – August 2024
Lenovo

- Researched and developed a pipeline for automatically categorizing DPO data and selecting the most appropriate judge model for each category.
- Developed an automatic scraper to locate and format open-source images with corresponding text captions, creating a corpus of reliable multi-modal ground-truth training data.
- Compiled a detailed report on dataset compositions of open-source language models.
- Verified English-Chinese translations of DPO pairs to ensure consistency in bilingual dataset.

Software Defined Networking & Software Engineering Intern May 2023 – July 2023
Nokia Shanghai Bell

- Developed and tested automated redundancy switching tools for 7750 Service Router (SR7750) and Fortinet 3800, 3900E firewalls - fully adopted by the team to replace manual configuration editing.
- Developed an experimental machine learning pipeline to extract correlation patterns in failed system health checks.
- Gave a department-wide seminar titled *Understanding Large Language Models* to an 80-person non-technical audience, including department-level business executives.

RESEARCH EXPERIENCE

Research Assistant June 2025 – Present
Multimodal Understanding, Reasoning, and Generation Lab
Department of Computer Science, University of North Carolina at Chapel Hill
Principal Investigator: Mohit Bansal, PhD

- Designed a benchmark revealing that state-of-the-art MLLMs fail at identifying image rotation (particularly 90°/270°) even with auxiliary visual information, exposing fundamental gaps in spatial visual reasoning compared to humans.
- Developed an LLM routing pipeline using model consensus to predict accuracy without ground-truth data, enabling flexible model pools and adaptation to novel tasks through synthetic profiling data.
- Investigated methods of improving multi-agent aggregation under conflicting information.

Student Researcher May 2023 – May 2025
Learning from Language Lab
Department of Computer Science, University of North Carolina at Chapel Hill
Principal Investigator: Shashank Srivastava, PhD

- Co-authored EMNLP paper (Chameleon LLMs): Contributed to analysis pipeline to investigate how user personas induce personality shifts in chatbots. Parallelized primary experiment pipeline to obtain 10x speed-ups in model response collection.
- Designed and maintained a high-throughput LLM deployment via vLLM on lab servers (including Llama, Phi, Mistral, DeepSeek). Reducing storage usage and allowed greater accessibility for new lab members.
- Designed and executed student-teacher interaction experiments, showing student-led interaction paradigms yields strong performance improvements on complex reasoning tasks.
- Contributed to a cross-linguistic sound symbolism study by compiling 'big/small' word pairs across diverse languages and coordinating with linguistic experts for phonological transcriptions.
- Completed UNC Senior Honors thesis: Proposed and evaluated a three-stage pretraining approach using formal languages of ascending complexity, finding that Chomsky hierarchy complexity is not a suitable reference for strong inductive biases.

Research Assistant February 2025 – August 2025
Center for Virtual Care Value and Excellence
School of Nursing, University of North Carolina at Chapel Hill
Principal Investigator: Saif Khairat, PhD, MPH

- Benchmarked the viability of LLMs for healthcare; compiled a pilot patient survey to assess acceptability of LLMs for sensitive mental health information.
- Led development of an LLM-powered platform for supporting cancer patients, integrating RAG pipelines for grounded academic references, FitBit data for personalization, and the Transtheoretical Model (TTM) to encourage positive behavior change.
- Implemented a Chatbot to support natural language exploration of the Digital Health Index, greatly expediting research workflows.

Student Researcher August 2024 – January 2025
Department of Linguistics, University of North Carolina at Chapel Hill
Principal Investigator: Katya Pertsova, PhD

- Co-authored SIGMORPHON paper: Examined how attention-based neural networks and logistic regression learn minority default patterns in artificial phonological environments, demonstrating type-frequency exerts a stronger effect than distributional frequency.

TEACHING EXPERIENCE

Graduate Teaching Assistant August 2024 – December 2024
COMP 426: Modern Web Programming

Undergraduate Learning Assistant August 2022 – December 2022
COMP 210: Data Structures and Analysis

PROJECTS

BERT Propaganda Detection 2023

- Fine-tuned and analyzed a BERT-based propaganda detection model for news articles on UNC's *Longleaf* HPC cluster.
- Developed a program to expose and identify incorrect labels for specific propaganda techniques (e.g., "Repetition", "Appeal to Authority").

SMTP Client and Server Emulator 2023

- Developed a suite of command-line programs that emulate Client and Server communication using the SMTP protocol; capable of sending MIME emails to live SMTP servers.

SKILLS

- **Languages:** Python, Java, C, SQL, Bash
- **Systems/Tools:** Linux, Slurm
- **Libraries/Frameworks:** PyTorch, Keras, Matplotlib, Scikit-Learn, NumPy, NLTK, Spacy, HuggingFace

LANGUAGES

- **Native:** English, Mandarin
- **Intermediate:** Spanish
- **Elementary:** French