Max David Gupta

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EDUCATION

Princeton University Princeton, NJ
M.S.E, Computer Science | August 2024-Present
Funded by the machine learning department under the supervision of Prof. Tom Griffiths in the computational cognitive science lab.
Relevant Coursework: Machine Learning and Pattern Recognition, Foundations of Probabilistic Modeling, AI Safety, Cognitive Psychology
Research Interests: Relational reasoning, meta-learning, and human-like inductive biases in neural networks

Columbia University New York, NY
B.A, Applied Mathematics | GPA: 3.51 | Major GPA: 3.71 September 2017-May 2021
Relevant Coursework: Natural Language Processing, Applied Deep Learning, Data Structures, Discrete Math, Linear Algebra, Intro to Statistics, Discrete Math, Complex Variables, Analysis and Optimization, Calculus III & IV

PRESENTATIONS & PAPERS

- **Gupta M**., Rane S., McCoy T., Griffiths T. *Convolutional Neural Networks Can (Meta)-Learn the Same-Different Relation:* In the Proceedings of the 47th Annual Conference of the Cognitive Science Society
- Bencomo G., **Gupta M**., Marinescu I., McCoy T., Griffiths T. *Teasing Apart Architecture and Initial Weights as Sources of Inductive Bias in Neural Networks:* In the Proceedings of the 47th Annual Conference of the Cognitive Science Society
- **Gupta M.** *Navigating High Dimensional Concept Space with Metalearning:* ICML 2025, Workshop on High-Dimensional Learning Dynamics
- **Gupta, M**., Franke M., Hawkins R., Wu C. *Pragmatic Vigilance Inoculates Social Networks Against Misinformation*, Presentation to the Computational Pragmatics Lab: University of Tübingen
- Azizi E., Azad T., **Gupta M**., Nazaret A. *Ensembling in Variational Autoencoder Architectures for Effective Posterior Distribution of Cell State Estimation*. Pre-print and Azizi Lab Presentation: Columbia University
- **Gupta M.,** Nika J., Carsault T. *Multi-Step Chord Prediction for Human-AI Improvisation*. Presentation: Columbia Undergraduate Research Symposium, New York, NY (Virtual): September 2020
- **Gupta M.,** Malt M. *Musical Markov Chains*. Presentation: Reid Hall Research Seminar, Paris, France: May 2020

AWARDS & HONORS

- Hackathon Winner: Cognitive Modeling of Humans vs. Large Language Models, University of Tübingen – 2023
- Dean's List – Columbia University 2020-2021
- Heinrich Research Fellowship, Columbia University ($2500) - 2020
- Spritz Family Research Grant, Columbia University ($3000) – 2020
- PSAT National Commended Scholar – 2017
- Canadian Gold Medalist in both French (2016-2017) and Latin (2014-2017) National Language Exams
- Greville Smith Scholarship, McGill University ($48,000, not availed) – 2017
- Hugh M. Brock National Entrance Scholarship, University of British Columbia ($30,400, not availed) - 2017

RESEARCH EXPERIENCE

Max Planck Institute – Center For Humans and Machines Berlin, Germany
AI Behaviorist - Research Assistant May-August 2024
- Engineered online JS experiments to simulate multi-generational human-Large Language Model (LLM) communications in transmission networks of varying sizes and types. Built for research published in human-AI interaction conferences.
- Contributed visualizations and NLP analyses of public sentiments on AI risks/rewards across 400 human participants from India and the US. Compared attitudes via sociological coding.

University of Tübingen Tübingen, Germany
Research Intern – *Supervisors: Michael Franke, Robert Hawkins, Charley Wu* Feb 2024–July 2024
- Built a multi-agent extension of the Rational Speech Act (RSA) framework to examine effects of persuasive social goals

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on belief diffusion in social networks. Simulating RSA communications in a random network in Python and R and examining belief convergence with Bayesian inference over iterated dyadic communications.
- Led modeling, data generation, and experimentation; presented preliminary work to the Computational Pragmatics Lab

Columbia University Medical Center New York, NY
Research Assistant - *Supervisor: Elham Azizi* Jan – August 2021
- Analyzed the effects of aggregating neural network outputs to form posterior distributions (ensembling). Compared deep ensembling and batch ensembling on variational autoencoders (VAE's) performing differential gene expression.
- Trained Bayesian neural networks and VAE's on single-cell data in PyTorch analyzed posteriors across random initializations. Presented methods and findings to the computational cancer biology lab.

IRCAM, Centre Pompidou Paris, France
Research Fellow – *Supervisors: Mikhail Malt, Jérôme Nika* Jan-Sep 2020
- Built language models (RNNs, LSTMs) trained in PyTorch on musical data from live jazz for human-AI improvisations.
- Authored, presented a report and poster on generative music with language models at Columbia's 2020 research symposium. Authored a manuscript on stochastic models in music, published at Reid Hall's research symposium.

PROFESSIONAL EXPERIENCE

Weill Cornell Medical, Cornell University New York, NY
Research Software Engineer May 2022 - Nov 2022
- Worked on efficiency and indexing of the main NLP pipeline, using OCR to parse doctor notes into machine-readable text.
- Built an AWS-hosted ETL pipeline with Docker, Python, Java, and SQL to securely geocode address data from hospital patients, increasing geocoding accuracy and runtime efficiency by 15%.

Infosys Consulting New York, NY
Business Analyst – AI & Automation August 2021-May 2022
- Built and deployed an NLG model from open-source to automate 85% of credit loan risk report writing at a top 3 US bank.
- Engineered several NLP models for financial document classification, summarization, and generation in NLTK and JS.
- Assisted executive advising at 2 of the top 5 US banks in AI automation, chatbot implementation, and process mining. Wrote concise technical guides on each of the above topics, shared to clients and the firm at large.

TEACHING EXPERIENCE

Assistant Instructor: COS 126, COS 240 Princeton, NJ
Princeton University Sep. 2024 – Present
- Weekly teaching and grading for a cohort of 20 Princeton undergraduates with coding and theory p-sets and exams. COS 126 is an intro to java class and COS 240 is a proof-based math class for CS majors.

Teaching Assistant: Reinforcement Learning for Language Model Training Tübingen, Germany
University of Tübingen Nov. 2023 – Present
- Grading and coding support for 50+ Tübingen graduate students using Tensorflow for p-sets and RL research projects.

CompTIA New York, NY
Head Data Science Instructor Jan 2022-Present
- Head instructor for an online data science and coding boot-camp for Python and SQL. Assistant teacher for web development with React JS: providing comprehensive grading, coding, and career support to students.
- Design and deliver all written and technical curriculum on computer science, statistics, and data analysis, focused on libraries like Pandas, NumPy and Matplotlib. I hand-write the content for the course in Python/Markdown.

Teaching Assistant: Calculus IV New York, NY / Remote
Columbia University Jan - May 2021
- Graded assignments and held office hours for ~80 students in Professor Daniela De Silva's class. Coordinated grading across sections. Wrote technical guides and explanations on calculus-related concepts from the course textbooks.

EXTRACURRICULAR EDUCATION

Journal Clubs: Meta-Learning and Mechanistic Interpretability Princeton, New Jersey
Organized journal clubs for post-doc and graduate students to come together bi-weekly to discuss topics in meta-learning and mechanistic interpretability (with support of the Natural and Artificial Minds initiative at Princeton).

National Deep Inference Fabric (NDIF) Pilot Virtual, Feb 2025
Running mechanistic interpretability analyses on Llama 405-B with NN-sight, an NDIF-run library for mech-interp.

IICCSSS 2023 (Interdisciplinary Computational Cognitive Science Summer School) Tübingen, Germany
1st Place: Hackathon for Cognitive Modeling September 2023
Coursework: Comparing language models to humans; Computational modeling for learning; Human language models

ESSLLI 2023 (European Summer School in Language, Logic & Information) Ljubljana, Slovenia
Coursework: Probabilistic Language of Thought; Formal Language Theory and Neural Networks; August 2023
Deep Language Learning from Raw Speech; Logic, Data, Examples, and Learning

Center for AI Safety Berkeley, CA **(**Remote)
Intro to Machine Learning Safety Fellow June – August 2023
Grant-funded student. Coursework covering mechanistic interpretability, machine ethics, systemic AI safety, adversarial robustness, and preventing existential risk from future AI systems.

SKILLS, LANGUAGES & INTERESTS

Programming Languages: Python, Java, R, SQL, JavaScript, HTML, Bash, MATLAB

Technical Skills: Machine learning, data visualization, data analysis and statistical insights, computational modeling, scientific communication, experimental design, web design, teaching and curriculum design

Spoken Languages: English (fluent); French (intermediate) **Interests:** Cognitive science, Running, Tennis, Literature