KANISHKA MISRA

PhD candidate interested in Natural Language Understanding and Cognitive Science
Email: kmisra@purdue.edu   **Website:** https://kanishka.website/
Last Updated: February 15, 2023

Education

Purdue University, West Lafayette
Ph.D. in Computer Information Technology, 2018–*present*
Dissertation: *On Semantic Cognition, Inductive Generalization, and Language Models*
Advisor: Julia Taylor Rayz
Committee: Dr. Allyson Ettinger, Dr. Victor Raskin, Dr. Jin Wei Kocsis, Dr. John Springer

Purdue University, West Lafayette
M.S. in Computer Information Technology, 2020
Thesis: *Exploring Lexical Sensitivities in Word Prediction Models: A case study on BERT* [link]
Advisor: Julia Taylor Rayz
Note: Work performed alongside requirements for Ph.D.

Purdue University, West Lafayette
B.S. *with distinction*. Computer Information Technology, 2014–2018
Minor in Statistics

Fellowships and Assistantships

2022–2023	**Purdue Graduate Student Mentoring Fellowship**. Selected to understand and improve the advising relationship between faculty and students at Purdue University. **Award:** $5,000 in research and travel funds.
2021–2022	**Research Assistantship** funded through NSF EAGER Grant number 2039605. **Title:** *AI-based Humor-integrated Social Engineering Training*. **Contribution:** Co-wrote the "Technical Contribution" section, and served as key personnel. **PI:** Julia Taylor Rayz, **Co-PI:** Ida B. Ngambeki
2018–2019	**Purdue Research Foundation (PRF) Fellowship. Title:** *Computational Analysis of Online Predatory Texts*. **Contribution:** Wrote the proposal in its entirety. **Mentor:** Julia Taylor Rayz.

Industry Experience

Fall 2022	**Google Research - *Research Intern*** **Project:** Triggering Multi-Hop Reasoning in LLMs with Soft-prompts. **Host(s):** Siamak Shakeri and Cicero Nogueira dos Santos.
Summer 2021	**Pythonic AI - *NLP Engineering/Research Intern*** **Project:** Integrating Biomedical Commonsense into Language Models. **Host:** Baoqiang Cao, CTO and Co-founder.

Work In Progress

2023 **Kanishka Misra**, Cicero Nogueira dos Santos, Siamak Shakeri. Triggering Multi-hop reasoning in language models using soft-prompts and random walks. *Under review at ACL 2023*

2023 Freda Shi, Xinyun Chen, **Kanishka Misra**, David Dohan, Ed Chi, Nathan Scharli, Denny Zhou. Large Language Models are sensitive to Irrelevant Facts. *Under review at ICML 2023*

2023 Koustuv Sinha, Jon Gauthier, Aaron Mueller, **Kanishka Misra**, Keren Fuentes, Roger Levy, Adina Williams. Language model acceptability judgments are not always robust to context. *Under review at ACL 2023*.

2022 **Kanishka Misra**. `minicons`: Enabling Flexible Behavioral and Representational Analyses of Transformer Language Models. Demo Paper. [`preprint`]

Peer-reviewed Publications

2023 **Kanishka Misra**, Julia Taylor Rayz, Allyson Ettinger. COMPS: Conceptual Minimal Pair Sentences for Testing Robust Property Knowledge and its Inheritance in Pre-trained Language Models. *Accepted at EACL 2023*.

2022 **Kanishka Misra**, Julia Taylor Rayz, Allyson Ettinger. A Property Induction Framework for Neural Language Models. *44th Annual Conference of the Cognitive Science Society.*

2022 **Kanishka Misra**, Julia Taylor Rayz. LMs Go Phishing: Adapting Pre-trained Language Models to Detect Phishing Emails. *IEEE/ACM Web Intelligence Conference* (**Oral Presentation**).

2022 **Kanishka Misra**. On Semantic Cognition, Inductive Generalization, and Language Models. *AAAI 2022 Doctoral Consortium*, Vancouver, Canada. [`preprint`]

2021 **Kanishka Misra**, Allyson Ettinger, Julia Taylor Rayz. Do Language Models learn typicality judgments from text? *43rd Annual Conference of the Cognitive Science Society.* (**Oral Presentation**) [`preprint`]

2021 **Kanishka Misra**, Julia Taylor Rayz. Finding fuzziness in Neural Network models of Language Processing. *Annual Meeting of the North American Fuzzy Information Processing Society 2021.* (**Honorable Mention for Best Student Paper**). [`preprint`]

2020 **Kanishka Misra**, Allyson Ettinger, Julia Taylor Rayz. Exploring BERT's Sensitivity to Lexical Cues using Tests from Semantic Priming. *Findings of the Association for Computational Linguistics: EMNLP 2020.* [`link`]

2020 Qingyuan Hu, Yi Zhang, **Kanishka Misra**, Julia Taylor Rayz. Exploring Lexical Irregularities in Hypothesis-Only Models of Natural Language Inference. *2020 IEEE 19th International Conference on Cognitive Informatics & Cognitive Computing (ICCI* CC).* [`link`]

2020 **Kanishka Misra**, Julia Taylor Rayz. An Approximate Perspective on Word Prediction in Context: Ontological Semantics meets BERT. *Annual meeting of the North American Fuzzy Information Processing Society 2020.* Online. [`preprint`]

2019 **Kanishka Misra**, Hemanth Devarapalli, Tatiana Ringenberg, Julia Taylor Rayz. Authorship Analysis of Online Predatory Conversations using Character Level Convolution Neural Networks. *2019 IEEE International Conference on Systems, Man and Cybernetics (SMC).*, Bari, Italy. [`link`]

2019   Tatiana Ringenberg, **Kanishka Misra**, Julia Taylor Rayz. Not So Cute but Fuzzy: Estimating Risk of Sexual Predation in Online Conversations. *2019 IEEE International Conference on Systems, Man and Cybernetics (SMC).*, Bari, Italy. **(joint first author)** [link]

2019   Qiaofei Ye, **Kanishka Misra**, Hemanth Devarapalli, Julia Taylor Rayz. A Sentiment Based Non-Factoid Question-Answering Framework. *2019 IEEE International Conference on Systems, Man and Cybernetics (SMC).*, Bari, Italy. [link]

2019   **Kanishka Misra**, Hemanth Devarapalli, Julia Taylor Rayz. Measuring the Influence of L1 on Learner English Errors in Content Words within Word Embedding Models. *17th International Conference on Cognitive Modelling 2019.*, Montréal, Canada. [link]

2019   Tatiana Ringenberg, **Kanishka Misra**, Kathryn C. Seigfried-Spellar, Julia Taylor Rayz. Exploring Automatic Identification of Fantasy-Driven and Contact-Driven Sexual Solicitors. *2019 Third IEEE International Conference on Robotic Computing (IRC).*, Naples, Italy. [link]

2019   Kathryn C. Seigfried-Spellar, Marcus K Rogers, Julia T Rayz, Shih-Feng Yang, **Kanishka Misra**, Tatiana Ringenberg. Chat analysis triage tool: Differentiating contact-driven vs. fantasy-driven child sex offenders. *Forensic Science International, 2019.* [link]

Presentations and Invited Talks

Fall 2022
   Conceptual Minimal Pairs for testing Robust Property Knowledge and its Inheritance in Pre-trained Language Models (Invited Talk)
CompLing Lab, University of Chicago
Human and Machine Learning Lab. New York University
Computation and Psycholinguistics Lab. New York University
CompLang/Ev Lab joint meeting. MIT

Fall 2022
   Triggering Multi-Hop Reasoning in LLMs using Soft-Prompts
Prompt-tuning sync. Google Research.

Spring 2022
   On Semantic Cognition, Inductive Generalization, and Language Models
AAAI 2022 Doctoral Consortium. Vancouver (held online).

Fall 2021
   Finding fuzziness in Neural Network Models of Language Processing
NAFIPS 2021 (held online).

Summer 2021
   Do Language Models Learn Typicality Judgments from Text?
CogSci 2021 Main Conference (held online).

Honors and Awards

2022   **Best Student Poster (runner-up)** *PPI Holistic Safety and Security Research Impact area.* **Amount:** $250.

2022   **Fellow**, *Purdue Graduate Student Mentoring Fellows Program.* **Amount:** $5,000 in research funds.

2021   **Honorable Mention for Best Student Paper**, *North American Fuzzy Information Processing Society.* **Amount:** $100.

2019   **Holistic Safety and Security Research Travel Grant**, *Purdue Polytechnic Institute.* **Amount:** $500.

2019   **CIT Research Travel Grant Award**, *Purdue CIT.* **Amount:** $1200 (CogSci 2019), $600 (IEEE-SMC 2019).

2019   **Best HSS Poster Presentation**, *CERIAS Symposium.* Award presented by committee on Holistic Safety and Security (HSS) research impact area. [`link`].

2019   **Conference Travel Award**, *Chicago R Unconference.* **Amount:** $150.

2018   **PRF Fellowship**, *Purdue Research Foundation.* Covered two semesters worth of graduate school, in addition to stipend.

2018   **Best Poster Award - PPI**, *Purdue Office of Undergraduate Research Expo.* **Amount:** $250. [`link`]

2018   **Research Scholarship**, *Purdue Office of Undergraduate Research.* **Amount:** $500.

2017   **First Place**. *Indy Civic Hackathon.* **Amount:** $2000 split across 4 team members.

Teaching

Teaching Assistant - *Database Fundamentals* (CNIT 272)
Timeline: Fall 2019, Spring 2020, Fall 2020
Course Professor: Dr. Dawn D. Laux
Developed lecture videos and taught fundamentals of relational databases and SQL to <u>three</u> lab sections
($\approx$ 70 students on average across three semesters).
Instructor Rating: 4.8 (on average across three semesters)

Guest Lecturer - *Natural Language Technologies* (CNIT 519)
Timeline: Fall 2019, Fall 2020, Spring 2022
Course Professor: Dr. Julia Taylor Rayz
- Two lectures on Neural Network models of Natural Language Processing
- Developed two assignments on language model interpretability and evaluation.

Mentorship

2022–   Sam Huang (UChicago Undergraduate). **Topic:** *Assessing reasoning behavior in LMs in presence of distraction.*

2020   Qingyuan "Carol" Hu and Yi Zhang (Undergraduates). **Topic:** *Exploring Lexical Irregularities in Hypothesis-only Models of Natural Language Inference.* **Outcome:** Publication in *IEEE ICCC* CI 2020*, and a presentation at *PURC 2020*, which was <u>awarded second place</u> across all students from the Purdue Polytechnic Institute.

2018–19   John Phan (Undergraduate). **Topic:** *Gender Bias in Word Embeddings.* Awarded NSF REU scholarship. **Outcome:** Two poster presentations.

Reviewing

Conference	ACL (2023); EACL (2023); CogSci (2020, 2021, 2022); CoNLL (2021, 2022); ARR (2021, 2022); *SEM 2022; EMNLP 2020; IJCAI 2020; *SEM 2019; IEEE-IRC 2019.
Journal	*Cognitive Science*
Book	Chapman & Hall/CRC Press Statistics Series (2020, 2021).

Service

- **Organizer**, *Neural Nets for Cognition.* Discussion group at CogSci 2022.

- **Local Arrangements Chair**, *Annual Meeting of the North American Fuzzy Information Processing Society 2021 (NAFIPS 2021) held at Purdue University.*

- **Program Committee:** CoNLL (2021, 2022).

- **Volunteer**, *36th AAAI Conference on Artificial Intelligence*.

- **Graduate Student Advisor**, *Purdue CIT Student Council*.

- **Organizer**, *Undergraduate Research Panel*, Purdue CIT.

Skills

Programming	Python, R, pytorch, jax, SQL, LaTeX
Natural Languages	English, Hindi, Gujarati, Odiya

Software Developed

`minicons`   A toolkit to facilitate behavioral and representational analyses of transformer-based language processing models. [`github`]

Professional Affiliations

- Association of Computational Linguistics (ACL)

- Cognitive Science Society (CogSci)

- Institute of Electrical and Electronic Engineers (IEEE)

- Center for Education and Research in Information Assurance and Security (CERIAS)

- Society for Mathematical Psychology (MathPsych)

References

NLP Research: Dr. Julia Taylor Rayz, Dr. Allyson Ettinger, Dr. Victor Raskin
Teaching: Dr. Dawn Laux
Industry: Dr. Cicero Nogueira dos Santos, Dr. Baoqiang Cao.