KANISHKA MISRA

PhD candidate interested in Natural Language Understanding and Cognitive Science
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Education

Purdue University, West Lafayette
Ph.D. in Natural Language Understanding, 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 Natural Language Understanding, 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–present **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

Google Research - *Research Intern*
Fall 2022 **Project:** Triggering Multi-Hop Reasoning in LLMs with Soft-prompts.
Host(s): Siamak Shakeri and Cicero Nogueira dos Santos.

Pythonic AI - *NLP Engineering/Research Intern*
Summer 2021 **Project:** Integrating Biomedical Commonsense into Language Models.
Host: Baoqiang Cao, CTO and Co-founder.

Work In Progress

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

2022 **Kanishka Misra**, Julia Taylor Rayz, Allyson Ettinger. COMPS: Conceptual Minimal Pair Sentences for Testing Robust Property Knowledge and Inheritance in Pre-trained Language Models. *Under Review*.

2022 **Kanishka Misra**, Najoung Kim. Analyzing Syntactic Category Abstraction in Pre-trained Language Models. *Work in Progress*.

Peer-reviewed Publications

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*.

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***; 14% acceptance rate) [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]

Peer-reviewed Abstracts

2020 **Kanishka Misra**, Allyson Ettinger, Julia Taylor Rayz. Exploring BERT's lexical relations using Semantic Priming. *CogSci 2020* [poster] [link]

2019 **Kanishka Misra**, Hemanth Devarapalli, Julia Taylor Rayz. L1 Influence on Content Word errors in Learner English Corpora: Insights from Distributed Representation of Words. *CogSci 2019*, Montréal, Canada. [poster] [link]

Presentations and Invited Talks

Fall 2022	*Conceptual Minimal Pairs for testing Robust Property Knowledge and its Inheritance in Pre-trained Language Models* Human and Machine Learning Lab. NYU-CDS Computation and Psycholinguistics Lab. NYU-CDS 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).

Honors and Awards

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

2022 **Bilsland Fellowship Nomination**. *Purdue Polytechnic Institute*

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 three 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 awarded second place 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

Primary	CogSci (2020, 2021, 2022); CoNLL (2021, 2022); ARR (2021, 2022), EACL 2023
Secondary	*SEM 2022; EMNLP 2020; IJCAI 2020; *SEM 2019; IEEE-IRC 2019.
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.