

# KANISHKA MISRA

*PhD candidate interested in Natural Language Understanding and Cognitive Science*

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## Education

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### Purdue University, West Lafayette

Ph.D. in Natural Language Understanding, 2018–*present*

Close collaboration with Allyson Ettinger (UChicago Linguistics)

**Dissertation:** *On Semantic Cognition, Inductive Generalization, and Language Models*

**Advisor:** Julia Taylor Rayz

### Purdue University, West Lafayette

M.S. in Natural Language Understanding, 2020, **GPA:** 4.0

**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, **GPA:** 3.72

Minor in Statistics

## Fellowships and Assistantships

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

## Work In Progress

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| 2022 | <b>Kanishka Misra</b> . minicons: Enabling Flexible Behavioral and Representational Analyses of Transformer Language Models. Demo Paper. [ <a href="#">preprint</a> ]                                      |
| 2022 | <b>Kanishka Misra</b> , Julia Taylor Rayz, Allyson Ettinger. COMPS: Conceptual Minimal Pair Sentences for Testing Property Knowledge and Inheritance in Pre-trained Language Models. <i>Under Review</i> . |

## Peer-reviewed Publications

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- 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**. 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* [[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

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- 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](#)]

## Honors and Awards

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- 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

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### 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
- Developing two assignments on neural networks and language models.

## Industry Experience

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Fall 2022	<b>Research Intern - <i>Google Research</i></b> <b>Project:</b> Triggering Multi-Hop Reasoning in LLMs with Soft-prompts. <b>Host:</b> Siamak Shakeri and Cicero Nogueira dos Santos.
Summer 2021	<b>NLP Engineering/Research Intern - <i>Pythonic AI</i></b> <b>Project:</b> Integrating Medical Knowledge into Language Models. <b>Host:</b> Baoqiang Cao, CTO and Co-founder.

## Mentorship

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<b>2018-19</b>	John Phan (Undergraduate). <b>Topic:</b> <i>Gender Bias in Word Embeddings</i> . Awarded NSF REU scholarship. <b>Outcome:</b> Two poster presentations.
<b>2020</b>	Qingyuan “Carol” Hu and Yi Zhang (Undergraduates). <b>Topic:</b> <i>Exploring Lexical Irregularities in Hypothesis-only Models of Natural Language Inference</i> . <b>Outcome:</b> Publication in <i>IEEE ICC* CI 2020</i> , and a presentation at <i>PURC 2020</i> , which was awarded <u>second place</u> across all students from the Purdue Polytechnic Institute.

## Reviewing

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<b>Primary</b>	CogSci (2020, 2021, 2022); CoNLL (2021, 2022); ARR (2021, 2022)
<b>Secondary</b>	*SEM 2022; EMNLP 2020; IJCAI 2020; *SEM 2019; IEEE-IRC 2019.
<b>Book</b>	Chapman & Hall/CRC Press Statistics Series (2020, 2021).

## Service

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- **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

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<b>Programming</b>	R (expert), Python (expert), SQL (proficient), L <sup>A</sup> T <sub>E</sub> X
<b>Libraries</b>	pytorch, tidyverse(R), tidymodels(R), tensorflow, Rcpp, gensim
<b>Statistics</b>	Probability Theory, GLMs, LMEMs, Bayesian Models
<b>Natural Languages</b>	English, Hindi, Gujarati, Odiya

## Software Developed

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

## Professional Affiliations

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- 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

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**NLP Research:** Dr. Julia Taylor Rayz, Dr. Allyson Ettinger, Dr. Cicero Nogueira dos Santos, Siamak Shakeri, Dr. Adina Williams, Dr. Victor Raskin

**Teaching:** Dr. Dawn Laux

**Industry:** Dr. Baoqiang Cao, Matt Younkle.