

# KANISHKA MISRA

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## Academic Positions

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2024–current	<b>Toyota Technological Institute at Chicago</b> Research Assistant Professor <i>Endowed faculty position for up to 3 years</i>
2023–2024	<b>The University of Texas at Austin</b> Postdoctoral Fellow, Department of Linguistics <b>Advisor:</b> Dr. Kyle Mahowald

## Education

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**Purdue University**, West Lafayette, USA

Ph.D. in Computer Information Technology, 2018–2023

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

**Advisor:** Dr. Julia Taylor Rayz

**Committee:** Dr. Allyson Ettinger, Dr. Victor Raskin, Dr. Jin Wei Kocsis, Dr. John Springer

**Purdue University**, West Lafayette, USA

M.S. in Computer Information Technology, 2020

**Thesis:** *Exploring Lexical Sensitivities in Word Prediction Models: A case study on BERT*

**Advisor:** Dr. Julia Taylor Rayz

**Note:** Work performed alongside requirements for Ph.D.

**Purdue University**, West Lafayette, USA

B.S. *with distinction*. Computer Information Technology, 2014–2018

Minor in Statistics

## Fellowships and Assistantships

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2023	<b>Bilsland Fellowship.</b> Dissertation Fellowship awarded by Purdue University.
2022–2023	<b>Purdue Graduate Student Mentoring Fellowship.</b> 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	<b>Research Assistantship</b> 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	<b>Purdue Research Foundation (PRF) Fellowship.</b> <b>Title:</b> <i>Computational Analysis of Online Predatory Texts</i> . <b>Contribution:</b> Wrote the proposal in its entirety. <b>Mentor:</b> Julia Taylor Rayz.

## Industry Experience

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- 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 and Preprints

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- 2024      **Kanishka Misra**, Allyson Ettinger, and Kyle Mahowald. [Experimental Contexts Can Facilitate Robust Semantic Property Inference in Language Models, but Inconsistently.](#) *Under Review.*
- 2024      **Kanishka Misra** and Kyle Mahowald. [Language Models Learn Rare Phenomena from Less Rare Phenomena: The Case of the Missing AANNs.](#) *Under Review.*
- 2024      **Kanishka Misra** and Najoung Kim. [Generating novel experimental hypotheses from language models: A case study on cross-dative generalization.](#) *Submitted.*
- 2022      **Kanishka Misra.** [minicons: Enabling Flexible Behavioral and Representational Analyses of Transformer Language Models.](#) Demo Paper. *Preprint/Demo.*

## Peer-reviewed Publications

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- 2023      **Kanishka Misra**, Cicero Nogueira dos Santos, Siamak Shakeri. [Triggering Multi-hop reasoning in language models using soft-prompts and random walks.](#) *Findings of ACL 2023*
- 2023      Koustuv Sinha\*, Jon Gauthier\*, Aaron Mueller<sup>†</sup>, **Kanishka Misra**<sup>†</sup>, Keren Fuentes, Roger Levy, Adina Williams. [Language model acceptability judgments are not always robust to context.](#) *ACL 2023.* **Recipient of Outstanding Paper Award.**\*,<sup>†</sup>: Equal Contribution
- 2023      Freda Shi\*, Xinyun Chen\*, **Kanishka Misra**, David Dohan, Ed Chi, Nathan Scharli, Denny Zhou. [Large Language Models Can Be Easily Distracted by Irrelevant Context.](#) *ICML 2023.* \*: Equal Contribution
- 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.](#) *EACL 2023.* **Recipient of Best Paper Award.**
- 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.*

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

## Peer-reviewed Abstracts

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- 2023 **Kanishka Misra** and Najoung Kim. [Abstraction via exemplars? A representational case study on lexical category inference in BERT](#). *BUCLD 48*
- 2020 **Kanishka Misra**, Allyson Ettinger, Julia Taylor Rayz. [Exploring BERT's lexical relations using Semantic Priming](#). *CogSci 2020* [poster]
- 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]

## Presentations and Invited Talks

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Summer 2024	<i>Controlled Rearing of Language Models can reveal Linguistic Insight</i> (Invited Talk) Princeton Psychology of Language Lab (Adele Goldberg's group)
Spring 2024	<i>Controlled Rearing of Language Models can reveal Linguistic Insight</i> (Invited Talk) SynSem Seminar, UT Austin Linguistics. South by Semantics Workshop, Austin
Fall 2023	<i>Analyzing Robust Conceptual Knowledge and Property Inheritance in Language Models</i> (Invited Talk) Guest lecture for <i>Topics in Natural Language Processing</i> (taught by Eunsol Choi) Toyota Technological Institute at Chicago. C.Psyd Lab (Marten van Schijndel's lab), Cornell University.
Fall 2023	<i>Language model acceptability judgments are not always robust to context</i> UT Austin NLL Reading Group.
Spring 2023	<i>COMPS: Conceptual Minimal Pair Sentences for testing Robust Property Knowledge and its Inheritance in Pre-trained Language Models</i> EACL 2023, Main Conference
Spring 2023	<i>On the synthetic semantic cognition of language models</i> (Invited Talk) EvLab and LINGO lab. MIT. Toyota Technological Institute at Chicago.
Fall 2022	<i>Conceptual Minimal Pairs for testing Robust Property Knowledge and its Inheritance in Pre-trained Language Models</i> (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 Language Evolution, Acquisition and Processing Workshop. University of Chicago
Fall 2022	<i>Triggering Multi-Hop Reasoning in LLMs using Soft-Prompts</i> Prompt-tuning sync. Google Research.
Spring 2022	<i>On Semantic Cognition, Inductive Generalization, and Language Models</i> AAAI 2022 Doctoral Consortium. Vancouver (held online).
Fall 2021	<i>Finding fuzziness in Neural Network Models of Language Processing</i> NAFIPS 2021 (held online).
Summer 2021	<i>Do Language Models Learn Typicality Judgments from Text?</i> CogSci 2021 Main Conference (held online).

## Honors and Awards

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- 2024 **Google PaliGemma Credits.** *Google.* **Amount:** \$5000.
- 2023 **Paula Menyuk Travel Award.** *BUCLD 48.* **Amount:** \$385.
- 2023 **Outstanding Paper Award.** *ACL 2023.*
- 2023 **Best Paper Award.** *EACL 2023.* **Amount:** \$1000.
- 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

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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

- Developed two assignments on language model interpretability and evaluation.

## Mentorship

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- 2024– **Lalchand Pandia** (PhD Student at the University of Chicago). **Topic(s):** *Investigating distributional signals of hypernymy in Language Models.*
- 2023– **William Sheffield** (PhD Student at UT Austin). **Topic(s):** *Discourse-sensitive properties of Language Models*
- 2023– **Juan Diego Rodriguez** (PhD Student at UT Austin). **Topic(s):** *Conceptual Organization and Inference in Language Models*
- 2023– **Jwalanthi Ranganathan** (Undergraduate at UT Austin). **Topic:** *Projecting Contextualized Word Embeddings onto Interpretable Semantic Spaces.*
- 2023– **Daniel Brubaker** (Undergraduate at UT Austin). **Topic:** *Exploring pragmatic inference in LMs with Discourse Connectives.*
- 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 ICC\* 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

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- Conference** CogSci (2024); EMNLP (2023); CoNLL (2023); 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.
- Workshop** Blackbox NLP (2023)
- Journal** *Journal of Memory and Language* (2024); *Computational Linguistics* (2024); *PNAS Nexus* (2024); *Cognitive Science* (2023); *Open Mind* (2023)
- Book** Chapman & Hall/CRC Press Statistics Series (2020, 2021).

## Service

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- **Area Chair**, ACL Rolling Review (ARR) 2024 (Feb, April, June).
- **Area Chair**, *Linguistic Theory, Cognitive Modeling, and Psycholinguistics*. LREC-COLING 2024.
- **Session Chair**, *Linguistic Theory, Cognitive Modeling, and Psycholinguistics*. ACL 2023 (on-site).
- **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>	Python, R, pytorch, jax, SQL, $\text{\LaTeX}$
<b>Natural Languages</b>	English (near-native), Hindi (near-native), 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. Allyson Ettinger, Dr. Kyle Mahowald, Dr. Julia Taylor Rayz, Dr. Junyi Jessy Li  
**Teaching:** Dr. Dawn Laux  
**Industry:** Dr. Cicero Nogueira dos Santos, Dr. Baoqiang Cao.