

Personal Statement

Kanishka Misra (kmisra@purdue.edu)

Throughout my time as a graduate student, I have found collaborative discussion to be an exceptionally effective method to strengthen and refine research ideas. My own research practice has benefited tremendously through feedback from researchers from different institutions and with different levels of experience – ranging from theoretical linguists to experimental cognitive scientists. In the past, I have engaged in such efforts through informal meetings at conferences such as CogSci, ACL, and EMNLP. At the AAAI 2022 Doctoral Consortium, I hope to more firmly engage in this intellectual cross-pollination by presenting my PhD research work titled, *On semantic cognition, inductive generalization, and language models*.

My doctoral research focuses on understanding semantic knowledge in neural network models trained solely to predict natural language (referred to as language models, or LMs), by drawing on insights from the study of concepts and categories grounded in cognitive science. To this end, I propose a framework inspired by ‘inductive reasoning,’ a phenomenon that sheds light on how humans utilize background knowledge to make inductive leaps and generalize from new pieces of information about concepts and their properties. Drawing from experiments that study inductive reasoning, I propose to analyze semantic inductive generalization in LMs using phenomena observed in human-induction literature, investigate inductive behavior on tasks such as implicit reasoning and emergent feature recognition, and analyze and relate induction dynamics to the learned conceptual representation space.

Due to the interdisciplinary nature of my project, feedback from other AI researchers is a top priority – it will help me advance the technical aspects of the project, and enable me to produce research outputs that are accessible to all the fields I borrow from: Knowledge Representation, Natural Language Processing, and Cognitive Science. Attending the event will let me expand my peer-cohort, opening up avenues for potentially impactful work in the future. The AAAI doctoral consortium has traditionally given participants the opportunity to pair up with influential AI researchers who will guide them through the event and provide valuable feedback. I am highly enthusiastic about the prospect of being mentored by an experienced scientist – a learning experience that will yield better characterization of higher level insights that can be drawn from my findings, thereby helping me shape the long-term vision and direction for my research.

I hope to contribute to the consortium’s program as well as my peers’ research by bringing in diverse insights and lessons from my attempts to integrate cognitive science into natural language processing research. The AAAI 2022 Doctoral Consortium will be my maiden doctoral consortium, and I look forward to having fruitful conversations with experienced as well as early-career researchers, as we collectively advance the scientific goals of AI research.