

# DAN LI

**Areas of Specialty:** philosophy of complex systems, networks science, climate science, modeling

**Areas of Competence:** feminism, general philosophy of science, history of science

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Indiana University

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## EDUCATION

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- Ph.D.** Indiana University (Bloomington, IN) 2018-Expected May 2022
- Major: Philosophy of Science
  - Major: Complex Networks and Systems
  - Minor: Earth and Atmospheric Sciences
- Dissertation: “Frontiers in Climate Science: a methodological inquiry”  
Committee: Elisabeth Lloyd (co-chair), Alessandro Flammini (co-chair), Amit Hagar, Ben Kravitz
- M.S.** Peking University (Beijing, China) 2015-2018
- Major: History of Science
- Thesis: “The Pharmaceuticalization of Premenstrual Syndrome: from progesterone to Sarafem”  
Advisor: Guosheng Wu
- B.E.** University of Science and Technology of China (Anhui, China) 2009-2014
- Major: Thermal Science and Energy Engineering
- Thesis: “The Calculation of the Optical Properties of VO<sub>2</sub> with Microstructure”  
Advisor: Hong Ye

## HONORS AND AWARDS

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- College of Arts and Science CNS Graduate Fellowship** 2020-2022
- Two-year graduate fellowship for students participating the NSF-funded [CNS research trainee program](#) (\$36,000 with fee remissions)
- [Norwood Russell Hanson Prize for Outstanding Grad Student Papers](#)** 2021-2022
- Awarded annually by departmental faculty
- Informatics Graduate Support Fellowship & Travel Award** 2020-2022
- Two-year support fellowship (\$4,240) and travel award (\$3,000) for graduate students from College of Arts and Science
- [Irving & Leno Lo Scholarship](#)** 2019-2020
- Scholarship for students in music, history and philosophy of science (\$6,000)

**COAS Graduate Scholars Fellowship & Travel Award**

2018-2019

[College of Arts and Sciences] Entrance fellowship for first year

Ph.D. students (\$21,500 with fee remissions) with additional travel award (\$2,800)

**RESEARCH IN PROGRESS**

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“Don’t Make Machine Learning ‘Gruesome’— the importance of feature selection learning biases in earth system science”

- I link machine learning (the i.i.d. assumption and the underspecification problem) with the problem of induction (Hume’s principle of Uniformity of Nature and Goodman’s New Riddle) to show the importance of feature selection and learning biases.

“Machines Do Not Need to Learn Convection”

- I identify some problems with a recent skeptical analysis of machine learning in climate modeling and debunk the core assumptions of this skepticism.

“The Missing Links in Inferences with Climate Networks”

- I articulate the flaws of scientists applying network modeling to climate data and I offer a diagnosis of these flaws. I further suggest how to correct the problem.

“Is ‘pregnancy brain’ a real thing? A philosophy of science perspective” (with Siyu Yao)

- Sexist biases have led some scientists to look for brain changes and cognitive decline in pregnant women. We show that their research methods and questions are misguided and that they crucially overlook explanatorily relevant factors such as sleep deprivation in pregnant women.

“Chronological Anchors in Paleoclimatology” (with Ryan O’Loughlin)

- We examine a recent revision to an ice core chronology and explore the role of mutability in temporal data. We further analyze the importance of temporal anchors, such as volcanic eruptions and cosmogenic events, in dating paleoclimate proxies.

**WORK EXPERIENCE**

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**Indiana University, Bloomington**

June 2021

**Research Assistant**, Institute for Digital Arts & Humanities

- Transform traditional text-based humanity projects into digital humanities with the [IDAH Summer Incubator](#)
- Design data structure and apply network modeling techniques for data visualization and analytics

**Indiana University, Bloomington**

Aug 2019 to May 2020

**Associate Instructor**, Department of History and Philosophy of Science and Medicine

- *Scientific Reasoning*, an undergraduate course averaging 30 students per semester, covering the following topics: summary statistics, probability theory, logic and fallacies, data visualization, scientific modeling, etc.
- Teaching assistant to Jordi Cat (Fall 2019)
- Instructor of Record (Spring 2020)
- Developed quizzes, exams, assignments, and extra-credit project
- Transitioned course online, midway through, due to COVID19

**Peking University, Beijing**

Sept 2015 to July 2017

**Teaching Assistant**, Department of Philosophy

- *History of Science*, an undergraduate course averaging 300 students per semester, covering the period from ancient Greek to Early modern
- Led weekly discussion sessions and graded homework

## **PUBLICATIONS**

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### ***Journal Papers Accepted***

### ***Journal Papers in Review***

Li, D., “Does Universality Make a Difference? –the predicament of the universality approach,” under review at *European Journal for Philosophy of Science*

Li, D., and O’Loughlin, R., “Model Robustness in Economics: the admissibility and evaluation of tractability assumptions,” under review at *Synthese*

Li, D., “If A Tree Grows No Ring and No One Is Around: how scientists deal with missing tree rings,” under re-review at *Climatic Change*

### ***Peer-Reviewed Conference Papers/Posters\* Accepted***

Li, D., “Some Models are Universal and Rare: does “universality” make a difference?,” The 8<sup>th</sup> Biennial meeting of the European Philosophy of Science Association, Sept. 15-18, 2021

Li, D. and O’Loughlin, R., “Tractability Assumptions, Holism, and Model Robustness,” Philosophy of Science Association 27<sup>th</sup> Biennial Meeting (2020/2021), Nov. 11-14, 2021, PAPERID-PSA2020668.

\*Li, D., “If A Tree Grows No Rings and No One is Around: how scientists deal with missing tree rings,” Philosophy of Science Association 27<sup>th</sup> Biennial Meeting (2020/2021), Nov. 11-14, 2021, PAPERID-PSA2020956. [[video abstract](#)]

\*Li, D., “The Missing Link in Inferences with Climate Networks”, Philosophy of Science Association 27<sup>th</sup> Biennial Meeting (2020/2021), Nov. 11-14, 2021, PAPERID-PSA20201062.

## PRESENTATIONS AND INVITED LECTURES

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### Paper Presentation (\*I presented)

- “Can We Infer the Absolute Timescale from Paleoclimate data? –lessons from paleoclimatology,” (coauthored with Ryan O’Loughlin), Boston University Philosophy Grad Conference, April 22<sup>nd</sup>-23<sup>rd</sup>, 2021. Held virtually.
- \* “Tractability Assumptions, Holism, and Model Robustness,” (coauthored with Ryan O’Loughlin) IU HPSC Women’s Leadership Conference, October 26<sup>th</sup>, 2019. [[recording](#)]
- \* “The Medicalization of Premenstrual Syndrome,” 9<sup>th</sup> Meeting of International Society for the History of Medicine, September 2017.

## ABORTED PROJECTS OR FAILURES

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“The Medicalization of Premenstrual Syndrome: from progesterone to Sarafem,” submitted to *Studies in History and Philosophy of Science Part A* in 2018, but the reviewer #2 didn’t think a social history narrative that draws on social theory concepts such as “medicalization” was a legitimate history project. And then my interests led me to other projects and schoolwork.

“A Bayesian factor of 6 does NOT really mean twice the evidence compared to a Bayesian factor of 3,” a commentary submitted to *Nature Neuroscience* in 2020. The editors did not think it worth publishing. Yet, I still think we should treat Bayesian factors as implying how far one should be moved from initial position (degree of prior belief) given the new evidence, rather than treating them as evidential metrics, because priors cannot be ignored.

## PROFESSIONAL TRAINING

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### Visiting Student to National Center of Atmospheric Research

Boulder, CO, July 4-30, 2021

Description: four-week visit to NCAR to communicate with climate scientists on regional modeling, big data, and machine learning applications in climate science

### [Philosophy & Physical Computing 2019 Summer Workshop](#)

Virginia Tech, Blacksburg, June 10-23, 2019

Description: two-week summer workshop that aims to bridge the gap between philosophers and computer scientists.

## PROFESSIONAL AFFILIATIONS

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Philosophy of Science Association

European Philosophy of Science Association

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**PROFESSIONAL SERVICE**

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**Graduate conference Co-Organizer**

IU HPSC Women's Leadership Conference, October 26, 2019

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**COMMUNITY SERVICE**

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Indiana University's Sciencefest (Fall 2017, Fall 2018): outreach to encourage STEM interest in elementary school students

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**LANGUAGES**

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**Chinese:** Native

**English:** Proficient

**Japanese:** Novice Speaker, Intermediate Reading

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**COMPUTER SKILLS**

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**Programming:** Python (with a passion for data visualization; familiar packages include Numpy, Pandas, Networkx, Matplotlib)

**Platform:** AutoCAD

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**OTHER**

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Big fan of forensic science. Constantly amazed by the variety of evidence employed in solving murders—methodological pluralism rocks!

## REFERENCES

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**Dr. Elisabeth Lloyd**, Distinguished Professor  
History and Philosophy of Science and Medicine, Biology, Kinsey Institute for Research  
Indiana University  
Ballantine Hall 905  
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