Mel Andrews

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Research Areas

AOS **Philosophy of Science & Technology, AI Ethics, Philosophy of Cognitive Science**.
AOC **Philosophy of Mind, Philosophy of Mathematics, Philosophy of Biology**.

Work

2025-2027 **Principal Investigator**, *Epistemic Credentials of AI in Science Evaluation*, The Alfred P. Sloan Foundation Metascience & AI Grant.
Princeton University, Princeton, NJ

2025-2027 **Postdoctoral Research Associate**, *Center for Information Technology Policy (CITP) & the Natural and Artificial Minds (NAM) Initiative, the AI Lab at Princeton.*
Princeton University, Princeton, NJ

2024-2025 **Doctoral Student Researcher**, *Responsible AI Team.*
Google Research, Mountain View, CA

2022-2024 **Research Associate**, *Department of Machine Learning (MLD).*
Carnegie Mellon University, Pittsburgh, PA

2019-2022 **Graduate Teaching Assistant**, *Department of Philosophy.*
The University of Cincinnati, Cincinnati, OH

Education

2025 **PhD, Philosophy**, University of Cincinnati.
Dissertation Chair: Angela Potochnik. Dissertation Committee: Colin Allen, Zvi Biener, Anthony Chemero. Dissertation Title: *The Math & the Territory: On the Scientific Uses & Abuses of Machine Learning & Other Mathematical Modeling Strategies*

2014 - 2018 **Bachelor of Science**, Tufts University, Psychology, Cognitive & Brain Sciences.

Grants, Fellowships, & Awards

2025-2027 **Metascience and AI Grant**, *USD $250,000*, The Alfred P. Sloan Foundation.

2024 **Taft Fellowship**, *USD $48,775*, The University of Cincinnati.

2023 **Racial Equity in Technology Policy Accelerator**, *USD $3,000*, Federation of American Scientists.

2022 **AI Alignment Summer Fellowship**, *USD $36,000*, Principles of Intelligent Behaviour in Biological & Social Systems.

2019 **Graduate Dean's Excellence Scholarship**, *USD $3,000*, University of Cincinnati.

Publications

Andrews, M. (2025), The Immortal Science of ML: Machine Learning & the Theory-Free Ideal. *Erkenntnis.* Springer. DOI:10.1007/s10670-025-01010-x

Andrews, M. (2025), Towards an Applied Philosophy of Mathematics, in Currie, A., & Veigl, S. (Eds.) *Methods in the Philosophy of Science: A User's Guide.* The MIT Press.

Andrews, M., Smart, A., & Birhane, A., (*2024*), The Reanimation of Pseudoscience in Machine Learning & its Ethical Repercussions. *Patterns, Cell Press.* DOI:10.1016/j.patter.2024.101027

Fawkes, J., Fishman, N., **Andrews, M.**, Lipton, Z. (*2024*), The Fragility of Fairness: Causal Sensitivity Analysis for Assessing the Robustness of Fair Machine Learning, *Proceedings of the 38th International Conference on Neural Information Processing Systems (NeurIPS)*. DOI:10.48550/arXiv.2410.09600

Andrews, M. (*2022*), Making Reification Concrete: A Response to Bruineberg et al. *Behavioral and Brain Sciences (BBS), Cambridge University Press.* DOI:10.1017/S0140525X22000310

Andrews, M. (*2021*), The Math is Not the Territory: Navigating the Free Energy Principle. *Biology & Philosophy. 36*(3), 1-19, Springer. DOI:10.1007/s10539-021-09807-0

Feldman, D. H. & **Andrews, M.** (*2017*), Parenting Talented Children, in *Handbook of Parenting,* (3rd ed.) (Ed. Bornstein), Psychology Press. DOI:10.4324/9780429440847-12

Public Philosophy

Andrews, M. (*2023*), Philosophy in the Trenches and Laboratory Benches of Science. *The Philosopher.*

Andrews, M., and Polt, R. (*2020*), The Philosophers' Touch. *ETCetera Journal.*

Andrews, M. & Feiten, E. (2018), Conference Report: The Generalized Theory of Evolution, *The Reasoner*, *12*(5).

Teaching

2025-2026 **Co-lead**, *Princeton University*, **Future Values Seminar**, Seminar on AI in Science for Princeton faculty and staff through the University Center for Human Values (UCHV).

Andrews, M. (*2024, Summer*), Instructor, Summer School, Philosophy of Science for AI Ethics, SEMF Interdisciplinary Summer School, Valencia Polytechnic University, Valencia, E.S.

2023, Spring **Co-Instructor**, *Carnegie Mellon University*, **Philosophical Foundations of Machine Intelligence**, Graduate Seminar on Philosophy of Machine Learning & Artificial Intelligence for graduate students in the school of computer science.

Andrews, M. (*2022, Summer*), *Instructor, Summer School, Mathematical Modeling in the Cognitive and Brain Sciences,* Nencki School of Ideas in Neuroscience, Warsaw, P.L.

2022, Spring **Teaching Assistant**, *University of Cincinnati*, **Introduction to Philosophy**.

2021, Fall **Instructor**, *University of Cincinnati*, **Introduction to Cognitive Science**.

2021, Summer **Instructor**, *University of Cincinnati*, **Introduction to Cognitive Science**.

2021, Spring **Instructor**, *University of Cincinnati*, **Medical Ethics: Moral Issues in Medical AI**.

2020, Fall **Teaching Assistant**, *University of Cincinnati*, **Contemporary Moral Issues**.

2020, Spring **Teaching Assistant**, *University of Cincinnati*, **Introduction to Cognitive Science**.

2019, Fall **Teaching Assistant**, *University of Cincinnati*, **Introduction to Philosophy**.

2018, Summer **Co-Instructor**, *Binghamton University*, **Topics in Theoretical Biology & Philosophy of Biology**.

2018, Spring **Teaching Assistant**, *Tufts University*, **Intellectual Development**.

2018, Spring **Co-Instructor**, *Binghamton University*, **Topics in Theoretical Biology & Philosophy of Biology**.

2017, Fall **Co-Instructor**, *Binghamton University*, **Topics in Theoretical Biology & Philosophy of Biology**.

Invited Talks & Workshops

Andrews, M. (*2026*), NeuroAI and the Reification of Formal Analogies, Dynamic Computation and Explanation, Stanford University, Stanford, CA

Andrews, M. (*2026*), Cultural contributions of science and impacts of AI on science evaluation, Cultural AI Conference, NYU Digital Theory Lab, NYU, NYC, NY

Andrews, M. (*2025*), AI for Peer Review & the Future of Science, Workshop on AI in Science, University of Cincinnati, Cincinnati, OH

Andrews, M. (*2025*), False Promises and False Premises of Algorithmic Fairness, Seminar, The Center for Information Technology Policy, Princeton University

Andrews, M. (*2025*), Invited Keynote Presentation: What could an AI ethics be? An epistemological proposal, Conference on Philosophy of Computing, Universidad Nacional Autónoma de México, Mexico City, MX

Andrews, M. (*2025*), Representation in Brains & Neural Networks, *Johns Hopkins University, Baltimore, M.D.*

Andrews, M. (*2025*), Machine Learning & Neuroscience: Curious (& Spurious) Connections, *Centre for Cognitive Science (COGS), University of Sussex, Brighton, U.K.*

Andrews, M. (*2024*), Empirical Grounding in (Neuro)scientific ML, *Philosophy and Psychology of Generalization and Creativity Group, Simons Institute for the Theory of Computing, Berkeley, C.A.*

Andrews, M. (*2024*), What's scientific representation got to do with responsible AI? *Artificial Intelligence Research Centre at City, University of London (CitAI)*

Andrews, M. (*2024*), Responsible AI is Sound Science *Workshop on Causation, Complexity, Cognition, and Representation for Responsible AI*, Google & the Santa Fe Institute (SFI)

Andrews, M. (*2023*), Machine Learning & The Theory-Free Ideal *Workshop on Philosophy of AI in Science,* Cambridge University, Cambridge, UK

Andrews, M. (*2023*), Panelist on AI Alignment and Artificial Life *ALIFE 2023 (Conference on Artificial Life),* Sapporo, JP

Andrews, M. (*2023*), The Devil in the Data: Assessing the Atheoreticity of Scientific Machine Learning *Foundations of Computation Workshop,* presented at the Department of Philosophy, Australian National University, Canberra, AU

Andrews, M. (*2022*), *Workshop on the Free Energy Principle as Model Structure or Model Template,* presented at the Department of Philosophy, Universität Wien, Wien, AT

Andrews, M. (*2022*), *Workshop on metascience and theorising, Leiden, NL*

Andrews, M. (*2022*), *Reification in ML & the FEP* "The Free Energy Principle: Science, Tech and Philosophy" Conference, The Berlin School of Mind and Brain, Humboldt-Universität zu Berlin, Berlin, DE

Andrews, M. (*2021*), *Recognising & Rectifying Reification: Machine Learning & Model-Target Misidentification,* Keynote Presented at COGNITIO 2021, Université du Québec à Montréal, Québec, CA

Refereed Talks & Workshops

Andrews, M. *The Future of Peer Review: Automation or Institutional Reform?* in Symposium *Philosophical Perspectives on AI/ML for Science Evaluation*, Biennial Meeting of the Philosophy of Science Association (PSA) 2026, San Diego, CA

Andrews, M., & Smart, A. (*2024*), *Militarising ML: Functionality & Harm,* Presented to conference *Harms and Risks of AI in the Military*, Mila - Quebec AI Institute in Montréal, Montreal, CA

Andrews, M. & Curtis-Trudel, A., (*2024*), *Machine learning, cognitive prosthetics, and the future of science,* Presented to conference *Philosophy of Science: Past, Present and Future*, Minnesota Center for Philosophy of Science, Minneapolis, MN, USA

Andrews, M. (*2023*), *Machine Learning & The Theory-Free Ideal,* Accepted to conference *Philosophy of Science of ML*, Tübingen, DE *not presented due to pandemic*

Andrews, M. (*2021*), *Between Oracular Modeling & the Theory-Free Ideal* Talk accepted at the East European Network for Philosophy of Science, Tartu, EE *not presented due to pandemic*

Andrews, M. (*2021*), *Assessing the FEP in Scientific Practice* Talk Presented at the 5th International Conference on Interactivity, Language & Cognition: Integrating Quantitative and Qualitative Methods in the Cognitive and Language Sciences, Warszawa, PL

Andrews, M. (*2021*), *Machine Learning as Model & as Metaphor* Talk accepted at the joint conference of the International Society of Ethics and Information Technology/International Association for Computing and Philosophy, Universität Hamburg, DE *not presented due to pandemic*

Andrews, M. (*2021*), *Machine Learning in Scientific Practice: Normative & Descriptive Aims* Presented at the CUNY Graduate Center Graduate Conference on Artificial Intelligence, NY, NY, USA

Andrews, M. (*2021*), *Machine learning & the scientific method: the case of the Free Energy Principle* Presented at Digital Studies of Digital Science, Université catholique de Louvain, Louvain-la-Neuve, BE

Andrews, M. (*2018*), *A Theory of Representation with Error in Deacon & Bickhard* Presented at The Peripatetic Conference for Cognitive Systems Modeling, Małe Ciche, PL

Andrews, M. (*2018*), *Mind the (Informational) Gap: Mind, Machine, & the Space in Between* Presented at a workshop on Machine Learning and Explanation in Cognitive Science hosted by the Czech Academy of Sciences, Prague, CZ

Andrews, M. (*2018*), *Life-mind (dis-)continuities: bridging biological selfhood and biosemiosis.* Presented at The 18th Annual Biosemiotics Gathering, Berkeley, CA, USA

Andrews, M. (*2018*), *On the subject of evolution: towards a biological basis of subjectivity, selfhood, and agency.* Presented at The Science of Consciousness Conference, Tucson, AZ, USA

Andrews, M. (*2018*), *Adapting evolution: complexity & culture within a universal Darwinian framework.* Presented at The Generalized Theory of Evolution Conference, Düsseldorf, DE

Organization Experience

2026 **Workshop Organizer**, *AI for Science Evaluation*, Princeton University.

2026 **Symposium Organizer**, *Biennial Meeting of the Philosophy of Science Association (PSA)*, Philosophical Perspectives on AI/ML for Science Evaluation.

2022 **Conference Co-Organizer**, *University of Cincinnati*, Machine Learning, Abstract Thought, and the Expanding Reach of A.I.: Ethical and Conceptual Frontiers, Featuring talks by Zachary Lipton, Kathleen Creel, Cameron Buckner, Subbarao Kambhampati, S. Matthew Liao, Mariya Toneva, & Ahmed Elgammal.

2019-2021 **Organized and ran international reading and working group on mathematical modelling across physics, biology, and neuroscience**.

2018 **Conference Co-Organizer**, *Tufts University*, Predictive Processing: A Critical Evaluation of its Prospects, Featuring talks by Daniel Dennett, Lisa Feldman Barrett, Fiery Cushman, Bryce Huebner, Sam Gersham, Krzysztof Dołęga, Rosa Cao, Enoch Lambert, Matteo Colombo, & Philipp Schwartenbeck.

2018 **Organizer and Editor with David Sloane Wilson, Special Issue**, *This View of Life*, Reflections on the notion of 'teleology' & 'consciousness' in evolution, Featuring contributions by Massimo Pigliucci, Eva Jablonka & Simona Ginsburg, Lenny Moss, Liane Gabora, Steven Hayes, and Stanley Salthe.