
Research Areas

- AOS **Philosophy of Artificial Intelligence, AI Ethics, Philosophy of Science, Philosophy of the Cognitive and Neurosciences.**
- AOC **Philosophy of Biology, Philosophy of Applied Mathematics, Philosophy of Mind.**

Work

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

Education

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

Fellowships, Grants, & Awards

- 2024 **Taft Fellowship**, The University of Cincinnati.
- 2023 **Visiting Fellowship**, *Philosophy Department*, Australian National University.
- 2023 **Racial Equity in Technology Policy Accelerator**, *Federation of American Scientists*.
- 2022 **Fellowship**, *Oxford & Czech Academy of Sciences*, Principles of Intelligent Behaviour in Biological & Social Systems.
- 2021 **Visiting Scholarship**, *University of Pittsburgh*, Department of History & Philosophy of Science.
- 2019 **Graduate Dean's Excellence Scholarship**, *University of Cincinnati*.

Publications

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

Forthcoming & Under Review

- Andrews, M.** (*In Press*), Towards an Applied Philosophy of Mathematics, in Currie, A., & Veigl, S. (Eds.) *Philosophy of Science: A User's Guide*. The MIT Press.
- Andrews, M.** (*Under Review*), The Immortal Science of ML: Machine Learning & the Theory-Free Ideal. DOI:10.13140/RG.2.2.28311.75685

Fawkes, J., Fishman, N., **Andrews, M.**, Lipton, Z. (*Under Review*), The Fragility of Fairness: Causal Sensitivity Analysis for Assessing the Robustness of Fair Machine Learning.

Andrews, M. (*Contracted & In Prep*), A Theory of Representation for Applied ML, in *The Role of Artificial Intelligence in Science: Methodological and Epistemological Studies*, Curtis-Trudel, A. E., Rowbottom, D., & Barack, D., (Eds)., Routledge.

Public Writing

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

- 2023, Spring **Co-Instructor**, Carnegie Mellon University, MLG-10721 | **Philosophical Foundations of Machine Intelligence**, Graduate Seminar on Philosophy of Machine Learning & Artificial Intelligence for graduate students in the school of computer science.
- 2022, Spring **Teaching Assistant**, University of Cincinnati, PHIL-1000 | **Introduction to Philosophy**.
- 2021, Fall **Instructor**, University of Cincinnati, PSYCH-1006 | PHIL-1006 | **Introduction to Cognitive Science**.
- 2021, Summer **Instructor**, University of Cincinnati, PSYCH-1006 | PHIL-1006 | **Introduction to Cognitive Science**.
- 2021, Spring **Instructor**, University of Cincinnati, PHIL-2029 | **Medical Ethics: Moral Issues in Medical AI**.
- 2020, Fall **Teaching Assistant**, University of Cincinnati, PHIL-1025 | **Contemporary Moral Issues**.
- 2020, Spring **Teaching Assistant**, University of Cincinnati, PSYCH-1006 | PHIL-1006 | **Introduction to Cognitive Science**.
- 2019, Fall **Teaching Assistant**, University of Cincinnati, PHIL-1000 | **Introduction to Philosophy**.
- 2018, Summer **Co-Instructor**, Binghamton University, **Topics in Theoretical Biology & Philosophy of Biology**.
- 2018, Spring **Teaching Assistant**, Tufts University, CSHD-0051 | **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. (2024), Minicourse: Philosophy of Science for AI Ethics, SEMF Interdisciplinary Summer School, Valencia Polytechnic University, Valencia, E.S.

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, U.K.

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

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, A.U.

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

Andrews, M. (2022), *Workshop on role of mathematics in theorising in the cognitive and brains science*, presented at the Nencki School of Ideas in Neuroscience, Warsaw, P.L.

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

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, D.E.

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

Refereed Talks & Workshops

Andrews, M. (2023), *Machine Learning & The Theory-Free Ideal* Accepted to conference *Philosophy of Science of ML*, Tübingen, D.E. *withdrawn due to illness*

Andrews, M. (2021), *Between Oracular Modelling & the Theory-Free Ideal* Talk accepted at the East European Network for Philosophy of Science, Tartu, E.E. *withdrawn due to illness*

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, P.L.

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, D.E. *withdrawn due to illness*

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

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, B.E.

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

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, C.Z.

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

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, A.Z.

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

Conference Posters

Andrews, M. (2020), *Is the FEP Epistemologically Applicable?* Presented at POBAM (Philosophy of Biology at the Mountains) 2020

Andrews, M. (2018), *Explanatory limits of blanket assumptions: the free energy principle and Markov blanket models of mind and life*. Presented at The Predictive Processing Conference, Medford, M.A.

Feldman, D.H. & Andrews, M. (2018), *The dynamic complexity of cultural construction*. Presented at the 48th annual meeting of the Jean Piaget Society: The Dynamics of Development: Process, (Inter-)action, & Complexity, Amsterdam, N.L.

Feldman, D. H. & Andrews, M. (2017), *Cultural evolution is not evolution*. Presented at the Society for the Study of Human Development's 2017 Annual Conference, Providence, R.I.

Andrews, M., Liu, S., & Spelke, E. (2017), *Do infants exhibit preferences for rational agents?* Presented to the Laboratory for Developmental Studies, Harvard University, Cambridge, M.A.

Organization Experience

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 Gershman, 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.

Services to the Field

2023-2024 **Program Committee**, *ACM FAccT 2024 - Association for Computing Machinery Conference on Fairness, Accountability, and Transparency*.

2021-2022 **Chair**, *University of Cincinnati Minorities in Philosophy (MAP) Chapter*.

2019 **Editor**, *The Cartesian Semantics of the Port Royal Logic*.

2022 **Reviewer**, *The British Journal for the Philosophy of Science (BJPS)*.

2021 **Reviewer**, *Behavioral & Brain Sciences*.

2021 **Reviewer**, *Mind & Language*.

2020 **Reviewer**, *Biology & Philosophy*.

2020, 2021, 2022 **Reviewer**, *Synthese*.

Professional References

Dr. Angela Potochnik, Department of Philosophy, University of Cincinnati, send.Potochnik.4BA99F1431@interfoliodossier.com.

Dr. Julian Jara-Ettinger, Department of Cognitive Science, Yale University, send.JaraEttinger.7AB96B6DCB@interfoliodossier.com.

Dr. Zvi Biener, Department of Philosophy, University of Cincinnati, send.Biener.6E1C573193@interfoliodossier.com.

Dr. Anthony Chemero, *Department of Philosophy*, University of Cincinnati,
send.Chemero.CDAFB1D162@interfoliodossier.com.