

# Louis Mahon

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## Computer Science • Machine Learning • Computational Linguistics

My research interest lies in unsupervised structure discovery in complex data, with a focus on information-theoretic clustering methods that reveal meaningful patterns without supervision or parameter setting. I also work on multimodal language modeling to understand how different modalities interact in communication.

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## Education

**DPhil (PhD) in Computer Science** | University of Oxford | 2019-2022

**MSc in Computer Science (Distinction)** | University of Oxford | 2018-2019

**MPhil Speech and Language Processing (Distinction)** | Trinity College Dublin | 2016-2017

**B.A. Mathematics and Philosophy (First-Class Honours)** | Trinity College Dublin | 2016  
*Foundation Scholarship (2014)*

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## Research Interests

- Unsupervised Machine Learning and Artificial Intelligence (primary)
- Deep clustering algorithms grounded in information theory (primary)
- Multimodal Large Language Models (primary)
- Representation Learning and Disentanglement (secondary)
- Computational Linguistics and Language Acquisition (secondary)
- Animal Vocalization Analysis (secondary)
- Machine Learning for Knowledge Graphs (secondary)

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## Publications

**Mahon L., Johnson M., Steedman M.** (2025) Modelling Child Learning of Long-range Syntactic Dependencies. *Cognition*.

**Mahon L.** (2025) Local Compositional Complexity: How to Detect a Human-Readable Message. *Entropy*.

**Mahon L. & Lapata M.** (2024). A Modular Approach for Multimodal Summarization of TV Shows. *Proceedings of the 62nd Annual Meeting of the Association for Computational Linguistics (ACL)*—Long Paper.

**Mahon L., Shah L. & Lukasiewicz T.** (2024) Correcting Flaws in Common Disentanglement Metrics. *Transactions on Machine Learning Research (TMLR)*.

**Mahon L. & Lukasiewicz T.** (2024). Hard Regularization to Prevent Collapse in Online Deep Clustering without Data Augmentation. *Association for the Advancement of Artificial Intelligence*.

**Meo C., Mahon L. Goyal A & Dauwels J.** (2024)  $\alpha$ -TCVAE: On the Connection between Disentanglement and Diversity. *International Conference on Learning Representations*.

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**Mahon L., Abend O., Berger U., Demuth K., Johnson M., Steedman M** (2024). A Language Agnostic Model of Child Language Acquisition. *Computer, Speech and Language*.

**Mahon L.** Towards a Universal Method for Meaningful Signal Detection (2024). *4th International Workshop on Vocal Interactivity in-and-between Humans, Animals and Robots (VIHAR), Interspeech Satellite*.

**Mahon L. & Lukasiewicz T.** (2023). Minimum Description Length Clustering to Measure Meaningful Image Complexity. *Pattern Recognition*.

**Mahon L. & Lukasiewicz T.** (2021). Selective Pseudo-label Clustering. *German Conference on Artificial Intelligence (Künstliche Intelligenz)* Springer, Cham.

**Mahon L., Giunchiglia E., Li B., Lukasiewicz L.** (2020). Knowledge Graph Extraction from Videos. *International Conference on Machine Learning and Applications*.

## Under Review

**Mahon L., Lapata M.** Parameter-free Video Segmentation for Vision and Language Understanding

**Mahon L., Lapata M.** K\*Means: A Parameter-free Clustering Algorithm

**Mahon L.** The Theorem of Babel: A Puzzle Concerning Shared Understanding Through Language

## Work in Progress

**Mahon L., Johnson M., Abend O., Steedman M.** A two-system model for efficiently modelling language acquisition.

**Mahon L., et al.** Detecting overlapping animal vocalisations.

**Mahon L., et al.** A Machine-learning analysis of the audio of elephant interactions

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## International Collaborations

Established research partnerships with leading institutions worldwide:

- **University of Oxford** (UK): Ongoing collaborations with Prof. Thomas Lukasiewicz
- **University of Edinburgh** (UK): Research partnerships in computational linguistics
- **Macquarie University** (Australia): Joint work with Prof. Mark Johnson and Prof. Mark Steedman
- **TU Delft** (Netherlands): Collaborative research on disentanglement methods
- **Saarland University/Meta** (Germany): Joint projects in language processing
- **Georgetown University & Hebrew University of Jerusalem**: Cross-institutional research initiatives
- **Universities of Bari and Athens**: European research network participation

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## Teaching Experience

**Royal Institution Masterclass Demonstrator** | Oxford Department of Computer Science | 2022

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**MSc Student Co-Supervisor** | University of Oxford | 2021-2022 *Successfully supervised MSc student to distinction in thesis*

**Advanced ML and AI Lab Demonstrator** | Oxford Department of Computer Science | 2020

**ML and AI Teaching Assistant** | Oxford Department of Computer Science | 2020

**Royal Institution Masterclass Assistant** | Oxford Department of Computer Science | 2019

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## Professional Experience

**Editorial Board Member** | Transactions on Graphs, Data and Knowledge | 2023-present *Contributing to editorial decisions for new journal led by leading researchers A. Hogan, I. Horrocks, A. Hotho and L. Kagal*

**Contractor** | Earth Species Project | 2024-2025 *Collaborated on two research projects focused on machine learning analysis of animal vocalisations*

**Fellow** | Good Data Institute | 2021-2022 *Led team of data scientists on charitable projects, applying ML techniques for social good*

**Language Technologist** | Oxford University Press | 2017-2018 *Developed machine learning tools to link entries from the Oxford Dictionary of English to other online dictionaries*

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## Research Funding Experience

**EPSRC Proposal** | 2024 *Co-applicant with Prof. Mark Steedman on machine-learning model of language acquisition. Received competitive scores (6,4,4 out of 6) demonstrating strong research merit.*

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## Research Impact & Recognition

- Multiple publications in top-tier venues (ACL, ICLR, AAAI, Cognition)
- International collaborative network spanning 4 continents
- Interdisciplinary research bridging computer science, linguistics, and cognitive science
- Active contribution to the academic community through editorial service
- Applied research impact through industry and non-profit collaborations