# Matthias Lalisse

CONTACT INFORMATION

PhD Recipient
Johns Hopkins University
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## PHD RESEARCH

**Ph.D. Thesis**: Structure Assembly in Neural Networks

My thesis examines models of knowledge representation in neural networks using classical representational models like Holographic Reduced Representations (HRRs) & Tensor Product Representations (TPRs). In addition to formal results relating to those architectures, I developed three models for knowledge base completion that perform at the state of the art, and developed a number of new datasets based on WordNet, Freebase, and WikiData.

Key terms: **Computational semantics/computational cognitive science. Neurosymbolic computation.** Models of semantic composition. Computational models of common sense inference applied to knowledge base completion. HRRs and TPRs. Harmonic Grammar.

## EDUCATION

**Johns Hopkins University**, Baltimore, MD

Ph.D., Cognitive Science                                            2015 - 2021
- Dissertation: Structure Assembly in Knowledge Base Representation          Sept. 2021
- Advisers: Paul Smolensky, Kyle Rawlins
- Areas of Study: compositional semantics, computational linguistics, knowledge representation

**University of Oxford**, Oxford, UK

M.Phil (*with Distinction*), Linguistics, Philology and Phonetics          2015
- Thesis Title: Distinguishing Intersective and Non-Intersective Adjectives in Compositional Distributional Semantics
- Adviser: Ash Asudeh
- Ertegun Scholar

**McGill University**, Montreal, QC

B.A./M.A. English, Minor in Political Science                        2007 - 2011
Advisers: Peter Gibian & Monica Popescu

## RESEARCH PAPERS

Scalable Knowledge Base Completion with Superposition Memories with Eric Rosen & Paul Smolensky
Workshop on Gradient Symbolic Computation, Baltimore, MD          Sept 2019

Distributed neural encoding of binding to thematic roles with Paul Smolensky
Poster presentation @ MACSIM 8, New York City                    April 2019

Augmenting Compositional Models for Knowledge Base Completion Using Gradient Representations. with Paul Smolensky
Proceedings of the Society for Computation in Linguistics (LSA), New York City

Supervaluationist Semantics for Absolute Gradability.              May 2017
CLS 53, University of Chicago

OTHER PROJECTS

### LobbyLinks

- A processing pipeline for extracting links between government entities (legislators, agencies...) and lobbyists operating on behalf of private organizations.
- Uses government filings and ML tools to process unstructured text data and produce visualizations (sample linked above) of lobbying networks.
- Designed to serve as a resource for investigating how lobbyist penetration of the legislative process shapes policy.

### Energy Democracy

- I am engaged in efforts to build energy democracy by building public utilities, especially in Rochester, NY. I've written on the subject in Truthout (2020).

PRESENTATIONS

Distributed neural encoding of binding to thematic roles
MACISM 8, NYU.                                                    April 2019

Augmenting Compositional Graph Completiom with Harmony Networks
LSA-SCiL, New York City                                            Jan 2019

Maximality, Minimality and Absoluteness in Delineation Semantics for Gradable Predicates
MACSIM 7, Georgetown University.                                October 2017

AWARDS AND
HONORS

### University of Oxford

- Ertegun Scholarship ("full-ride")                               2013-2015
- Faith Ivens-Franklin Travel Award                               Aug. 2014
- Linguistics Department Travel Grant                             Aug. 2014

### McGill University

- Mary Keenan Scholarship in English                              2010
- Provost's Graduate Fellowship                                   2010
- Molson Chair Graduate Fellowship                                2010
- Chester Macnaghten Prize in Creative Writing                    2010
- Charles William Snyder Memorial Scholarship                     2009
- Shakespeare Scholarship                                         2009
- Dean's Honour List                                              2009-10
- Golden Key Honour Society                                       2009

ORGANIZING
EXPERIENCE

**UNITE HERE**, Atlanta, GA

*Volunteer canvasser: Georgia Senate runoff*            Dec. 2020/Jan. 2021
- With labor organizers, canvassed in the Atlanta metro area to elect Rev. Raphael Warnock and Jon Ossoff to the US Senate.

**AOC for Congress**, remote from Rochester, NY

*Data volunteer*                                                2020-Present
- Analysis of text data using machine learning models such as BERT.

*"Supervol Squad" member*                                    Summer/Fall 2020
- Organized and led trainings and phone banks to promote the Green New Deal and Alexandria Ocasio-Cortez during the 2020 election cycle.

**Teachers and Researchers United (SEIU Local 300)**, Baltimore, MD

*Worker-organizer* 2015-Present
- Former AFT affiliate, current SEIU affiliate.
- Organized graduate workers of Johns Hopkins University around unionization, healthcare, job security, and national policy issues such as immigration and taxation.

**Citizens Climate Lobby**, Baltimore, MD

*Citizen lobbyist* 2015-2017
- Met with Congressional staff to advocate for CCL's Carbon Fee and Dividend policy, a national carbon tax.

**Keble College MCR**, Oxford, UK

*Environment Officer* Oct. 2014-July 2015
- Organized green events for graduate students at Keble College, Oxford.

**Push Your Parents**, Oxford, UK

*Secretary* Oct. 2014-June 2015
- Bottom-lined administrative functions for an advocacy group mobilizing students to persuade their parents to divest from fossil fuels.

GUEST LECTURES

Semantics, Pragmatics, & Discourse. October 2017
Johns Hopkins University. Course: Cognition, taught by Tal Linzen

Lexical and Compositional Semantics. October 2016
Johns Hopkins University. Course: Language and Mind, taught by Julia Yarmolinskaya

TEACHING EXPERIENCE

Teaching Assistant for Foundations of Cognitive Science Spring 2018
Johns Hopkins University. Instructor: Paul Smolensky

Teaching Assistant for Cognition Fall 2017
Johns Hopkins University. Instructor: Tal Linzen

Teaching Assistant for Phonology Spring 2017
Johns Hopkins University. Instructor: Colin Wilson

Teaching Assistant for Language and Mind Fall 2016
Johns Hopkins University. Instructor: Julia Yarmolinskaya

Teaching Assistant for Mathematical Models of Language Spring 2016
Johns Hopkins University. Instructor: Kyle Rawlins

ESL Teacher 2012-2013
Centre de perfectionnement linguistique. Montreal, QC.

Teaching Assistant for Postcolonial Literature 2010
McGill University. Instructor: Monica Popescu

NON-ACADEMIC EMPLOYMENT

**Indigo Bookstores**, Montreal, QC

*Book stocker and bookseller* 2011-2013
- Stocked books in the in-store warehouse of a Canadian bookstore chain, and also worked on the sales floor.

**IGA**, Montreal, QC

*Grocery store product sample distributor* 2008-2010
  - Worked through college distributing food samples in a Canadian grocery store chain.

**French Territories Translation**, Rochester, NY

*French-English Translator* 2006-2012
  - Translated documents including press releases, periodicals, employee and technical manuals, legal contracts, and essays for publication from French to English for business and academic clients.

**CGI Communications**, Rochester, NY

*Script-writer* Summer 2008
  - Produced informational scripts for videos about cities and towns as part of CGI's eLocalLink business.

RESEARCH
EXPERIENCE

**McGill University**, Montreal, QC

*Research Assistant* 2012-2013
Principal Investigator: Saleem Razack (Centre for Medical Education)

*Research Assistant* Summer 2009, 2010
Professors Alanna Thain and Peter Gibian.

OTHER TRAINING    NASSLLI, New Brunswick, NJ    August 2016
  - *North American Summer School in Logic, Language and Information*
  - Rutgers University

ESSLLI, Tübingen, Germany    August 2014
  - *European Summer School in Logic, Language and Information*
  - University of Tübingen

ACTL, London, UK    Fall 2014
  - *Advanced Core Training in Linguistics*
  - University College London

CONFERENCE
ORGANIZATION    *The Humanities in the 21st Century*    March 2014
  - Funded by The Oxford Research Centre for the Humanities (TORCH) and the Mica and Ahmet Ertegun Scholarship Programme.