Daniel Gratzer
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Education

— **Aarhus University** PhD   (*Fall 2018 – (Expected) Fall 2023*)
  (Masters GPA: 12.0)
— **Carnegie Mellon University** Bachelors of Science   (*Fall 2014 – Spring 2018*)
  (GPA: 3.73. Dean's List for 5 semesters. University Honors)
  Honors Thesis (*supervised by Karl Crary*): **The Next 700 Failed Step-Index-Free Logical Relations**

Current Research

My research focuses on managing the complexity of modern programming languages and type theories. As programming languages and type theories introduce new features, it has become increasingly common to stratify the type system through *modalities*; thus preventing the uncontrolled mixing of features. The introduction of any modality, however, introduces serious challenges to the study of the behavior of a system. I am interested in applying modern algebraic and geometric techniques to the study of such modal type theories and programming languages.

Publications

In my field, conferences are the typical venue, not journals. A conference publication is full research paper and, generally, they are as or more important as journal publications. Three of the conferences below are rated at A* by the Australian CORE rankings. This signifies that they are in the top 4% of computer science conferences.

- **Multimodal Dependent Type Theory**   *2020*
  Daniel Gratzer, G.A. Kavvos, Andreas Nuyts, Lars Birkedal.
  Logic in Computer Science (LICS)   *A* flagship conference*
- **Implementing a Modal Dependent Type Theory**   *2019*
  Daniel Gratzer, Jonathan Sterling, Lars Birkedal.
  International Conference on Functional Programming (ICFP)   *A* flagship conference*
  Distinguished paper.
- **Cubical Syntax for Reflection-Free Extensional Equality**   *2019*
  Jonathan Sterling, Carlo Angiuli, Daniel Gratzer.
  Formal Structures in Computational and Deduction (FSCD)
  Best Junior Researcher Paper
- **Managing Obligations in Higher-Order Concurrent Separation Logic**   *2019*
  Aleš Bizjak, Daniel Gratzer, Robbert Krebbers, Lars Birkedal.
  Principles of Programming Languages (POPL)   *A* flagship conference*

Talks

- **Multimodal Dependent Type Theory**   *2020*
  International Conference on Mathematical Software
- **Multimodal Dependent Type Theory**   *2020*
  Conference talk at *Logic in Computer Science*
- **Multimodal Dependent Type Theory**   *2020*
  Invited talk at *Stockholm University, Logic Seminar*
- **Multimodal Dependent Type Theory**   *2020*
  Invited talk at *IT University of Copenhagen, PLZ Seminar*
- **Modal Dependent Type Theory**   *2019*
  Invited talk at *University of Paris*
- **Implementing a Modal Dependent Type Theory**   *2019*
  Conference talk at *International Conference on Functional Programming*
- **Implementing Type Theory**   *2019*
  Computer Science Day in Aarhus
- **Managing Obligations in Higher-Order Concurrent Separation Logic**   *2019*
  Conference talk at *Principles of Programming Languages*
- **A Topos-Theoretic Proof of The Independence of the Continuum Hypothesis**   *2017*

Lecture for the Graduate Course on Categorical Logic at Carnegie Mellon University

Preprints

- **Strict universes for Grothendieck topoi**   *2021*
  Daniel Gratzer, Jonathan Sterling

- **Modalities and Parametric Adjoints**   *2021*
  Daniel Gratzer, Evan Cavallo, G.A. Kavvos, Adrien Guatto, Lars Birkedal
  Under peer-review

- **Syntactic categories for dependent type theory: sketching and adequacy**   *2020*
  Daniel Gratzer, Jonathan Sterling

- **Transfinite Iris: Resolving an Existential Dilemma of Step-Indexed Separation Logic**   *2020*
  Simon Spies, Leonard Gäher, Daniel Gratzer, Joseph Tassarotti, Robbert Krebbers, Derek Dreyer, Lars Birkedal
  Under peer-review

- **Multimodal Dependent Type Theory**   *2020*
  Daniel Gratzer, G.A. Kavvos, Andreas Nuyts, Lars Birkedal
  Under peer-review

- **Multimodal Dependent Type Theory**   *2020*
  Daniel Gratzer, G.A. Kavvos, Andreas Nuyts, Lars Birkedal
  Under peer-review

- **A Cubical Language for Bishop Sets**   *2020*
  Jonathan Sterling, Carlo Angiuli, Daniel Gratzer
  Under peer-review

- **A Case Study in Iris: Concurrent Stacks with Helping**   *2017*
  Daniel Gratzer, Mathias Høier, Aleš Bizjak, Lars Birkedal.

- **Positive Function Spaces in Focalized Propositional Logic**   *2015*
  Daniel Gratzer, Karl Crary

Teaching and Service

— *Teaching at Aarhus University*
  - Co-organizer for Categorical Type Theory Seminar   (*Spring 2021*)
  - Co-organizer for Category Theory   (*Fall 2019, Fall 2020*)
  - Teaching assistant for Program Analysis and Verification   (*Fall 2018*)

  In addition to the above, I have helped with Lars Birkedal to advise students' masters and bachelors theses.

— *Teaching at Carnegie Mellon University*
  - Teaching assistant for Constructive Logic   (*Fall 2017*)
  - Teaching assistant for Practical Foundations of Programming Languages   (*Spring 2016*)
  - Teaching assistant for Introduction to Functional Programming   (*Spring 2015 – Fall 2015*)

— *Miscellaneous Service*
  - Layout Editor for LMCS   (*Spring 2019 – Spring 2021*)