

Daniel Gratzer

PhD Student, Aarhus University

gratzer@cs.au.dk

<https://jozefg.github.io>

Education

- **Aarhus University** PhD (Masters GPA: 12.0) (Fall 2018 – (Expected) Fall 2023)
- **Carnegie Mellon University** Bachelors of Science (GPA: 3.73. Dean's List for 5 semesters. University Honors) (Fall 2014 – Spring 2018)
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 peer-reviewed research paper and, generally, they are as or more important than 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.

Peer-reviewed publications

- **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

Abstracts

- **Multimodal Dependent Type Theory** 2020
Daniel Gratzer, G.A. Kavvos, Andreas Nuyts, Lars Birkedal.
International Congress on Mathematical Software (ICMS)
- **Multimodal Dependent Type Theory** 2020
Daniel Gratzer, G.A. Kavvos, Andreas Nuyts, Lars Birkedal.
TYPES
- **XTT: Cubical Exact Equality and Categorical Gluing** 2019
Jonathan Sterling, Carlo Angiuli, Daniel Gratzer.
HoTT
- **Cubical Syntax for Reflection-Free Extensional Equality** 2019
Jonathan Sterling, Carlo Angiuli, Daniel Gratzer.
TYPES

Talks

Conference and workshop talks

- **Multimodal Dependent Type Theory** 2020
Workshop talk at *International Congress on Mathematical Software*
- **Multimodal Dependent Type Theory** 2020
Conference talk at *Logic in Computer Science*
- **Implementing a Modal Dependent Type Theory** 2019
Conference talk at *International Conference on Functional Programming*
- **Managing Obligations in Higher-Order Concurrent Separation Logic** 2019
Conference talk at *Principles of Programming Languages*

Invited talks

- **Multimodal Dependent Type Theory** 2020
Stockholm University, Logic Seminar
- **Multimodal Dependent Type Theory** 2020
IT University of Copenhagen, PLZ Seminar
- **Modalities in Type Theory** 2019
University of Paris
- **Implementing Type Theory** 2019
Computer Science Day in Aarhus 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
- **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 Craty

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)
 - Reviewer for ESOP, POPL, JFP, and LICS.