Vít Jelínek

v.jelinek@sussex.ac.uk Brighton, United Kingdom jelinekv.github.io

Education

Sep 2024 – Mar 2028?

Ph.D., University of Sussex, Brighton
Informatics

Topic: Categorical Semantics of Deep Inference
Supervisors: Alessio Santamaria, Bernhard Reus

Sep 2022 – Jun 2024

M.Sc., Masaryk University, Brno
Theoretical computer science – Discrete algorithms and models

Thesis: Type Theory and its Semantics
Supervisors: John Bourke, Peter LeFanu Lumsdaine

Abstract: We examine categories with representable maps (CwRs) – an answer to the question 'What is a (dependent) type theory?' suggested by Taichi Uemura in his PhD thesis. We prove that the 2-category of CwRs has various good 2-categorical properties – it is an accessible 2-category with flexible limits and bicolimits. Using this, we deduce that CwRs can be freely generated by categories with specified arrows. These constructions are then used to build colimit presentations of CwRs such that their models are models of dependent type theory with some constructors – we choose unit types and empty types.

Description of studies:

- graduated with honours
- average grade 1.0
- Dean's Award for an Outstanding Final Thesis

Sep 2018 – Jun 2022

B.Sc., Masaryk University, Brno
Informatics – Mathematical informatics

Thesis: Categorical View of Monads in Computer Science
Supervisors: Ivan Di Liberti, Petr Novotný

Abstract: The thesis is devoted to monads, a notion from category theory. We present a mathematical point of view by showing various mathematical analogies as well as the perspective of computer science by showing how to model various computational effects via monads. Then, we introduce Lawvere theories that serve as a categorical description of universal algebra and explain how universal algebra connects to monads.

Description of studies:

- graduated with honours
- among 1 % of the best students in the programme; average grade 1.1
- obtained 296 ECTS, among them 143 credits for mathematical courses and 68 credits for courses in theoretical computer science

Stays Abroad

Jan 2023 – Jun 2023 — **Stockholm University**
Description: Visiting the logic group of Peter LeFanu Lumsdaine: attending courses and logic seminar. With professor Lumsdaine, we had many meetings about type theory for my master's thesis; these covered initiality conjecture, soundness and completeness of semantics, natural models of type theory and categories with representable maps.
Supported by the Freemovers scholarship

Talks Given

2025 — **Bicolimit Presentations of Type Theories**
A talk based on the work done in my master's thesis. In various forms presented at:

- International Category Theory Conference CT2025;
- Foundational Methods in Computer Science;
- Masaryk University Algebra Seminar.

March 2025 — **Statements from Heaven**
An expository talk explaining Makkai's First Order Logic with Dependent Sorts. Presented at a local seminar at the University of Sussex.

Reading Seminar in Category Theory at Masaryk University
Course aimed at postgraduate students in Mathematics – each attendant picks a topic and then presents it. I presented the following topics:

- Monads and Theories; main source: Bourke and Garner's paper Monads and theories
- Effective Topos; main source: Hylands's paper The Effective Topos
- Game Comonads; main source: Abramsky and Shah's paper Relating structure and power: Comonadic semantics for computational resources

June 2022 — **(Co)limits and Initial Algebras**
Students of the Department of Informatics at Masaryk University organised a seminar to understand basics of category theory. I gave a talk explaining (co)limits and how are they used to provide initial algebras for certain endofunctors.

Teaching and Supervision

Spring 2025 — **Data Structures and Algorithms**
Doctoral tutor in weekly labs for 280 students
Undergraduate module at the University of Sussex

Autumns 2021, 22, 23 — **Mathematical Logic**
Seminar tutor for group of about 15 students, marking homeworks and exams
Master's course at Masaryk University

Springs 2021, 24 — **Formal Languages and Automata**
In 2024, weekly tutoring and marking homework. In both years, grading exam of more than a hundred of students
Bachelor's course at Masaryk University

Teaching and Supervision (continued)

2021 – 2022 **Supervision of High School Professional Activity (SOČ)**
Student: Andrej Bružeňák
Thesis: Metric Spaces and Banach's Fixed Point Theorem

2019 – 2024 **High School Seminar**
Weekly mathematical seminar for talented high school students at Gymnázium Brno, třída Kapitána Jaroše. Responsible for whole curriculum

Conferences, Workshops, Schools,…

13 – 19 Jul 2025 **International Category Theory Conference CT2025**
Description: Conference in category theory

23 Jun – 5 Jul 2025 **Oregon Programming Languages Summer School**
Description: Summer school focused on formal methods in computer science. This year the topics were Types, Logic, and Formal Methods

17 – 20 Jun 2025 **Foundational Methods in Computer Science Workshop**
Description: Meeting focused on category theory

7 – 11 Apr 2025 **Midlands Graduate School in the Foundations of Computing Science 2025**
Description: Spring school focused on mathematical background of computing. My focus was on courses Linear Logic and Coalgebra

16 – 19 Dec 2024 **Categorical Logic and Higher Categories**
Description: Workshop to promote connections between categorical logic and higher categories

3 – 6 Sep 2024 **Toposes in Mondovi**
Description: Summer school for everyone interested in topos theory

2 – 8 Jul 2023 **Mathematics in Ljubljana**
Description: Summer school for students considering their PhD in Ljubljana

24 – 25 Apr 2023 **WG6 meeting in Vienna**
Description: Gathering of researchers interested in syntax and semantics of type theory

22 – 23 Apr 2023 **Workshop on Homotopy Type Theory/ Univalent Foundations**
Description: Meeting of researchers interested in homotopy type theory (from syntax and semantics to practical formalisation in proof assistants)

Outreach

2018 – 2022 **BrKoS – correspondence seminar for high school students**
Creating problems, correcting solutions of students, writing study texts, giving talks at camps. In the years 2020 and 2021, I was responsible for an online mathematical competition MathRace that had more than 300 contestants in both years.

2014 – 2018 **KoMáR – correspondence seminar for primary school students**
Since 2015, I was the main organiser of the entire seminar managing a team of more than ten people. Apart from that, I had all the duties of an ordinary organiser: creating problems, correcting solutions of students, giving talks at camps.

Contests

2018 **Mathematical Olympiad**
Competition for high school students
Among winners of the national round

2017 **High School Professional Activity (SOČ)**
Thesis: Multiplicative Functions in Number Theory
3rd place in the national round