CHRIS BARRETT

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PERSONAL PROFILE

PhD candidate with a research focus on deep inference proof theory, lambda calculus, functional programming language theory and semantics and computational effects. Experience communicating mathematical ideas via writing journal papers, presenting at international conferences and teaching.

EDUCATION

University of Bath
PhD Candidate, Dept. of Computer Science   Jan 2018 – present (submission anticipated Oct 2021)
Fully funded by Engineering and Physical Sciences Research Council (EPSRC)
Thesis Title: Relating String Diagrams and the Lambda Calculus
Supervisors: Dr. Willem Heijltjes and Dr. Alessio Guglielmi

The thesis investigates the categorical semantics of the Functional Machine Calculus (FMC), which incorporates computational effects (state, I/O, probabilities, etc.) into a functional framework in a novel and elegant manner, while maintaining the desirable properties of functional languages. The FMC suggests a novel type system which stays very close to intuitionistic logic and thus constitutes a new approach to type systems for effects. The thesis also proposes the use of the `first-order' fragment of the FMC as a computational language for string diagrams. In addition, I produced a paper with Alessio Guglielmi, submitted for publication in ACM TOCL, on the deep inference proof theory of classical logic.

University of Newcastle
MMath Mathematics (First-class Honours)   2013-2017

The masters project involved writing a Haskell program to generate `follower set graphs' which represent certain spaces of infinite sequences. This was used to find counter-examples to a conjecture of Kakariadis, which resulted in a contribution to a published paper.

PUBLICATIONS

Journal papers:

Chris Barrett, Alessio Guglielmi, `A Subatomic Proof System for Decision Trees',
submitted 2021 to *ACM Transactions on Computational Logic (TOCL)*

Chris Barrett, Evgenios T.A Kakariadis `On the quantized dynamics of factorial languages',
Published in Q*uarterly Journal of Mathematics* 2018, 69(1), 119-152.

Conference presentations:

Chris Barrett, Alessio Guglielmi, `A Subatomic Proof System for Binary Decision Trees',
oral presentation at *Structures and Deduction, a satellite event of FSCD 2019, Dortmund, Germany*

EXPERIENCE

University of Bath
Teaching assistant   Jan 2018 – present

Teaching modules in the Computer Science department including "Foundations of Computation", "Functional Programming" and "Analytical Mathematics for Applications" to masters and undergraduate students. This includes running seminars in a traditional lecture style as well as running computer labs.

University of Newcastle
Research Assistant   Summer 2016
Implementing `simulated annealing' – a probabilistic technique for approximating the global optimum of a function –
in MatLab for a project aiming to predict optimum historical settlement placements.

Scott Logic
Internship   Summer 2015
Developing a real-time financial data visualization application in JavaScript, using the d3 and react.js libraries, as a
technology showcase for the company's own open-source d3fc library, which I also contributed to during the
internship.

ADDITIONAL INFORMATION

Technical skills: Competence in Haskell, Python, JavaScript, C++, MatLab, R Studio
Responsibilities: Organiser for the University of Bath Mathematical Foundations Seminar 2020-2021