# DANIEL BERLYNE, PH.D.


**Mathematician and programmer**

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## EMPLOYMENT

### Heilbronn Research Fellow | University of Bristol

Sep 2021 – Sep 2023 | Bristol, UK

- Researched mathematics while collaborating internationally, developing theorems and algorithms.
- Developed Python programs (link 1, link 2) for graph braid groups, implementing novel algorithms produced in my own research to provide the first computations of previously unknown properties of these groups.
- Secured funding for and led the organisation of the international conference *Quotients of Hierarchically Hyperbolic Groups*.
- Organiser for the Bristol Geometry & Topology Seminar.
- Taught the undergraduate course *Topics in Modern Geometry*.

### Instructor/Curriculum Developer | City University of New York

Aug 2016 – May 2020 | New York, USA

- Lead instructor for the undergraduate courses *Matrix Algebra* and *Calculus II*.
- Teaching assistant for the Master's course *Probability and Stochastic Processes For Finance*.
- Collaborated on design & development of a digital module for the Zicklin School of Business, creating an original syllabus and integrating open educational resources.
- Created and maintained my own professional website https://berlyne.net/.

## EDUCATION

### Ph.D. in Mathematics | City University of New York

Aug 2015 – Jun 2021 | New York, USA

- Dissertation Fellowship, University Fellowship, Doctoral Student Research Grant, Graduate Center Fellowship.

### MMath integrated BSc and Master's degree in Mathematics | University of Warwick

Oct 2010 – Jun 2015 | Coventry, UK

- First class hons, Undergraduate Research Scholarship.
- Included courses in Java and C programming.

## MATHEMATICAL CONTRIBUTIONS

- Wrote 5 research papers in pure mathematics (available on my website), both collaboratively and as the sole author, published in top journals including the *International Journal of Algebra and Computation*, *Transactions of the American Mathematical Society*, and *Groups, Geometry, and Dynamics*.
- Research in geometric group theory, low-dimensional topology, combinatorics, and probability.
- Developed the Python programs graph-braid-splitter and graph-braid-presenter.
- Invited to give dozens of talks internationally on mathematical work, at universities such as Newcastle University, Cardiff University, University of Warwick, Institut Henri Poincaré, University of Michigan, The Ohio State University.
- Refereed mathematics papers for the *Journal of Topology*.

## TECHNICAL SKILLS

- *Proficient:* Python, C#, Unity, Linux, LaTeX.
- *Some experience:* C++, Java, C, HTML, SQL.

# PROGRAMMING PROJECTS

### Graph Braid Splitter (Python) | graph-braid-splitter

Jun 2023 – Aug 2023

- Computes free splittings of graph braid groups.
- Implements algorithms developed in my mathematical paper *Graph of groups decompositions of graph braid groups*.
- Enabled the first computations for several previously unknown groups.

### Graph Braid Presenter (Python) | graph-braid-presenter

Aug 2023 – Aug 2023

- Computes presentations of graph braid groups.
- Combines computational methods developed in *Graph Braid Splitter* with Tomasz Maciazek's program *graph-morse*.
- Significantly improved the efficiency and effectiveness of Tomasz Maciazek's original program.

### Recap Video Generator (Python) | recap-video-generator

Aug 2023 – Sep 2023

- Extracts clips from video files and combines them into a single video, adding custom subtitles, crossfade transitions, and normalising audio.
- Used in online forums for streamlining creation of video compilations.

### Surface Level (C#) | SurfaceLevel

Sep 2023 – present

- A futuristic pachinko-style puzzle game that takes place on various topological surfaces, rendered as polygons whose sides are paired together to act as portals.
- Developed using the Unity game engine.

# REFERENCES


**Prof. Mark Hagen**
University of Bristol
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**Prof. Jason Behrstock**
City Univerity of New York
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**Ivan Levcovitz**
Software Engineer at AWS
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