

SOPHIE RAYNOR

Citizenship *Netherlands and UK citizenship*
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CURRENT EMPLOYMENT

*Post-doc,
Category theory* *01/2019-21* **Macquarie University, NSW, Australia.**
 Two year post-doctoral fellowship at **Centre of Australian Category Theory**,
 mentored by Steve Lack and Richard Garner, funded by the Australian Research Council.

EDUCATION

*PhD,
Mathematics* *2012-2017* **University of Aberdeen, UK.**
 Title: **Compact symmetric multicategories and the problem of loops**
 Fully funded by an award from the **Blue Brain Project, EPFL, CH.**
 Supervisors: R. Levi (University of Aberdeen) and K. Hess (EPFL, Switzerland).
 Examined in *January 2018* by R. Hepworth (University of Aberdeen) and D. Spivak (MIT).

*BScMSc,
Mathematics* *2002-2010* **Leiden University, The Netherlands.**
Cum Laude (First Class Honours)
 Thesis: **The Riemann-Roch theorem is a special case of the Atiyah-Singer index formula.**
 MSc courses in geometry and analysis

*BA Hons,
Philosophy* *1997-2000* **King's College, Cambridge University, UK.**
 (MA Cantab 2004).

RESEARCH INTERESTS

- Operad theory. In particular, modular operads (and other structures described by graphs with cycles) and their applications, particularly in topology.
- Geometric and algebraic aspects of higher (modular) operads and higher categories.
- Understanding exceptional cases in general constructions.

ARTICLES

Under review · *Graphical combinatorics and a distributive law for modular operads.*
 Under review at *Advances in Mathematics*. Most recent version available at
<https://www.sophieraynor.org>

Under review · *An infinity operad of normalized cacti.*
 Together with Luciana Bonatto, Safia Chettih, Abigail Linton, Marcy Robertson and Nathalie Wahl. Under review at *Topology and its Applications*.
 ArXiv preprint available at <https://arxiv.org/abs/2007.01588>

(ARTICLES NEAR COMPLETION)

*Exp. submission:
10/2020.* · *Compact closed categories, modular operads, wheeled props and circuits.*
*Exp. submission:
10/2020.* · *Modular operads with product: circuit operads and an iterated distributive law for compact closed categories*

BLOGPOST

July 2018. · *Beyond Classical Bayesian Networks.*
 Together with Pablo Andrez Martinez, blog post at [The n-Category Café](#).

STUDENTSHIPS

- Doctoral funding* 2012-2016 · My PhD was fully funded by an award from the **Blue Brain Project, EPFL, CH.**
- Doctoral funding* 2010, *declined* · Offer of full studentship with Professor J. Gray, **Open University, UK.**
Developments in topology from Hirzebruch-Riemann-Roch to Atiyah-Singer.

ACADEMIC TEACHING

- Undergraduate tutor* *Late 2019* · Macquarie University, AU.
Workgroup tutor complex analysis and vector calculus.
- Undergraduate tutor* 06-12/2018 · Rotterdam University of Applied Sciences, NL..
· Principles of programming tutor, Computer Science degree.
- Undergraduate tutor* 2003-2004 · Mathematical Institute, Leiden University, NL.
· Academic tutor for analysis and linear algebra courses for BSc students.

SELECTED INVITED AND CONTRIBUTED TALKS

- Operads Pop-Up* *Aug. 2020* · 24hr online meeting.
· Invited talk: **Unpacking the combinatorics of modular operads.**
- Geocat 2020* *July 2020* · Paris, online.
· Invited talk: **A distributive law for modular operads.**
- Topology Seminar* *Sep. 2019* · EPFL, Switzerland.
· **A distributive law for compact symmetric multicategories.**
- Topology Seminar* *May. 2019* · Melbourne University, Aus.
· **A new nerve theorem for compact symmetric multicategories.**
- Topology Seminar* *Feb. 2018* · Aberdeen University, UK.
· **An operad-style generalisation of compact closed categories.**
- MATRIX Research Institute* *June 2016* · Conference **Higher structures in geometry and physics**, Melbourne, AU
Contributed talk: **Hierarchical networks and coloured modular operads.**
- Joint Mathematics Meetings* *Jan. 2016* · AMS special session **Applied and Computational Topology**, Seattle, USA.
· Invited talk: **Formal perspectives on hierarchichal networks.**
- Oxford Junior Seminar* *Oct. 2013* · Oxford junior topology and group theory seminar, Oxford University, UK.
· Invited talk: **Learning spaces.**
- Scottish Topology Seminar* *Sept. 2013* · Glasgow University, UK.
· Invited talk: **Towards a topological model of the brain.**
- Leiden Student Seminar* *April 2005* Student functional analysis seminar, Leiden University, NL.
· Introductory talk: **Holomorphic functional calculus.**
- Topology, Category Seminars* 2013-19 · A number of seminars at home institutions (Australian Category Seminar, Aberdeen and EPFL Topology Seminars).

SELECTED WORKSHOPS, CONFERENCES AND MINI-COURSES

- Research visit* *Sep. 2019* · **University of Oxford, UK.** Guest of Prof. Ulrike Tillmann, Mathematics, and Quantum Group, Computer Science. · **EPFL, CH.** Guest of Prof. Kathryn Hess, Mathematics.
- Women in Topology* 2018-19 · **Hausdorff Institute of Mathematics, Bonn, DE.**
· Project: **'Operads and props for surfaces'.**
- Applied Category Theory* *Jan. - April 2018* · <http://www.appliedcategorytheory.org/school/>
Online reading seminar and a research week at the **Lorentz Center, Leiden, NL.**
· Project: **'Unification of the logic of causality'.**

- Quantum Theory* *March 2018* · ICMS, Edinburgh, UK.
· Multi-disciplinary workshop on ‘**combining viewpoints in quantum theory**’.
- Women in Topology* *29 Nov. - 1 Dec. 2017* · MSRI, Berkeley, USA.
· Project: ‘**Direct proofs of properties and structures of model structures for $(\infty; 1)$ -categories**’.
- ∞ -Operads* *12 - 14 Jul. 2017* · University of Osnabrück, Germany.
· Workshop on **∞ -operads and applications**.
- Junior Hausdorff Trimester* *5 - 9 Dec. 2016* · Hausdorff Research Institute for Mathematics, Bonn, Germany.
· Research guest of Dr. M. Robertson (Melbourne). Trimester program ‘**Topology**’.
- Higher Structures* *5- 17 June 2016* · MATRIX Research Institute, Victoria, Australia.
· Workshop and conference on **higher structures in geometry and physics**.
- Hochschild complexes* *12 - 16 Oct. 2015* · University of Copenhagen, Denmark.
· Masterclass on **algebraic structures of Hochschild complexes**.
- Applied Category Theory* *15 - 18 Sept. 2015* · EPFL, Switzerland.
· Mini-course tutored by Dr. David Spivak (MIT) on **Applied category theory: information structures and modular systems**.
- Algebraic Topology* *9 - 13 Sept. 2015* · Université Catholique de Louvain, Louvain-la-Neuve, Belgium.
· Workshop in **category theory and algebraic topology**.
- Applied Topology* *2 - 6 Feb. 2015* · EPFL, Switzerland.
· Mini-course tutored by Dr. Pawel Dlotko (Swansea University) on **Applied and computational topology**.
- Atiyah 80* *20 - 22 April 2009* · Informatics Forum, Edinburgh, UK.
· **Geometry and Physics**, 80th birthday conference for Sir Michael Atiyah.

VOCATIONAL TRAINING

- Academic Teaching Training* *2003* · ICLON, Leiden University, NL.
· Academic teaching course completed at Leiden University Graduate School of Teaching (ICLON) for mathematics department teaching staff.

SELECTED PAST EMPLOYMENT

- Machine learning* *06-12/2018* · Hoppinger, Rotterdam, NL.
· **Machine learning developer** at full service IT agency.
- Own Business, Teaching* *2010-2012* · Yoga Maya, Rotterdam, NL.
· I (co-)founded and ran a succesful yoga studio in Rotterdam. Business administration, daily teaching, and mentoring junior teachers.
- Mathematics Education* *2002-2005* · Vierkant voor Wiskunde, Leiden, NL.
· **Project manager** developing materials for enhancing mathematics education in Dutch schools.
- Educational Publishing* *2000-2001* · Cambridge Publishing Management, Cambridge, UK.
· **Project editor** for school mathematics textbooks at publishing packager.

SERVICE

- Australian Category Seminar Institute Council* *Since June 2019* · Organiser · [Australian Category Seminar](#).
Institute Council *2002-2003* · Student member of the *instituuetsraad*, the council of the Mathematical Institute of the University of Leiden.
- Life Saving* *2019-* · Australian Surf Life Saving, bronze lifesaving certificate. Patrolling member, Mona Vale. Currently nominated - with my husband & children - for club *Patrol person of the year*.