

SOPHIE RAYNOR

Citizenship *Netherlands and UK citizenship*
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ACADEMIC EMPLOYMENT

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

Post-doc, *From 01/2021 University of Copenhagen, Denmark.*
Topology Research fellowship with Nathalie Wahl,
 Copenhagen Centre for Geometry and Topology.

EDUCATION

PhD, *2012-2017 University of Aberdeen, UK.*
Mathematics 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, *2002-2010 Leiden University, The Netherlands.*
Mathematics *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, *1997-2000 King's College, Cambridge University, UK.*
Philosophy (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 Chetthi, 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: · *Compact closed categories, modular operads, wheeled props and circuits.*
 10/2020.
Exp. submission: · *Modular operads with product: circuit operads and an iterated distributive law for compact closed*
 10/2020. *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 hierarchical 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

<i>Research visit</i>	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.
<i>Women in Topology</i>	2018-19 · Hausdorff Institute of Mathematics, Bonn, DE. · Project: ‘ Operads and props for surfaces ’.
<i>Applied Category Theory</i>	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 ’.
<i>Quantum Theory</i>	March 2018 · ICMS, Edinburgh, UK. · Multi-disciplinary workshop on ‘ combining viewpoints in quantum theory ’.
<i>Women in Topology</i>	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 .
<i>Junior Hausdorff Trimester</i>	5 - 9 Dec. 2016 · Hausdorff Research Institute for Mathematics, Bonn, Germany. · Research guest of Dr. M. Robertson (Melbourne). Trimester program ‘ Topology ’.
<i>Higher Structures</i>	5- 17 June 2016 · MATRIX Research Institute, Victoria, Australia. · Workshop and conference on higher structures in geometry and physics .
<i>Hochschild complexes</i>	12 - 16 Oct. 2015 · University of Copenhagen, Denmark. · Masterclass on algebraic structures of Hochschild complexes .
<i>Applied Category Theory</i>	15 - 18 Sept. 2015 · EPFL, Switzerland. · Mini-course tutored by Dr. David Spivak (MIT) on Applied category theory: information structures and modular systems .
<i>Algebraic Topology</i>	9 - 13 Sept. 2015 · Université Catholique de Louvain, Louvain-la-Neuve, Belgium. · Workshop in category theory and algebraic topology .
<i>Applied Topology</i>	2 - 6 Feb. 2015 · EPFL, Switzerland. · Mini-course tutored by Dr. Pawel Dlotko (Swansea University) on Applied and computational topology .
<i>Atiyah 80</i>	20 - 22 April 2009 · Informatics Forum, Edinburgh, UK. · Geometry and Physics , 80 th birthday conference for Sir Michael Atiyah.

VOCATIONAL TRAINING

<i>Academic Teaching Training</i>	2003 · ICLON, Leiden University, NL. · Academic teaching course completed at Leiden University Graduate School of Teaching (ICLON) for mathematics department teaching staff.
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SELECTED PAST EMPLOYMENT

<i>Machine learning</i>	06-12/2018 · Hoppinger, Rotterdam, NL. · Machine learning developer at full service IT agency.
<i>Own Business, Teaching</i>	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.
<i>Mathematics Education</i>	2002-2005 · Vierkant voor Wiskunde, Leiden, NL. · Project manager developing materials for enhancing mathematics eduction in Dutch schools.
<i>Educational Publishing</i>	2000-2001 · Cambridge Publishing Management, Cambridge, UK. · Project editor for school mathematics textbooks at publishing packager.

SERVICE

*Australian
Category Seminar
Institute Council
Life Saving*

Since June 2019 · Organiser · [Australian Category Seminar](#).

*2002-2003 · Student member of the *instituutsraad*, the council of the Mathematical Institute of the University of Leiden.*

*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*.*