

SOPHIE RAYNOR

Citizenship Netherlands and UK citizenship
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CURRENT EMPLOYMENT

*Post-doc,
Category theory* From 01/2019 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, compact closed categories (and other structures described by graphs with cycles) and their applications, particularly in topology.
- Higher (modular) operads, higher categories, and their applications.

ARTICLES (IN PREPARATION)

Under review · *A distributive law for compact symmetric multicategories (CSMs).*
 Submitted September 2019. ArXiv preprint available at <https://arxiv.org/abs/1911.05914>

*Exp. submission:
2019.* · *CSMs with product: an iterated distributive law for compact closed categories.*

*Exp. submission:
2019.* · *Higher operads and props for moduli spaces of curves.*
 Together with Luciana Bonatto, Safia Chettih, Abigail Linton, Marcy Robertson and Nathalie Wahl.

*Exp. submission:
2020.* · *Enriched categories of plastic networks.*
 Together with Kathryn Hess and Ran Levi.

*Exp. submission:
2020.* · *A functorial approach to (higher) circuit algebras.*

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
tutorLate 2019 · Macquarie University, AU.
Workgroup tutor complex analysis and vector calculus.Undergraduate
tutor06-12/2018 · Rotterdam University of Applied Sciences, NL..
· Principles of programming tutor, Computer Science degree.Undergraduate
tutor2003-2004 · Mathematical Institute, Leiden University, NL.
· **Academic tutor** for analysis and linear algebra courses for BSc students.

INVITED AND CONTRIBUTED TALKS

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
InstituteJune 2016 · Conference **Higher structures in geometry and physics**, Melbourne, AU
Contributed talk: **Hierarchical networks and coloured modular operads.**Joint Mathematics
MeetingsJan. 2016 · AMS special session **Applied and Computational Topology**, Seattle, USA.
· Invited talk: **Formal perspectives on hierarchical networks.**Oxford Junior
SeminarOct. 2013 · Oxford junior topology and group theory seminar, Oxford University, UK.
· Invited talk: **Learning spaces.**Scottish Topology
SeminarSept. 2013 · Glasgow University, UK.
· Invited talk: **Towards a topological model of the brain.**Leiden Student
SeminarApril 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
Topology2018-19 · **Hausdorff Institute of Mathematics, Bonn, DE.**
· Project: **‘Operads and props for surfaces’.**Applied Category
TheoryJan. - 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 founded and ran a succesful yoga studio in Rotterdam. Main tasks included 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 education in Dutch schools.
<i>Educational Publishing</i>	2000-2001 · Cambridge Publishing Management, Cambridge, UK. · Project editor for school mathematics textbooks at publishing packager.

OTHER INFORMATION

<i>Australian Category Seminar Institute Council</i>	Since June 2019 · Organiser · Australian Category Seminar . 2002-2003 · Student member of the <i>institutenraad</i> , the council of the Mathematical Institute of the University of Leiden.
<i>Life Saving</i>	2019 · Currently working towards Bronze lifesaving certificate with Australian Surf Life Saving.