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REFERENCES

Darren Long, long@math.ucsb.edu (Thesis advisor)
Dror Bar-Natan, drorbn@math.toronto.edu
Stephen Bigelow, bigelow@math.ucsb.edu
Hugh Howards, howards@wfu.edu (teaching)

RESEARCH INTERESTS

Knot theory, finite type invariants, braid groups, representations of the braid groups, virtual trivalent graphs

CURRENT EMPLOYMENT

Visiting Assistant Professor at Wake Forest University Fall 2019 to present

EDUCATION

Ph.D in Mathematics, University of California, Santa Barbara Spring 2019
Advisor: Darren Long
Thesis topic: Discrete Representations of the Braid Groups
MS in Mathematics, *summa cum laude*, Oregon State University 2013
Advisor: William Bogely, Thesis: *The Alexander Polynomial*
BS in Mathematics, *magna cum laude*, University of California, Los Angeles 2011

PUBLICATIONS

Discrete Real Specializations of Sesquilinear Representations of the Braid Groups, Submitted. <https://arxiv.org/abs/1910.04595>

Ribbon 2-knots, $1+1=2$, and Duflo's Theorem for arbitrary Lie Algebras, joint with Dror Bar-Natan and Zsuzsanna Dancso, Accepted to AGT March 2020. <https://arxiv.org/abs/1811.08558>

Real Discrete Specializations of the Burau Representation for B_3 , Mathematical Proceedings of the Cambridge Philosophical Society, 1-10. doi:10.1017/S0305004118000683 <https://arxiv.org/abs/1801.08203>

A Survey of Grid Diagrams and a Proof of Alexander's Theorem, Knots, Low-Dimensional Topology and Applications, Springer, 2019

A Simplification of Grid Equivalence, Involve Journal, 2015, vol. 8, no. 5.

Turning Math Into Dance; Lessons From Dancing My PhD, Proceedings of Bridges 2018: Mathematics, Art, Music, Architecture, Education, Culture; pg 351-354

WORKS IN
PROGRESS

Finite Type Invariants and the Goldman-Turaev Lie Bialgebra, joint with Dror Bar-Natan and Zsuzsanna Dancso, In preparation

Virtual Trivalent Graphs and Niebrzydowski Algebras, joint with Sheri Tamagawa, In preparation

AWARDS AND
HONORS

AWM-NSF *Travel Grant* 2019

Honorable Mention in the NSF Competition *We are Mathematics* 2019

UCSB Graduate Division *Special Fellowship in the STEM Disciplines*, full academic year 2017-18

UCSB *Individualized Professional Skills Grant* 2018

UCSB Academic Senate *Doctoral Student Travel Grant* 2018

Nominated for *UCSB Outstanding Teaching Assistant Award* 2018

Winner of Science Magazine's *Dance Your PhD* Competition 2017

Research Training Group (RTG) Fellowship UCSB, Spring quarter 2016

UCLA Alumni Scholar, full tuition scholarship for two years 2009-2011

TEACHING
EXPERIENCE

Lecturer

Differential Calculus, Wake Forest University, Fall 2019, Spring 2020
Mathematics for Elementary Teaching, UCSB, Summer 2017,
Integral Calculus, UCSB, Summer 2014
College Algebra, OSU, Summer 2012

Teaching Assistant

UCSB Fall 2013 to Spring 2019
OSU Fall 2011-Spring 2013

Mentor at Canada/USA Mathcamp

Summer 2015

A five week summer school program for high school students.

Graduate Student Coordinator for TA Training, UCSB

Fall 2015

TALKS AND
PRESENTATIONS

Invited Talks

2020 USC Topology seminar, "The Braid Groups and their Representations"

2020 Virginia Tech Topology seminar, "The Braid Groups and their Representations"

2019 Tech Topology Conference, "The Braid Groups and their Representations"

2019 JMM, AMS Special Session on Number Theoretic Methods In Hyperbolic Geometry, "Discrete Representations of the Braid Groups"

2018 Australian National University, Quantum seminar, "Discrete Representations of the Braid Groups"

2018 University of Melbourne, Australia, Topology seminar, "Discrete Representations of the Braid Groups"

2018 Monash University, Australia, Topology seminar, "Discrete Representations of the Braid Groups"

2018 University of Sydney, Australia, Algebra seminar, "Discrete Representations of the Braid Groups"

2018 Claremont McKenna Topology seminar, "An application of Salem numbers to Representations of the Braid Groups"

2018 Oregon State Topology Seminar, "An application of Salem numbers to Representations of the Braid Groups"

2017 Loyola University, Chicago, Algebra seminar invited speaker, "An application of Salem numbers to Representations of the Braid Groups"

Research Presentations

2018 Topology Student Workshop, GA Tech, "Salem Numbers and Braid Group Representations"

2018 Knots in Washington conference, "An application of Salem numbers to Representations of the Braid Groups"

2018 GSTGC University of Chicago, at Illinois, "An application of Salem numbers to Representations of the Braid Groups"

2018 Bridges Math-Art Conference, Stockholm, "Turning Math into Dance; Lessons from Dancing My PhD"

2017 WimSoCal, "Mapping the Braid Groups into Lattices"

2016 UCSB Topology Seminar, "Mapping the Braid Groups into Lattices"

2016 Knots in Hellas Conference, poster presentation "Mapping the Braid Groups into Lattices"

2016 USCB Planar algebra seminar, "Intro to grid diagrams and possible applications to planar algebras"

2013 Oregon State University, Topology seminar, "The Alexander Polynomial"

2012 Oregon State University, Topology seminar, "Grid diagrams and the Alexander Polynomial"

2011 UCLA, Topology seminar, "On Grid Equivalence"

CONFERENCES ATTENDED

MSRI Higher Categories and Categorification, Connections for Women,	2020
Tech Topology Conference, GA Tech	2019
Expansions, Lie algebras and Invariants, CRM University du Montreal	2019
Joint Math Meetings, Baltimore	2019
Knots in Washington	2019

Bridges Math-Art Conference, Stockholm	2018
Topology Student Workshop, GA Tech	2018
Thin Groups in Number Theory, Geometry and Topology Conference	2018
Knots in Washignton	2018
GSTGC University of Chicago, at Illinois	2018
Joint Math Meetings, San Diego	2018
AAAS annual meeting, Austin Tx	2018
GSAGT, Temple University	2017
AWM Symposium, UCLA	2017
WimSoCal, USC	2017
Joint Math Meetings, Atlanta	2017
Knots in Hellas, Ancient Olympia	2016
WimSoCal, Pomona College	2015
Cascade Topology Seminar, Portland State University	2013

OUTREACH

Outreach Talks

2020 Keynote speaker, Florida Women in Mathematics Day at Florida Atlantic University, "A Dancing introduction to the Braid Groups"

2019 Davidson College, Math and Coffee Seminar, "Math, Dance, and Braids"

2019 MSRI National Math Festival, "A Fine Art of Problem Solving: How Mathematicians Use Braids to Save the Day, One Ribbon at a Time"

2019 Power's Math day, Opening speech

2017 UCSB AWM student chapter "Coping with Imposter Syndrome"

2016 UCSB AWM student chapter meeting, "On Imposter Syndrome"

Representations of the Braid Groups

In the summer of 2017, I made an aerial dance video describing the basics of braid groups and representation theory. This video garnered international attention and can be viewed on my youtube channel [HERE](#).

Awards

Winner of Science Magazine's 2017 *Dance Your PhD* competition

Official Selection in Raw Science Film festival 2018

Bridges Math Art Films Festival 2018

Honorable mention in UCSB's Art of Science competition 2018

Selected Publicity. For a complete list of publicity and links to articles visit

<https://nancyscherich.com/publicity-about-math-dance/>

WGN Morning News Chicago Interview

Wall Street Journal Article

Newsweek Article

Canadian Broadcasting Corporation Live Interview

Algebra, Geometry, and Topology: What's the Difference? This Math-Dance video describes how the fields of mathematics are different. This video can be found at [this link HERE](#), and won Honorable mention in the NSF 'We are Mathematics' 2019 competition and first place in UCSB's Art of Science competition.

Performative Lectures

Performative Lecture is a phrase I coined to describe a new lecture style where I perform aerial dancing in addition to a traditional lecture. These performances are outreach events to engage public interest in math.

Performances:

A special event for the UCSB AWM student chapter; May 26, 2018

UCSB Lunch and Learn Series; June 1, 2018

Tensegrity is an aerial dance piece that I choreographed. [HERE](#) is a video.

SERVICE

Volunteer Math Consultant for MOXI Nov 2017- Aug 2018

MOXI is a children's museum of innovation in Santa Barbara which hosts an innovative workshop on art, craft and hands on creative activities. I helped design four one-week long math projects for the workshop in knot theory, string art, minimal surfaces with bubbles, and tessellations.

Volunteer for WISE Mentoring Program Fall 2016-Present

WISE (Women in Science and Engineering) is non profit campus organization founded to promote equal opportunity for women and girls in science and engineering, and improve their scientific and career advancement. I served as a graduate mentor for an undergraduate math student. I met bimonthly with my mentee offering both academic and personal support.

Volunteer for POWERS Math Day April 2017, Feb 2019

POWERS Math Day is an undergraduate run outreach event for high school and middle school girls interested in math. I served as a graduate student panelist, opening invited speaker and ran a session on Math-Dance.

Volunteer for Girls Inc. March 2017

Girls Inc. is an after school program for middle school girls. Along with three other female mathematicians, I hosted a group of girls on campus at UCSB where we taught them how to gather data for the famous Monty Hall math problem in a simplified version of the game show, *Let's Make a Deal*.

NanoDays Volunteer April 2016

NanoDays is part of a nationwide festival of educational programs about nanoscale science and engineering. It is a festival of interactive experiments and displays for children to learn about Nano-science. I hosted a booth about art in science.

OTHER PROFESSIONAL EXPERIENCE

Mentor for STEEM Fall 2015-Summer 2016

The STEEM program is a Scholarship for Transfers to Engage and Excel in Mathematics. As a mentor, I provided academic advisement, weekly tutoring and counseling to two transfer students.

Research Experience for Undergraduates REU Summer 2010

I participated in a VIGRE funded REU at UCLA under the direction of Liam Watson. The topic of research was using grid diagrams to create simplified algorithms to prove invariance for knot invariants.