W. Garrett Mitchener: Curriculum Vitae

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Education

- 1999–2003: Ph.D. from the Program in Applied and Computational Mathematics at Princeton University, Princeton, NJ
  Dissertation: *A Mathematical Model of Human Languages: The Interaction of game dynamics and learning processes*
  Advisor: Martin A. Nowak

- 1995–1999: B.S. in Mathematics and B.A. in Computer Science, *summa cum laude*, with distinction from Duke University, Durham, NC

- 1993–1995: Diploma from the North Carolina School of Science and Mathematics, Durham, NC

Employment

- 2019–present: Professor at the College of Charleston

- 2011–2019: Associate professor at the College of Charleston

- 2006–2011: Assistant professor at the College of Charleston

- 2003–2006: Post-doctoral research associate in the mathematics department at Duke University, Durham, NC

Research Interests

I am an applied mathematician focusing on dynamical systems and stochastic processes, with applications to population dynamics and learning models, specifically mathematical models of human languages. My research combines modeling techniques from ecology and evolutionary biology with up-to-date linguistic knowledge. My dissertation, written under my advisor Dr. Martin Nowak, focused on a continuous selection-mutation model based on the replicator equation. Current research includes: ordinary, partial, and stochastic differential equations and Markov chains for modeling of populations with learning; statistical models of implicit negative evidence in primary linguistic data; artificial life simulations; and evolution of regulatory networks.

External Grants

- My proposal *Deterministic and Stochastic Dynamics for Language Learning and Change* was funded in 2006 by the National Science Foundation (7/1/2006 to 6/30/2010) as award number 0605042 when I was at Duke and 0734783 when I transferred it to the College of Charleston.

Annotations: b = before graduate school; P = based primarily on work at Princeton as a graduate student; D = based primarily on work at Duke; otherwise, based primarily on work while at the College of Charleston. ⇛ means after my 2010 promotion review. ⇒ means after my 2018 promotion review. ⇸ means in progress.

Research Publications

- ⇸ W. G. M. Replicator dynamics with decaying-regenerating payoffs. In preparation.

- ⇸ W. G. M. Using genetic diversity to quantify the evolutionary difficulty of a problem. Under revision.

- ⇒ W. G. M. Ranking with Hamiltonian Dynamics. *Physica D,* to appear.

- ⇛ W. G. M. A Stochastic model of language change through social structure and prediction-driven instability. *SIAM Journal on Applied Mathematics,* 77(6): 2272–2293, 2017.

- ⇛ Jocelyn Evans, Timothy Jones, W. G. M. An ownership network framework for managers' accelerated SEO decisions: The importance of cross-block holders in the real estate industry. *Journal of Real Estate Portfolio Management* 22(2): 159–178, 2016.

➥ W. G. M. How selection for language could distort the dynamics of human evolution. In: Roberts et al, eds. *The Evolution of Language: Proceedings of the 11th International Conference (EVOLANG11).* 2016, doi:10.17617/2.2248195. (refereed)

➥ W. G. M. Evolving communication protocols using an artificial regulatory network model of biochemical computation. *Artificial Life* 20(4): 491–530, 2014.

➥ W. G. M., Andrew Shealey, and Dinesh Sarvate. Further existence results on beautifully ordered balanced incomplete block designs. *Journal of Combinatorial Mathematics and Combinatorial Computation* 86:151–161, 2013.

➥ W. G. M. A Discrete artificial regulatory network for simulating the evolution of computation. Proceedings of the Artificial Life 13 conference, Evonet workshop, July 19, 2012.

• W. G. M. A Mathematical model of prediction-driven instability: How social structure can drive language change. *Journal of Logic, Language and Information.* 20(3): 385–396, 2011.

• W. G. M. and Misha Becker, Computational models of learning the raising-control Distinction. *Research on Language & Computation.* 8(2–3):169-207, 2010.

• W. G. M. Inferring leadership structure from corpus data reflecting a change in syntax. In: Carlos Martín-Vide (ed.). *Scientific Applications of Language Methods.* Imperial College Press: London, 2010.

• W. G. M. Mean-field and measure-valued differential equation models for language variation and change in a spatially distributed population. *SIAM Journal on Mathematical Analysis,* 42(5), 2010.

• W. G. M. A Cautionary tale of caterpillars and selectional interference. 24 pages. *International Journal of Mathematics, Game Theory and Algebra,* 18(4/5), 2009.

(D) W. G. M., Game dynamics with learning and evolution of universal grammar. *Bulletin of Mathematical Biology,* 69(3): 1093–1118, 2007.

(D) W. G. M., A Mathematical model of the loss of verb-second in Middle English. Proceedings of the 13th International Conference for English Historical Linguistics, 2005. Published in: Ritt, Nikolaus et al., eds. *Medieval English and its Heritage: Structure, Meaning, and Mechanisms of Change.* Studies in English Medieval Literature and Language, volume 16, pages 189–202. Peter Lang GmbH, Frankfurt, 2006.

(D) Brian P. Tighe, Joshua E. S. Socolar, David G. Schaeffer, W. G. M., and Mark Huber. Force distributions in a triangular lattice of rigid bars. *Physical Review E,* 72(3) 031306, 2005.

(D) W. G. M., A Simulation of language change in the presence of non-idealized syntax. *Proceedings of the workshop Psychocomputational Models of Human Language Acquisition,* held at the 43rd annual meeting of the Association for Computational Linguistics, June 2005.

(P) W. G. M. and M. A. Nowak, Chaos and language. *Proceedings of the Royal Society: Biological Sciences,* 271(1540): 701–704, April 7, 2004.

(P) W. G. M. and M. A. Nowak, Competitive exclusion and coexistence of universal grammars. *Bulletin of Mathematical Biology,* 65(3): 67–93, January 2003.

(P) W. G. M., Bifurcation analysis of the fully symmetric language dynamical equation. *Journal of Mathematical Biology,* 46(3): 265–285, March 2003.

Other Academic Writing

➥ W. G. M., Let the numbers speak. *College of Charleston Magazine,* June 16, 2017.

➥ W. G. M. Spontaneous language. An invited entry in: Weekes-Shackelford V., Shackelford T. (eds) *Encyclopedia of Evolutionary Psychological Science,* April 2017. Springer.

(b) W. G. M., *Lattices and sphere packings.* My senior thesis for Duke University, presented to the department and general public in Spring 1999.

(b) S. Malone, W. G. M. and J. Mermin, Determining the people capacity of a structure. *The UMAP Journal,* Fall 1999.

(b) W. G. M., J. Mermin and J. Thacker, Grade inflation. *The UMAP Journal,* Fall 1998.

(b) M. Gambrell, W. G. M. and F. Thorne, The world's most complicated payroll. *The UMAP Journal,* Fall 1995.

Presentations and Posters

⇛ *Immediate chaos in population game dynamics with depletable payoffs* A contributed poster at the Dynamics Days conference, January 2020.

⇛ *Dynamics from ranking problems.* A contributed poster at the SIAM Dynamical Systems conference, May 2019.

⇛ *Artificial life with gene regulatory networks.* A presentation at College of Charleston's Darwin Week, February 2018.

⇛ *How to evolve a neuron.* An invited presentation at the University of South Carolina department of mathematics colloquium, March 2017.

⇛ *An undergraduate exploration in models of human vision using Mathematica.* A contributed presentation at the Southeastern Sectional meeting of the American Mathematical Society, March 2017, at the College of Charleston.

⇛ *Using phylogenetic trees to measure the impact of background selection on population diversity.* A contributed presentation at the International Symposium on Biomathematics and Ecology Education and Research, October 2016.

⇛ *The Search for* BOBIBD$(9, 5, 5, 4, 3)$*.* An invited presentation at the Discrete Mathematics Seminar, Department of Mathematics, University of South Carolina, Columbia, April 15, 2016. The project was in collaboration with Dinesh Sarvate and Drew Shealey.

⇛ *How selection for language could distort the dynamics of human evolution.* A contributed presentation at the Evolution of Language Conference, March 24, 2016, at Tulane University, New Orleans, LA. (This is a selective conference.)

⇛ *Modeling Mental Imagery.* A poster at Dynamics Days, January 2016, in Durham, NC.

⇛ *The Search for* BOBIBD$(9, 5, 5, 4, 3)$. A contributed presentation at the Midwestern Conference on Combinatorics and Combinatorial Computation, October 2015, at the College of Charleston.

⇛ *Evolving adaptive coincidence-detecting neurons.* An invited presentation at the theoretical biology colloquium, April 2015, at Pennsylvania State University in State College, PA.

⇛ *Evolving adaptive coincidence-detecting neurons.* A contributed presentation at Dynamics Days, January 2015, at Rice University in Houston, TX.

⇛ *How a Regulatory Network Evolves Robust Communication Mechanisms.* A presentation at the College math department's weekly colloquium, April 11, 2014.

⇛ *Haploid and diploid recombination and their evolutionary impact.* A poster at Dynamics Days, January 2014, at the Georgia Institute of Technology in Atlanta, GA.

⇛ *Artificial Life: An introduction to the Utrecht Machine.* An invited presentation at the Carolina Mathematics Seminar, October 2013, at Benedict College in Columbia, SC.

⇛ *Simulating the Evolution of Regulatory Networks.* A contributed presentation at MAASE: Mathematical Association of America, Southeast Regional Conference, March 2013, at Winthrop University in Rock Hill, SC.

⇛ *How is the acquisition of raising and control verbs possible?* An invited presentation at the Mathematical Behavioral Science Colloquium, February 2013, at the University of California at Irvine.

- ➡ *Impact of Selection Strength on the Evolution of Regulatory Networks.* A poster at Dynamics Days, January 2013, in Denver, CO.

- ➡ *Why is Language Complicated? & what can evolutionary theory say about it?* An invited presentation at the Expressive Communication and Origins of Meaning Colloquium, December 2012, at the University of North Carolina, Chapel Hill.

- ➡ *Transition times for a model of language change in an age-structured population.* Invited presentations for the statistics colloquium and mathematics colloquium, October 2012, at Michigan State University.

- ➡ *A Discrete Artificial Regulatory Network for Simulating the Evolution of Computation.* A contributed presentation at the Artificial Life 13 conference, Evonet workshop, July 19, 2012, at Michigan State University.

- *Simulating the evolutionary discovery of combinatorial phonology.* A contributed presentation at the Evolution of Language Conference, workshop on 'Models of Language Evolution: Does the Math Add Up?' April 14, 2010, Utrecht University, Netherlands.

- *Estimating transition times for a model of language change in an age-structured population.* A poster at Dynamics Days, January 2010, Northwestern University.

- *Inferring Leadership Structure from Linguistic Data.* A presentation at the SIAM regional meeting, April 4–5 2009, at the University of South Carolina, Columbia.

- *Wavelets, Images, and Language.* An invited presentation at the UNC Charlotte high-school math contest, March 9, 2009, Charlotte, NC. This was about 50 minutes of edu-tainment for the contest participants.

- *Using mathematical models to understand language change.* An hour long invited presentation at the University of California at Irvine, Institute for Mathematical Behavioral Sciences weekly colloquium, November 13, 2008, Irvine, CA.

- *Inferring Leadership Structure from Linguistic Data.* A presentation at the Southeastern Section Meeting of the MAA, March 29, 2008, The Citadel, Charleston, SC.

- *Inferring Leadership Structure from Linguistic Data.* A presentation at the Joint Mathematics Meeting, January 9, 2008, San Diego, CA.

- *Algorithms for learning the raising/control distinction from semantic information.* A presentation with Misha Becker at the workshop on Psychocomputational Models of Human Language Acquisition at the meeting of the Cognitive Science Society. August 1, 2007, Nashville, TN.

- *A stochastic model of language change through prediction-driven instability.* A presentation at the 10th Mathematics of Language Conference. July 27-30, 2007, UCLA, Los Angeles, CA.

- *Deterministic & Stochastic Dynamics of Usage Frequencies in Language.* A presentation at a conference on mathematical biology, held in honor of Michael Reed. May 20–24, 2007, Duke University, Durham, NC.

- *Deterministic & Stochastic Dynamics of Usage Frequencies in Language.* A poster at Dynamics Days, January 3–6, 2007, Boston, MA.

- *Game Dynamics with Learning and Universal Grammar.* An hour long invited lecture at the Duke Computational Biology and Genomics Seminar, October 5, 2005

- *Why language learning requires miscalibration.* A half-hour presentation at SEAMS at UNC Chapel Hill, September 24, 2005.

- *Using Linguistics Problems to Teach Math Modeling.* A 15 minute presentation at the MAA Mathfest, Albuquerque, NM, August 4, 2005.

- *A Simulation of Language Change in the Presence of Non-Idealized Speech.* A half-hour presentation at the Annual Meeting of the Association for Computational Linguistics, Workshop on Psychocomputational Models of Human Language Acquisition, Ann Arbor, MI, June 29, 2005.

- *Game Dynamics with Learning and Universal Grammar.* An hour invited presentation at the summer school on statistical learning theory, Toyota Technology Institute, University of Chicago, May 25, 2005.

- *A Simulation of Language Change in the Presence of Non-Idealized Speech.* A half-hour presentation at the UNC linguistics department spring colloquium, April 16, 2005.

- *A Simulation of Language Change in the Presence of Non-Idealized Speech.* An hour presentation at the UMIACS Computational Linguistics Colloquium, University of Maryland College Park, March 17, 2005.

- *A Simulation of Language Change in the Presence of Non-Idealized Speech.* A half-hour presentation at the MAA Southeast Section Meeting, Meredith College, Raleigh, NC, March 12, 2005.

- *Math Team Coaching, Math Clubs, and Math Contests.* One branch of a workshop for teachers of advanced high school mathematics, MAA Southeast Section Meeting, Meredith College, Raleigh, NC, March 12, 2005.

- *Mathematical Models of Word Order Change in Middle English.* An hour presentation at the Duke mathematics department's weekly faculty/graduate student seminar, November 19, 2004.

- *Mathematical Models of Word Order Change in Middle English.* A half-hour presentation at the South East Atlantic Mathematical Sciences Workshop (SEAMS) at the College of Charleston, September 19, 2004.

- *Mathematical Models of Word Order Change in Middle English.* A half-hour presentation at the International Conference for English Historical Linguistics (ICEHL) in Vienna, August 25, 2004. (For linguists.)

- *A Model of a Word Order Change in English.* An hour-long invited presentation at the differential equations seminar at NC State math department, February 18, 2004.

- *A Model of a Word Order Change in English.* A 15 minute presentation at Dynamics Days at UNC Chapel Hill, January 4, 2004.

- *A Mathematical Model of Human Languages.* A 15 minute presentation at the Duke University Postdoctoral Association Research Day, October 24, 2003.

- *Complex Behavior in a Model of Human Language.* An hour-long presentation at the applied math seminar at Duke University, September 22, 2003.

- *Complex Behavior in a Model of Human Language.* A short presentation given at the AMS-MAA joint math meeting in Baltimore, January 16, 2003.

- *Population Dynamics and Universal Grammar.* At the PACM Conference, September 10, 2002, Princeton University.

- *Template Polynomials and Bifurcation Analysis: What I did when Mathematica gave me a 10 page answer.* At the PACM Graduate Student Seminar, March 1, 2002, Princeton University.

- *Mathematical Models of Human Languages.* Presentation for the PACM general examination, May, 2001.

- *A Chat Room Assignment for Teaching Network Security.* At the ACM SIGCSE Symposium, February 21–25, 2001, Charlotte, NC.

Mentoring

- Mentored master's student Kimberly Stubbs. Her thesis was *On Co-orbital Moons.* Spring 2018.

- Mentored undergraduates Grier Jones and Daniel Rich in a project on simulating an acoustical-optical experiment, with Dr. Alem Teklu from the physics department at the College of Charleston. Summer 2017.

- Mentored undergraduate Grier Jones in a project on mathematical models of mental imagery, with Dr. Thomas Naselaris and post-doc Ghislan Saint-Yves from MUSC. Summer 2015 through Fall 2016.

- Mentored undergraduate Adam Dexter on a project on English linguistics, specifically the syntax of *do*-support. Spring 2012.

- Mentored high-school senior thesis by Kaydren Orcutt on fractals and chaos. Fall 2011 through Fall 2012.

- Mentored undergraduate Robert Samuel on a project in financial modeling. Fall 2009 and Spring 2010.

- Mentored independent studies on developing Scrabble-like games in other languages (Blake Matheney) and modeling competition among synonyms (Taylor Hamrick). Summer 2008 to spring 2009.

(D) Mentor for Adam Chandler for a summer research program at Duke called PRUV (Practical Research for Undergraduates with VIGRE). We worked on a model of a sound change taking place in Pennsylvania.

(D) Mentored Adam Chandler and Pradeep Baliga at Duke in a research independent study in Fall 2005 and Spring 2006 on mathematical models of toll roads. This was a continuation of their paper for the 2005 Mathematical Contest in Modeling, which earned an Outstanding rating.

Teaching

➼ Taught calculus for business and social sciences (MATH 105) at the College of Charleston, Spring 2009–Spring 2012, Fall 2013 to the present. Text: *Essential Calculus* by Wright, Hurd, and New, with Hawkes Learning System software.

➼ Taught mathematical modeling (MATH 470) at the College of Charleston, Spring 2018. Texts: *Nonlinear Dynamics and Chaos* by Strogatz. *Probability for the Enthusiastic Beginner* by Morin.

➼ Taught an honors interdisciplinary course on mathematical biology (HONS 380) at the College of Charleston, Fall 2017. Text: *A Course in Mathematical Biology* by de Vries, Hillen, Lewis, Müller, and Schönfisch.

➼ Taught elementary statistics (MATH 104) at the College of Charleston, Fall 2016. Text: *Elementary Statistics* 12th edition, by Triola, with My Stat Lab software.

➼ Taught ordinary differential equations (MATH 323) at the College of Charleston, Fall 2015. Text: *Fundamentals of Differential Equations, 8th edition* by Nagle, Saff, and Snider.

➼ Taught advanced linear algebra (MATH 402/502) at the College of Charleston, Fall 2010, Fall 2013, Fall 2014. Text: *Linear Algebra Done Right* by Axler.

➼ Taught a special topics course on phonetics and speech analysis, Math 480/580 at the College of Charleston, Spring 2014. Texts: *Phonetics* by Henning Reetz and Allard Jongman. *Wavelets Made Easy* by Yves Nievergelt.

➼ Taught mathematical models (MATH 470) at the College of Charleston, Spring 2012. Texts: *Nonlinear Dynamics and Chaos* by Strogatz. *Introduction to Difference Equations,* by Goldberg.

- Taught undergraduate real analysis/advanced calculus (MATH 311) at the College of Charleston, Fall 2011. Text: *Advanced Calculus* by Fitzpatrick.

- Taught undergraduate real analysis/advanced calculus 2 (MATH 411) at the College of Charleston, Spring 2011. Text: *Advanced Calculus* by Fitzpatrick.

- Taught discrete mathematical models (MATH 450) at the College of Charleston, Spring 2010. Texts: *Finite Markov Chains* by Kemeny and Snell. *Introduction to Difference Equations* by Goldberg.

- Taught discrete mathematical models (MATH 450) at the College of Charleston, Spring 2009. Texts: *A Course in Mathematical Modeling* by Mooney and Swift. *Introductory Graph Theory* by Chartrand.

- Taught ordinary differential equations (MATH 323) at the College of Charleston, Fall 2008. Text: *Differential Equations and Boundary Value Problems* by Edwards and Penney.

- Taught undergraduate advanced calculus (MATH 311) at the College of Charleston, Spring 2008. Text: *Introduction to Real Analysis* by Bartle and Sherbert.

- Taught calculus for business and social sciences (MATH 105) at the College of Charleston, two sections each semester, Fall 2006, Spring 2007, Fall 2007, Spring 2008, Fall 2008. Text: *Calculus for Business, Economics, and the Social and Life Sciences* by Hoffman and Bradley.

- Taught master's level real analysis (MATH 612) at the College of Charleston, Spring 2007. Mentored a reading course on integration and functional analysis at the Math 612 level for William Baynard and Tim Hansen, Spring 2008. Texts: *Real Mathematical Analysis* by Pugh. Additional material from *Real Analysis* by Royden.

- Taught master's level real analysis (MATH 511) at the College of Charleston, Fall 2006, Fall 2007. Mentored a reading course on the essentials of real analysis at the Math 511 level for Ibai Basabe, Spring 2007. Text: *Real Mathematical Analysis* by Pugh.

(D) Taught dynamical systems seminar (MATH 132s) at Duke University, Spring 2006. Text: *Nonlinear Dynamics and Chaos* by Strogatz.

(D) Taught an independent study in Spring 2005 at Duke on stochastic calculus and option pricing to Ashleigh Price, an undergraduate interested in mathematical finance. Text: *Stochastic differential equations: an introduction with applications* by Øksendal.

(D) Taught mathematical modeling seminar (MATH 196S) at Duke University, Spring 2005. Material included topics from dynamical systems, probability, and mathematical writing, with applications to linguistics. I designed the course based on my research and experience in the mathematical contest in modeling.

(D) Taught differential equations (MATH 131) at Duke University, Fall 2003, Spring 2004, Fall 2004, and Fall 2005. This class is a thorough introduction to ordinary differential equations, with a short introduction to partial differential equations. Text: *Differential Equations and their Applications* by Braun for Fall 2003; and *Differential Equations and Boundary Value Problems* by Edwards and Penney for 2004 and 2005.

(P) Taught two sections of calculus (MATH 103) at Princeton University, Fall 2002. The class covered differential calculus, and basic integral calculus. The instructors worked together to write and grade the midterm and final examinations, and individually to write and grade weekly quizzes for their sections. The instructors met weekly to ensure we covered the same syllabus, and to discuss issues of fairness and teaching techniques. Text: *Calculus and Analytic Geometry* by Stein and Barcellos.

(P) Graded for APC503/AST557, a graduate level course on asymptotic techniques, at Princeton University. Material included power series, dominant balances, approximation of integrals, WKB theory, Heading's rules, and boundary layer analysis of ODEs. My job was to grade weekly homeworks, answer questions, and run a review session. Text: *Advanced Mathematical Methods for Scientists and Engineers* by Bender and Orszag.

(P) Attended a teaching workshop in the spring of 2002 at the McGraw Center for Teaching and Learning at Princeton University. Topics included lecturing techniques and problems in the classroom.

Professional and Service Activities

- Assisted with the College of Charleston Math Meet, Spring 2007 to the present. Co-director of the Math Meet, Summer 2014 to the present.

- Faculty co-advisor for the College of Charleston Math Club, including practice sessions for the Mathematical Contest in Modeling, Fall 2007 to the present.

- Member of the Math 105 (business calculus) committee, Fall 2006 to the present.

- Working with Elizabeth Martinez-Gibson and other faculty to develop the linguistics minor, Fall 2006 to the present.

- Served on a proposal review panel for the National Science Foundation, March 2018.

- Refereed an article for *Bulletin of Mathematical Biology,* March 2018 to May 2018.

- Refereed an article for *Mathematical Biosciences,* January 2018 to March 2018.

- Refereed an article for *Chaos,* November 2017 to January 2018.

- Co-organizer and webmaster for the 29th annual Midwestern Conference on Combinatorics and Combinatorial Computation, October 2015, at the College of Charleston.

- Refereed an article for *Journal of Theoretical Biology,* December, 2015 to May 2015.

- Refereed an article for *Risks,* August 2015 to September 2015.

- Refereed an article for *Journal of Complex Networks,* August 2015 to October 2015.

- ➡ Member of the faculty educational technology committee (FETC) Fall 2013 to Spring 2015.

- ➡ Refereed an article for *Physica D,* May 2013 to August 2013.

- ➡ Refereed an article for *Journal of Theoretical Biology,* January 2013 to March 2013.

- ➡ Refereed an article for *SIAM Journal of Applied Dynamical Systems,* June 2012.

- ➡ Refereed an abstract for the PschoCompLA workshop, September 2011.

- ➡ Refereed an article for *The American Mathematical Monthly,* May 2011 to August 2011.

- ➡ Refereed an article for *Chaos,* March 2011 to June 2011.

- ➡ Refereed proposals for the Ralph E. Powe Junior Faculty Enhancement Award, January 2011 to February 2011.

- ➡ Member of the faculty senate, representing the mathematics department and the School of Sciences and Mathematics, Fall 2009 to Spring 2012.

- Refereed an article for *SIAM Journal on Mathematical Analysis,* June 2007, and February 2008.

- Refereed an article for *Cognitive Science,* December 2007.

- Refereed an article for *Journal of Theoretical Biology,* June 2007.

- Refereed an article for *Computational Statistics and Data Analysis,* February 2007.

Outreach activities

- Tutored pre-algebra students at St. Andrews Middle School, Charleston, SC, 2006–2007. (Unpaid volunteer work, about an hour a week.)

- Assisted with NC state math contest and practice for NC ARML team, 2005–2006.

Professional Memberships

- American Mathematical Society

- Mathematical Association of America, and SIGMAA on Teaching Advanced High-School Mathematics

- Linguistic Society of America

Other work experience

- Research in speech analysis at JAARS, Waxhaw, NC, as an intern during the summers of 2000 and 2001. JAARS writes speech analysis software for SIL International and the Wycliffe Bible Translators. My job was to experiment with algorithms for breaking up a stream of speech into linguistic segments.

- Teaching assistant for algebra 1 at the Talent Identification Program, Davidson College Branch, summer 1998. I was asked to fill in for two weeks when one of the TAs became ill and had to leave.

- Research on the sphere packing problem, summer 1998, Duke University. This research was in preparation for my senior thesis.

- Developed course material for computer science class at Duke University through the DROOL project, summer 1996, 1997, and 1999. My job was to create interesting assignments and sample solutions. In 1999, I wrote a networking package for LEGO Mindstorm robots, and a chat room with two different security systems. I presented the chat room at the 2001 SIGCSE Symposium of the Association for Computing Machinery, and a short paper describing it was published in the proceedings. In 1996, I wrote an animation program in Java to be used for illustrating algorithms. In 1997, I wrote a detailed solution to a file cataloging assignment for CPS108, a computer science course on software engineering and object-oriented programming.

- Undergraduate Teaching Assistant for CPS108 at Duke University, spring 1997 to spring 1999. Responsibilities included grading assignments and helping programming teams.

- Editor and writer for *Duke Math News,* the math department newsletter at Duke University, fall 1995 to spring 1999.

Honors and Awards

- Won an "Outstanding" rating from the Mathematical Contest in Modeling, once while at the North Carolina School of Science and Math in 1995, and at Duke University in 1998 and 1999. In each case our team was one of the highest ranked world wide. Our papers were published in The UMAP Journal. Won a "Meritorious" rating at Duke University in 1996 and 1997.

- Barry M. Goldwater scholarship, 1998.

- Member of Phi Beta Kappa since my junior year, spring 1998.

- Member of Golden Key honor society, spring 1998. Received a small scholarship and was asked to speak at the induction dinner.

- Member of Phi Eta Sigma, a freshman honor society, spring 1996.

- Duke Math Scholarship, 1995.

Skills

- Considerable computer skills, including experience with Linux and UNIX. Programming expertise in C, C++, Java, Python, Scheme, Javascript, Haskell, Mathematica, and Prolog. Desktop publishing experience, including LaTeX, HTML, CSS, XML, GIMP, Inkscape, Photoshop, and Illustrator.

- Studied French for six years total in high school and at Duke University.

September 6, 2020