Kevin H. Wilson

Contact Information
225 Dyer Street Floor 5
Providence, RI 02903
Email: khwilson@gmail.com

Education

Princeton University, Princeton, NJ
Ph.D., Mathematics, January 2013
Advisor: Manjul Bhargava
Thesis: *Three perspectives on* n *points in* $\mathbf{P}^{n-2}$

University of Michigan, Ann Arbor, MI
B.S., Mathematics, April 2008, GPA 3.98/4.00
Awarded with Highest Honors and Highest Distinction in Mathematics

Professional Experience

The Policy Lab, Brown University, Providence, RI

Head of Data Science **Jun 2019 – Present**
Associate Director **Jan 2021 – Present**

- Manage the data science team, which works with governments across the United States to more effectively utilize data in decision making.
- Projects include: identifying pathways to treatment for opioid use disorder, improving and automating fine notices, identifying Rhode Island students in need of extra help to graduate on time, studying the efficacy of reemployment services with randomized control trials, and deploying COVID models for the State of Rhode Island.

The Lab @ DC

Senior Data Scientist **Jan 2017 – Present**

- Started the data science practice in the Office of the City Administrator of the District of Columbia.
- Developed a secure tech stack for analyzing sensitive administrative data.
- Scoped and executed randomized controlled trials to study, for example, the effect of introducing a nurse line to the 911 system, training police on systemic racism, and using novel tactics to solve murders.
- Developed and deployed machine learning models to help DC agencies identify rodent hotspots, substandard housing, and students at risk of chronic absenteeism.
- Currently I am a senior adviser, consulting on methodology.

JetBlack (Walmart subsidiary), New York, NY

Director of Research Engineering **Jan 2019 – May 2019**

- Built multiple prototypes and pre-production systems combining NLP and human agents to service retail customers via text message.
- Evaluated several potential M&A actions for Wal-Mart's NLP offerings.

Anosov Systems LLC

Personal Consultancy **Jun 2015 – Present**

- Example work has included evaluation of companies for potential VC or grant investment (especially companies focused on statistics-based, educational, or

cryptographic products), teacher training in math- and computer science-based topics, some work on the mathematics of Q-Learning, using statistics to build cheaper sensor arrays, and engineering consulting for healthcare companies.

Institute for Advanced Studies
Summer Fellow **Summer 2018**

- Expanded conjectures on counts of non-abelian extensions of number fields.
- Made substantial progress toward counting D_5-extensions of **Q**.

University of Chicago, Chicago, IL
Technical Mentor, Data Science for Social Good **Summer 2016**

- With two other mentors, oversaw four teams of 3 – 4 fellows (mostly graduate students or young professionals).
- Fellow teams worked on one of four problems, two of which were early warning systems (EWS) for K-12 schools in rural Ohio and Tulsa, one was an EWS for interacting with the criminal justice system based on education data in Milwaukee, and one was predicting pipe breaks in Syracuse.
- Guided design of solutions to fellows' problems, both from a modeling and a programming perspective.
- Interfaced with partners to procure data necessary to complete projects and buy in necessary to implement the outcomes.
- Taught several mini-courses on Python and the history of American education.

Knewton Inc., New York, NY
Principal Data Scientist **May 2014 – May 2016**

- Led several research projects, theoretical and practical, against Knewton's data sets of many millions of student interactions.
- Example projects include evaluating neural nets for proficiency estimation, building automatic content classifiers based on various NLP techniques, finding natural experiments to test the efficacy of our interventions, and experiments to find the sweet spot on the spectrum of a pure business-logic based system and a pure model-driven system.
- Consulted on system and security architecture, especially as related to data science needs, student privacy, and international expansion concerns.
- Compiled open sourcing standards for the company and shepherd projects into the wild.
- Built and maintained many production models (especially proficiency-derived models) and internal tools (especially Python development-related), which required performant, reliable coding in Java, Python, and assorted other languages.
- Among other things, built a package manager for Python that was backed by AWS S3 that provided HTTPS service for both internal and external packages, as well as command line and web utilities for their maintenance.
- Wrote our main software engineer coding interview (with three others), wrote our career paths for individual contributors in data science and software engineering (with two others), and oversaw rewrites to several other interview criteria.

Data Scientist **August 2012 – May 2014**

- Developed generalized proficiency and other models for the Knewton platform as well as analyzed their ongoing performance against real student data.
- Implemented these models and a good deal of the accompanying infrastructure for a platform with millions of users.
- Led many cross-team initiatives, including our MapReduce group and a revamping of our Python standards.
- At various times, was a co-maintainer of our code review, continuous integration, and deployment infrastructures.

TEALS (A Microsoft Subsidiary), Redmond, WA

Remote Teaching Consultant **June 2014 – August 2017**

- Extended two years of volunteer work teaching high school students computer science remotely in Eastern Kentucky (project won the PEAK Award in Kentucky).
- Have trained around 125 volunteers and 30 classroom teachers on how to run remote classrooms, especially focusing on scaling these trainings to more individuals (25 volunteers in 2015, 100 in 2016).
- Executed classroom visits and interviews for the improvement of the program and formalized the process by which observations are conducted.
- Compiled user research for desirable products necessary to ease remote/computer-based teaching.

Reasoning Mind, Houston, TX

Knowledge Engineering Intern **Summer 2011**

- Developed strategies for translating traditional Russian primary-grades math curricula to computer-based, individualized curricula.
- Specialized in rapid prototyping of prospective interfaces and user testing using HTML5/JS-based tools, standardized examinations of students' knowledge (especially around math and reading), and user-centered design approaches to the evaluation of prototypes.

Graphics Design and Custom Programming Contracting

Many companies in the Louisville, KY, area **2000 – 2013**

- Produced local, regional, and national print advertisements.
- Built custom computing solutions, especially inventory management, backup, and accounting services.
- Got start by automating the local newspaper's website updates before the age of WordPress.

Teaching Experience

Lee County High School, Beattyville, KY

Volunteer Remote Instructor

- Developed lessons for a SNAP!-based Computer Science course.
- Taught these lessons remotely two days each week, with other volunteers covering other days.
- Coordinated five volunteers and a classroom teacher to teach these courses.

- Program won a PEAK Award in Kentucky.

Princeton University, Princeton, NJ

Teaching Assistant **Winter 2011**

- Developed supplementary curricula for undergraduates taking a graduate-level course on cutting-edge topics in arithmetic statistics.
- Led several independent studies on the topic, in particular, was a prime mentor for Ashwath Rabindranath's junior thesis.

McGraw Fellow **Winter 2010 – Spring 2012**

- Provided (with a co-fellow) the only training provided to graduate students in the Princeton math department before they taught undergraduate courses.
- Focused on implementable strategies for 30+-person classrooms such as Think-Pair-Share.

Head Preceptor for The Magic of Numbers **Spring 2010**

- Helped develop curricula for and gave several lectures for the second iteration of a 180-person course.
- Managed four preceptors and ten graders and the communications between this team and the faculty instructor.

University of Michigan, Ann Arbor, MI

Course Apprentice **Fall 2006 – Winter 2008**

- Instructor for Honors Analysis and Mentor for Explorations in Mathematics
- Responsible for a weekly one-hour lecture, grading, and office hours.
- Mentored freshmen and sophomores in solving small research problems.
- Specialized in helping students with programming, especially in Mathematica.

Instructional Assistant **Winter 2006**

- Head Teaching Assistant and Autograder Czar for EECS 281, the final required data structures course for CS undergrads at the University of Michigan.
- Developed programming projects, homeworks, and exams for second-year data structures/algorithms course.
- With another student, developed a PHP/PERL web-based autograder.
- In charge of hiring and managing graders.

PROGRAMMING LANGUAGES

Expert: Python and Java
Used professionally: Scala (Spark), PHP, PERL, VBA, Matlab, Magma, Sage, SQL (mostly Redshift, Postgres, PostGIS), JavaScript, Node, and (ever so long ago) AppleScript
Used in side projects: Ruby, Julia, C
Competed with: C++
Taught courses in: Python, Java, SNAP/BYOB, C++

HUMAN LANGUAGES

Native: English
Reading Proficiency: Spanish
Order-off-the-menu Proficiency: Mandarin

Other Activities

Kentucky Science and Technology Corporation, Frankfort, KY

Grant Reviewer **January 2016 – June 2017**

- Frequent out-of-state reviewer for grants for a Commonwealth of Kentucky-funded NSF SBIR grant matching program administered by KSTC.
- Expertise sought for educational technology, general statistics and software applications, and feasibility of business plans.

Met Council, New York, NY

Highly Skilled Volunteer **January 2013 – January 2015**

- With a friend, developed a web app for determining whether low income New Yorkers qualify for SNAP (f.k.a. food stamps)
- Won volunteer of the year award for the work.

Princeton University, Princeton, NJ

Mentoring Möbius, Co-Director **September 2009 – May 2012**

- Coordinated a mentoring program for current and prospective math majors with an emphasis on expanding female participation in the math program.
- Paired interested undergraduates with graduate students who provide advice and encouragement.

Writing

Thesis

- *Three Perspectives on n Points in* $\boldsymbol{P}^{n-2}$. Princeton University. January 2013.

Patents

- Three related to computational number theory

Refereed Publications

- Rabb, N. Swindal, M., Glick, D., Bowers, J., Tomasulo, A., Oyelami, Z., **Wilson, K.H.**, Yokum, D. The limited reach of nudges: Evidence from a statewide vaccination RCT. *Nature* (in press; 2022).
  - Code: https://github.com/thepolicylab/covid-smsexperiment
- Xu, Y. and **Wilson, K.H.** Early Alert Systems During a Pandemic: A Simulation Study on the Impact of Concept Drift. Learning Analytics and Knowledge Conference (2021), pp. 504-510.
  - Associated official documentation
- Altuğ, S.A., Shankar, A., Varma, I., **Wilson, K.H.** *The number of* D_4-fields ordered by conductor. Journal of the European Mathematical Society 23 (2021), no. 8 pp. 2733–2785.
  - Code: https://github.com/khwilson/d4counting
- Macmadu A., Paull K., Youssef R., Batthala S., **Wilson K.H.**, Samuels E.A., Yedinak J.L., Marshall B.D.L. Predictors of enrollment in opioid agonist therapy after opioid overdose or diagnosis with opioid use disorder: A cohort study. Drug and Alcohol Dependence 219 (2021), pp. 108435.
  - Corrigendum: Coding error discovered in administrative data led to a small correction available here.
- Casey, P.C., **Wilson, K.H.,** Yokum, D. *A Cautionary Tail: A Framework and Case Study for Testing Predictive Model Validity*. Mining Urban Data 3 Workshop at SIGKDD'18.

    - Press: CityLab, GCN, WAMU, Next City, StateScoop, WTOP, GovTech
- Kumar, A., Brooks, B., Rizvi, S.A., Vanderveld, R.A., **Wilson, K.H.,** Kenney, C., Zuckerbraun, J., Edelstein, S., Finch, A., Ghani, R. *Using Machine Learning to Assess the Risk of and Prevent Water Main Breaks*. SIGKDD'18 Oral Presentation.
    - Press: Politico Magazine
    - Code: github.com/dssg/syracuse_public
- **Wilson, K.H.**, Xiong, X., Khajah, M., Lindsey, R.V., Zhao, S., Karklin, Y., Van Inwegen, E.G., Han, B., Ekanadham, C., Beck, J.E., Heffernan, N., Mozer, M.C. *Estimating student proficiency: Deep is not the panacea*. In NIPS 2016 Workshop on Machine Learning for Education.
- **Wilson, K.H.**, Karklin, Y., Han, B., and Ekanadham, C. *Back to the basics: Bayesian extensions of IRT outperform neural networks for proficiency estimation*. Educational Data Mining 2016.
    - Code: github.com/knewton/edm2016**.**
- Blanchet-Sadri, F., Fowler, J., Gafni, J.D., **Wilson, K.H.** *Combinatorics on Partial Word Correlations*. Journal of Combinatorial Theory, Series A. Vol. 116, Issue 6, August 2010.
- Blanchet-Sadri, F., Gafni, J.D., and **Wilson, K.H.** *Correlations of Partial Words*, in W. Thomas and P. Weil (Eds.), STACS 2007. LNCS 4393 pp 97-108.

Working Papers

- Rabb, N., Glick, D., Bowers, J., **Wilson, K.H.**, Yokum, D. The influence of social norms varies with "others" groups: Evidence from COVID-19 vaccination intentions. R&R at Proceedings of the National Academy of Sciences.
- Braman, D., Breslin, R., Casey, P.C., Johnson, R.A., **Wilson, K.H.** Does outreach encouraging families to engage with community-based organizations increase engagement and school attendance? (2021)
    - Code: github.com/thelabdc/ovsjg-suso-public
- Ravishankar, A., Moore, R.T. **Wilson, K.H.** *Policing in Historical and Cultural Context*. Pre-analysis plan available at https://osf.io/xf4jz/.
    - Example press: WUSA, CNN
    - Presented at NYU CESS, March 5, 2020.

Whitepapers

- **Wilson, K.H.** Collating charging data for the District of Columbia Criminal Code Reform Commission. Published as Appendix F and Appendix G of the Criminal Code Reform Commission's supporting materials for their proposed Revised Criminal Code. (2021)
- The Policy Lab. (Huh, E., Thang, S., **Wilson, K.H.**) Longitudinal Evaluation of Providence Public Schools' Multilingual Learners Program. A report to the Department of Justice on behalf of the Providence Public School District. (2021)
- Egar, B., **Wilson, K.H.**, Minnich, K., Gan, K., Quinney, S., Tonse, A., Jaiani, V., Rogers, L. Can messages on trash cans reduce litter? (2020)
- Office of the Deputy Mayor for Public Safety and Justice of the District of Columbia. (Foster-Moore, E., Testa, P., **Wilson, K.H.**) *A Report on Felony Crime in the District of Columbia in 2016*. (2018)

    - Code: github.com/thelabdc/NEAR-Act-public
- Braman, D., **Wilson, K.H.**, Breslin, R., Charland, A., Small, S., Duman, C., Weill, J., Linos, E., Reddy, K., Yokum, D. *Encouraging MPD Officer Applications via Postcard: A Randomized Controlled Trial*. Project report. 2017. Available at osf.io/ge5h4/
- **Wilson, K.H.**, Nichols, Z. *The Knewton Platform: A General-Purpose Adaptive Learning Platform*. January 2015.
- Green-Lerman, H., **Wilson, K.H.**, Kuntz, D. *Reducing the Gap: How Adaptive Follow-Ups Help Struggling Students*. October 2015.

Other Publications

- Braman, D., Casey, P., Egar, B., Mammo, N., Mei, V., Ravishankar, A., Sebastien, D., **Wilson, K.H.** Crime Gun Intelligence Center (CGIC) Evaluation. Pre-analysis Plan. https://osf.io/q8r5m/. (2019)
    - Final report submitted to DOJ available at https://osf.io/sc58h/
- **Wilson, K.H.** *Sharing securely within government*. DSSG'17.
    - Paper and code: github.com/thelabdc/PAPER-DSSG-2017.
- **Wilson, K.H.** *Redraw the States.* A mapping project allowing users to "gerrymander" the United States to change the outcome of the 2016 presidential election. Associated work:
    - **Wilson, K.H.** *Clinton would have won if the United States looked like this*. Medium. November 27, 2016.
    - **Wilson, K.H.** *My favorite maps from Redraw the States*. Medium. December 5, 2016.
    - Press on the work appeared in *Daily Kos* and the *Washington Post*.
    - 4k monthly users in a typical month in 2021.
- **Wilson, K.H.** *Thoughts on the future of math education*. Mathbabe.org. June 15, 2016.

In preparation

- **Wilson, K.H.,** Schmechel, R. *Graph Coloring for Justice! An exploration of time sentenced versus time served in the District of Columbia.* (Working Title)
- Lam, O., Borhani, R., Cohen, Y., Naveed, H., **Wilson, K.H.**, Kenney, C., Ghani, R. *Preventing Interactions with the Juvenile Justice System*. (Working title)

Fielded projects

- Hatzimasoura, C., Holman, R., **Wilson, K.H.**, Yokum, D. *911 Nurse Triage Line*. Pre-analysis plan registered and embargoed at osf.io/t7nhj. Available upon request.
    - Example press: Washington Post, NPR, NBC4, FOX5
    - Code: github.com/thelabdc/FEMS-911NurseTriageLine-public
- The Policy Lab (Calley, C., Huh, E., Pearson, S., **Wilson, K.H.**, Yokum, D.). The impact of Rhode Island's Reemployment Services and Eligibility Assessments (RESEA) on Career Outcomes for Participants. Pre-analysis plan posted 2021. Experiment should finish in 2025.
- Breslin, R., Burnett, S., Gamboa, F., Papakannu, N., **Wilson, K.H.** *Predicting Housing Violations in the District of Columbia*. Pre-analysis plan available at osf.io/pt6w2. Currently in the field.

- Thorson, A., **Wilson, K.H.** *An evaluation of the Summer Crime Initiative in the District of Columbia*. Currently in the field.

Web Resources

- Library of Statistical Techniques (LOST). A collaborative project documenting how to perform various statistical analyses across various programming languages. An ongoing collaboration led by N.C. Huntington-Klein begun in 2020. My primary responsibilities are for website DevOps including automated testing of all code snippets.

Open Source Software

- IPUMS and The Policy Lab (**Wilson, K.H.**, Huh, E., Rogers, R.). ipumspy. A Python package for programmatically interacting with the IPUMS API and with IPUMS data. (2021)
- The Policy Lab (Xu, Y. and **Wilson, K.H.**) ZenTables. A Python package for formatting pandas dataframes for publication. (2021)
- **Wilson, K.H.** Census2020. A Python package for interacting with decennial Census tables in lieu of the as-yet-released API. (2021)

Invited Talks and Conferences

- *APS 2019*. American Psychological Society, Washington, DC. Panel participant discussing Policing in Historical and Cultural Context.
- *2018 Local Government CIO & Leadership Summit*. Public Technology Institute, Washington, DC. "How CIOs Can Enable Evaluation." November 2018.
- *Organizational Sciences Seminar Series*. George Washington University, Washington, DC. "Improving Recruitment at the Metropolitan Police Department." September 2018.
- *Pew Research Seminar Series.* Pew Research, Washington, DC. Talk entitled "Reflections on 18 Months of Data Science in Local Government." July 2018.
- *Can ML Smell a Rat? Field Testing Predictive Models in DC*. Machine Learning Seminar at George Washington University. (Invited May 2018; delayed due to technical issues.)
- *National Association of Counties Annual Conference*. Keynote to Chief Information Officers. Talk entitled "Diamonds in the Rough." March 2018.
- *Gerrymandr*. Invited to conference. 2017.
- *Learning Analytics Seminar Series*. Teacher's College, Columbia University. April 6, 2016. Invited Speaker. Talk entitled "Exploring Recurrent Neural Networks in Educational Data"
- *Computer-Aided Personalized Education*. Computing Community Consortium. November 12–13, 2015. Invited participant. Determining the Grand Challenges in personalized education in the coming 5–10 years.
- *Inference and Representation*. David Sontag's class for the NYU data science program. October 16, 2015. Guest lecture on building up a simple model of student proficiency from logistic regression.
- *IACAT 2015*. International Association for Computer Adaptive Testing. September 14 – 16, 2015. Keynote address on the distinctions between adaptive learning and adaptive testing.
- *PyData NYC 2014*. PyData. November 22–23, 2014. Invited speaker. Talk on Python-based tools usable for adaptive learning platforms. Code, slides, and exercises at github.com/khwilson/pydata2014.

- *Miniworkshop on arithmetic geometry and related topics*. Department of Mathematics, Kyoto University. April 2012. Invited talk on representation theoretic structures arising in differential graded algebras associated with certain parameterizations of rank n rings.
- *Arithmetic Invariant Theory*. Department of Mathematics, Princeton University. February 2012. Invited talk on representation theoretic structures arising in differential graded algebras associated with certain parameterizations of rank n rings.
- *toorcamp 2009*. toorcamp. July 2009. Invited introductory lecture on elliptic curve cryptography for (non-mathematical but professional) hackers. Delivered in an abandoned nuclear missile silo for good effect.

AWARDS

- *Chief of Police Special Award.* Metropolitan Police Department. March 2019. Given for "play[ing] an instrumental role in designing and refining [MPD's] research methodology, ensuring the highest level of scientific rigor and quality of [their] analyses, lay[ing] the foundation for MPD to invest in more data-driven, evidence-based policy and practice."
- *The Best of the Best Engagement Photos of the Year 2018.* (As model.) Junebug Weddings.
- *Public Education Achieves in Kentucky (PEAK) Award* (very, very shared). Kentucky School Boards Association. December 2015. Given to Lee County Schools in Kentucky for the TEALS program I helped grow and foster there.
- *Volunteer of the Year Award* (shared with Trevor Summers Smith). Met Council in New York. Summer 2013. Given in recognition of a project for centralizing data at the Met Council related to the Supplemental Nutrition Assistance Program (previous Food Stamps), greatly speeding up their work identifying eligible New Yorkers and allowing them to more easily examine their data in the future.
- *NSF Graduate Research Fellowship*. Summer 2008.
- *Princeton Centennial Fellowship*. Princeton University. Summer 2008.
- *Phi Beta Kappa*. University of Michigan. Summer 2008.
- *Karle Award in Math and Natural Sciences*. University of Michigan. Spring 2008. Given to highest achieving graduating senior in the natural sciences at the University of Michigan.
- *Outstanding Graduating Senior in Mathematics*. University of Michigan. Spring 2008.
- *Cornwell Prize in Mathematics*. University of Michigan. Spring 2007. Given to a student at the University of Michigan who, during the previous four years, shall have demonstrated the greatest intellectual curiosity and given the most promise of original study and creative work in Mathematics.
- *Goldwater Fellowship*. Summer 2007.