

# ADAM KAPELNER

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## RESEARCH INTERESTS

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Data science, Machine Learning, Statistical Software, Experimental Design, Crowdsourced Experiments, Biomedical Applications of the above, Educational Technology

## ACADEMIC EMPLOYMENT

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<b>Queens College</b> Assistant Professor of Mathematics	Aug 2014 - present
<b>The Technion, Israel Institute of Technology</b> Visiting Scholar, Faculty of Industrial Engineering & Management	Jul 2018 - present

## EDUCATION

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<b>Wharton School of the University of Pennsylvania</b> Ph.D. in Statistics under Abba Krieger and Edward George	May 2014
<b>Wharton School of the University of Pennsylvania</b> A.M. in Statistics	May 2012
<b>Stanford University</b> B.S. in Mathematical & Computational Science (minors in Physics and Economics)	June 2006

## PUBLICATIONS

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# citations: 1250, h-index: 12 and i10-index: 14

### Methodology

- Kapelner, A., Shalit, U., Krieger, A., Sklar, M. & Azriel, D. (2020) Harmonizing Optimized Designs with Classic Randomization in Experiments. *The American Statistician* DOI 10.1080/00031305.2020.1717619
- Krieger, A., Azriel, D. & Kapelner, A. (2019) Nearly Random Designs with Greatly Improved Balance. *Biometrika* 106 (3), 695–70
- Kapelner, A., Krieger, A. & Blanford, W. J. (2016). Optimal Experimental Designs for Estimating Henry’s Law Constants via the Method of Phase Ratio Variation. *Journal of Chromatography A* 1468 183–191
- Kapelner, A. & Krieger, A. (2014). Matching on-the-fly in Sequential Experiments for Higher Power and Efficiency. *Biometrics* 70 (2) 378–388
- Mehlretter, J., Fratila, R., Benrimoh, D.A., Kapelner, A., Perlman, K., Snook, E., Israel, S., Miresco, M. & Turecki, G. Differential Treatment Benefit Prediction For Treatment Selection in Depression: A Deep Learning Analysis of STAR\*D and CO-MED Data *in review at Psychiatric Research and Clinical Practice*

- Kapelner, A., Bleich, J., Levine, A., Cohen, Z. D., DeRubeis, R. J. & Berk, R. A. Evaluating the Effectiveness of Personalized Medicine with Software *in review at Frontiers in Big Data*
- Kapelner, A., Sklar M., Krieger, A., & Azriel, D. Optimal Rerandomization via a Criterion that Provides Insurance Against Failed Experiments. *in review at Journal of Statistical Planning and Inference*
- Blanford, W. J., Jofat, D. & Kapelner, A. A new Model for Solution Density as Molal and Mass Fraction as Functions of Salinity, and Cyclodextrin and Temperature, via Stepwise Regression. *in review at the Journal of Chemical & Engineering Data*
- Azriel, D., Kallus, N. & Kapelner, A. Optimal Regret Designs in a Sequential Trial. *in preparation for Biometrics*
- Kapelner, A. & Krieger, A. A Matching Procedure for Sequential Experiments that Iteratively Learns which Covariates Improve Power *in preparation for Biometrics*
- Krieger, A., Azriel, D., Sklar, M. & Kapelner, A. Improving the Power of the Randomization Test *in preparation for JASA*

### **Machine Learning and Data Science**

- Kapelner, A. & Bleich, J. (2016). `bartMachine`: A Powerful Tool for Machine Learning. *Journal of Statistical Software* 70 (4)
- Kapelner, A. & Bleich, J. (2014). Prediction with Missing Data via Bayesian Additive Regression Trees. *Canadian Journal of Statistics* 43 (2) 224–239
- Bleich, J., Kapelner, A., George, E. I. & Jensen, S. T. (2014). Variable Selection Inference for Bayesian Additive Regression Trees. *Annals of Applied Statistics* 8 (3) 1750–1781
- Goldstein, A., Kapelner, A., Bleich, J. & Pitkin, E. (2014). Peeking Inside the Black Box: Visualizing Statistical Learning with Plots of Individual Conditional Expectation. *Journal of Computational & Graphical Statistics* 24(1), 44–65
- Bleich, J & Kapelner, A. (2014). Bayesian Additive Regression Trees With Parametric Models of Heteroskedasticity. *in review at Communications in Statistics - Theory and Methods*, available on arXiv
- Kapelner, A. YARF: A Fully-Flexible Non-Parametric Learning Suite *in preparation for Journal of Statistical Software*
- Kapelner, A., Bleich, J. & Berk, R. A. An R Package for Kernel Regression with PCA, *in preparation for Statistical Surveys*

### **Crowdsourcing and Social Science**

- Kapelner, A. & Weinberg. (2019) Do Readers Judge Books by Author Gender? Results from a Randomized Experiment. *Socius* 5
- Weinberg, D. B. & Kapelner, A. (2018) Comparing gender discrimination and inequality in indie and traditional publishing. *PLoS One* 13 (4) e0195298
- Schwartz, H. A., Eichstaedt, J., Blanco, E., Agrawal, M., Dziurzyński, L., Kern, M. L., Kapelner, A., Park, G., Jha, S., Stillwell, D., Kosinski, M. & Ungar, L. H. (2016) Predicting individual well-being through the language of social media. *Biocomputing: Proceedings of the Pacific Symposium* 516–527

- Chandler, D. & Kapelner, A. (2013) Breaking Monotony with Meaning: Motivation in Crowdsourcing Markets. *Journal of Economic Behavior & Organization*, 90: 123-133
- Kapelner, A., Kaliannan, K., Schwartz, H. A., Ungar, L. H. & Foster, D. P. (2012) New Insights from Coarse Word Sense Disambiguation in the Crowd. *CoLING*
- Kapelner, A. & Chandler, D. (2010) Preventing Satisficing in Online Surveys. *Proceedings of CrowdConf*
- Kapelner, A. & Weinberg. Do Readers Care about Author Race and Gender? Results from a Randomized Experiment across Genres. *in preparation for Socius*

### **Education Applications**

- Adlof, A., Baron, L. S., Scoggins, J., Kapelner, A., McKeown, M. G., Perfetti, C., Miller, E., Soterwood, J. & Petscher, Y. (2019) Accelerating Adolescent Vocabulary Growth: Development of an Individualized, Web-based, Vocabulary Instruction Program. *Language, Speech, and Hearing Services in Schools* 50 (4): 579-595
- Kapelner, A., Nessaiver, S., Soterwood, J. & Adlof, A. (2018) Predicting Contextual Informativeness for Vocabulary Learning. *IEEE Transactions on Learning Technologies* 11(1) 13-26
- Adlof, A., McKeown, M., Perfetti, C., Petscher Y. & Kapelner, A. Demonstrating the Effectiveness of a New Vocabulary Teaching Method with an RCT. *in preparation for Language, Speech, and Hearing Services in the Schools*

### **Biomedical Applications**

- Schoeler, N., Bell, G., Yuen, A., Kapelner, A., Heales, S. J. R., Cross, J. H. & Sisodiya, S. (2017) Acetyl carnitine and association with response to ketogenic dietary therapies. *Epilepsia* 58 (5), 893-900
- Kapelner, A. & Vorsanger, M. (2015) Starvation of Cancer via Induced Ketogenesis and Severe Hypoglycemia. *Medical Hypotheses*, 84(3): 162–168
- Chang, A. Y., Bhattacharya, N., Mu, J., Setiadi, A. F., Carcamo-Cavazos, V., Lee, G. H.; Simons, D. L., Yadegarynia, S., Hemati, K., Kapelner, A., Zheng, M., Krag, D. N., Schwartz, E. J., Chen, D. Z. & Lee, P. P. (2013) Spatial organization of dendritic cells within tumor draining lymph nodes impacts clinical outcome in breast cancer patients. *Journal of translational medicine*, 11(1): 242
- Setiadi, A. F.; Ray, N. C., Kohrt, H. E., Kapelner, A., Carcamo-Cavazos, V., Levic, E. B., Yadegarynia, S., van der Loos, C. M., Schwartz, E. J., Holmes, S. & Lee, P. P. (2010) Quantitative, architectural analysis of immune cell subsets in tumor-draining lymph nodes from breast cancer patients and healthy lymph nodes. *PloS one*, 5(8): e12420
- Holmes, S., Kapelner, A. & Lee, P. P. (2009) An interactive java statistical image segmentation system: Gemident. *Journal of Statistical Software*, 30(10): 1–20
- Kapelner, A., Lee, P. P. & Holmes, S. (2007) An interactive statistical image segmentation and visualization system. *in proceedings of IEEE, Medivis*

- Clarke, G. P. & Kapelner, A. The BART Formula for Safe Machine-Learning Based IOL Predictions. *in review at Frontiers in Medicine*

## GRANTS AWARDED

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- Israel-USA Binational Science Foundation (BSF)** 2019-2023  
 More Powerful Experiments via Harmonizing Classic Randomization with Modern Optimization, 2018112, \$167,000
- PSC CUNY** 2019-2020  
 A Natural Field Experiment on Race and Gender Discrimination in the Gig Economy, TRADB-50-65, \$6,000
- MQ Foundation** May 2017 - Jul 2018  
 The Stratified Medicine Approaches for Treatment Selection Mental Health Prediction Tournament, \$3,200 • Winner of tournament
- PSC CUNY** 2017-2018  
 Optimal Experimentation: Trading Randomization for Balance, TRADA-48-469, \$3,500
- MQ's Psy-IMPACT** Nov 2014 - Dec 2018  
 • Serve as an expert consultant and investigator to the grant
- U.S Dept. of Education, Inst. of Educational Science** Sept 2013 - Aug 2018  
 Grant #R305A130467, \$1,500,000, PI: Suzanne Adlof, University of South Carolina. I cowrote and served as the expert consultant to the grant.

## GRANTS APPLIED

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- NSF PD18-1269** (applied 2018) Oct 2019 - Sep 2023  
 More Powerful Experiments via Harmonizing Classic Randomization with Modern Optimization, \$500,000
- PSC CUNY** (applied 2015) TRADA-47-330, \$2500 2016  
 Demonstrations of Inference for Personalized Medicine Treatment Models

## HONORS AND AWARDS

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- Certificate for Highly Cited Research in the Journal of Economic Behavior and Organization Jan 2017
- National Science Foundation Graduate Research Fellowship May 2010 - April 2013
- J. Parker Bursk Memorial Award for Excellence in Research Dec 2013
- Donald S. Murray Award for Excellence in Teaching Dec 2012
- Intel Science Talent Search Semifinalist Jan 2002

## FORMAL PRESENTATIONS AND TALKS

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- Kapelner A., Harmonizing Fully Optimal Designs with Classic Randomization in Experiments, Harvard University, Applied Statistics Lecture Series Feb 2020
- Kapelner A., Harmonizing Fully Optimal Designs with Classic Randomization in Experiments, Design & Analysis of Experiments Conference Oct 2019

Kapelner A., Harmonizing Fully Optimal Designs with Classic Randomization in Experiments, Atlantic Causal Inference Conference May 2019

Kapelner A., Harmonizing Fully Optimal Designs with Classic Randomization in Experiments, Wharton Statistics Faculty Seminar Mar 2019

Kapelner A., Harmonizing Fully Optimal Designs with Classic Randomization in Experiments, Economics Dept Seminar, Queens College Feb 2019

Kapelner A., Harmonizing Fully Optimal Designs with Classic Randomization in Experiments, *EMR-IBS, '18, Jerusalem, Israel* Dec 2018

Kapelner A., Harmonizing Fully Optimal Designs with Classic Randomization in Experiments, Haifa University Statistics Faculty Seminar Oct 2018

Kapelner A., Harmonizing Fully Optimal Designs with Classic Randomization in Experiments, Tel Aviv University Statistics Faculty Seminar Oct 2018

Kapelner A., Harmonizing Fully Optimal Designs with Classic Randomization in Experiments, Hebrew University of Jerusalem Statistics Faculty Seminar Oct 2018

Kapelner A., Harmonizing Fully Optimal Designs with Classic Randomization in Experiments, Weizmann Institute of Science Statistics Faculty Seminar Oct 2018

Kapelner A., Personalized Medicine Inference via the R Package PTE, Industrial Engineering and Management Seminar, the Technion July 2018

Kapelner A., Personalized Medicine Modeling with Survival and Incidence Endpoints *TSIL, '18, London, England* Jun, 2018

Kapelner A., Personalized Medicine Inference and Machine Learning via the R Packages PTE & YARF *TSIL 1/2 Day Workshop, '18, London, England* Jun, 2018

Kapelner, A., Weighted Matching on-the-fly: Improved Sequential Allocation with Higher Power and Efficiency *SAE '18 Shanghai, China* Jun, 2018

Kapelner A., Weighted Matching on-the-fly: Improved Sequential Allocation with Higher Power and Efficiency, Technical Seminar, Amazon Inc. June 2018

Kapelner, A., Starving Cancer through Induced Ketogenesis *QC Biology Symposium* Jan, 2018

Kapelner, A., YARF: A Fully Customizable Non-Parametric Regression Toolbox *The Technion, seminar series* Jul, 2017

Kapelner, A., Weighted Matching on-the-fly: Improved Sequential Allocation with Higher Power and Efficiency *The 6th International Workshop in Sequential Methodologies (IWSM '17 Rouen, France)* Jun, 2017

Kapelner, A., Predicting Contextual Informativeness for Vocabulary Learning *Kasisto, Inc. seminar series* Nov, 2016

Kapelner, A., Optimal experimental designs for estimating Henry's law constants via the phase ratio method *ACS National Meeting* Aug, 2016

Clarke, G., Hill, W., Kapelner, A. Data-Driven IOL Calculations *Amer. Society of Cataract and Refractive Surgeons Annual Meeting* May, 2016

Kapelner, A., Inference for Personalized Medicine Models *UPenn Treatment Lab* June, 2016

Kapelner, A., Better Experiments on MTurk? NYU Statistics Seminar May, 2016

Jensen, S., Kapelner, A., Variable Selection with Bayesian Additive Regression Trees. ENAR Mar, 2015

Kapelner, A., Experiments via Crowdsourcing: A New Platform

for Social Science Research? Economics Dept Seminar, Queens College	Feb 2015
Kapelner, A., Better Randomization via Greedy Pair Switching <i>IMS China</i>	Jul, 2015
Kapelner, A., Ungar L. Crowdsourcing for Statisticians. <i>JSM</i> , Continuing Education Course	Aug 2013
Kapelner, A., Chandler D. Preventing Satisficing in Online Surveys. <i>CrowdConf</i>	Oct 2010
Wieland, K., Fitzgerald, J., Kapelner, A. Contextual Vocabulary Analysis Processes. <i>National Reading Conference</i>	Dec 2009
Kohrt, H. E., Kapelner, A., Holmes, S., Lee, P. P. An interactive statistical imaging system. <i>J Clin Oncol (Poster)</i>	May 2008

## INFORMAL PRESENTATIONS AND TALKS

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Episode 109 - Experimental Design <i>Local Max (Data Science Podcast)</i>	Mar 9, 2020
The Data Science & Statistics Mathematics Major Option at QC <i>NYC Tech Talent Pipeline Conference</i>	May 14, 2018
Predicting Informativeness from Context <i>QC Math Club</i>	Feb 5, 2018
How to Teach an Effective Summer Course (for Wharton graduate students) Wharton, May, 2012	

## TEACHING EXPERIENCE

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### **Queens College, City University of New York**

Math 390 (Data Science via Machine Learning and Statistical Modeling with the R Lan- guage)	Jan 2018 - present
Math 368 / 621 (Advanced Probability)	Aug 2017 - present
Math 341 (Bayesian Modeling)	Feb 2016 - present
Math 241 (Probability and Statistics)	Aug 2014 -present

### **Wharton School of the University of Pennsylvania**

Stat 422/722 (Predictive Analytics)	Jan 2017 - Feb 2017
Stat 101 (Probability and Statistics)	May 2011 - July 2011
Teaching Assistant for Stat 101 (Probability and Statistics) and Statistics 102 (Linear Regression)	Sept 2009 - June 2010
Teaching Assistant for Stat 613 (Required Statistics course for MBA students)	Sept 2013 - Dec 2013
Teaching Assistant for Stat 112 (Statistical Inference)	Jan 2014 - Jun 2014

## MENTORING EXPERIENCE & STUDENT INDEPENDENT STUDIES

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### **Studies in Optimal Experimental Design**

Abhinav Patil	Spring, 2020
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### **A Nonparametric Bayesian Model for Extreme Events**

Bracha Blau	Fall, 2018
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### **Studies in Fully Customizable Tree Models**

Ashok Rao	Spring, 2018
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**Optimal Experimental Design**

Bracha Blau

Spring, 2018

**A Nonparametric Bayesian Model for Extreme Events**

Evangeline Spzylka

Summer, 2017 - Spring, 2018

**Personalized Medicine Models for Survival**

Alina Levine

Summer, 2016-present

and Xin Ling Luang (local HS student)

Summer, 2016

**Deep Learning for Image Segmentation**

Christian Colon and Stefan Hernandez

Spring, 2016 - present

**Predicting Congressmens' Party Affiliation**

Savvas Tjortjoglou

Spring, 2016

**Web Application Engineering for Social Science Experimentation**

Rikki Katz

Spring, 2015

**Studies in Real Analysis**

Elliot Gangaram

Spring, 2015

**NEW COURSES DEVELOPED**

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**Queens College, City University of New York**

Math 369 (Statistical Inference)

Sept 2020 - present

Math 368 (Advanced Probability)

Sept 2019 - present

Math 342W (Data Science Basics: Machine Learning and Statistical Modeling with the R Language)

Jan 2018 - present

Math 341 (Bayesian Modeling)

Feb 2016 - present

**UNDERGRADUATE PROGRAMS DEVELOPED**

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**Queens College, City University of New York**

Data Science &amp; Statistics Option for the BA in Mathematics

(with Chris Hanusa and Alan Sultan)

Sep 2018 - present

Actuarial Studies Track in the MA in Risk Management

(with Cara Marshall)

Jan 2018 - present

Data Science &amp; Statistics Speaker Series

Feb 2019 - present

**DEPARTMENT SERVICE**

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**Position****dates**

Data Science &amp; Statistics Option Advisor

9/19-present

Coaching and Interviewing Adjunct Instructors

9/19-present

Hiring Committee

9/17-present

Mathematics Minor Advisor

1/17-present

Mathematics Curriculum Committee

6/16-present

Learning Outcomes Committee	1/16-present
Faculty Development Committee	1/16-present

## COLLEGE SERVICE

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<b>Position</b>	<b>dates</b>
Academic Senate	6/16-present

## PROFESSIONAL SERVICE (REVIEW WORK)

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<b>Journal (or Organization)</b>	<b>Year</b>
INFORMS Journal on Computing	2020
International Statistical Review	2020
Biometrika	2019
Journal of the American Statistical Association	2019
PSC CUNY Grant for Statistics Research	2019
Annals of Applied Statistics	2019
PLoS One	2019
Journal of Educational & Behavioral Statistics	2018
Neural Networks	2018
IEEE Access	2018
PLoS One	2018
The R Journal	2018
PSC CUNY Grant for Statistics Research	2018
Journal of the American Statistical Association	2017
Statistical Analysis and Data Mining	2017
PSC CUNY Grant for Statistics Research	2017
PLoS One	2016
The R Journal	2016
Statistical Analysis and Data Mining	2016
International Journal of Approximate Reasoning	2016
Journal of the Royal Statistical Society (Series B)	2015
Statistics in Medicine	2015
Bayesian Analysis	2014
Medical Hypothesis	2014
Journal of Cancer Research & Therapy	2014
Annals of Applied Statistics	2013
Transactions of the Association for Computational Linguistics	2013
National Science Foundation	2010

## INDUSTRY EXPERIENCE

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<b>Data Science Private Consulting</b>	June 2014 - Present
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- Prediction modeling, data mining, statistical testing for a variety of clients from tech to biomedical to finance

**DictionarySquared, Inc.**

*Founder & CTO*

April 2010 - Dec 2018

*San Francisco, CA*

- Conceived and engineered a web application that teaches vocabulary via reading contextual snippets
- Wharton Business Plan Semifinalist Winner
- Applied and received federal grant money for research (see Grants section)

**Eventbrite, Inc.**

*Software Engineer*

April 2007- Aug 2007

*San Francisco, CA*

- First engineer. Designed and engineered portions of their web platform.

**Stanford University, Lab of Peter Lee**

*Staff Scientist*

June 2005 - Mar 2007

*Stanford, CA*

- Conceived and engineered software that finds objects in images, used to find cells in microscopic images. Uses Java-R programming, Random Forests and image processing

**SOFTWARE**

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R Package: CovBalAndRandExpDes (in dev.)	Optimal Designs for Experiments
R Package: YARF (in dev.)	A highly customizable predictive modeling suite
R Package: SampleRepresentativenessChecker	Assesses sample respresentativeness
R Package: GreedyExperimentalDesign	Creates better experimental designs
R Package: optDesignSlopeInt	Optimal designs for slope:intercept ratios
R Package: ICEbox	Statistical learning visualization suite
R Package: bartMachine	A flexible statistical learning suite
R Package: PTE	Inference for personalized medicine models
GemIdent	Finds objects of interest in images
GemVident	Finds objects of interest in videos
dictionaryquared	Teaches High School Students Vocabulary
gradesly.com	gives students grade transparency and helps professors administer grades

**TECHNICAL STRENGTHS**

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<b>Software Languages</b>	R, Java, Ruby on Rails, C++, Python, HTML/CSS/JS
<b>R Skills</b>	ggplot, dplyr, data.table, mlr3, rJava, Rcpp, most ML packages
<b>Other Skills</b>	git, MySQL, Linux, Gurobi, grid computing, simulation, AWS