Panagiotis (Panos) Toulis

CONTACT INFORMATION	5807 S Woodlawn Ave Chicago, IL, 60637	*tel:* 773-834-5953 *e-mail:* panos.toulis@chicagobooth.edu *website:* http://www.ptoulis.com *codebase:* https://github.com/ptoulis

ACADEMICS

University of Chicago, Booth School of Business, Chicago, IL, USA
Associate Professor of Econometrics and Statistics (2021-present)

University of Chicago, Booth School of Business, Chicago, IL, USA
Assistant Professor of Econometrics and Statistics (2016-2021)
John E. Jeuck Faculty Fellow
Interests: Causal inference; networks; randomization inference; statistical machine learning.

EDUCATION

Harvard University, Cambridge, MA, USA
Ph.D. in Statistics, 2016; M.S. in Statistics, 2013;
Advisors: Edoardo M. Airoldi, David C. Parkes, Donald B. Rubin
Topics: Causality in complex systems; scalable estimation with stochastic approximations.

Harvard University, Cambridge, MA, USA
M.S. in Computer Science, 2011
Advisor: David C. Parkes

Aristotle University, Thessaloniki, Greece
B.S. in Electrical and Computer Engineering, 2006
Thesis: Mertacor, A Successful Autonomous Trading Agent

HONORS/AWARDS
SINCE 2011

2020 Faculty Prize, Adobe Analytics Challenge
— *advised team of Booth students who reached Top-10 out of 1,600 teams competing worldwide*
https://www.adobeanalyticschallenge.com/

2019 PolMeth Faculty Poster Award
— *with David Puelz, Guillaume Basse, Avi Feller*

2018 IBM Award
— *with Thibaut Horel and Edoardo Airoldi*
https://nestat.org/ibmawards/ibm2018/

2015 Winner of Economic Graph Challenge, LinkedIn Corp
— *with Alexander Volfovsky and Edoardo Airoldi*
http://economicgraphchallenge.linkedin.com

2015 Arthur P. Dempster Prize, Department of Statistics, Harvard University
— *Awarded for "significant contributions to theoretical or foundational research in statistics".*
http://www.stat.harvard.edu/Site_Content/Dempster_Award.pdf

2014 Teaching Excellence for STAT 221-Statistical Computing, Harvard University
— *Awarded to teaching fellows who receive student evaluation scores > 4.5 out of 5.*

2013 Ten Have Award (with Ed Kao), Atlantic Causal Inference Conference
— *Awarded "for exceptionally creative or skillful research on causal inference".*
http://bit.ly/2omxn30

2012 Fellowship in Statistics, 2012 Google US/Canada PhD Fellowship Program
— *Awarded annually to one graduate student in US/Canada "doing exceptional work in computer science, related disciplines, or promising research areas".*
http://research.google.com/university/relations/fellowship_recipients_usca.html

WORKING PAPERS

"Invariant Inference via Residual Randomization"
arXiv:1908.04218.

"Invariance-based inference in high-dimensional regression with finite-sample guarantees"
with Guo, W. *arXiv:2312.15079.*

"Randomization tests for monotone spillover effects"
with Li, Xinran, Guo, W *(In preparation).*

"Randomization Inference of Periodicity in Unequally Spaced Time Series with Application to Exoplanet Detection"
with Bean, J. *arXiv:2105.14222.*

"Experimental Designs for Structural Economic Models of Large Production Networks "
with Best, M., Grosset, F., Huang, S., Shaikh, A *(In preparation).*

"The many null hypotheses of network randomization tests"
with Ugander, J *(In preparation).*

IN REVISION

"Estimation of causal effects when treatments are entangled by network dynamics"
with Volfovsky, A., Airoldi, E. *Biometrika.*

JOURNAL PUBLICATIONS

"Randomization tests for peer effects in group formation experiments"
with Basse, G., Feller A., Ding, P. *Econometrica (2023, forthcoming).*

"Minimax designs for causal effects in temporal experiments with treatment habituation"
with Basse, G., Ding, Yi (2023). *Biometrika, 110(1), pp. 155-168.*

"A graph-theoretic approach to randomization tests of causal effects under interference"
with Puelz, D., Basse, G., Feller, A. (2022). *Journal of the Royal Statistical Society, Series B, 84(1), pp.174-204.*

"Randomization tests in observational studies with staggered adoption of treatment"
with Shaikh, A. (2021) *Journal of the American Statistical Association, 116(536), pp. 1835-1848.*

"The proximal Robbins–Monro method"
with Horel T., Airoldi, EM. (2021). *Journal of the Royal Statistical Society, Series B, 83(1), pp. 188-212.*

"Estimation of Covid-19 prevalence from serology tests: A partial identification approach"
Journal of Econometrics (2020), 220(1), pp. 193-213.

"Randomization tests of causal effects under interference"
with Basse, G., Feller, A. (2019). *Biometrika, 106(2), pp. 487-494.*

"Asymptotic and finite-sample properties of estimators based on stochastic gradients"
with Airoldi, EM. (2017). *Annals of Statistics, 45(4), pp. 1694-1727.*

"Scalable estimation with stochastic approximations: Classical results and new insights"
with Airoldi, EM. (2015). *Statistics and Computing, 25(4), pp. 781-795.*

"Design and analysis of multi-hospital kidney exchanges using random graphs"
with Parkes, DC. (2015). *Games and Economic Behavior, 91, pp. 360-382.*

Conference Papers   "Plus/Minus the Learning Rate": Easy and Scalable Inference with SGD"
with with Chee, J., Kim, H. (2023) *AI & Statistics (AISTATS'23).*

"Robust inference for high-dimensional linear models via residual randomization"
with Wang, S., Lee S.K., Kolar, M. (2021) *Int'l Conference on Machine Learning (ICML'21).*

"Dynamical systems theory for causal inference with application to synthetic controls"
with Ding, Yi (2020). *AI and Statistics (AISTATS'20).*

"Convergence diagnostics for stochastic gradient descent with constant step size"
with Chee, J. (2018). *AI and Statistics (AISTATS'18,* oral presentation*).*

"Long-term causal effects via behavioral game theory"
with Parkes, DC. (2016). *Neural Information Processing Systems (NIPS'16).*

"Towards stability and optimality in stochastic gradient descent"
with Tran, D., Airoldi, EM. (2016). *AI and Statistics (AISTATS'16).*

"Incentive-compatible experimental design"
with Parkes, DC., Pfeffer, E., Zou, J. (2015) *Economics and Computation (EC'15).*

"Statistical analysis of stochastic gradient methods for generalized linear models"
with Rennie, J., Airoldi, EM. (2014). *Int'l Conference of Machine Learning (ICML'14,* oral*).*

"Estimation of Causal Peer Influence Effects"
with Kao, E. (2013). *International Conference of Machine Learning (ICML'13,* oral*) .*

"A Random Graph Model of Kidney Exchanges"
with Parkes, DC. (2011). *Economics and Computation (EC'11,* oral*).*

"Synergies between online social networking, face recognition, and interactive robotics"
with Mavridis, N., Kazmi, W., Ben-AbdelKader, C. (2009) *International Conference on Computational Aspects of Social Networks (CASoN'09).*

"Mertacor, a successful trading agent"
with Kehagias, D., Mitkas, P. (2006) *Int'l Conference on Autonomous Agents and Multi-Agent Systems, 2006 (AAMAS'06).*

Book Chapters   "Stochastic gradient methods for principled estimation with large datasets"
with Airoldi, EM. *Handbook of Big Data, 2016.*

"Friends with Faces: How Social Networks Enhance Face Recognition and Vice Versa"
with Mavridis, N.; Kazmi, W. *Computational Social Network Analysis, 2009.*

Editorial and   **Editorial:** Associate Editor for Biometrika (from January 2023)
Reviewing

Reviews: NSF, Journal of the Royal Statistical Society A/B/C, Annals of Statistics, Annals of Applied Statistics, Journal of the American Statistical Association, Biometrika, Journal of Econometrics, Quantitative Economics, Journal of Business and Economic Statistics, Biometrics, Scandinavian Journal of Statistics, EJS, CSDA, JMLR, NIPS, ICML, AISTATS, EC.

Program Committee: IJCAI'19, UAI'19.

STUDENTS   Current: Wenxuan Guo (Ph.D., Booth); Shunzhuang Huang (Ph.D., Booth). Hwanwoo Kim (Ph.D., CAM Program at U Chicago)

Previous:
JungHo Lee (2021-, M.S. in Statistics) → Ph.D. in Statistics, Carnegie Mellon University (CMU)
Yating Liu (M.S. in Statistics; 2021-2022) → Ph.D. in Statistics (U Chicago).
David Puelz (Post-doc; 2018-2021) → Clinical Assistant Professor at The University of Texas at Austin's McCombs School of Business; and Director of policy analytics at Salem Center for Policy.
Haoyang Wu (M.S. in Statistics; 2019-2020) → Ph.D. in Statistics, University of Washington.
Connor Dowd (Ph.D. in Econometrics & Statistics, Booth School; 2018-2021) → Joint Committee on Taxation (jct.gov).
Yi Ding (Ph.D. in CS; 2017-2020) → Post-doc at MIT, EECS (CRA Computing Innovation Fellowship) → Assistant Professor of CS at Purdue University.
Junhyung Lyle Kim (Undergrad; 2017-2019) → Ph.D. in CS, Rice University (2019-)
Jerry Chee (Undergrad; 2017-2019) → Ph.D. in CS, Cornell University (2019-)

INVITED TALKS   Upcoming: (02/2024) Stanford, MS&E; (04/2024) University of Warwick, Dept. of Statistics; (07/2024) King's College London, Workshop on "Design and Analysis of Experiments on Networks"; (08/2024) BIRS Workshop on "Causal Inference and Prediction for Network Data".

Randomization tests in observational studies with staggered adoption of treatment
Yale Cowles Econometrics Conference (06/2021)

Randomization Inference of Periodicity in Unequally Spaced Time Series with Application to Exoplanet Detection
Statistical Challenges in Modern Astronomy VII (06/2021). University of California, Berkeley, Department of Statistics (03/2021). Harvard University, Topics in Astrostatistics (03/2021)

A graph-theoretic approach to randomization tests of causal effects under general interference.
Session on "Combinatorial and graph methods in causal inference" (JSM'23, 08/2023); Simons Institute Workshop on Quantifying Uncertainty: Stochastic, Adversarial, and Beyond (09/2022). Advances in Field Experiments Workshop on "Statistical methodology" (04/2022); CMStatistics Conference (12/2020); Airbnb, Inc. (10/2020); Stanford University, Online Causal Inference Seminar (08/2020); Stanford University, GSB (10/2019); Northwestern University, Kellogg School of Business, Network Econometrics Conference (10/2019); U. Chicago, Econometrics Seminar (10/2019); MIT, Lincoln Labs, GraphEx Symposium (04/2019); U. Chicago, QMESS Workshop (11/2018);

Conditional randomization tests for spillover effects.
IMSI workshop on "Permutation and Causal Inference" (08/2023); WNAR 2023 Session on Causal Inference (WNAR 06/2023); Bocconi University (09/2022); U Chicago, Department of Statistics (10/2018); Conference on Advances in Field Experiments (10/2018); JSM18 (invited session, 07/2018); American Causal Inference Conference (ACIC'18); UT, Austin, Department of Statistics and Data Sciences (07/2017); Conference on Political Methodology (PolMeth, 07/2017).

Life after bootstrap: Residual randomization inference in regression models.
Northwestern University, Econometrics (10/2022) University of California, Berkeley, Department of Statistics (forthcoming). University of California, Berkeley, Causal Inference Group (12/2020). MIT, Data Science Lab (11/2020). Citadel LLC (06/2020). Yale University, ISPS (03/2020). Statistics5 Conference (09/2019). Two Sigma, LP. (NYC, 07/2019).

Convergence diagnostics of stochastic gradient descent.
JSM'19 (invited session, 07/2019). IBM Thomas J. Watson Research Center (11/2018).

Asymptotic and finite-sample properties of estimators based on stochastic gradients.
TwoSigma, LP, NYC (02/2022, online). CMStatistics Conference (12/2018). DIMACS Conference (08/2018). ForecastNY Conference (04/2017). TTIC (03/2017). Duke University, Department of Statistics (02/2017).

ORGANIZATION / COMMUNITY	"7th Causal Inference Workshop, 2018"

ORGANIZATION / COMMUNITY

"7th Causal Inference Workshop, 2018"
with A Volfovsky, B Chen (IBM). *International Conference on Uncertainty in Artificial Intelligence (UAI'18, Monterey, California).* https://sites.google.com/view/causaluai2018/home

"Workshop on Network Causal Inference and Design of Experiments, 2018"
with A Volfovsky, D Sussman, E Ogburn. *Satellite workshop of Int'l Conference on Network Science, 2018 (NetSci 2018, Paris, France).* https://sites.google.com/view/causal-netsci2018/home

"Workshop on Causal Inference and Machine Learning, 2017"
with A Volfovsky, A Swaminathan (Microsoft), N Kallus (Cornell), R Silva (UCL), J Shawe-Taylor (UCL), T Joachims (Cornell), L Li (Microsoft). *Neural Information and Processing Systems, 2017 (NIPS'17, Long Beach, CA).* https://sites.google.com/view/causalnips2017

"Workshop on Networks in the Social and Information Sciences, 2015"
with E Airoldi, D Choi (CMU), A Clauset (U Colorado), J Ugander (Stanford). *Neural Information and Processing Systems, 2015 (NIPS'15, Montreal, Canada).* https://nips.cc/Conferences/2015/Schedule?showEvent=4929

PRIOR WORK EXPERIENCE

Software Engineering Intern – Google Inc., Cambridge, USA, 05-08/2012, and 05-08/2013
Campaign Data Analyst – Obama for America, Chicago, USA, 10-11/2012
Research Assistant – Interactive Robotics and Media Laboratory, Abu Dhabi, UAE, 2009
Software Engineer – CERTH, VTrip Ltd, Thessaloniki, Greece, 2006-2009

OTHER INFO

- Extensive Programming Experience: Perl, R, Python, Java, C/C++, C#, Javascript.
- R package(s):
  sgd at https://cran.r-project.org/package=sgd
  RRI at https://cran.r-project.org/package=RRI
- Languages: Greek (native), English (CPE from Cambridge University), French (Sorbonne II from University of Sorbonne)
- Citizenship: Greek. US immigration status: permanent resident.