

Massimiliano Russo

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Current position

Associate Biostatistician and Instructor of Medicine, *Division of Pharmacoepidemiology and Pharmacoeconomics*, Department of Medicine Brigham and Women's Hospital & Harvard Medical School.

Past positions

2019–2022 **Postdoctoral research fellow**, *Harvard Medical School program in Therapeutic Sciences within the Harvard-MIT Center for Regulatory Science*, I was also part of Prof. Lorenzo Trippa's group at the *Dana-Farber Cancer Institute (DFCI) department of Data Science*.

Research interests Analysis and design of clinical trials; Decision theory; Bayesian nonparametrics; Tensor factorization; Categorical data; Complex data; Hierarchical models; Models for latent variables; Machine learning and Data mining; Computational statistics.

Education

2015–2019 **PhD in Statistical Sciences**, *University of Padova, Dept. of Statistical Sciences*, Thesis: *Bayesian inference for tensor factorization models*.
Advisor: [Bruno Scarpa](#)

2013–2015 **Master in Statistical Sciences**, *University of Padova, Dept. of Statistical Sciences*, Final Mark: 110/110 cum laude,
Thesis: *Olfactory perception differences in Italian regions: a nonparametric Bayesian approach to tensor factorization*.
Advisor: [Bruno Scarpa](#); Co-advisor: Giancarlo Ottaviano

2009–2013 **Bachelor in Statistical and Actuarial sciences**, *Università degli Studi del Sannio, Benevento*, Final Mark: 110/110 cum laude,
Thesis: *Multivariate robust estimation*.
Advisor: [Luca Greco](#)

Awards

- Best poster award, "Inference in Response-Adaptive Clinical Trials When the Enrolled Population Varies Over Time", ASA Biopharmaceutical Section Regulatory-Industry Statistics Workshop 2020
- Best paper award for "Bayesian Inference on Group Differences in Multivariate Categorical Data", Dept. of Statistical Sciences, University of Padova (Research Prize 2018)
- Winner of the 3 minutes thesis competition selection of Dept. of Statistical Sciences, University of Padova, October 19, 2018.
- Young researcher travel award ISBA2018, Edinburgh, United Kingdom.
- Travel support for COBAL V (2017), Guanajuato, Mexico
- Young researcher travel award ISBA2016, Sardinia, Italy.

Publications

Published papers
refereed journals

Lauffenburger, J. C., K. Choudhry, N. K., Russo, M., Glynn, R. J., Ventz, S., Trippa, L., *Leveraging adaptive trials to evaluate interventions in health services research*, BMJ Medicine, in press.

Russo, M., Singer, B. H., and Dunson, D. B., *Multivariate mixed membership modeling: Inferring domain-specific risk profiles*, The Annals of Applied Statistics, 16 (1) 391 - 413, 2022.

DOI: 10.1214/21-AOAS1496

Russo, M., Ventz, S., Wang, V., and Trippa, L., *Inference in response-adaptive clinical trials when the enrolled population varies over time*, Biometrics, 00 1 – 13, 2021.

DOI: 10.1111/biom.13582

Aliverti, E. and Russo M., *Stratified stochastic variational inference for high-dimensional network factor model*, Journal of Computational and Graphical Statistics, accepted for publication, 2021.

DOI: 10.1080/10618600.2021.1984929

Rigon, T., Aliverti, E., Russo, M., and Scarpa, B., *A discussion on: Centered partition processes: Informative priors for clustering* by Paganin, S., Herring, A. H., Olshan, A. F. and Dunson, D. B., Bayesian Analysis 16(1): 301-370, 2021.

DOI: 10.1214/20-BA1197

Ottaviano, G., Nardello, E., Pendolino, A. L., Pozza, M. D., Russo, M., Savietto, E. Peter, J. A., Ermolao, A., *Nasal Function Changes at High Altitude*, American Journal of Rhinology & Allergy, 34(5) 618-625, 2020.

DOI: 10.1177/1945892420916393

Aliverti, E., Paganin, S., Rigon, T. and Russo, M., *A discussion on: Latent nested nonparametric priors* by Camerlenghi, F., Dunson, D.B., Lijoi, A., Prünster, I. and Rodriguez, A., Bayesian Analysis, 14 (4) 1303 - 1356, 2019.

DOI: 10.1214/19-BA1169

Ottaviano, G., Pendolino, A. L., Nardello, E., Maculan, P., Martini, A., Russo, M. and Lund, V. J., *Peak nasal inspiratory flow measurement and visual analogue scale in a large adult population*, Clinical Otolaryngology; 44: 541–548, 2019.

DOI:10.1111/coa.13329

Russo, M., Durante, D. & Scarpa, B., *Bayesian Inference on Group Differences in Multivariate Categorical Data*, Computational Statistics & Data Analysis. 126, 136-149, 2018.

DOI:10.1016/j.csda.2018.04.010

Cantone E., Ciofalo A., Vodicka J., Iacono V., Mylonakis I., Scarpa B., Russo M., Iengo M., de Vincentiis M., Martini A. and Ottaviano G., *Pleasantness of olfactory and trigeminal stimulants in different Italian regions.*, European Archives of Oto-Rhino-Laryngology, 1–7, 2017.

DOI:10.1007/s00405-017-4722-5

Peer reviewed
proceedings

Russo, M., *Malaria risk detection via mixed membership models*, CLADAG 2021 book of abstract and short papers.

DOI: 10.36253/978-88-5518-340-6

Russo, M., *Detecting Group Differences in Multivariate Categorical Data*, Proceedings the Italian Statistical Society, Firenze University Press, 2017.

ISBN 9788891927361

Cabassi, A., Casa, A., Fontana, M., Russo, M., and Farcomeni, A., *Three testing perspectives on connectome data*, Springer Proceedings in Mathematics & Statistics, vol 257, 37–55. Springer, Cham, 2018.
DOI:10.1007/978-3-030-00039-4_3

Book chapters **Russo M. and Scarpa B.,** *Learning in medicine: the importance of statistical thinking*, Springer Nature, Method in Molecular Biology, (accepted for publication).

Papers under review **Russo, M., Paganin S., and Scarpa B. ,** *Modeling students' ability: a generalized partial credit model for network dependent latent traits*, (submitted).

Aliverti, E. and Russo M., *Dynamic modeling of the Italians' attitude towards Covid-19*, arXiv preprint, arXiv:2108.01194, (submitted).

Presentations

Invited talks **Invited in the session “Using external data in adaptive clinical trial design”, at ISBA world meeting 2021**, (ISBA 2021), Online.

Invited in the session “Bayesian non parametrics methods for classification”, Classification and Data Analysis Group, (CLADAG 2021), Online.

Invited in the session “Recent developments in Bayesian methodology”, (CMStatistics 2020), Online.

Inference in clinical trials when the patient population is subject to changes over time, *Division of Pharmacoepidemiology and Pharmacoeconomics*, Brigham and Women's Hospital & Harvard Medical School.

Invited in the topic contributed session: "Statistical innovation in regulatory science", *Joint Statistical Meeting of the American Statistical Society*, (JSM 2020), Online.

Contributed talks **Bayesian optimal sequential futility decisions via auxiliary endpoints**, *International Biometric Conference*, (IBC 2020), Accepted for contributed oral Presentation (selected among 700 submissions).
canceled due to COVID-19

Scalable inference for network factor model, *Advanced Statistics for Physics Discovery*, Padova, Italy, September 24, 2018.

Multivariate mixed membership modeling: Inferring domain-specific risk profiles, *IBC2018*, Barcellona, Spain, July 10, 2018.

Bayesian Inference on Group Differences in Multivariate Categorical Data, *COBAL V*, Cimat, Guanajuato, Mexico, June 8, 2017.

Posters **Inference in response-adaptive clinical trials when the enrolled population varies over time**, *2020 Global Conference on Regulatory Science*, Online.

Inference in response-adaptive clinical trials when the enrolled population varies over time, *ASA Biopharmaceutical Section Regulatory-Industry Statistics Workshop 2020*, Online.

Inference in response-adaptive clinical trials when the enrolled population varies over time, *DIA Regulatory Science Forum 2020*, Online.

Inference in clinical trials when the patient population is subject to changes over time, *HiTS Annual Symposium*, Boston, MA, USA, October 21, 2019.

Soft classification tree ensemble of Higgs pair production, *Advanced Statistics for Physics Discovery*, Padova, Italy, September 24, 2018.

Multivariate mixed membership modeling: Inferring domain-specific risk profiles, *ISBA2018*, Edinburgh, United Kingdom, June 29, 2018.

A multivariate mixed membership model for malaria risk detection, *Obayes2017*, Austin, Texas, December 11, 2017.

Detecting Group Differences in Multivariate Categorical Data, *SIS2017*, Florence, Italy, June 28, 2017.

Bayesian Inference on Group Differences in Multivariate Categorical Data, *ISBA2016*, Sardinia, Italy, June 16, 2016.

Service to profession

- Organized sessions **Advances in Bayesian methods for medical data**, *Bayesian Young Statisticians Meeting: Online*, (BAYSM:O 2020).
- Conference committee Member of the program committee of the workshop “[Your Model is Wrong: Robustness and misspecification in probabilistic modeling](#)” of the Thirty-fifth Conference on Neural Information Processing Systems NeurIPS (2021)
- Member of the scientific committee of the [Bayesian Young Statisticians Meeting \(BAYSM2022\)](#), Montreal, Canada.
- Reviewer for: Applied Sciences; BMC Bioinformatics; Computational Statistics and Data Analysis (CSDA); Electronics, European Symposium on Artificial Neural Networks (ESANN) 2020; Intensive Care Medicine; International Journal of Environmental Research and Public Health (IJERPH); Journal of Computation and Graphical Statistics (JCGS); Journal of Computational Methods in Sciences and Engineering (JCMSE); Journal of Open Source Software (JOSS) Mathematics; RJournal; Symmetry; Social Indicator Research; Statistical Methods & Applications (SMA); Trials.

Teaching & mentoring

- Teaching **Parallel Computing for big data analysis**, *March 2018*, Specialist lectures during the class of *Statistical Methods for Big Data Analysis* of Prof. Bruno Scarpa, University of Padova, Dept. of Statistical Sciences, Padova, Italy.
- Introduction to real analysis (B.Sc.)**, *Year 2014/2015*, Academic Tutor, University of Padova, Dept. of Statistical Sciences, Padova, Italy.
- Advanced statistical inference (M.Sc.)**, *Year 2014/2015*, Academic Tutor, University of Padova, Dept. of Statistical Sciences, Padova, Italy.
- Mentoring **Item response theory for network data**, *Master thesis in statistical Science at the University of Padova of Claudia Stocchi*, 2021.

Participation to research groups

- Biostatistical analysis of X-Linked Dystonia-Parkinsonism. The collaborative center for XDP, Massachusetts General Hospital.
- Characterizing Disease Evolution in Non-Alcoholic Steatohepatitis (NASH). Research project of the Harvard-MIT Center for regulatory science and the FDA Center for Drug Evaluation (CDER).
- Bayesian inference on brain network data. PRAT 2015 CPDA154381/15.
- Bayesian methods for conditional dependence learning. within Statistical methods and models for complex data, university of Padova.
- Reproducibility and Robustness of Dimensionality Reduction (National Institute of Health) P.I. Amy H. Herring. Grant R01ES027498

Outreach & events

- Regulatory Science Student & Faculty Mixer (October 2020)
Online meeting with graduate and prospective students to discuss research opportunities.
- Regsci Forum: Fellows Showcase. What the Harvard-MIT Center for Regulatory Science actually does? Wonder no more! (January 2020)
Research presentation to describe the world of regulatory science to students.
- Big data Biosensori e Biobanche, December 2019
Presentation of my research at Università degli Studi del Sannio.
- Harvard-MIT Center for Regulatory Science Open House: Learn about RegSci and research opportunity. (September 2019)
Meeting with Harvard graduate students to discuss research opportunities.
- Volunteer for Venetoneight – La notte dei ricercatori, Padova, Italy. (2015, 2016 & 2017)
Developed an online app interfacing with twitter to track and display in real-time the sentiment of the event.
- Volunteer for StatisticaAll, Treviso, Italy (2015)
Statistical games and activities to show the magic of statistics to kids and adults.
- Volunteer at orientation days for high schools students, Scegli con noi. Campus Agripolis di Legnaro, Padova, Italy. (2015 & 2016)

Workshops & Summer Schools **NIMBLE short course**, UC Berkeley, June 2020, (online).
3-day workshop on NIMBLE: a system for building and sharing analysis methods for statistical models, especially for hierarchical models and computationally-intensive methods.

Start-Up Research, University of Siena, Italy, June 2017.

A 2-day meeting where groups of young scholars, advised by senior researchers, were asked to develop innovative methods and models to analyze a common dataset from the Neurosciences.

Data Hackathons - **Duke Datathon**, Durham, NC, USA, February 2017.
- **Stats under the stars-3**, Firenze, Italy, June 2017.
- **Stats under the stars**, Padova, Italy, September 2015.

Work experience

Feb. 2019 **Data Analyst**, WorkFor, WFIT CRM Services, Roma.
Aug. 2019 Data analysis and consulting.

Study visits

Nov. 2016 **Visiting Research Scholar**, Duke University, Department of Statistical Science, Durham, NC, USA, under the supervision of prof. [David B. Dunson](#).
June 2017
Sept. 2017 **Visiting Research Scholar**, Duke University, Department of Statistical Science, Durham, NC, USA, under the supervision of prof. [David B. Dunson](#).
Mar. 2018

Languages

Italian: native; English: fluent; French: basic; Spanish: basic.

Computing skills

Developed software **MMM**: an R/C++ package with broad implementation of the multivariate mixed membership model algorithm. Available for download at <https://github.com/rMassimiliano/MMM-tutorial>.

TrendUtilities: an R/C++ package implementing multi-arms and platform Bayesian adaptive designs. Available for download at <https://github.com/rMassimiliano/TimeChangingPopulation>.

Programming languages	R (advanced knowledge of Rcpp, tidyverse and shiny libraries); C/C++, Python, Julia, Matlab, JAVA.
Operative System	Linux (Fedora/Ubuntu), Windows, OSX and relative softwares.
Software	SPSS, PSPP, Office, SQL/MYSQL, BUGS, JAGS, STAN, and NIMBLE.
Other	L ^A T _E X, git/github, vim & emacs, bash.

June 14, 2022