

CURRICULUM VITAE

Julia Brettschneider

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PROFILE

Field: Data science, applied statistics and decision theory.

Methods development: Stochastic modelling and quantification for novel measurement technologies, predictive systems in complex data, data quality assessment, bias identification, decision support systems.

Domains of application: Genomics, neuroscience, ecology, agriculture, X-ray science, oncology, circadian rhythm, microscopy, behavioural sciences.

Collaborator for experimentalists: Study planning and analysis, evaluation of novel measurement techniques, multiple hypothesis testing.

Graduate supervision: Extensive experience with supervision of undergraduate and graduate students, primarily on interdisciplinary data-intensive projects.

Funding: PI/Co-I on grants from NIHR, I-NEXUS GLOBAL PCL, NERC, Philips Respiration, Alan Turing Institute, EPSRC, and REF impact case studies.

Collaborations with industry: Data quality and machine learning to predict success of large projects (I-NEXUS GLOBAL PCL), entropy-based metrics and shuffling methods for lists (Spotify), cancer screening data quality (NHS), penumbra in XCT (Nikon Metrology), digital x-ray detector quality (Diamond Lightsource), cancer prognosis (VeracYTE).

EMPLOYMENT

Assistant Professor (9/2007-8/2011) and Associate Professor (since 9/2011) Department of Statistics, University of Warwick, Coventry, UK

Assistant Professor (7/2005-8/2007), Department of Mathematics & Statistics and Department of Community Health & Epidemiology, Queen's University, Kingston, Canada

Neyman Visiting Assistant Professor (7/2001-6/2003), Research Statistician (7/2003-6/2005), Department of Statistics, University of California at Berkeley, US

Postdoctoral Fellow (1/2001-7/2001), Eurandom, Technical University Eindhoven, NL

Research and teaching assistant ("Wissenschaftlicher Mitarbeiter")

AFFILIATIONS

Fellow of The Alan Turing Institute (from 10/2018)

Visitor at the Oxford Big Data Institute (1/2019-4/2019, 1/2018-4/2018)

Doctoral stipend by German National Scholarship Foundation ("Promotionsstipendiatin der Studienstiftung des Deutschen Volkes")

Undergraduate stipend by German National Scholarship Foundation ("Stipendiatin der Studienstiftung des Deutschen Volkes")

EDUCATION

PhD in Mathematics (*magna cum laude*), Title: Shannon-MacMillan theorems for random fields along curves and lower bounds for surface-order large deviations, Adviser: Prof H Föllmer, June 2001, Humboldt University Berlin

Diplom (Research based Masters) in Mathematics (*distinction*), Title: Construction of exit measures of superprocesses and applications to quasilinear Dirichlet problems, Adviser: Prof H Föllmer May 1993, University of Bonn

IMPACT

Impact (in progress), Researcher: J Brettschneider, W Kendall, Title of Case Study: **Quality assessment of digital X-ray detector data**

Impact statement for REF2014, Researcher: J Brettschneider, Title of Case Study: **Quality assessment (QA) for high-throughput genomic data (B10.1)**, Unit B10 Mathematical Sciences, featured as case study by the Newton Gateway to Mathematics, Isaac Newton Institute, Cambridge

RECENT RESEARCH GRANTS

Co-I on *Adapt-MAMMO (Observational study of Age, test THreshold and frequency on English National Mammography screening outcomes (ATHENA-M))*, NIHR grant 130107, PI: S Taylor-Phillips, £750K 08/2020-07/2023.

Co-I on I-NEXUS GLOBAL PLC, PI: N Brookes, \$39K, 10/2020-1/2021.

PI on NERC small grant *JDec: Joint decision models for citizens, crops, and environment*, Co-I: Prof R Collier, £50K 10/2019-9/2020.

Co-PI on Turing postdoc funding, PI: W Kendall, 1/2020-9/2020.

Co-I on Philips Respironics grant *IDEAs (Identification of DEterminants of Altered circadian rhythm clinical study)*, PI: F Lévi, £400K, 4/2017-3/2019.

Co-I on EPSRC *Inside-out: Statistical methods for Computed Tomography validation of complex structures in Additive Layer Manufacturing*, PI: W Kendall, £300K, 9/2014-8/2017.

SOFTWARE AND DATA MANAGEMENT

Stephan Brownsey and **J Brettschneider** (3/2020), Web app for eliciting orchard manager protocol for building decision trees.

Elisabeth Potter and **J Brettschneider** (3/2020), Web app for visualisation of agri-environmental timelines.

Matt Persin and **J Brettschneider** (3/2020), Web app for building decision tree for agri-environmental scenarios.

J Brettschneider, O Giles, W Kendall and T Lazauskas (2019).

DetectorChecker R package and web app for assessment of damage to CT scanners.

<https://github.com/alan-turing-institute/DetectorChecker>

<https://github.com/alan-turing-institute/DetectorCheckerWebApp>

Development of concept for data bank for IDEAs (clinical study) on computing cluster with multiple user functionalities (audible and remotely accessible).

LANGUAGES

German: native

English: fluent (working and living in English speaking countries since 2002)

French: very good (*Diplôme de Langue de l'Alliance Française*)

Dutch: advanced beginner

RECENT TEACHING

Warwick University, UK:

Lecture *Decision models and real-world applications (ST912)*, 2020.

Lecture course *Games, Decisions, and Behaviour (ST222)*, designed in 2014, delivered in 2014, 2015, 2016 and 2017.

Lecture course *Advanced Topics in Statistics - Statistical methods for large biological data sets (ST414)*, designed and delivered in 2016.

Lecture course *Statistical Laboratory - Part B (ST104)*, designed and delivered in 2015.

Lecture course *Statistical Laboratory - Part B (ST104)*, designed and delivered in 2015.

Lecture course *Advanced Topics in Biostatistics (ST416)*, designed 1011, delivered in 2011 and 2012.

Lecture course *Probability Theory A/B*, delivered in 2010, 2011, 2012.

Lecture course *Introduction to the Practice of Statistics (ST912)*, designed in 2007, delivered in 2007 and 2014.

PREVIOUS TEACHING

Queen's University, Canada: Lecture courses in Bioinformatics, Seminar in Robust Statistics (2005-2007)

University of California in Berkeley, US: Lecture courses in Statistics for all majors, Probability for engineers, and Bioinformatics (2001-2005)

Technical University Berlin, Germany: Applied lectures courses ("Große Übung) in Analysis I, II, III, Stochastic processes, and Measure Theory (1996-2000)

Humboldt University Berlin, Germany: Tutorial classes in Stochastic Analysis (1994)

University Bonn, Germany: Tutorial classes in Probability I, II, Stochastic Analysis, and Mathematical Finance (1989-1993)

RESEARCH SUPERVISION

PhD: 6 in progress, 4 completed

Masters: 4 in progress, 38 completed

Data Science projects (3rd year): 4 in progress, 3 completed

MAJOR ADMINISTRATION (DEPARTMENT AND UNIVERSITY)

Graduate training: Liaison for Statistics with the Centre for Doctoral Training for the *Mathematics of Real-World Systems*.

Conferences: Local organising committee and sponsorship officer for *useR!2011* conference, CRISM workshops.

Director of UG Admissions: Team lead, work share and training of junior members, international offer design and strategy, process management of applications, analysis of academics outcomes versus school qualifications, dropout monitoring, negotiations with central admissions, design of strategy for prospective student communication, offer holder visit day concept and implementation, international recruitment. Achieved growth of application numbers by 57% in 6 years.

Chair of publicity committee: Concept and editor of *Warwick Statistics Research Spotlights* brochure, Warwick Statistics Research Spotlight online pages, recruitment publicity (incl. UG course brochures, careers flyers, course websites), events (incl. public lectures, TEDx talk), image competition, News and social media, complete overhaul of departmental websites (concept and implementation).

EXTERNAL

Publication peer review: Referee for numerous journals in bioinformatics, applied statistics and life sciences

Grant peer review: NERC grant panel, Ontario Genomics proposal reviewer

Research community service: Member of the Royal Society's International Exchanges Committee, Member of the Council of the Bernoulli Society

Professional societies: DMV Fachgruppe Stochastik, Bernoulli

Industrial contacts: Nikon Metrology (X-ray CT), YXLON and Teledyne Delsa (digital X-ray detectors), Spotify (online music), I-NEXUS GLOBAL PCL (strategy execution software), Oakland group (data consultancy), Culham Centre for Fusion Energy (national fusion research laboratory), Diamond Lightsource (particle accelerator), Veracyte (genomic cancer prognosis).

SELECTED PUBLICATIONS AND PREPRINTS

- [1] S Lo, J Warnett, G Gibbons, M Williams, T Nichols, **J Brettschneider**, Local normalisation using the empirical null for inspection of additive manufacturing using a single x-ray projection, to be submitted to *Journal of X-Ray Science and Technology* in Spring 2021.
- [2] HF Williamson, **J Brettschneider**, M Caccamo, RP Davey, C Goble, P Kersey, S May, RJ Morris, R Ostler, T Pridmore, C Rawlings, D Studholme, SA Tsaftaris, S Leonelli, Artificial Intelligence for Plant and Agricultural Research: A Review of Data Challenges, Submitted to *eLife*.
- [3] **J Brettschneider**, OT Giles, WS Kendall, T Lazauskas DetectorChecker: analyzing patterns of defects in detector screens, *Journal of Open Source Software* 5(56) (2020).
- [4] F Lévi, S Komarzynski, Q Huang, T Young, Y Ang, C Fuller, M Bolborea, **J Brettschneider**, B Finkenstädt, J Fursse, DP White, PF Innominato, Tele-Monitoring of Cancer Patients' Rhythms during Daily Life Identifies Actionable Determinants of Circadian and Sleep Disruption, *Cancers*, 2020, 12(7), 1938.
- [5] S Rajan, **J Brettschneider**, JF Collingwood, Segmentation of the corpus callosum in diffusion tensor images - methodology comparison in a study of healthy ageing and mild cognitive impairment, *Journal of Neuroscience Methods*, (2020):108870.
- [6] M Palma, S Tavakoli, **J Brettschneider**, T Nichols, Quantifying uncertainty in brain-predicted age using scalar-on-image quantile regression, *NeuroImage* (2020): 116938.

- [7] M Christodoulou, **J Brettschneider**, D Steinsaltz, Erosion of representativeness in a cohort study, Resubmitted (by invitation) to *International Journal of Epidemiology* (2020).
- [8] **J Brettschneider**, G Burro, V Henderson, Wide Framing Disposition Effect: an empirical study, Invited to resubmit to *Journal of Economic Behaviour and Organisation* (2020).
- [9] **J Brettschneider**, G Burro, V Henderson, Make hay while the sun shines: an empirical study of maximum price, regret and trading decisions, Submitted to *Journal of the European Economic Association*, Available at SSRN.
- [10] **J Brettschneider**, Perspectives on decision trees, Conference abstract, SPUDM Amsterdam 2019.
- [11] M McFarlane, **J Brettschneider**, A Gelsthorpe, S James, D Snead, K Gopalakrishnan, H Mehenna, J Jankowski, R Arasaradnam, and C Nwokolo, An assessment of candidate genes to assist prognosis in gastric cancer, *Journal of Gastrointestinal Oncology*, 2018 Apr; 9(2): 303-310.
- [12] **J Brettschneider**, M Burgess, Using a frailty model to measure the effect of covariates on the disposition effect, CRiSM No. 17-05, 2017.
- [13] S Cheung, **J Brettschneider**, J Hutton, Review of sojourn time calculation models used in breast cancer screening, CRiSM No. 17-04, 2017.
- [14] F M Nixon, T R Honnor, NI Clarke, GP Starling, AJ Beckett, AM Johansen, **J Brettschneider**, IA Prior, SJ Royle, Microtubule organization within mitotic spindles revealed by serial block face scanning EM and image analysis, *Journal of Cell Science*, 2017.
- [15] TR Honnor, AM Johansen, **J Brettschneider**, A nonparametric test for dependency between estimated local bulk movement patterns, CRiSM No. 17-03, 2017.
- [16] **J Brettschneider**, JW Warnett, TE Nichols, WS Kendall, Higher level spatial analysis of dead pixels on detectors based on local grid geometry, CRiSM No. 17-02, 2017.
- [17] TR Honnor, AM Johansen, **J Brettschneider**, Differences in spatial point patterns with application to subcellular biological structures, CRiSM No. 17-01, 2017.
- [18] **J Brettschneider**, Practical uses of quality assessment for high-dimensional gene expression data, in Aston et al (Eds): UK Success Stories in Industrial Mathematics, Chapter 29, Springer, 2016.
- [19] A Kueh, JW Warnett, GG Gibbons, **J Brettschneider**, TE Nichols, MA Williams, WS Kendall, Modelling the Penumbra in Computed Tomography, *Journal of X-Ray Science and Technology*, vol. 24, no. 4, pp. 583-597, Gold access, 2016.
- [20] **J Brettschneider**, J Thornby, TE Nichols, WS Kendall, Spatial analysis of dead pixels, CRiSM Working Paper No. 14-24, 2014.
- [21] **J Brettschneider**, Mixing properties of skew products and uniform convergence in ergodic theorems, in *Discrete and Continuous Dynamical Systems A*, 29 (3), Mar 2011.
- [22] M Alhejaily, CJ Foster, P Farmer, T Baetz, **J Brettschneider**, HE Feilotter and DP LeBrun, Differential expression of cell-cycle regulatory proteins defines distinct classes of follicular lymphoma, in *Human Pathology*, February 2011.
- [23] JG Hickey, SM Myers, X Tian, SJ Zhu, JLV Shaw, SD Andrew, DS Richardson, **J Brettschneider** and LM Mulligan (2009), RET-dependent gene expression patterns distinguish RET isoforms but not oncogenic mutants, in *Genes, Chromosomes and Cancer*, 48(5), 429-440, May 2009.
- [24] **J Brettschneider**, F Collin, BM Bolstad, and TP Speed, Quality assessment for short oligonucleotide arrays (with Discussion) *Technometrics*, 50(3): 241-283, Aug 2008.
- [25] **J Brettschneider**, Shannon-MacMillan theorems for random fields along curves and lower bounds for surface-order large deviations, *Probability Theory and Related Fields*, 142 (3), 443-473, Nov 2007.
- [26] BM Bolstad, F Collin, **J Brettschneider**, K Simpson, L Cope, RA Irizarry, and TP Speed, Quality assessment of Affymetrix genechip data, in *Bioinformatics and Computational Biology Solutions Using R and Bioconductor*, R Gentleman et al (editors), Statistics for Biology and Health, Springer, New York, 2005.

- [27] A Barrier, A Lemoine, PY Boelle, C Tse, D Brault, F Chiappini, **J Brettschneider**, F Lacaine, S Houry, M Huguier, MJ Van der Laan, T Speed, B Debuire, A Flahault, and S Dudoit, Colon cancer prognosis prediction by gene expression profiling, *Oncogene*, 24(40): 6155-6164, September 2005.
- [28] PG Marciano, **J Brettschneider**, E Manduchi, JE Davis, S Eastman, R Raghupathi, KE Saatman, TP Speed, CJ Stoeckert, JH Eberwine, and TK McIntosh, Neuron-specific mRNA complexity responses during hippocampal apoptosis after traumatic brain injury, *Journal of Neuroscience*, 24(12): 2866-2876, March 2004.

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