

Dr. Christian Borgs

University of Duisburg-Essen

Lotharstr. 65, LE 612

47057 Duisburg, Germany

☎ +49 (203) 379-1276

✉ christian.borgs@uni-due.de

🌐 www.uni-due.de/soziologie/borgs.php

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Professional positions and internships

- since 09/2013 **Research assistant**, *Lehrstuhl für empirische Sozialforschung (Research methodology group)*, University of Duisburg-Essen, Campus Duisburg, Germany.
- since 07/2017 **Adjunct research fellow**, *Faculty for Health Sciences*, Curtin University, Perth, Australia.
- 02/2013–04/2013 **Internship**, *Robert Koch-Institut, RKI*, Germany, Fachgebiet 24 (Befragungssurveys). Berlin, Germany
- 10/2012 –09/2013 **Student assistant**, *German Record Linkage Center*, Duisburg.
- 08/2010–10/2010 **Internship**, *IT.NRW*, Forschungsdatenzentrum. Düsseldorf, Germany
- 10/2009 –09/2013 **Student assistant**, *Lehrstuhl für empirische Sozialforschung (Research methodology group)*, University of Duisburg-Essen, Germany.

Education

- 12/2014–07/2019 **PhD**, *Dr. phil. (Social Sciences)*, University of Duisburg-Essen. Grade: Summa cum laude.
- 10/2011–12/2013 **Survey Methodology**, *Master of Arts*, University of Duisburg-Essen.
- 10/2008–11/2011 **Sociology**, *Bachelor of Arts*, University of Duisburg-Essen.

Teaching (University of Duisburg-Essen)

- Summer 2019 **Seminar**, *Introduction and graphical data analysis using R*.
- Summer 2018 **Seminar**, *Sampling and weighting using R*.
- Summer 2017 **Seminar**, *Graphical data analysis using R*.
- Jan/Feb 2017 **Lecture**, *Methods for the empirical Social Sciences*.
- Summer 2016 **Seminar**, *Large Scale Surveys*.
- Summer 2015 **Seminar**, *Applied sampling techniques using R*.
- Winter 2014–2019 **Seminar**, *Tools for scientific research*.
 - Winter 2014 **Seminar**, *Introduction to scientific techniques and methods*.
- Summer 2014 **Seminar**, *Writing scientific papers using \LaTeX* .
- Summer 2013 **Seminar**, *Writing scientific papers using \LaTeX* .

Academic positions and other contributions

- 2016–2019 **Gewählter Mittelbauvertreter**, (*elected research staff representative*).
- since 2018 **CRAN Contributor**, *Contributor, CRAN Package PPRL*, <https://CRAN.R-project.org/package=PPRL>.

Publications

Articles (*peer reviewed)

- *2018 Randall, Sean, Adrian Brown, James Boyd, Rainer Schnell, Christian Borgs and Anna Ferrante: Sociodemographic Differences in Linkage Error: an Examination of Four Large-Scale Datasets. In: *BMC Health Services Research* 18 (678): 1–9.
- *2018 Schnell, Rainer and Christian Borgs: Proof of Concept for a Privacy Preserving National Mortality Register. In: *International Journal for Population Data Science* 3 (4): 140.
- *2018 Schnell, Rainer and Christian Borgs: Protecting Record Linkage Identifiers Using a Language Model for Patient Names. In: *Stud Health Technol Inform.* 253: 91–95.
- *2017 Brown, Adrian P., Christian Borgs, Sean M. Randall and Rainer Schnell: Evaluating privacy-preserving record linkage using cryptographic long-term keys and multibit trees on large medical datasets. In: *BMC Medical Informatics and Decision Making* 17: 83–89.
- *2017 Brown, Adrian, Christian Borgs, Sean Randall and Rainer Schnell: High quality linkage using Multibit Trees for privacy-preserving blocking. In: *International Journal for Population Data Science* 1 (1).
- *2017 Schnell, Rainer and Christian Borgs: Secure Privacy Preserving Record Linkage of Large Databases by Modified Bloom Filter Encodings. In: *International Journal for Population Data Science* 1 (1).
- *2017 Stausberg, Jürgen, Andreas Waldenburger, Christian Borgs and Rainer Schnell: Combining Different Privacy-Preserving Record Linkage Methods for Hospital Admission Data. In: *Stud Health Technol Inform* 235: 161–165.

Contributing author to books

- 2015 Allen, Jennifer, Christian Borgs, Gisela Dugnus, Jonas Finger, Jens Hoebel, Franziska Jentsch, Panagiotis Kamtsiuris, Anna Lena Kratz, Cornelia Lange, Stephan Müters, Maximilian Prohl, Ralph Schilling, Patrick Schmich, Marike Varga, Elena von der Lippe, Matthias Wetzstein and Yvonne Wüst: *Pilotstudie zur Durchführung von Mixed-Mode-Gesundheitsbefragungen in der Erwachsenenbevölkerung (Projektstudie GEDA 2.0)*. Gesundheitsberichterstattung des Bundes. Robert Koch-Institut.

Conference proceedings (*peer reviewed)

- *2017 Schnell, Rainer, Anke Richter and Christian Borgs: A Comparison of Statistical Linkage Keys with Bloom Filter-based Encryptions for Privacy-preserving Record Linkage Using Real-world Mammography Data. In: *Proceedings of the 10th International Joint Conference on Biomedical Engineering Systems and Technologies (BIOSTEC 2017) – Volume 5: HEALTH-INF*, SCITEPRESS: 276–283.
- *2016 Schnell, Rainer and Christian Borgs: Randomized Response and Balanced Bloom Filters for Privacy Preserving Record Linkage. In: *IEEE International Conference on Data Mining (ICDM)*. IEEE.
- *2015 Schnell, Rainer and Christian Borgs: Building a National Perinatal Database Without the Use of Unique Personal Identifiers. In: *Proceedings of the 2015 IEEE 15th International Conference on Data Mining Workshop*: 232–239.
- *2015 Sehili, Ziad, Lars Kolb, Christian Borgs, Rainer Schnell and Erhard Rahm: Privacy Preserving Record Linkage with PPJoin. In: *Proceedings 16. GI-Konferenz für Datenbanksysteme in Business, Technologie und Web (BTW)*, LNI: 85–104.

Published working papers

- 2016 Schnell, Rainer and Christian Borgs: *XOR-Folding for Bloom Filter-based Encryptions for Privacy-preserving Record Linkage*. German Record Linkage Center. WP-GRLC-2016-03.
- 2015 Schnell, Rainer, Christian Borgs, Günther Heller and Frank Niedermeyer: *Pseudonymisierte Verknüpfung der Perinatal- und Neonatalerhebung mit Bloom-Filtern (English title: Pseudonymised Linking of the perinatal- and neonatal-Survey with Bloom Filter, in German)*. Technischer Bericht für den Gemeinsamen Bundesausschuss (G-BA), Berlin. Technischer Bericht für den Gemeinsamen Bundesausschuss (G-BA), Berlin.

Other publications

- 2019 Borgs, Christian: *Optimal parameter choice for Bloom filter-based Privacy-preserving Record Linkage*. PhD thesis. Duisburg: University of Duisburg-Essen.

Presentations (*held by me)

- 2019 Schnell, Rainer and Christian Borgs: *Encoding hierarchical classification codes for Privacy-preserving Record Linkage using Bloom filters*. Data Integration and Applications Workshop (DINA 2019) at the ECML/PKDD 2019; 20.09.2019, Würzburg.
- 2019 Schnell, Rainer and Christian Borgs: *Evaluating Privacy-preserving Encryptions for large-scale National Mortality Registries*. Confidential Computing Conference, 21.02.–22.02.2019, CSIRO, Data61, Sidney, Australia.
- 2019 Schnell, Rainer and Christian Borgs: *Hardening Methods*. Confidential Computing Conference, 21.02.–22.02.2019, CSIRO, Data61, Sidney, Australia.
- 2019 Schnell, Rainer and Christian Borgs: *Using Adaptive Cluster Sampling in a CATI Survey of Rare Populations*. Eighth Conference of the European Survey Research Association (ESRA): 15.07-19.07.2019; Zagreb; 19.07.2019.
- 2019 Schnell, Rainer, Philip Höcker and Christian Borgs: *Privacy-Preserving Linkage of Encrypted Survey and Administrative Numerical Data using Distance-Preserving Bloom Filters*. Eighth Conference of the European Survey Research Association (ESRA): 15.07-19.07.2019; Zagreb; 18.07.2019.
- 2018 Schnell, Rainer and Christian Borgs: *Hardening Encrypted Patient Names Against Cryptographic Attacks Using Cellular Automata*. DINA 2018: 4th Workshop on Data Integration and Applications; IEEE ICDM 2018; Singapore, 17.11.2018.
- 2018 Schnell, Rainer and Christian Borgs: *Implementing Privacy-preserving National Health Registries*. International Methodology Symposium 2018; Ottawa, Kanada, 09.11.2018.
- 2018 Schnell, Rainer and Christian Borgs: *Privacy-preserving Methods for Linking Big Data and Survey Data sets*. Big Data Meets Survey Science 2018 (BigSurv18); Barcelona, Spain, 26.10.2018.
- 2018 Schnell, Rainer and Christian Borgs: *Proof of Concept for a Privacy Preserving National Mortality Register*. 2018 International Population Data Linkage Conference; Banff, Canada, 12.09.-14.09.2018.
- 2018 Schnell, Rainer and Christian Borgs: *Protecting Record Linkage Identifiers Using a Language Model for Patient Names*. 63th GMDS Conference; Osnabrück, 04.09.2018.
- *2017 Borgs, Christian: *Personenbezogenes Datenmatching per Privacy-preserving Record Linkage (PPRL) (English title: Privacy Preserving Record Linkage of Personal Data, in German)*. Berufsverband Deutscher Markt- und Sozialforscher e.V. (BVM) Regionalabend Bielefeld-Osnabrück-Münster: 18.04.2017; Bielefeld.
- *2017 Borgs, Christian and Rainer Schnell: *Estimating Optimal Parameter and Identifier Choices for Bloom Filter-based PPRL using Model Estimates*. Data Linkage Technical Forum: 04.10.2017; Curtin University, Perth, Western Australia.

- 2017 Schnell, Rainer and Christian Borgs: *An Overview of State of the Art Bloom Filter-based Privacy-preserving Record Linkage for Very Large Databases*. Conference of the European Survey Research Association (ESRA): 17.07.-21.07.2017; Lisbon, 18.07.2017.
- *2017 Schnell, Rainer and Christian Borgs: *New Techniques for Privacy-preserving Record Linkage of Large-scale Social Science Data Sets*. International Conference on Computational Social Science (IC2S2 2017), 11.07.2017, Cologne.
- 2017 Schnell, Rainer and Christian Borgs: *Practical Challenges for Implementing Privacy-preserving Record Linkage*. Data Linkage Technical Forum: 04.10.2017; Curtin University, Perth, Western Australia.
- 2016 Brown, Adrian, Christian Borgs, Sean Randall and Rainer Schnell: *High quality linkage using multibit trees for privacy-preserving blocking*. International Population Data Linkage Conference (IPDLN2016): 24.08-26.08.2016; Swansea.
- 2016 Schnell, Rainer and Christian Borgs: *Available Methods for Privacy Preserving Record Linkage on Census Scale Data*. European Conference on Quality in Official Statistics (Q2016): 31.05-03.06.2016; Madrid, 01.06.2016; available via <http://www.ine.es/q2016/ppts/Q78.pdf>.
- 2016 Schnell, Rainer and Christian Borgs: *Hardening Bloom Filter PPRL by Modifying Identifier Encodings*. [DLAW02] Data Linkage: Techniques, Challenges and Applications; 12.09.2016-16.09.2016; Isaac Newton Institute for Mathematical Sciences, Cambridge University.
- *2016 Schnell, Rainer and Christian Borgs: *Linking Against All Odds: Using Administrative Data with Modern Privacy Preserving Record Linkage Techniques*. 9th International Conference on Social Science Methodology: 11.09-16.09.2016; Leicester.
- 2016 Schnell, Rainer and Christian Borgs: *Randomized Response and Balanced Bloom Filters for Privacy Preserving Record Linkage*. IEEE International Conference on Data Mining (ICDM); Barcelona.
- 2016 Schnell, Rainer and Christian Borgs: *Secure Privacy Preserving Record Linkage of Large Databases by Modified Bloom Filter Encodings*. International Population Data Linkage Conference (IPDLN2016): 24.08-26.08.2016; Swansea, 23.08.2016.
- 2015 Schnell, Rainer and Christian Borgs: *Recent Advances in Privacy Preserving Record Linkage*. Sixth Conference of the European Survey Research Association (ESRA): 13.07.-17.07.2015; Reykjavik, 17.07.2015.
- *2014 Schnell, Rainer and Christian Borgs: *Datenschutzgerechte Zusammenführung personenbezogener Daten: Techniken des 'Privacy Preserving Record Linkage' (English title: Privacy Preserving Record Linkage of Personal Data: Techniques of the 'Privacy Preserving Record Linkage', in German)*. 59. GMDs-Jahrestagung: 07.09.-10.09.2014; Göttingen, 10.09.2014.
- 2014 Schnell, Rainer, Anke Richter and Christian Borgs: *Performance of Different Methods for Privacy Preserving Record Linkage with Large Scale Medical Data Sets*. 2014 International Health Data Linkage Conference: 28.04.-30.04.2014; Vancouver, 29.04.2014.