

## Selected papers: Foundations of learning from dependent and high-dimensional data

- Stewart\*, Jonathan R. and **Michael Schweinberger** (2021). Pseudo-likelihood-based  $M$ -estimation of random graphs with dependent edges and parameter vectors of increasing dimension. Submitted.
- **Schweinberger, Michael**, Krivitsky, Pavel N., Butts, Carter T., and Jonathan R. Stewart\* (2020). Exponential-family models of random graphs: Inference in finite, super, and infinite population scenarios. *Statistical Science*, 35, 627–662.
- **Schweinberger, Michael** and Jonathan R. Stewart\* (2020). Concentration and consistency results for canonical and curved exponential-family models of random graphs. *The Annals of Statistics*, 48, 374–396.
- **Schweinberger, Michael** (2020). Consistent structure estimation of exponential-family random graph models with block structure. *Bernoulli*, 26, 1205–1233.
- **Schweinberger, Michael** (2019). Random graphs. *Wiley StatsRef: Statistics Reference Online*. Edited by Brian Everitt, Geert Molenberghs, Walter Piegorsch, Fabrizio Ruggeri, Marie Davidian, and Ron Kenett. [The online successor of the Encyclopedia of Statistical Sciences](#).
- **Schweinberger, Michael**, Babkin\*, Sergii, and Katherine B. Ensor (2017). High-dimensional multivariate time series with additional structure. *Journal of Computational and Graphical Statistics*, 26, 610–622.
- **Schweinberger, Michael** and Mark S. Handcock (2015). Local dependence in random graph models: Characterization, properties and statistical inference. *Journal of the Royal Statistical Society, Series B (Statistical Methodology)*, 77, 647–676.
- **Schweinberger, Michael** (2011). Instability, sensitivity, and degeneracy of discrete exponential families. *Journal of the American Statistical Association, Theory & Methods*, 106, 1361–1370.

## Selected papers: Large-scale learning from dependent and high-dimensional data

- Park, Jaewoo, Jin, Ick Hoon, and **Michael Schweinberger** (2021+). Bayesian model selection for high-dimensional Ising models, with applications to educational data.

*Computational Statistics & Data Analysis*, 165, 1–20.

- Babkin\*, Sergii, Stewart\*, Jonathan R., Long\*, Xiaochen, and **Michael Schweinberger** (2020). Large-scale estimation of random graph models with local dependence. *Computational Statistics & Data Analysis*, 152, 1–19.
- **Schweinberger, Michael** and Pamela Luna\* (2018). hergm: Hierarchical exponential-family random graph models. *Journal of Statistical Software*, 85, 1–39.
- **Schweinberger, Michael**, Babkin\*, Sergii, and Katherine B. Ensor (2017). High-dimensional multivariate time series with additional structure. *Journal of Computational and Graphical Statistics*, 26, 610–622.
- Vu\*, Duy Q., Hunter, David R., and **Michael Schweinberger** (2013). Model-based clustering of large networks. *The Annals of Applied Statistics*, 7, 1010–1039.
- Hunter, David R., Krivitsky, Pavel N., and **Michael Schweinberger** (2012). Computational statistical methods for social network models. *Journal of Computational and Graphical Statistics*, 21, 856–882. **Equal contributions. Invited.**
- Snijders, Tom A.B., Koskinen, Johan, and **Michael Schweinberger** (2010). Maximum likelihood estimation for social network dynamics. *The Annals of Applied Statistics*, 4, 567–588.
- **Schweinberger, Michael** and Tom A.B. Snijders (2007). Markov models for digraph panel data: Monte Carlo-based derivative estimation. *Computational Statistics and Data Analysis*, 51, 4465–4483. **These methods are the default methods for approximating standard errors, score-type tests, and  $t$ -type tests in the (R)Siena software ( $\gg$  145,000 downloads). The (R)Siena manuals have been cited more than 900 times based on Google Scholar.**
- **Schweinberger, Michael** and Tom A.B. Snijders (2003). Settings in social networks: A measurement model. *Sociological Methodology*, 33, 307–341. **One of the first two latent space models for network data.**

#### Selected papers: Applications in computational social science and other areas

- **Schweinberger, Michael**, Bomiriya\*, Rashmi P., and Sergii Babkin\* (2021+). A semiparametric Bayesian approach to epidemics, with application to the spread of the

coronavirus MERS in South Korea in 2015. Accepted, *Journal of Nonparametric Statistics*, 1–35. [Detecting potential superspreaders.](#)

- Jeon, Minjeong, Jin, Ick Hoon, **Schweinberger, Michael**, and Samuel Baugh\* (2021). Mapping unobserved item-responder interactions: A latent space item response model with interaction map. *Psychometrika*, 86, 378–403. [Providing teachers with visual student-problem interaction maps, with a view to detecting students who need more support.](#)
- Stewart\*, Jonathan R., **Schweinberger, Michael**, Bojanowski, Michal, and Martina Morris (2019). Multilevel networks facilitate statistical inference for curved ERGMs with geometrically weighted terms. *Social Networks*, 59, 98–119. [How do children form bonds?](#)
- **Schweinberger, Michael**, Babkin\*, Sergii, and Katherine B. Ensor (2017). High-dimensional multivariate time series with additional structure. *Journal of Computational and Graphical Statistics*, 26, 610–622. [How is air pollution related to air pollution in neighboring areas?](#)
- **Schweinberger, Michael** and Mark S. Handcock (2015). Local dependence in random graph models: Characterization, properties and statistical inference. *Journal of the Royal Statistical Society, Series B (Statistical Methodology)*, 77, 647–676. [How do terrorists communicate?](#)
- **Schweinberger, Michael**, Petrescu-Prahova, Miruna, and Duy Q. Vu\* (2014). Disaster response on September 11, 2001 through the lens of statistical network analysis. *Social Networks*, 37, 42–55. [How did the responders to the September 11, 2001 terrorist attacks coordinate the disaster response?](#)
- Vu\*, Duy Q., Hunter, David R., and **Michael Schweinberger** (2013). Model-based clustering of large networks. *The Annals of Applied Statistics*, 7, 1010–1039. [Online trust networks: Whom to trust?](#)

## Preprints

Past and present students indicated by \*. Some of them are my students, others are students of collaborators.

- (32) Stewart\*, Jonathan R. and **Michael Schweinberger**. Pseudo-likelihood-based  $M$ -estimation of random graphs with dependent edges and parameter vectors of increasing dimension. Submitted.
- (31) Jin, Ick Hoon, Jeon, Minjeong, **Schweinberger, Michael**, and Lizhen Lin. Hierarchical network item response modeling for discovering differences between innovation and regular school systems in Korea. Submitted.
- (30) Sean Eli\* and **Michael Schweinberger**. *A note on non-asymptotic model selection for network models with parameter vectors of increasing dimension*. Submitted.
- (29) With Johannes Lederer. *Scalable model selection with a single observation of dependent random variables: pseudolikelihood-based Dantzig selectors*.
- (28) With Minjeong Jeon, Samuel Baugh\*, and Eric Ho\*. *Student learning through learning progression maps, with application to online educational assessment data*.
- (27) With Johathan R. Stewart\*. *Composite likelihood in dependent-data problems with parameter vectors of increasing dimension*.

## Publications

More than 2,800 citations according to Google Scholar. Past and present students indicated by \*. Some of them are my students, others are students of collaborators.

- (26) **Schweinberger, Michael**, Bomiriya\*, Rashmi P., and Sergii Babkin\* (2021+). A semiparametric Bayesian approach to epidemics, with application to the spread of the coronavirus MERS in South Korea in 2015. Accepted, *Journal of Nonparametric Statistics*, 1–35.
- (25) Park, Jaewoo, Jin, Ick Hoon, and **Michael Schweinberger** (2021+). Bayesian model selection for high-dimensional Ising models, with applications to educational data. *Computational Statistics & Data Analysis*, 1–20.
- (24) Jeon, Minjeong, Jin, Ick Hoon, **Schweinberger, Michael**, and Samuel Baugh\* (2021). Mapping unobserved item-respondent interactions: A latent space item response model with interaction map. *Psychometrika*, 86, 378–403. **The first three authors have made equal contributions.**

- (23) **Schweinberger, Michael** (2021). Discussion of “Bayesian graphical models for modern biological applications” by Yang Ni, Veerabhadran Baladandayuthapani, Marina Vannucci, and Francesco C. Stingo. *Statistical Methods & Applications*, 1–7. **Invited.**
- (22) **Schweinberger, Michael** and Jonathan R. Stewart\* (2020). Concentration and consistency results for canonical and curved exponential-family models of random graphs. *The Annals of Statistics*, 48, 374–396.
- (21) **Schweinberger, Michael** (2020). Consistent structure estimation of exponential-family random graph models with block structure. *Bernoulli*, 26, 1205–1233.
- (20) **Schweinberger, Michael**, Krivitsky, Pavel N., Butts, Carter T., and Jonathan R. Stewart\* (2020). Exponential-family models of random graphs: Inference in finite, super, and infinite population scenarios. *Statistical Science*, 35, 627–662.
- (19) Babkin\*, Sergii, Stewart\*, Jonathan R., Long\*, Xiaochen, and **Michael Schweinberger** (2020). Large-scale estimation of random graph models with local dependence. *Computational Statistics & Data Analysis*, 152, 1–19.
- (18) **Schweinberger, Michael** (2020). Statistical inference for continuous-time Markov processes with block structure based on discrete-time network data. *Statistica Neerlandica*, 74, 342–362.
- (17) **Schweinberger, Michael** (2019). Random graphs. *Wiley StatsRef: Statistics Reference Online*. Edited by Brian Everitt, Geert Molenberghs, Walter Piegorsch, Fabrizio Ruggeri, Marie Davidian, and Ron Kenett. **Invited.**
- (16) Stewart\*, Jonathan R., **Schweinberger, Michael**, Bojanowski, Michal, and Martina Morris (2019). Multilevel networks facilitate statistical inference for curved ERGMs with geometrically weighted terms. *Social Networks*, 59, 98–119.
- (15) **Schweinberger, Michael** and Pamela Luna\* (2018). hergm: Hierarchical exponential-family random graph models. *Journal of Statistical Software*, 85, 1–39.
- (14) Cao\*, Ming, Chen, Yong, Fujimoto, Kayo, and **Michael Schweinberger** (2018). A two-stage working model strategy for network analysis under hierarchical exponential random graph models. *Proceedings of the 2018 IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining*, 290–298. **Acceptance rate: 15%.**

- (13) **Schweinberger, Michael**, Babkin\*, Sergii, and Katherine B. Ensor (2017). High-dimensional multivariate time series with additional structure. *Journal of Computational and Graphical Statistics*, 26, 610–622.
- (12) **Schweinberger, Michael** and Mark S. Handcock (2015). Local dependence in random graph models: Characterization, properties and statistical inference. *Journal of the Royal Statistical Society, Series B (Statistical Methodology)*, 77, 647–676.
- (11) **Schweinberger, Michael**, Petrescu-Prahova, Miruna, and Duy Q. Vu\* (2014). Disaster response on September 11, 2001 through the lens of statistical network analysis. *Social Networks*, 37, 42–55.
- (10) Vu\*, Duy Q., Hunter, David R., and **Michael Schweinberger** (2013). Model-based clustering of large networks. *The Annals of Applied Statistics*, 7, 1010–1039.
- (9) Hunter, David R., Krivitsky, Pavel N., and **Michael Schweinberger** (2012). Computational statistical methods for social network models. *Journal of Computational and Graphical Statistics*, 21, 856–882. **Equal contributions. Invited.**
- (8) **Schweinberger, Michael** (2012). Statistical modeling of network panel data: goodness-of-fit. *British Journal of Mathematical and Statistical Psychology*, 65, 263–281.
- (7) **Schweinberger, Michael** (2011). Instability, sensitivity, and degeneracy of discrete exponential families. *Journal of the American Statistical Association, Theory & Methods*, 106, 1361–1370.
- (6) Lospinoso\*, Joshua, **Schweinberger, Michael**, Snijders, Tom A.B., and Ruth Ripley (2011). Assessing and accounting for time heterogeneity in stochastic actor oriented models. *Advances in Data Analysis and Classification*, 5, 147–176.
- (5) Snijders, Tom A.B., Koskinen, Johan, and **Michael Schweinberger** (2010). Maximum likelihood estimation for social network dynamics. *The Annals of Applied Statistics*, 4, 567–588.
- (4) **Schweinberger, Michael** and Tom A.B. Snijders (2007). Markov models for digraph panel data: Monte Carlo-based derivative estimation. *Computational Statistics and Data Analysis*, 51, 4465–4483.

- (3) Snijders, Tom A.B., Steglich, Christian E.G. and **Michael Schweinberger** (2007). Modeling the co-evolution of networks and behavior. In: Van Montfort, K., Oud, H. and A. Satorra (editors). Longitudinal models in the behavioral and related sciences. Mahwah, NJ: Lawrence Erlbaum.
- (2) **Schweinberger, Michael** (2007). Statistical Methods for Studying the Evolution of Networks and Behavior. Ph.D. thesis, University of Groningen, NL.
- (1) **Schweinberger, Michael** and Tom A.B. Snijders (2003). Settings in social networks: A measurement model. *Sociological Methodology*, 33, 307–341.

## Technical reports

- (3) **Schweinberger, Michael**, Krivitsky, Pavel N., and Carter T. Butts (2017). A note on the role of projectivity in likelihood-based inference for random graph models. **The first two authors have made equal contributions.**
- (2) Vu\*, Duy Q. and **Michael Schweinberger** (2014). Model-based clustering of large random graphs with high-dimensional predictors.
- (1) **Schweinberger, Michael** and Tom A.B. Snijders (2007). Random effects models for digraph panel data.