

# WORKSHOP DESCRIPTIONS

Below you will find all workshop descriptions. Beware: there are many concurrent sessions. At the end of the document, a schedule will give you an overview of the workshops.

Lunch is included in the price for 6-hour workshops.

## Table of content

|   |    |
|---|----|
| A Hands-On Introduction to Analyzing Social Networks with UCINET & Netdraw.....                                 | 3  |
| An Introduction to Necessary Condition Analysis (NCA) .....   | 3  |
| Analysis of bibliographic networks.....   | 4  |
| Analysis of Multiplex Social Networks with R .....  | 4  |
| Designing and Conducting Online Lab Experiments on Social Networks .....  | 5  |
| EgoWeb 2.0: Flexible and user friendly social network data collection software (Basic and Advanced).....        | 5  |
| Enso: Engaging Social Network Data Collection Software .....  | 6  |
| Everything you ever wanted to know about network statistics but were afraid to ask.....                         | 6  |
| Exploring networks using latent variable models in R with lvm4net.....  | 7  |
| Extending ERGM Functionality within statnet: Building Custom User Terms .....                                   | 7  |
| From Texts to Networks to Maps: Social Media and Beyond.....  | 8  |
| Intermediate Social Network Analysis with UCINET .....  | 8  |
| Introduction to egocentric network analysis with R.....   | 9  |
| Introduction to Egocentric Network Data Analysis with ERGMs using statnet .....                                 | 9  |
| Introduction to ERGMs using statnet.....  | 9  |
| Introduction to Modeling Temporal (dynamic) Networks using TERGMs in statnet .....                              | 10 |
| Introduction to SNA descriptive statistics and hypothesis testing using R/statnet.....                          | 10 |
| Introduction to Social Network Analysis in Stata .....  | 11 |
| Introduction to Social Network Data Collection with an Emphasis on Social Survey Methods.....                   | 11 |
| Method selection and adaptation.....  | 11 |
| Mixed Methods Research in Social Networks.....  | 12 |
| Modeling Relational Event Dynamics with R/statnet .....   | 12 |
| Moving beyond Descriptives: Basic Network Statistics with R/statnet .....                                       | 12 |
| Multilevel Modeling for Egocentric Network Analysis.....  | 13 |
| Network Canvas: Simplifying complex network data collection.....  | 13 |
| Network visualization with R.....   | 14 |
| Permutation Tests for Network Data.....   | 14 |
| Relational event models for large and multivariate event networks - introduction to the eventnet software ..... | 15 |
| Simplifying ego-centered network analysis in R with egor.....   | 15 |



Social Network Approaches for Behavior Change ..... 16  
statnetWeb: The easy way to learn (or teach) statistical modeling of network data with  
ERGMs ..... 16  
Understanding Diffusion with NetDiffusR..... 16  
Using R and igraph for Social Network Analysis..... 17  
Valued Tie Network Modeling with statnet ..... 17  
**Workshops Schedule ..... 18**

#### A HANDS-ON INTRODUCTION TO ANALYZING SOCIAL NETWORKS WITH UCINET & NETDRAW

Dan Halgin  
Rich DeJordy

Tuesday 8:30 AM  
6-hour

This interactive workshop gives all participants an opportunity for hands-on experience analyzing network data using the UCINET/Netdraw software package. We will provide a beginner's tutorial on the concepts, methods, and data analysis techniques for a whole social network research project, from data entry through reporting results. Together, we will use sample datasets to focus on the interpretation and calculation of some of the most common measures of network analysis at the node, dyad, and whole-network level of analysis. We will also provide a hands-on tutorial for NetDraw, which creates network visualizations.

In order to get the most practical benefit from the workshop, each participant should bring a Windows laptop computer (or Mac with a Windows emulator) in order to personally run the analyses as the instructors are demonstrating them. We ask participants to download a free trial version of UCINET (which includes NetDraw as well as sample network data), available at <http://www.analytictech.com/ucinet/>, prior to the workshop.

#### AN INTRODUCTION TO NECESSARY CONDITION ANALYSIS (NCA)

Zsofia Toth  
Jan Dul

Tuesday 3:00 PM  
3-hour

This workshop will provide an introduction to Necessary Condition Analysis (NCA). NCA is an upcoming approach that can be used to test whether a condition (X) is necessary but not sufficient for an outcome (Y). It provides a new perspective on existing phenomena and is complementary to the regression-based modeling that we usually apply.

When a condition is necessary for an outcome, the outcome does not exist without the condition. The condition serves as a "bottleneck", "critical factor", or "constraint". This resonates with the social networks literature in which the limitations of certain relationships or network positions are often considered. NCA allows us to quantify those limitations and to answer questions like "Is a brokerage position necessary for creativity?", "Is a closed network position necessary for trust?", "Is network centrality necessary for status?", and "Are positive ties necessary for a person's well-being?". We can answer these questions with a simple yes or no (e.g., yes, brokerage is necessary for creativity), but we can also determine what level of brokerage is necessary for what level of creativity.

This interactive workshop will teach participants the logic and importance of necessary conditions, illustrated with examples from different fields. We will also compare NCA to other methods, such as regression analysis. The workshop will help participants to become the first users of NCA in their field, with hands-on instructions about how to build necessity theories, and how to analyze data for testing such theories using the NCA R software. Every participant will leave the workshop with a mini research proposal that can be developed into a full paper.

For more information on Necessary Condition Analysis see: [www.irim.nl/nca](http://www.irim.nl/nca).

#### ANALYSIS OF BIBLIOGRAPHIC NETWORKS

Vladimir Batagelj  
Daria Maltseva

Tuesday 8:30 AM  
6-hour

Bibliographic networks consider different types of relations between publications and their authors, thus underlying different patterns of collaboration in science (co-authorship, co-citation, citing). Data for such networks can be easily obtained from special bibliographies (BibTEX) and bibliographic services (Web of Science, Scopus, SICRIS, CiteSeer, Zentralblatt MATH, Google Scholar, DBLP Bibliography, US patent office, IMDb, etc.). Besides names of authors and titles of works, more detailed information can be obtained from these data bases (institution, occupation, time of the first work, time of the last work – for authors; publisher, journal, editor/s, number, volume, pages, key words, time of submission, classification/s – for works). We can get many various kinds of networks and study the co-appearances between different entities (works, authors, journals, key words, institutions, etc.).

However, producing the networks some problems can occur, connected to the synonymy and homonymy, lack of standardization of names and key words, errors, etc. Many tools for network production work well for the Latin alphabet only. Another problem is that networks obtained from the bibliographic data bases can be large (hundreds of thousands of nodes), and their analysis can be quite time and computationally consuming.

During our workshop we will present the network approach to bibliographic data and different methods used for their analysis, covering the questions of getting and preparing networks. Among others, we will present a measure of collaborativeness of authors with respect to a given bibliography and show how to compute the network of citations between authors and identify citation communities. The participants will be able to collect bibliographic data, construct the corresponding networks and apply the discussed techniques of network analysis to them. We will use a program Pajek, supported by some special programs in Python and R. Workshop materials will be available at GitHub: <https://github.com/bavla/BibNets>.

#### ANALYSIS OF MULTIPLEX SOCIAL NETWORKS WITH R

Matteo Magnani  
Luca Rossi

Tuesday 3:00 PM  
3-hour

A multiplex network is a network where actors are connected through different types of edges, such as "working together", "friend", etc. These different types of connections are also known as layers. The workshop will introduce the R multinet library for the analysis of multiplex social networks. For each topic, a quick presentation of the relevant theory and methods will be followed by a practical application on a real pedagogical dataset. The main topics covered will be: network exploration, actor measures (degree, neighborhood, ...), layer-dependent actor measures (layer relevance, ...), layer comparison methods, community detection (generalized louvain, clique percolation, ...), and a quick discussion of generative models for multiplex networks. Part of the presented material is covered in the book "Multilayer Social Networks", Cambridge, 2016. The workshop includes methods developed in different fields by several different authors.

Technical requirements for the participants: a laptop with a recent version of R installed.

## DESIGNING AND CONDUCTING ONLINE LAB EXPERIMENTS ON SOCIAL NETWORKS

Jason Radford  
David Lazer

Tuesday 8:30 AM  
6-hour

The internet enables researchers to perform a wide variety of lab experiments on social networks online. However, conducting online network experiments presents a unique set of challenges ranging from subject attrition and pilot testing large, multi-person studies to recruiting large numbers of subjects to participate together. In the first session, attendees will learn about the recent history of large-scale network experiments and learn the best practices for conducting network experiments online. We will cover the core methodological choices including the design choices that drive success and failure, the strengths and weakness of various subject pools, and techniques for recruiting bursts of subjects. In the second session, attendees will build their own network experiments using HTML, CSS, and JavaScript in the Volunteer Science platform. A basic grasp of these languages is prerequisite, but an introductory training is available upon request to attendees who are unfamiliar with them before the workshop.

## EGOWEB 2.0: FLEXIBLE AND USER FRIENDLY SOCIAL NETWORK DATA COLLECTION SOFTWARE (BASIC AND ADVANCED)

David Kennedy  
Marie R. Kennedy, Stacey Giroux

Tuesday 8:30 AM  
6-hour

In these hands-on workshops, attendees will learn to use EgoWeb 2.0, an open-source and freely available software for network data collection instrument development, network interview administration, and network data processing and analysis for a variety of data collection modes. Attendees will learn to create data collection instruments that can be administered on laptops, mobile tablets, or over the internet. Workshop attendees will learn how to use EgoWeb 2.0 to collect egocentric/personal network data (Session 1) as well as whole/cognitive network data (Session 2). Session 2 will build off of Session 1 instruction but current users of EgoWeb 2.0 will be able to participate in Session 2 without participating in Session 1.

Attendees of the basic features session (Part 1) will learn all of the basic features for programming egocentric survey instruments that ask questions about network alters generated from scratch. Basic features include multiple name generators, name interpreter options, and network visualization options.

Attendees of the advanced workshop will learn to program advanced features, such as longitudinal, whole network, and a variety of optional question display customizations. The advanced workshop will also give an overview of different options for using EgoWeb 2.0 to collect data (in the field, over the web, etc.).

The workshop will primarily involve live demonstrations and hands-on exercises with minimal lecturing. Session 1 attendees will be expected to have a basic understanding of social network analysis and survey data collection. Session 2 attendees should have some prior experience using EgoWeb 2.0. Attendees should bring their own laptops to access to the internet via a web-browser (Chrome preferred) in order to participate in workshop exercises. Attendees will be given access to a server installation of EgoWeb 2.0 to follow workshop exercises.

Additional EgoWeb 2.0 information can be found at [egoweb.info](http://egoweb.info).

## ENSO: ENGAGING SOCIAL NETWORK DATA COLLECTION SOFTWARE

Kate Eddens

Tuesday 3:00 PM

3-hour

Enso is an open-source software application for collecting sociometric (complete, roster-based) and egocentric (personal) network data. Designed to be engaging and playful, Enso can be used on computers or mobile devices with or without an internet connection, making it ready for field collection on tablets or phones.

This workshop will walk participants through developing a network data collection survey instrument in Enso, administering the survey, and exporting survey data in CSV format. Participants can bring their own laptops to access a server instance of Enso through a web browser and participate in hands-on survey development and administration exercises. If participants do not have a laptop to bring, they may still attend and choose to follow along with the workshop instructor.

There are no pre-requisites for attending this workshop, although a basic understanding of sociometric and/or egocentric network data collection is recommended. While we will provide an overview of types of measures that can be used in Enso, we will not spend time exploring why to choose which measures for a survey in this particular workshop.

## EVERYTHING YOU EVER WANTED TO KNOW ABOUT NETWORK STATISTICS BUT WERE AFRAID TO ASK

Momin Malik

Tuesday 8:30 AM

3-hour

Introductions to social network analysis, when talking about how we move beyond collecting, handling, and describing network data to do statistical modeling, often have some version of the statement: "the 'usual' statistics don't work for networks because of dependencies. So, we need specialized models."

But what, exactly, do these dependencies do? How do network models address these problems?

When choosing a model, the situation is no better: ERGMs are sometimes met with visceral disgust, while every other week computer scientists or physicists seem to come up with a shiny new model. What's a social scientist to do?

Come to this session! I have learned statistics from the ground up, and have endlessly pestered statisticians, so you don't have to. Find clear and explicit answers to questions such as:

- What's the deal with "dependencies", anyway?
- What's the proper way to do regression with centralities, or, why is it not okay?
- What kinds of questions are appropriate to address by what sorts of models?
- How do I decide between MRQAP, network autocorrelation, ERGMs, REM, SIENA, latent space models, AME, DyNAMs, or something else?
- What does inference on networks mean if the network is the whole population?
- How do ERGMs work, anyway?
- Is [fancy new model] the solution to network statistics? How can I know, if I can't understand the technical details?

Through examples, derivations, simulations, breakdowns of equations, and sample code, participants will leave with an understanding of the foundational problems of statistics on networks, an overview of current models, and knowledge of how to select the model(s) they should invest time in learning. Participants are encouraged to bring questions, whether conceptual and general or specific to their work.

Prerequisite: confusion about network statistics!

#### EXPLORING NETWORKS USING LATENT VARIABLE MODELS IN R WITH LVM4NET

Isabella Gollini

Tuesday 3:00 PM

3-hour

Latent variable network models represent an effective and efficient approach for exploring the structure of complex relational data. In this hands-on workshop we will describe and demonstrate the modelling approaches of the `lvm4net` package for R by the analysis of real network data. This package have been developed to provide a rich source of insights on probabilistic visualisation and clustering and describing the heterogenous connectivity structure of one-mode, two-mode, and multiplex networks using fast estimation techniques (such as variational inference).

Topics of the workshop include:

- Introduction to latent variable network models;
- Latent space models for one-mode, two-mode, and multiplex networks;
- Model-based clustering for two-mode networks;
- Probabilistic visualisation and interpretation of estimated latent variables;
- Model selection and goodness of fit assessment.

Prerequisites: Basic knowledge of network analysis, statistics and R. Participants are recommended to bring a laptop with R/RStudio, and the latest version of `lvm4net` installed.

The package `lvm4net` is available on CRAN at <https://CRAN.R-project.org/package=lvm4net>, further information is available on <http://igollini.github.io/lvm4net/>.

#### EXTENDING ERGM FUNCTIONALITY WITHIN STATNET: BUILDING CUSTOM USER TERMS

Steven Goodreau

Wednesday 8:30 AM

David R Hunter

3-hour

Have you ever wanted to write your own term for an ERGM model? If so, this is the workshop for you. Exponential-family random graph models (ERGMs) represent a powerful and flexible class of models for the statistical analysis of networks. `statnet` is a set of packages that implements a wide range of ERGMs in the R computing environment.

The variables on the right hand side of an ERGM equation are different from the covariates in more traditional statistical models because they must be coded up by hand before they can be used in a model. `statnet` includes about 100 of the most commonly used terms in the `ergm` package; but if you want a specific term that is not included in the list, you would need to code it up yourself. This workshop will teach participants how to do this.

This will be a hands-on tutorial with the `statnet` package "`ergm.userterms`", a package that can help users write their own ERGM terms. The package is designed to make this process as

straightforward as possible. We explain some of the internal workings of statnet that will help users understand the basic principles that govern the structure and function of an ergm term. We will work through examples in a published tutorial and demonstrate each step in the practical process. Participants work in small groups to code up their own ergm.userterms during the last part of the workshop. We will discuss the process for submitting the terms you write to the statnet project, where they can be shared with others.

Prerequisites: Familiarity with R, and the and ergm package in statnet.  
 The "Introduction to ERGMs using statnet" workshop is recommended as preparation.

#### FROM TEXTS TO NETWORKS TO MAPS: SOCIAL MEDIA AND BEYOND

Kathleen Carley Tuesday 8:30 AM  
 Rick Carley 6-hour

This workshop teaches participants how to extract networks from texts (e.g. tweets, blogs, email contents, newspapers), analyze and visualize these as networks, and examine the results spatially. Participants will learn how to use NetMapper and ORA. Key issues for network based rhetorical assessment of communicative power, social influence and information roles of actors and social media analytics will be addressed. Data sets to be used will include sample news and twitter data. Semantic and meta-networks (high dimensional networks) will be extracted from the texts using NetMapper. Then these networks will be analyzed and visualized using ORA. Sentiment and stance will be extracted from the texts and analyzed in ORA. Special network metrics for social media analytics will be defined and used to assess the data. Network metrics for social media analytics to identify and cluster actors of interest, identification of topic-groups, echo-chambers, and assessment of texts in terms of communicative power will be discussed as will their use with weighted, valenced data. Finally, those networks with spatial information will be analyzed visualized and assessed using geo-spatial networks. This session is intended to be hands-on.

Expected Technical Requirements: Participants should bring their laptops. Copies of ORA and NetMapper for Mac or PC will be provided as well as data. All participants must be able to load information onto their laptop using USB sticks

#### INTERMEDIATE SOCIAL NETWORK ANALYSIS WITH UCINET

Steve Borgatti Tuesday 8:30 AM  
 Martin Everett 6-hour

This is a 1-day workshop for participants who already have some experience with network analysis, but would like to learn more. We cover advanced aspects of centrality, finding subgroups, and measuring equivalence. We also cover techniques for measuring network change and handling multiple relations, missing data, non-symmetric data, valued data and 2-mode data. Throughout, we demonstrate powerful, sometimes undocumented, features of UCINET and NETDRAW, including newer routines that make work easier. Note: what makes this workshop advanced is the selection of topics, not the speed or complexity of the exposition. In other words, wherever practical, all concepts are explained from first principles, making as few assumptions about prior knowledge as possible. However, we do assume basic familiarity with UCINET as a pre-requisite for the workshop as given in the introductory workshop.



#### INTRODUCTION TO EGOCENTRIC NETWORK ANALYSIS WITH R

Raffaele Vacca

Tuesday 12 noon  
6-hour

This workshop is an introduction to the R programming language for statistical computing, and the tools it offers to represent, store and manipulate egocentric network data; to visualize ego-networks; and to conduct compositional and structural analysis on large collections of ego-networks. No previous familiarity with R is required. Topics include: Short introduction to ego-network research and data; introduction to data structures and network objects in R; visualizing ego-networks; calculating summary measures on ego-network composition and structure; converting your ego-network measures to general R functions; applying your functions to many ego-networks in few lines of code; "split-apply-combine" with the tidyverse suite of packages. We'll cover both base R functions and specific packages, including igraph, network (from statnet), dplyr and purrr (from tidyverse). This workshop has been taught for the past five years at several network analysis conferences, including INSNA's Sunbelt and EUSN conferences. At the INSNA Sunbelt, it can be taken as a follow-up to Michał Bojanowski's igraph workshop, and as an introduction to Till Krenz's workshop on the egor package. You can visit the workshop's web page for more details and feedback from participants: <http://www.raffaelevacca.com/teaching/workshops/ego-network-r/>

#### INTRODUCTION TO EGOCENTRIC NETWORK DATA ANALYSIS WITH ERGMs USING STATNET

Pavel Krivitsky  
Martina Morris

Tuesday 12 noon  
3-hour

This workshop will provide an introduction to analyzing egocentrically sampled data with exponential-family random graph models (ERGMs) for statistical network analysis. It will be a hands-on workshop demonstrating how to fit, diagnose and simulate both static and dynamic ERG models from such data, using the 'ergm.ego' package, part of the integrated statnet software collection in R. Topics covered in this session include: a review of approaches to analyzing egocentrically sampled data, an overview of the statistical theory that supports the use of ERGMs for egocentric samples; defining and fitting ERGMs to egocentric data; interpretation of model coefficients; goodness-of-fit and model adequacy checking; and simulation of complete networks from the specified ERG models. statnet is an open source collection of integrated packages for the R statistical computing environment that support the representation, manipulation, visualization, modeling, simulation, and analysis of network data.

Prerequisites: Some experience R and familiarity with descriptive network concepts and statistical methods for network analysis in the R/statnet platform (especially ERGM).

#### INTRODUCTION TO ERGMs USING STATNET

David Hunter  
Steven M Goodreau

Tuesday 3:00 PM  
3-hour

This workshop will provide a hands-on tutorial to using exponential-family random graph models (ERGMs) for statistical analysis of social networks, using the "ergm" package in statnet. The ergm package provides tools for the specification, estimation, assessment and simulation of ERGMs that incorporate the complex dependencies within networks. Topics covered in this workshop include: an overview of the ERGM framework; defining and fitting models to empirical data;

interpretation of model coefficients; goodness-of-fit and model adequacy checking; simulation of networks using ERG models; degeneracy assessment and avoidance; and modeling and simulation of complete networks from egocentrically sampled data. statnet is an open source collection of integrated packages for the R statistical computing environment that support the representation, manipulation, visualization, modeling, simulation, and analysis of network data.

Prerequisites: Familiarity with R. If new to network analysis, the workshops "Introduction to SNA with R and statnet" and "Moving Beyond Descriptives" are strongly suggested.

#### INTRODUCTION TO MODELING TEMPORAL (DYNAMIC) NETWORKS USING TERGMs IN STATNET

Martina Morris

Wednesday 8:30 AM

Steven M Goodreau

3-hour

This workshop will provide a hands-on tutorial on the estimation and simulation of dynamic networks with Temporal Exponential-Family Random Graph Models (TERGMs) using the 'tergm' package in statnet. TERGMs can be used for both estimation from and simulation of dynamic network data. The topics covered in this workshop include exploratory data analysis with temporal network data (using the statnet packages tsna for descriptive statistics and ndtv to create network movies), model estimation (from network panel data, a single cross-sectional network with link duration information, and cross-sectional, egocentrically sampled network data), model diagnostics, and simulating dynamic networks from fitted models. These methods can be used with both fixed and changing node sets. statnet is an open source collection of integrated packages for the R statistical computing environment that support the representation, manipulation, visualization, modeling, simulation, and analysis of network data.

Prerequisites: Familiarity with R. Previous experience with the statnet packages (ergm, network, sna).

#### INTRODUCTION TO SNA DESCRIPTIVE STATISTICS AND HYPOTHESIS TESTING USING R/STATNET

Lorien Jasny

Tuesday 8:30 AM

3-hour

This workshop will serve as an introduction to the use of basic statistical methods for network analysis within the R/statnet platform. The approach taken is practical rather than theoretical, with emphasis on simple, robust methods for hypothesis testing and exploratory data analysis of single and multi-network data sets. Topics will include: tests for marginal relationships between node or graph-level indices and covariates; Monte Carlo tests for structural biases; network correlation, autocorrelation, and regression; and exploratory multivariate analysis of multi-network data sets. We will also cover interpreting R code in existing functions and writing your own functions. Attendees are expected to have had some prior exposure to R, but extensive experience is not assumed. Completion of the "Introduction to Network Analysis with R and statnet" workshop session is suggested (but not required) as preparation for this session. Familiarity with the basic concepts of descriptive network analysis (e.g., centrality scores, network visualization) is strongly recommended. To get the most out of the workshop, participants are recommended to bring a laptop with R, RStudio, and statnet installed. Sample data will be provided by the organizer.

#### INTRODUCTION TO SOCIAL NETWORK ANALYSIS IN STATA

Thomas Grund

Tuesday 8:30 AM  
3-hour

This workshop introduces the `nwcommands`—a software suite of over 100 Stata commands—for social network analyses in Stata. The software includes programs for importing and exporting, loading and saving, handling, manipulating and replacing, generating, and visualizing and animating networks. It also includes commands for measuring the importance of network nodes, the detection of network patterns and features, the similarity of multiple networks, node attributes, and the advanced statistical analysis of networks including. This workshop gives several examples using these programs, provides instructions for the installation, use, and support of the software (<http://www.nwcommands.org>). A book published by StataPress (written by the course provider) is forthcoming and will be the basis of this workshop.

#### INTRODUCTION TO SOCIAL NETWORK DATA COLLECTION WITH AN EMPHASIS ON SOCIAL SURVEY METHODS.

David Tindall

Tuesday 3:00 PM  
3-hour

This workshop is intended for relative newcomers to social network analysis. The workshop will provide an introduction to social network data collection with an emphasis on social survey methods. The workshop will consider a variety of related methodological issues such as research design, measurement, sampling, data analysis, and ethics, as well as the linkage of these issues to data collection. Different types of data collection techniques will be illustrated such as the name generator, position generator, and name roster. The different opportunities and constraints associated with data collection for whole versus ego-networks will be considered. Some discussion of non-survey techniques may also be provided. Some attention may also be given to mixed methods.

#### METHOD SELECTION AND ADAPTATION

Ulrik Brandes

Wednesday 8:30 AM  
3-hour

Which centrality measure should I use? Why are there no interesting regular equivalences? Is modularity clustering appropriate for my data? Or should I use this fancy new machine learning approach that everyone keeps recommending? And how do I defend my choices when reviewers disagree?

This workshop will introduce the pivotal notion of network position, i.e., how an actor relates to everyone else in the network, as a means to inform method selection by theory and context. The approach reveals tacit assumptions in commonly used methods, and facilitates adaption without requiring a degree in mathematics.

Reframing network analysis in positional terms is a different way of thinking about social structure aiming to reduce the gap between methods and theory. As plenty examples will show, it applies to social structures and personal networks alike, and supports mixed-method approaches.

#### MIXED METHODS RESEARCH IN SOCIAL NETWORKS

Elisa Bellotti  
Betina Hollstein

Tuesday 8:30 AM  
6-hour

The workshop focuses on the use of mixed methods research designs when studying whole and ego-centered social networks. The workshop will be conducted in two parts. The first part introduces social network qualitative research and the principles of mixed methods research designs and its contributions to the study of social networks, pointing out advantages and challenges of this approach. Illustrations of the theoretical and methodological aspects are given by bringing examples from a variety of fields of research. The second part is devoted to the presentation of concrete procedures to apply mixed methods in network research both at the level of data collection and analysis. This part includes an introduction of different approaches to the collection of whole and ego-centered network data, i.e. interviews, ethnographic methods, archival data, together with visual instruments. It then moves to the analysis of the quantitative and qualitative dimensions of network relationships and structures in a mixed method perspective.

#### MODELING RELATIONAL EVENT DYNAMICS WITH R/STATNET

Carter Butts

Wednesday 8:30 AM  
3-hour

This workshop will provide an introduction to the analysis of relational event data (i.e., actions, interactions, or other events involving multiple actors that occur over time) within R/statnet platform. We will begin by reviewing the basics of relational event modeling, with an emphasis on models with piecewise constant hazards. We will then discuss estimation of dyadic and more general relational event models using the relevant package, with an emphasis on hands-on applications of the methods and interpretation of results. Using the informR package, we will then show how to construct models for spell data, and data involving multiple event types.

Prerequisites: Familiarity with R and descriptive network analysis in the statnet platform is expected (e.g., the workshop "Introduction to Network Analysis with R and statnet"). Familiarity with parametric statistical methods is strongly recommended, and some knowledge of hazard or survival analysis will be helpful.

#### MOVING BEYOND DESCRIPTIVES: BASIC NETWORK STATISTICS WITH R/STATNET

Lorien Jasny

Tuesday 12 noon  
3-hour

This workshop will serve as an introduction to the use of basic statistical methods for network analysis within the R/statnet platform. The approach taken is practical rather than theoretical, with emphasis on simple, robust methods for hypothesis testing and exploratory data analysis of single and multi-network data sets. Topics will include: tests for marginal relationships between node or graph-level indices and covariates; Monte Carlo tests for structural biases; network correlation, autocorrelation, and regression; and exploratory multivariate analysis of multi-network data sets. We will also cover interpreting R code in existing functions and writing your own functions. Attendees are expected to have had some prior exposure to R, but extensive experience is not assumed. Completion of the "Introduction to Network Analysis with R and statnet" workshop session is suggested (but not required) as preparation for this session. Familiarity with the basic concepts of descriptive network analysis (e.g., centrality scores, network

visualization) is strongly recommended. To get the most out of the workshop, participants are recommended to bring a laptop with R, RStudio, and statnet installed. Sample data and code will be provided by the organizer.

Prerequisites: Familiarity with R is helpful but not required, R code will be provided and explained. This workshop is the 2nd in the statnet series. Newbies may want to take the 'Intro to social network analysis with R/statnet' before this workshop.

#### MULTILEVEL MODELING FOR EGOCENTRIC NETWORK ANALYSIS

Brea Perry

Tuesday 3:00 PM  
3-hour

This workshop will provide an overview of multilevel modeling (MLM) techniques for analyzing egocentric network data, where alters are nested in ego networks. Multilevel modeling offers a number of important advantages over standard aggregation and regression techniques for egocentric analysis, including taking full advantage of variation across alters, increased statistical power, and the ability to test complex research questions that cross levels of analysis. In this workshop, participants will learn when it is appropriate to use MLM for egocentric analysis and how to formulate and test multilevel hypotheses. In addition, the workshop will provide an introduction to the multilevel variance-components model and special considerations for egocentric data. Finally, participants will learn how to run and interpret MLM for egocentric data using the software program Stata and R.

Topics covered include:

- When to use MLM for egocentric network analysis
- Why MLM is necessary
- Examining tie formation, alter behavior, and characteristics of dyads
- Nested social contexts (individuals within dyads within networks)
- Interactions within and between levels
- Random-intercept, random-coefficient, and fixed effects models
- Formatting and coding nested data
- Conducting MLM for continuous and categorical outcomes
- MLM diagnostics for egocentric network analysis
- Interpreting coefficients, intraclass correlation, and other model parameters
- Stata and R code

#### NETWORK CANVAS: SIMPLIFYING COMPLEX NETWORK DATA COLLECTION.

Michelle Birkett

Tuesday 8:30 AM

Gregory Lee Phillips, Kate Banner, Bernie Hogan,  
Joshua Melville, Patrick Francis Janulis

6-hour

Network Canvas is a free, open-source suite of tools for simplifying the collection of complex network data. It captures data about both the individual and their social network through touch-optimized interfaces, in an interview-assisted environment. Since we represent abstract relationships and attributes visually, complex structural data becomes more tangible and simple to capture.

Following the recent release of the public beta of Network Canvas (see <https://networkcanvas.com>), we invite participants to a workshop that will introduce them to the workflow of these tools, and guide them in the implementation of their own measures and instruments within the Network Canvas framework.

We will cover the use of all three applications in the suite: Architect for designing network interviews, Server for deploying and managing the interviews, and Network Canvas itself, for conducting field interviews. These programs are free and open-source, and available on Windows, Mac and Linux, with tablet versions (iOS and Android) also available for the field app.

This workshop will be a full-day experience in order to provide a comprehensive introduction to the topics covered. Upon completion, participants will have the skills to:

- Create an egocentric interview
- Create a whole network interview
- Implement their own measures and techniques in a Network Canvas interview
- Deploy interviews to field devices
- Obtain data from field devices
- Export data for use in their favorite network data analysis tools

Additionally, participants will receive hands-on assistance from our project team and will be able to contribute direct feedback to help shape the direction of the tool's development.

Network Canvas is funded by the National Institutes of Health (R01 DA042711).

Prerequisites: Attendees should have a basic understanding of social network data capture.

Participants should download and install the public beta versions of Network Canvas, Server, and Architect from the project website (<https://networkcanvas.com>) prior to the workshop.

Doing this will require a laptop running Windows 10, macOS 10.13+, or Linux. Participants may optionally bring additional devices (tablet computers running Android 7.1+ or iOS 10+, or select models of Chromebook) for further testing.

#### NETWORK VISUALIZATION WITH R

Katherine Ognyanova

Tuesday 3:00 PM

3-hour

This workshop will cover network visualization using the R language for statistical computing ([cran.r-project.org](http://cran.r-project.org)) and RStudio ([rstudio.com](http://rstudio.com)). Participants should have some prior knowledge of R and network concepts. The workshop will provide a step-by-step guide describing through series of examples the path from raw data to graph visualization in the igraph and Statnet frameworks. The advanced portion of the workshop will touch on dynamic visualization for longitudinal networks and combining networks with geographic maps. We will also discuss ways of converting graphs in R to interactive JavaScript visualizations for the Web.

#### PERMUTATION TESTS FOR NETWORK DATA

David Dekker

Tuesday 3:00 PM

3-hour

This workshop focuses on 3 topics regarding the multiple regression quadratic assignment procedure, which encompasses permutation-based tests for network data in the regression analyses framework. First, the workshop provides an introduction into permutation-based testing by explaining the necessity to deal with structural dependencies when analyzing network-like data

and demonstrating the mechanics of permutations of data organized in square matrices. Second, in the workshop we will be elaborating on the use of different permutation scheme's for different tests. F-test for model significance and t-tests for coefficient significance require different permutation approaches. Specifically, the different uses of Y-permutation and DSP-permutation will be clarified. Third, an extension of linear models dealing with exogenous grouping will be presented to the participants. The usefulness of introducing further restrictions on permutations to deal with exogenous groupings of ties demonstrates the versatility of the approach. An application with time-series and geographic network data is presented. Participants may expect to feel more proficient in using permutation techniques and encouraged to explore the wide range of possible applications for permutation testing that remain unutilized to this day. Technical requirements involve a basic understanding of correlation and regression analyses, and, access to UCInet and R's statnet.

RELATIONAL EVENT MODELS FOR LARGE AND MULTIVARIATE EVENT NETWORKS - INTRODUCTION TO THE EVENTNET SOFTWARE

Juergen Lerner Wednesday 8:30 AM  
 Mark Tranmer, Federica Bianchi 3-hour

Relational event models are statistical models for social interaction networks such as communication networks, online collaboration, and social media networks that are typically observed with fine-grained time resolution. Sampling techniques originating from the field of survival analysis allow to reliably fit relational event models to networks of millions of nodes connected by hundreds of millions of dyadic events.

This workshop provides a practical introduction to relational event modeling with the event network analyzer (<http://algo.uni.kn/software/eventnet/>) illustrated on publicly available data from two application domains: (1) interaction events in international relation networks and (2) online collaboration networks in Wikipedia. These networks vary in a wide range of characteristics such as the presence of event signs, weights, or types; node and dyad covariates; one-mode vs two-mode networks; time resolution; and, last but not least, network size.

SIMPLIFYING EGO-CENTERED NETWORK ANALYSIS IN R WITH EGOR

Till Krenz Tuesday 8:30 AM  
6-hour

The workshop focuses the analysis of ego-centered networks in R. The first part of the workshop will introduce SNA measures at the alter level (e.g. multiplexity, EI-Index (network subgroups) and the network level (size, density, EI-Index (ego), diversity, proportions of ties with specific attributes). Afterwards we go on with multivariate analyses, both on the network level and the alter level (Regression, Multi-Level Regression, Cluster-Analysis, Clustered Graphs).

Major parts of the workshop will be “hands-on”, utilizing R (R-Studio).

A short intro into the basics of R will be given in the beginning. For a more in-depth introduction to R it is recommended to visit either the workshop "Introduction to ego-network analysis with R" by Raffaele Vacca, where data collection, data management and data transformation are discussed in detail or Michal Bojanowski's "Introduction to R and Social Network Analysis with igraph" for a general introduction to sociometric network analysis in R.

### SOCIAL NETWORK APPROACHES FOR BEHAVIOR CHANGE

Tom Valente

Wednesday 8:30 AM

3-hour

This workshop introduces the many ways that social networks influence individual and network-level behaviors. It also provides a brief introduction to analytic approaches for understanding network influences on behaviors; and reviews existing evidence for the utility of using social network data for behavior change in a variety of settings including health behaviors and organizational performance. The workshop presents a typology of network interventions and reviews existing evidence on the effectiveness of network interventions. (Students familiar with the R environment may follow an R script written to demonstrate the 24 or so tactical interventions presented.)

### STATNETWEB: THE EASY WAY TO LEARN (OR TEACH) STATISTICAL MODELING OF NETWORK DATA WITH ERGMS

Martina Morris

Tuesday 3:00 PM

3-hour

This workshop will provide a hands-on introduction to new software, statnetWeb, that provides a simple point-and-click interface for the statistical analysis of network data, including ERGMS. It is intended both for newbies to statistical network modeling, and for instructors seeking a robust software application for teaching introductory network analysis courses. Topics covered include: uploading network data, using plots and descriptive statistics to learn about the network, fitting exponential-family random graph models (ERGMS), model diagnostics, goodness of fit, and simulations. statnetWeb allows users to focus on concepts, rather than code. It runs in a web browser window, providing access to the functionality of the statnet suite of R packages without the need to learn R programming or, in some cases, download or install R and statnet. The app can be used as a stand-alone software application, or as a bridge to learn the traditional command-line statnet software in R.

### UNDERSTANDING DIFFUSION WITH NETDIFFUSR

Tom Valente

Tuesday 3:00 PM

George Vega Yon

3-hour

The netdiffuseR package provides a set of tools for analyzing and simulating diffusion of innovations and contagion processes on networks. In this workshop we demonstrate the features of the package through the analysis of both empirical and simulated data on the diffusion of innovations. The session will include examples on how to use netdiffuseR jointly with other network analysis packages such as RSiena, statnet, and igraph. NetdiffuseR's main features are computing network exposure models based on various weight matrices (direct ties, structural equivalence, attribute-weighted, etc.), thresholds, infectiousness and susceptibility, among others. The package works with both static and dynamic networks. Some other capabilities include handling relative large graphs, simulating networks and diffusion of innovation processes, and visualizing the diffusion of innovations. While there are no pre-requisites, it is suggested to have a working knowledge of the R programming language.



## USING R AND IGRAPH FOR SOCIAL NETWORK ANALYSIS

Michal Bojanowski

Tuesday 8:30 AM  
6-hour

The workshop introduces R and package igraph for social network data manipulation, visualization, and analysis.

The material will cover:

- Brief introduction to R.
- Creating and manipulating network data objects.
- Working with node and tie attributes.
- Creating network visualizations.
- A tour through computing selected SNA methods including: degree distribution, centrality measures, shortest paths, connected components, quantifying homophily / segregation, network community detection.
- Connections to other R packages for SNA, e.g.: statnet, RSiena, egonetR.

The focus is on analysis of complete network data and providing prerequisites for other workshops including two on ego-network analysis: "Introduction to ego-network analysis" by Rafaele Vacca and "Simplifying advanced ego-network analysis in R with egonetR" by Till Krenz and Andreas Herz.

Target audience and requirements: The workshop is designed to be accessible for people who have limited experience with R. The participants are expected to be familiar with basic R objects (e.g. matrices and data frames) and functions (e.g. reading data, computing basic statistics, basic visualization). Some brief introduction to R will be provided. To be absolutely on the safe side we recommend taking an internet course on the level of R programming course on Coursera (<https://www.coursera.org/course/rprog>), which you can take every month, or skimming through a book on the level of initial eight sections of Roger D. Peng book "R programming" (<https://leanpub.com/rprogramming>).

Participants are encouraged to bring own laptops. We have prepared examples and exercises to be completed during the workshop. Detailed instructions how to prepare will be distributed in due time.

## VALUED TIE NETWORK MODELING WITH STATNET

Pavel Krivitsky  
Carter Butts

Tuesday 3:00 PM  
3-hour

This workshop provides instruction on how to model social networks with ties that have weights (e.g., counts of interactions) or are ranks (i.e., each actor ranks the others according to some criterion). We will cover the use of latent space models and exponential-family random graph models (ERGMs) generalized to valued ties, emphasizing a hands-on approach to fitting these models to empirical data using the ergm and latentnet packages in statnet. statnet is an open source collection of integrated packages for the R statistical computing environment that support the representation, manipulation, visualization, modeling, simulation, and analysis of network data.

Prerequisites: Prior exposure to R; familiarity with binary ERG modeling with the R/statnet platform (e.g., the "Exponential Family Random Graph (ERGM) Modeling with statnet" workshop).

## Workshops Schedule

|                | 8h30 à 11h30  | 12h à 15h   | 15h00 à 18h  |
|----------------|---|---|--|
| Tuesday Room 1 | <b>Network Canvas: Simplifying complex network data collection</b><br>Michelle Birkett. Gregory Lee Phillips<br>Kate Banner Bernie Hogan<br>Joshua Melville Patrick Francis Janulis |   | <b>Introduction to Social Network Data Collection with an Emphasis on Social Survey Methods</b><br>David Tindall |
| Tuesday Room 2 | <b>EgoWeb 2.0: Flexible and user friendly social network data collection software (Basic and Advanced)</b><br>David Kennedy<br>Marie R. Kennedy<br>Stacey Giroux                    |   | <b>Enso: Engaging Social Network Data Collection Software</b><br>Kate Eddens                                     |
| Tuesday Room 3 | <b>Everything you ever wanted to know about network statistics but were afraid to ask</b><br>Momin Malik  | <b>Introduction to Egocentric Network Data Analysis with ERGMs using statnet</b><br>Pavel Krivitsky<br>Martina Morris | <b>Introduction to ERGMs using statnet</b><br>David Hunter<br>Steven M Goodreau                                  |
| Tuesday Room 4 | <b>Introduction to Social Network Analysis in Stata</b><br>Thomas Grund   | <b>Introduction to egocentric network analysis with R</b><br>Raffaele Vacca   |  |
| Tuesday Room 5 | <b>Simplifying ego-centered network analysis in R with egor</b><br>Till Krenz   |   | <b>Network visualization with R</b><br>Katherine Ognyanova   |
| Tuesday Room 6 | <b>A Hands-On Introduction to Analyzing Social Networks with UCINET &amp; Netdraw</b><br>Dan Halgin<br>Rich DeJordy   |   | <b>An Introduction to Necessary Condition Analysis (NCA)</b><br>Zsofia Toth<br>Jan Dul                           |
| Tuesday Room 7 | <b>Using R and igraph for Social Network Analysis</b><br>Michal Bojanowski  |   | <b>Analysis of Multiplex Social Networks with R</b><br>Matteo Magnani<br>Luca Rossi                              |

|                 | 8h30 à 11h30  | 12h à 15h  | 15h00 à 18h   |
|-----------------|---|--|---|
| Tuesday Room 8  | <b>Intermediate Social Network Analysis with UCINET</b><br>Steve Borgatti<br>Martin Everett               |  | <b>Permutation Tests for Network Data</b><br>David Dekker   |
| Tuesday Room 9  | <b>From Texts to Networks to Maps: Social Media and Beyond</b><br>Kathleen Carley<br>Rick Carley          |  | <b>Understanding Diffusion with NetDiffusR</b><br>Tom Valente<br>George Vega Yon                                      |
| Tuesday Room 10 | <b>Mixed Methods Research in Social Networks</b><br>Elisa Belloti<br>Betina Hollstein                     |  | <b>Exploring networks using latent variable models in R with lvm4net</b><br>Isabella Gollini                          |
| Tuesday Room 11 | <b>Analysis of bibliographic networks</b><br>Vladimir Batagelj<br>Daria Maltseva                          |  | <b>statnetWeb: The easy way to learn (or teach) statistical modeling of network data with ERGMs</b><br>Martina Morris |
| Tuesday Room 12 | <b>Designing and Conducting Online Lab Experiments on Social Networks</b><br>Jason Radford<br>David Lazer |  | <b>Multilevel Modeling for Egocentric Network Analysis</b><br>Brea Perry  |
| Tuesday Room 13 | <b>Introduction to SNA descriptive statistics and hypothesis testing using R/statnet</b><br>Lorien Jasny  | <b>Moving beyond Descriptives: Basic Network Statistics with R/statnet</b><br>Lorien Jasny | <b>Valued Tie Network Modeling with statnet</b><br>Pavel Krivitsky<br>Carter Butts                                    |

8h30 à 11h30

12h à 15h

15h00 à 18h

|                     |  |
|---------------------|--|
| Wednesday<br>Room 1 | <b>Social Network Approaches for Behavior Change</b><br>Tom Valente  |
| Wednesday<br>Room 2 | <b>Relational event models for large and multivariate event networks - introduction to the eventnet software</b><br>Juergen Lerner<br>Mark Tranmer<br>Federica Bianchi |
| Wednesday<br>Room 3 | <b>Extending ERGM Functionality within statnet: Building Custom User Terms</b><br>Steven Goodreau<br>David R Hunter  |
| Wednesday<br>Room 4 | <b>Introduction to Modeling Temporal (dynamic) Networks using TERGMs in statnet</b><br>Martina Morris<br>Steven M Goodreau   |
| Wednesday<br>Room 5 | <b>Method selection and adaptation</b><br>Ulrik Brandes  |
| Wednesday<br>Room 6 | <b>Modeling Relational Event Dynamics with R/statnet</b><br>Carter Butts   |