North Texas Chapter
American Statistical Association

Design and Analysis of Research Studies Using Generalized Linear Mixed Models

(ASA Council of Chapters Traveling Course)

Instructor: Professor Walt Stroup (University of Nebraska, Lincoln)

Date: October 19, 2015 (Monday)

Time: 8:30 a.m. – 4:30 p.m. (Lunch 12:00 noon – 1:30 p.m.)

Location: Department of Statistical Science, Southern Methodist University, Dallas, Texas 75275-0332 (Exact location to be arranged)

Registration and Fee:

$35 for students
$50 for ASA Members
$60 for others

An additional fee of $10 will be charged for registrations received after October 11, 2015. The registration fee includes all the course materials and lunch on October 19, 2015.

To register, please either (i) go to **Registration** (pay by credit card); or (ii) fill in the attached registration form and send your payment by check to "Ms. Sheila Crain, Department of Statistical Science, Southern Methodist University, Dallas, Texas 75275-0332")

Abstract

This day-long course is intended for those who want to learn about the application of generalized linear mixed models (GLMMs) across disciplines from a non-Bayesian perspective. The course will focus on the use of GLMMs for design and analysis of experiments especially those with non-normal response variables. The material is presented at an applied level, accessible to participants with previous exposure to linear mixed models.

In the morning we make the connection between linear models, generalized linear models, linear mixed models, and generalized linear mixed models in terms of model formulation, distributional properties, and approaches to estimation. Participants will learn that GLMMs are an encompassing family and understand the differences and similarities in approaches to estimation and inference within the family. We discuss overarching issues that confront analysts who work with correlated, non-normal data, such as overdispersion, marginal and conditional models, and model diagnostics. We present GLMMs for common non-normal response variables – count, binomial and multinomial (categorical), time-to-event and continuous proportion – in conjunction with common design formats – block designs, split-plots and repeated measures. Because different types of non-normal data present particular design challenges, we will present GLMM-based methods that address these issues to improve planning. Examples are used throughout the day to support the discussion and development.

In the afternoon we focus primarily on GLMM applications and on issues associated with these applications. Additional supporting theory is introduced as needed. Focus areas include comparison of pseudo-likelihood/penalized quasi-likelihood, integral approximation and transformation methods, the computation of power and sample size, model selection, and inferential tasks with and without adjustments.

Computations are based on the mixed model tools in SAS/STAT and R software, but the principles should be applicable to any GLMM-capable software.

Biography

Walt Stroup is Professor in the Department of Statistics at the University of Nebraska-Lincoln. He is Fellow in the American Statistical Association, and served as department chair, 2001-2010. His current responsibilities include teaching statistical modeling, design of experiments, and research on generalized and mixed models including collaboration with researchers in agriculture, natural resources, medical and pharmaceutical sciences, education, and the behavioral sciences. He participated in a multi-state mixed model project that provided motivation for the development of MIXED procedure in SAS/STAT. More recently he participated in an industry-government-academic working group focusing on pharmaceutical shelf life and is PI on an NSF grant concerned with statistical modeling of teaching effectiveness. He has co-authored textbooks on SAS for linear models, SAS for mixed models, and GLMM Applications for Plant and Natural Resource Sciences. Most recently, he authored the text Generalized Linear Mixed Models: Modern Concepts, Methods and Applications (2013).

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<u>Registration Form</u>

If registering for more than one individual, please attach a separate sheet with names, affiliations, email addresses, and student status of the participants.

Name: _____ **Email:** _____

Affiliation: Government _____ **Academia** _____ **Industry**_____

Other (specify)_____

Students $35 × ____ **people = $**_____

ASA members $50 × ____ **people = $**_____

Non-ASA members $60 × ____ **people = $**_____

Late registration fee
(after October 11) $10 × ____ **people = $**_____

Total $_____

(For students, please indicate the name of your department and school)