AMERICAN STATISTICAL ASSOCIATION

ALASKA CHAPTER

NEWSLETTER

August 15, 1990

1990 ANNUAL MEETING

The 1990 annual meeting will held in conjunction with the Arctic Science Conference on October 8 and 9 at the Sheraton Anchorage Hotel. An all day tutorial will be featured on Monday, October 8. On Tuesday there will be a contributed papers session in the morning and the annual business meeting in the afternoon.

An announcement for the Arctic Science Conference is enclosed with this newsletter. Registration information and an abstract submission form are included. Please note that the deadline for receipt of abstracts is September 10 and that the registration fee must accompany the abstract. This registration fee is for the Arctic Science Conference and does not include the Monday tutorial. As in the past, there will a $ 75 fee ($ 15 for students) for the tutorial. Please send the tutorial fee payable to AKASA to Linda Brannian, Secretary-Treasurer, 333 Raspberry Rd., Anchorage, AK 99518.

The success of the contributed papers session depends on your participation. Please take the time to submit an abstract and present a summary of some recent project. The objective is not to present a finished paper, but rather to share your recent experiences involving statistics. You might want to discuss an unusual or perplexing problem that you have encountered; perhaps someone will be able to suggest an innovative and useful solution. This is a joint session with the Arctic Science Conference; consequently, other conference attendees are eligible to submit papers. Hopefully some abstracts will be submitted by non ASA members, but as yet none have been received.

Dr. Ray Carroll of the Statistics Department at Texas A & M University will present the tutorial on Monday. The tutorial "Transformation and Weighting in Regression" will be based on the book of the same name coauthored by Dr. Carroll and Dr. David Ruppert. The book has received excellent reviews in top statistical journals; the review that appeared in Technometrics is reprinted elsewhere in this newsletter. The presentation will be organized into three sessions of approximately 90 minutes duration each. An outline follows:

I. *Introduction and Graphical Techniques*

The need for variance function estimation and data
transformation, beyond their use in weighted least squares.
The danger of using inverses of sample variances for weights.
Graphical techniques for detecting non-constant
variance, including smoothing.
Prediction and calibration.

II. *Methods of Variance Function Estimation*

Maximum likelihood and its dangers.
Pseudolikelihood as a weighted least squares method.
Restricted likelihood.
Absolute and log residuals.

Rodbard's method for equireplicated designs.
Computing tricks.

III. *The Transform Both Sides Methodology*
Fitting theoretical models.
The difference with the Box-Cox methodology (transform one side).
Likelihood methods and a computing trick.
Transformation to constant variance.
Transformation/weighting models.
Prediction and bootstrapping.

The traditional Vice President's pot luck supper will begin at 6:30 pm on Sunday evening prior to the meetings at the Eagle River home of Don and Barbara Marx. All members and their spouses are invited. Anchorage area members are asked to call Barbara (694-4603 evenings and weekends) to coordinate what to bring. (Those of you coming in from out of town need not bring anything but yourselves.) This will be an opportunity to chat with Dr. Carroll, meet newcomers to our membership ranks, and renew old friendships. The Marxes home is at 18838 Sutwik Circle in the Eaglewood subdivision. Coming from Anchorage on the Glenn Highway, take the first Eagle River exit and stay to the right. Turn right on Eagle River Road at the traffic light. Go about two miles to the next traffic light at Eagle River Loop Road. Turn right on Eagle River Loop Road. Take the first left onto Montegue. Again take the first left; this time onto Chichagoff Loop. Then take the second left onto Sutwik Circle. The brown home at the end of the road is the place.

NEWS.

Council of Chapters

The approval of the new Constitution restructures the seven Districts into six and places three representatives on the ASA Board. The new Council of Sections will also have three representatives and will be structured similar to the Council of Chapters. The next three years will be a transitional period until the three-year voting cycle is in place. The appointed Chapter Board representatives are Bob Mason and Randy Spoeri (Olga Pendalton was the one we already had). The term of office for the Chapter Representatives to the Council of Chapters is now three years. A full report of the Council meetings in Anaheim will be available at the Chapter meeting. (*Communicated by B. Alan Johnson, chair of the Ethics Committee of the national organization*).

The Statistical Graphics Section held a graphics exposition at the Joint statistical meetings in Anaheim as announced in AmStat News. The data set was on Kodiak red king crab and resides on STATLIB for researchers to continue to analyze. The nineteen presentations were well attended by the meeting registrants. The papers will be available in the Proceedings of the Section and will hopefully be printed in color. (*Communicated by B. Alan Johnson*)

Supercomputing

UAF has obtained a Partnership in Academic Computing Grant for 1990-1991 from the Pittsburgh Supercomputing Center. The principal investigator is Pham Quang. The grant provides local support and training of supercomputing users, and about 5 hours of Y-MP processor time. The PSC is equipped with a CRAY Y-MP/832 and diverse front end computers, hardwares and softwares. Possible uses include large-scale simulations of statistical models. It will be possible to perform simulations with boosttrap estimate of standard error. Such simulations are currently prohibitive on the UAF VAX.

PERSONAL ITEMS.

Earl and Julie Becker are recently the proud parents of Justin. Congratulations, Earl and Julie!

Hal and Segrid Geiger are recently the proud parents of Will. Congratualtions, Hal and Segrid!

Don Marx will be on Sabbatical leave from The University of Alaska Anchorage during the Fall 1990 Semester. He has accepted an invitation to be visiting professor at the Center for Quality and Productivity Improvement at the University of Wisconsin - Madison. He will return to Anchorage for our chapter's annual meeting in October. While on leave, Don's address will be

Center for Quality and Productivity Improvement
University of Wisconsin - Madison
610 Walnut Street
Madison, Wisconsin 53705

Dan Reed is promoted to Research Coordinator for Wildlife Conservation in Interior Alaskka. Congratulations, Dan!

Dana Thomas is rejoining UAF after a 2-year stint as the resident statistician of the Republic of Yemen. He is coauthoring a book on Resource Selection with Brian Manley and Lyman MacDonald.

Steve Thompson is enjoying a 3-year appointment at the Department of Mathematics and Statistics, University of Auckland, New Zealand. Besides his personal line of research, Steve has a joint project with George Seber, and is authoring a book on Sampling Theory to be published by Wiley. We hear him complaining about grape fruit ripening, and flowers blooming in the dead of winter. Mary is busy with producing and exhibiting art work.

EMPLOYMENT OPPORTUNITY.

The Division of Wildlife Conservation has an opening for the post of Biometrician vacated by Dan Reed. Call Dan Reed (456-5156), or SuzAnn Miller (267-2190) for information.

Transformations and Weighting in Regression, by R. J. Carroll and D. Ruppert. New York: Chapman & Hall, 1988. x + 249 pp., $45.

Just two or three decades ago, regression analysis consisted almost exclusively of using least squares to fit a prescribed linear model to data. Because of computational complexity, obtaining estimates and standard errors under usual assumptions was a major task. Since then, regression has become a much richer and more varied technology. The limits of the methodology have advanced in several directions. First, new model building tools allow analysts a much wider choice of model functions. In particular, paradigms such as generalized linear models allow them to contemplate many mean-function and error-distribution combinations. Similarly, nonlinear models are becoming much better understood; when linked with the existence of high quality software, nonlinear models are likely to play a much larger part in modeling in the future. A second major thrust in regression has been to decrease dependence on least squares to obtain estimates. The major goals here are to account for other than normal errors in fitting models and to obtain robustness. Finally, regression diagnostics, designed to examine a model, a set of assumptions, and a set of data to better understand the agreement between these three parts of a statistical data analysis, have become an area of study in their own right. Analysis of residuals and related quantities is now standard practice.

This book is a part of this trend of generalization of regression to a larger class of models and thus to a greater range of problems. It has elements of all three areas of change in regression analysis, specifically for problems in which a model for variability, though systematic, is not completely known to the analyst. Based largely on Carroll and Ruppert's substantial collaboration in the 1980s, this book is an important addition to the growing literature on regression.

The basic problem addressed in this book is simply described. One often assumes in a regression analysis that a mean function $E(y) = f(x, \theta)$ is known, except for the value of θ, and the variances $\text{var}(y) = E(y - f(x, \theta))^2 = w\sigma^2$ are known up to an unknown scale factor σ^2. In many problems, the assumption that the variances are known is not acceptable, so usual methods cannot be used. Carroll and Ruppert discuss a number of methods for dealing with the added complications of an unknown variance function. For example, one may have postulated that $\text{var}(y) = \sigma^2 w(z, \gamma)$, where z and γ may be related to x and θ or may be independent of them and where $w(\cdot, \cdot)$ is of a specified form. Given a distribution for the errors, the augmented model with parameters (θ, γ) may be estimated; the issues of choosing an estimation method—for example, by generalized least squares or by maximum likelihood—and especially of using the results are given careful attention by Carroll and Ruppert. Alternatively, a transformation approach may be used in which one fits the model $y^\lambda = [f(x, \theta)]^\lambda + \varepsilon$, where λ is the same on both sides of the equation. This methodology, called transforming both sides, maintains the integrity of the presumably known mean function, while allowing the transformation to stabilize the variance. The two approaches of estimating weights and transforming both sides are competitive with each other and can, of course, be combined to produce even further estimates. All of this is covered in this book.

Additional topics covered include graphical methods, diagnostic procedures, and robustness considerations for the models discussed. Both normal-error regression models and models with other error distributions are included in the general theory. The methodology that Carroll and Ruppert present is applicable to linear, generalized linear, and nonlinear models.

Any serious researcher in modern regression methodology will want to have a copy of this book. The topics it covers and the methods that it presents are unavailable outside the authors' original publications. The presentation in the book is coherent, well written, and illustrated by several examples with many graphs and tables. Nonspecialists may also find the work useful, especially those whose practical problems often include systematic nonconstant variance. A warning here, though—virtually all of the methods require specialized computer software to implement. Although the software may not be hard to write, the lack of it may make the book and the examples difficult to follow. Anyone who wants to make a serious attempt to learn the methodology described herein should be prepared to write or otherwise obtain the necessary software to rework the examples as the book is read.

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