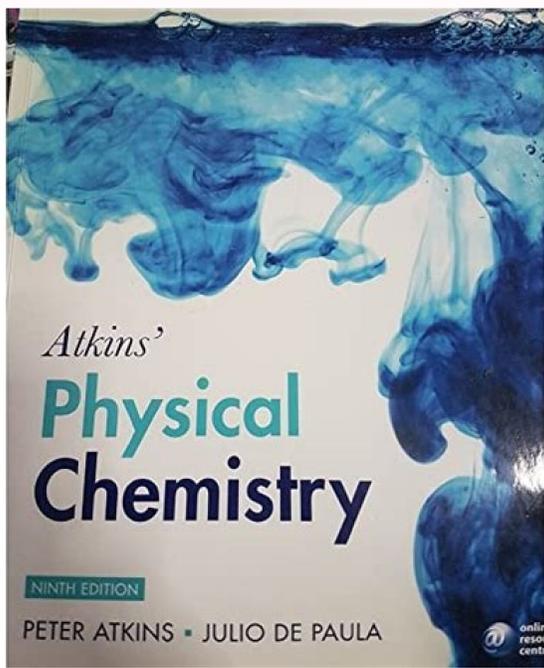


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Journal of Biopharmaceutical Statistics



ISSN: 1054-3406 (Print) 1520-5711 (Online) journal homepage: <http://www.tandfonline.com/loi/lbps20>

### A Review of: "Analysis of Ordinal Categorical Data, Second Edition, by A. Agresti,"

Nigel Smeeton

To cite this article: Nigel Smeeton (2010) A Review of: "Analysis of Ordinal Categorical Data, Second Edition, by A. Agresti," Journal of Biopharmaceutical Statistics, 20:5, 1080-1082, DOI: 10.1080/10543406.2010.495704

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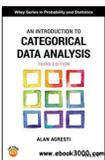
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## An Application on Multinomial Logistic Regression Model

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### Abstract

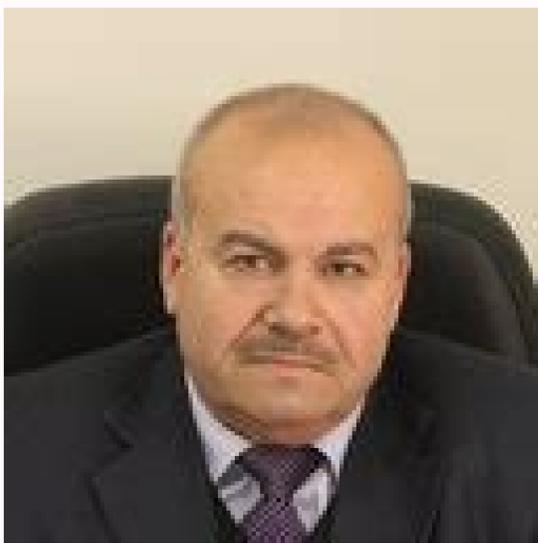
This study aims to identify an application of Multinomial Logistic Regression model which is one of the important methods for categorical data analysis. This model deals with one nominal/ordinal response variable that has more than two categories, whether nominal or ordinal variable. This model has been applied in data analysis in many areas, for example health, social, behavioral, and educational. To identify the model by practical way, we used real data on physical violence against children, from a survey of Youth 2003 which was conducted by Palestinian Central Bureau of Statistics (PCBS). Segment of the population of children in the age group (10-14 years) for residents in Gaza governorate, size of 66,935 had been selected, and the response variable consisted of four categories. Eighteen of explanatory variables were used for building the primary multinomial logistic regression model. Model had been tested through a set of statistical tests to ensure its appropriateness for the data. Also the model had been tested by selecting randomly of two observations of the data used to predict the position of each observation in any classified group it can be, by knowing the values of the explanatory variables used. We concluded by using the multinomial logistic regression model that we can able to define accurately the relationship between the group of explanatory variables and the response variable, identify the effect of each of the variables, and we can predict the classification of any individual case.

**Keywords:** Multinomial logistic regression model - categorical data analysis - maximum likelihood method - generalized linear models - classification.

### I. Introduction

In recent years, specialized statistical methods for analyzed categorical data have increased, particularly for application in biomedical and social science. Regression analysis is one of these statistical tools that utilize the relationship between two or more variables. The regression models can be divided into two groups, the first related to linear relationship models, and the second related to non-linear relationship models. The linear models, considered up to this point, are satisfactory for most regression applications. Nonlinear model used when the linear model is not suitable anyhow. Many of statisticians believe that the logistic regression model is one of the important models can be applied to analyze a categorical data; this model is a special case of generalized linear models (GLM). The multinomial logistic regression (MLR) model used in generally effective where the response variable is composed of more than two levels or categories. The basic concept was generalized from binary logistic regression. Continuous variables are not used as response variable in logistic regression, and only one response variable can be used. The MLR model can be used to predict a response variable on the basis of continuous and/or categorical explanatory variables to determine the percent of variance in the response variable explained by the explanatory variables, to rank the relative importance of independents, to

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This will prevent employees from saving dozens of iterations of the same database on their own computers. Any changes have to be visible to all other collaborators in real-time. Both papers have three of the same pages, but the fourth page is different. The database needs programming rules to prevent duplicate entries. The same entries could be in the database multiple times. It would also lead to redundant and inconsistent data if one or more of the individuals working on the databases could not see or keep track of the updates made by others. For example, suppose that four coworkers are creating a database of the customer email addresses for a large business. A Fellow of the American Statistical Association and the Institute of Mathematical Statistics, Dr. Agresti has published extensively on the topic of categorical data analysis and has presented lectures and short courses on the subject in more than thirty countries. Photo Courtesy: Yudram TA/StockPhoto To use data, it has to be recorded in a format that makes it easy to read and track. 8. If one coworker is updating a file that is only saved to his hard drive, the rest of the team will not see the changes he makes. Jack has one version of the paper that he worked on. Others come from a coupon opt-in, and the rest of the emails come from three different contests. Whether logistical or technological, the problems that can result in data inconsistencies have easy solutions. If a company uses an inconsistent database to mail catalogs to customers, the company could waste thousands of dollars sending multiple catalogs to the same household. How to Prevent Data Inconsistencies Photo Courtesy: pixelift/StockPhoto There is a term in technology that says, "garbage in, garbage out." If you put bad information into a database, the database can only give you bad information in return. He is the author of Categorical Data Analysis, Second Edition and An Introduction to Categorical Data Analysis, Second Edition, both published by Wiley. It is much easier to fix the causes of data inconsistency than to improve the wide variety of problems resulting from it. MORE FROM REFERENCE.COM Regression for Categorical DataG. The result is a set of data that is not accurate or easy to use. Photo Courtesy: Drazen /iStockPhoto Although technology makes data easier to track, improper use of technology is often the culprit for data inconsistency. Data inconsistency is one of the most common threats to reliable data. In particular beyond the basic logit model for binary response, the baseline category logit, the cumulative logit,... Praise for the First Edition: "The author has a fluent, easy-to-read style, and well-chosen interesting material to present and illustrate the ideas to the newcomer and the old hand alike." — Journal of the Royal Statistical SocietyCategorical data having ordered categories are common in practice, especially in applications throughout the biomedical and social sciences. Sorry, but the page you were trying to view does not exist. For example, a business can set a policy that all employees use the same online software that updates in real-time. However, you have to be aware of the potential issues and develop a plan that works. Ann uploads the information to a Google Doc, which she and Sheldon edit in real-time. The final database will be missing any email addresses he finds. Thoroughly updated to reflect developments since the publication of its predecessor, Analysis of Ordinal Categorical Data, Second Edition presents a comprehensive survey of methods for analyzing ordinal categorical data, complete with coverage of the most recent research. The author highlights various modeling techniques, including cumulative logit models with and without proportional odds structure, adjacent-categories logit and continuation-ratio logit models, stereotype models, association models for ordinal odds ratios, and models for clustered ordinal data. Several people can collaborate to make the same data set, but it is important to make sure that all of the people edit the same file. tests for a proportional odds modelAbstract The chi-square type test statistic is the most commonly used test in terms of mea-suring testing goodness-of- t for multinomial logistic regression model, which has itsgrouped data (binomial... Response Variable Analysis in Contingency TablesLogit models for binary, nominal, and ordinal responses are introduced in Chap. It is possible that some customers signed up for all three contests. Suppose that a database collects responses in a study on a new medicine. What is data inconsistency, and what problems does it cause? Data inconsistencies arise when the data that should be in one database ends up in multiple files, each with a different version of the same information. Database rules help identify data inconsistencies and remove them before they influence results and decisions. Photo Courtesy: shapecharge/iStockPhoto Businesses, scientists, and researchers worldwide use databases to keep track of information. There may be multiple versions of the same database where one version includes fields that another version is missing. Suppose Jack, Ann, and Sheldon are all working on a group project, and they need to write an essay together. Additional features of this Second Edition include:A new chapter on marginal models for multivariate ordinal responses, using maximum likelihood and generalized estimating equations for model fittingA new chapter on random effects models for clustered ordinal dataA new chapter on Bayesian approaches for analyzing ordinal dataModels and order-restricted inference methods for various types of ordinal odds ratios, including local odds ratios, cumulative odds ratios, and global odds ratiosPresentation of non-model-based methods, such as nonparametric rank methods that also apply to ordered categorical dataEach chapter concludes with notes on relevant research literature as well as exercises that allow readers to test their comprehension of the presented concepts. They worked together in the library, and they needed to finish the last page of the essay over the weekend. For large sets of data that multiple people work on, it takes careful planning to remove data inconsistencies from the process. Why Is Data Inconsistency a Problem? As the saying goes, an ounce of prevention is worth a pound of cure. If inconsistencies count 1,000 positive results twice, a medicine that does not actually work could go to market. Ann and Sheldon have another version of the paper. Simply using a list of emails from each contest would result in some email addresses being listed multiple times. TutzComputer Science, Mathematics 2011This paper presents a meta-modelling architecture for binary regression that combines log-linear and graphical models, and some basic tools for random effects modeling are presented. Planning and project management can prevent missing data. Even the most basic spreadsheet software can be programmed to detect errors. Understanding what data inconsistencies are is the key to understanding and preventing them. It is also an invaluable resource for researchers and practitioners who conduct data analysis in the areas of public health, business, medicine, and the social and behavioral sciences. There also needs to be a consistent, reliable source of data to enter into the database. The group will have to meet again to decide which information from both papers to use. Data inconsistency is far more serious in business and science than doing a little extra work on a paper. Inaccurate data results in poor decision-making. One of the simplest ways to prevent data inconsistencies is to build rules into the spreadsheet or other database software that is being used to track data. It would cause data inconsistencies if different individuals were pulling data from the same sources. Now, both of the documents are missing information. At the end of the weekend, there were two different papers. What Is Data Inconsistency? Industry-specific software has highly-sophisticated methods of recognizing duplicates. Data inconsistencies usually result in one of two problems: duplicate or missing data. Data inconsistency is a huge problem because people make decisions based on data. Some emails come from a sales funnel. Databases can be useful for everything from sending a postcard to all of your customers to discovering results in a scientific study. However, data becomes less valuable when it is not reliable. If the rest of the employees add to a database stored online where changes are visible in real-time, that's a step in the right direction, but what about their data sources? Jack typed up the original file on his laptop. He emails the file to his project partners as a Word document. Jack continues editing his Word document after emailing his partners. Praise for the First Edition: "The author has a fluent, easy-to-read style, and well-chosen interesting material to present and illustrate the ideas to the newcomer and the old hand alike." — Journal of the Royal Statistical SocietyCategorical data having ordered categories are common in practice, especially in applications throughout the biomedical and social sciences. Especially for large businesses or extensive studies, the size of the information to track may be much larger than can fit in one file or even on one computer. ALAN AGRESTI, PhD, is Distinguished Professor Emeritus in the Department of Statistics at the University of Florida and Visiting Professor in the Department of Statistics at Harvard University. A detailed appendix discusses the use of the latest software such as SAS, R, SPSS, and Stata, and the book's related Web site provides further instructions for the use of these software packages along with complete data sets.Analysis of Ordinal Categorical Data, Second Edition is an excellent book for courses on categorical data analysis at the upper-undergraduate and graduate levels. Photo Courtesy: PixelsEffect/StockPhoto Here's a real-life example of data inconsistency on a much smaller scale. Many businesses use electronic databases to track and store large batches of data.



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