

## Using Macro to simplify to Calculate Multi-Rater Observation Agreement

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### ABSTRACT

This paper describes using several macros program to calculate multi-rater observation agreement using the SAS ® Kappa statistic. In the paper, we show an example of four raters observed a video to select certain tasks. Each rater could select up to ten tasks. Each rater could select different tasks numbers. Inter-rater reliability (IRR) between the four raters is examined using the Kappa statistic, calculated using the SAS ® PROC FREQ, MEANS, and PRINT procedures. The Kappa statistic and 95% CI for observers were calculated and the overall IRR was calculated by averaging pairwise Kappa agreements. This paper provides an example of how using macro to calculate percentage agreement with the Kappa statistic with a 95% CI using SAS ® PROC FREQ, MEANS, and PRINT for multiple raters with multiple observation categories. The program can be used for more raters and tasks. This paper expands the current functionality of the SAS ® PROC FREQ procedure to support application of the Kappa statistic for more than two raters and several categories.

### Keywords:

Multi-rater Observation Agreement, Kappa Statistic, SAS

### INTRODUCTION

Inter-rater reliability (IRR) among rater can be measured in any situation in which two or more raters are assessing the same thing. It was first time to introduce kappa statistics by Cohen (1960). The Kappa statistic estimates the percentage of agreement among raters after removing the percentage of agreement which would occur by chance. In observational studies it is often necessary to assess multi-rater agreement for multiple observation categories. The Kappa statistic is commonly used to measure agreement among raters for categorical data (Altman, 1991). The SAS ® PROC FREQ procedure supports application of the Kappa statistic for two raters and several categories. However, calculation is not straightforward for more than two raters as data must first be manipulated in a square form table in order to use the SAS ® PROC FREQ procedure.

### PURPOSE

The purpose of this paper is to describe using macro program in SAS to calculate multi-rater observation agreement with the Kappa statistic.

### BACKGROUND

In this paper, we show an example of four raters observed a video to select certain tasks. Each rater could select up to ten tasks for simplification. Each rater could select different tasks numbers. An example could be: four raters watch video of children with Autism to select specific behavioral characteristics (tasks) which is determined by researcher. Each observer can select different number of tasks.

### DATA ANALYSIS

Analysis of this data was performed using **SAS/STAT** ® statistical software, version 9.2 (SAS, 2008). The SAS ® PROC FREQ procedure with the AGREE option was used for Kappa statistical calculations. The maximum number of tasks that could be selected by each rater was 10 for simplification. However, this can be extended to select more tasks. Some variability existed in the number and order of tasks recorded by each rater. Table 1 is part of the original data for the first three videos and shows the tasks that were selected by each rater. Table1 showed each rater selected different number of tasks. Also, there are missing for electing tasks.

The Macro requires that the dataset given has the columns ID, TASK1, and task1 to the number of raters the user wishes to compare. The variable **numoffRaters** determines how many raters the user wishes to compare, starting with 1 and going upwards. The dataset is loaded into SAS and formatted for easy use. In order to calculate Kappa in SAS the frequency table must be square. Uebersax (2002) used pseudo-observation to create square table. A weight of 1 for real observations and a weight of .0000000001 for pseudo-observations was assigned. Pseudo-

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### **Table of Contents Observational Paper Samples**

1. Understanding the eBook Observational Paper Samples
  - The Rise of Digital Reading Observational Paper Samples
  - Advantages of eBooks Over Traditional Books
2. Identifying Observational Paper Samples
  - Exploring Different Genres
  - Considering Fiction vs. Non-Fiction
  - Determining Your Reading Goals
3. Choosing the Right eBook Platform
  - Popular eBook Platforms
  - Features to Look for in an Observational Paper Samples
  - User-Friendly Interface
4. Exploring eBook Recommendations from Observational Paper Samples
  - Personalized Recommendations

- Observational Paper Samples User Reviews and Ratings
- Observational Paper Samples and Bestseller Lists
- 5. Accessing Observational Paper Samples Free and Paid eBooks
  - Observational Paper Samples Public Domain eBooks
  - Observational Paper Samples eBook Subscription Services
  - Observational Paper Samples Budget-Friendly Options
- 6. Navigating Observational Paper Samples eBook Formats
  - ePub, PDF, MOBI, and More
  - Observational Paper Samples Compatibility with Devices
  - Observational Paper Samples Enhanced eBook Features
- 7. Enhancing Your Reading Experience
  - Adjustable Fonts and Text Sizes of Observational Paper Samples
  - Highlighting and Note-Taking Observational Paper Samples
  - Interactive Elements Observational Paper Samples
- 8. Staying Engaged with Observational Paper Samples
  - Joining Online Reading Communities
  - Participating in Virtual Book Clubs
  - Following Authors and Publishers Observational Paper Samples
- 9. Balancing eBooks and Physical Books Observational Paper Samples
  - Benefits of a Digital Library
  - Creating a Diverse Reading Collection Observational Paper Samples
- 10. Overcoming Reading Challenges
  - Dealing with Digital Eye Strain
  - Minimizing Distractions
  - Managing Screen Time
- 11. Cultivating a Reading Routine Observational Paper Samples
  - Setting Reading Goals Observational Paper Samples
  - Carving Out Dedicated Reading Time
- 12. Sourcing Reliable Information of Observational Paper Samples
  - Fact-Checking eBook Content of Observational Paper Samples

- Distinguishing Credible Sources
- 13. Promoting Lifelong Learning
  - Utilizing eBooks for Skill Development
  - Exploring Educational eBooks
- 14. Embracing eBook Trends
  - Integration of Multimedia Elements
  - Interactive and Gamified eBooks

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