

## 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 Sample Of Observation Paper**

1. Understanding the eBook Sample Of Observation Paper
  - The Rise of Digital Reading Sample Of Observation Paper
  - Advantages of eBooks Over Traditional Books
2. Identifying Sample Of Observation Paper
  - 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 Sample Of Observation Paper
  - User-Friendly Interface
4. Exploring eBook Recommendations from Sample Of Observation Paper
  - Personalized Recommendations
  - Sample Of Observation Paper User Reviews and Ratings
  - Sample Of Observation Paper and Bestseller Lists
5. Accessing Sample Of Observation Paper Free and Paid eBooks
  - Sample Of Observation Paper Public Domain eBooks
  - Sample Of Observation Paper eBook Subscription Services
  - Sample Of Observation Paper Budget-Friendly Options
6. Navigating Sample Of Observation Paper eBook Formats

- ePub, PDF, MOBI, and More
- Sample Of Observation Paper Compatibility with Devices
- Sample Of Observation Paper Enhanced eBook Features
- 7. Enhancing Your Reading Experience
  - Adjustable Fonts and Text Sizes of Sample Of Observation Paper
  - Highlighting and Note-Taking Sample Of Observation Paper
  - Interactive Elements Sample Of Observation Paper
- 8. Staying Engaged with Sample Of Observation Paper
  - Joining Online Reading Communities
  - Participating in Virtual Book Clubs
  - Following Authors and Publishers Sample Of Observation Paper
- 9. Balancing eBooks and Physical Books Sample Of Observation Paper
  - Benefits of a Digital Library
  - Creating a Diverse Reading Collection Sample Of Observation Paper
- 10. Overcoming Reading Challenges
  - Dealing with Digital Eye Strain
  - Minimizing Distractions
  - Managing Screen Time
- 11. Cultivating a Reading Routine Sample Of Observation Paper
  - Setting Reading Goals Sample Of Observation Paper
  - Carving Out Dedicated Reading Time
- 12. Sourcing Reliable Information of Sample Of Observation Paper
  - Fact-Checking eBook Content of Sample Of Observation Paper
  - 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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