

HOW TO COMPUTE INTRACLASS CORRELATION USING MS EXCEL

A Practical Guide to Inter-Rater Reliability Assessment for Quantitative Data

Table26.2.xlsx - Microsoft Excel

Home Insert Page Layout Formulas Data Review View Developer Acrobat

Visual Basic Macros Insert Design Mode Run Dialog Properties View Code Source Map Properties Expansion Packs Import Export Refresh Data XML

N38 $= (I31-I33)/(I31+(2-1)*I34)$

	F	G	H	I	J	K	L
22	Total						
23	Count	6	6	6	6		
24	Sum	32	38	31	22		
25	Average	5.333333	6.333333	5.166667	3.666667		
26	Variance	10.66667	9.866667	2.166667	7.066667		
27							
28							
29	ANOVA						
30	Source of Variation	SS	df	MS	F	P-value	F crit
31	Sample		2	34.625	9.337079	0.003585	3.885294
32	Columns		3	7.263889	1.958801	0.174084	3.490295
33	Interaction		6	5.847222	1.576779	0.23615	2.99612
34	Within	44.5	12	3.708333			
35							
36	Total		23				
37							

Target Mean of Squares

Rater Mean of Squares

Interaction Mean of Squares

Error Mean of Squares

Model 1 Model 2 (No Replication) Model 3

Ready 100%

Kilem L. Gwet, Ph.D.

Printed Books by Kilem L. Gwet

- ▶ HANDBOOK OF INTER-RATER RELIABILITY (Second Edition):
The Definitive Guide to Measuring the Extent of Agreement Among Multiple Raters
- ▶ INTER-RATER RELIABILITY USING SAS: *A Practical Guide for Nominal, Ordinal, and Interval Data*

**HOW TO COMPUTE
INTRACLASS
CORRELATION WITH
MS EXCEL[®]**

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1

Introduction

I wrote this document to offer researchers and students, practical guidelines for computing various Intraclass Correlation Coefficients (ICC) using Microsoft Excel. I wanted these guidelines to be clear and sufficiently detailed for anybody who has access to MS Excel to be able to organize research data, choose the correct ICC statistic, and perform the calculations with confidence. No formal experience with MS Excel is really necessary to follow the instructions, although any prior exposure to it would be helpful.

Why Intraclass Correlation Coefficient ?

The ICC is the most widely-used statistic among researchers for quantifying Inter-rater and Intra-rater reliability for quantitative measurements. When the data is nominal, the Kappa coefficient of Cohen (1960), and many other Kappa-like coefficients are recommended (see Gwet (2010) for a detailed discussion of these coefficients). Therefore, the ICC is for quantitative measurements what Kappa is for nominal measurements. The article by Shrout and Fleiss (1979) has been influential in this area, and this document uses many of their results.

Shrout and Fleiss (1979) focussed on Inter-rater reliability, and not on Intra-rater reliability and the models they describe are essentially inter-rater reliability models. They described three models for the Intraclass Correlation Coefficient. The first model, known as Model 1 assumes that each subject is scored by a different group

of raters and is discussed in part 3 of this guide. The second model, known as Model 2 assumes that each subject is scored by the same group of raters, and I discuss it in part 4. In this model, subjects and raters are also assumed to be part of larger subject and rater populations respectively. The third model called Model 3 and also discussed in part 4, is similar to model 2. The only difference is that model 3's raters are not part of any larger rater population of interest. Participating raters are the only ones the researcher wants to investigate.

If you are interested in intra-rater reliability, you may also want to read the article by Gwet (2008) entitled *Intrarater Reliability in the Wiley Encyclopedia of Clinical Trials*. By the way, this article may also be downloaded at:

http://www.agreestat.com/research_papers/wiley_encyclopedia2008_eoct631.pdf

The recommendations I make in this guide also apply to the intra-rater reliability assessment. The ratings from different raters could simply be assumed to have been produced by the same rater on different occasions.

Why Excel ?

MS Excel is part of the Microsoft Office Suite products, and generally comes already loaded in most new personal computers that operate Microsoft Windows. Many students and researchers have easy access to Excel, and may use it to compute the ICC in a straightforward manner following the step-by-step instructions I provide in this guide. I have chosen Excel 2007 to illustrate the procedures. This version of Excel appears to still be the most widely-used at this time, even though Excel 2010 is already out. In Part 2 of this guide, I will show you how to prepare Excel to perform the tasks that are required to compute the ICC. Unfortunately, the techniques I recommend here do not apply to the Mac version of

Excel. They will only work for Windows-based Excel.

I Like to Hear from You

My goal is to create guidelines, books, and tools that help practitioners like you compute inter-rater and intra-rater reliability coefficients using inexpensive approaches. As a statistical consultant versed in inter-rater reliability assessment, I used to assist researchers with analyzing their inter-rater reliability data. Rather than charging you a high hourly fee of \$150.00 to produce Intraclass Correlation Coefficients, I thought I would prepare this inexpensive and clear document for you to do the work yourself. Tell me how useful you find this guide, and what I can do to make it better. When you write, please include your name and contact information in the e-mail. I look forward to hearing from you.

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