## HOW TO COMPUTE INTRACLASS CORRELATION USING MS EXCEL

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

Kilem L. Gwet, Ph.D.

### Table 2.3: Intraclass Correlation Coefficient (ICC)

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>P-value</th>
<th>F crit</th>
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<tr>
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<td>1.958801</td>
<td>0.174084</td>
<td>3.490295</td>
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<tr>
<td>Interaction</td>
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<td>1.576779</td>
<td>0.23615</td>
<td>2.39612</td>
<td></td>
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<tr>
<td>Total</td>
<td>34.625</td>
<td>23</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**Target Mean of Squares:**

**Rater Mean of Squares:**

**Interaction Mean of Squares:**

**Error Mean of Squares:**
Printed Books by Kilem L. Gwet

- 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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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.

I 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:


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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