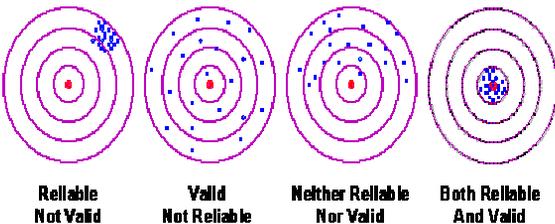


Measurement & Validity in Your Questionnaire Assignment

Reliability and Validity



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Construct Validity

- Issue is: do you have a good operationalization of your construct (the thing you are trying to measure)?
- First it is necessary to define the construct: what is it you want to measure or operationalize? (I want to know how in love people are.)
- Two general approaches to assessing construct validity:
 - Examine the content of the measure: does it make sense?
 - Study its relation to other variables

Construct Validity: Content

- This is essentially definitional: does the content of the measures match what you have in mind by the concept or construct?
- **“Face validity”** = you look at the measure and it “makes sense.” The weakest criterion.
- **“Content validity”** = you more systematically examine or inventory the aspects of the construct and determine whether you have captured them in your measures
- You may ask others to assess whether your measures seem reasonable to them

Construct Validity by Criterion

- **Predictive:** it correlates in the expected way with something it ought to be able to predict E.g. love ought to predict marriage (or gazing?)
- **Concurrent:** able to distinguish between groups it should be able to distinguish between (e.g. between those dating each other and those not)
- **Convergent:** different measures of the same construct correlate with each other (this is what we are doing in the survey exercise)
- **Divergent:** able to distinguish measures of this construct from related but different constructs (e.g. loving vs. liking, or knowledge from test-taking ability)

Convergent Validity and Reliability

- Convergent validity and reliability merge as concepts when we look at the correlations among different measures of the same concept
- Key idea is that if different operationalizations (measures) are measuring the same concept (construct), they should be positively correlated with each other.
- People who appear “in love” on one item should appear “in love” on another item. And conversely.

Steps in Data Analysis

#1 Check for Errors

- First, check for errors. Look at “list” output. Check data back against the surveys. {See example listing #1 in doc file}

Example of List of Data

ID	JEWKULT	JEWFRNDS	SELJEW	CHEAP	WNBORS	ECONWELL	REPPERSC	DISCTODY	OPENEND
101.00	4.00	3.00	3.00	2.00	3.00	3.00	4.00	1.00	1.00
102.00	4.00	5.00	2.00	4.00	3.00	3.00	4.00	3.00	4.00
103.00	5.00	4.00	2.00	3.00	3.00	3.00	4.00	2.00	3.00
104.00	5.00	5.00	3.00	3.00	3.00	5.00	4.00	2.00	4.00
105.00	4.00	5.00	1.00	3.00	3.00	4.00	4.00	3.00	1.00
106.00	5.00	5.00	3.00	3.00	2.00	4.00	5.00	4.00	4.00
107.00	4.00	5.00	3.00	4.00	4.00	3.00	4.00	2.00	3.00
108.00	2.00	3.00	1.00	4.00	4.00	2.00	2.00	2.00	-
109.00	3.00	2.00	1.00	3.00	4.00	4.00	1.00	2.00	3.00
110.00	1.00	4.00	1.00	3.00	3.00	4.00	4.00	3.00	3.00
201.00	2.00	3.00	1.00	2.00	3.00	4.00	3.00	3.00	4.00
202.00	2.00	3.00	1.00	4.00	3.00	4.00	2.00	2.00	4.00
203.00	2.00	2.00	1.00	5.00	5.00	1.00	5.00	5.00	3.00
204.00	1.00	1.00	1.00	3.00	3.00	3.00	4.00	4.00	2.00
205.00	1.00	1.00	1.00	3.00	4.00	3.00	4.00	2.00	-
206.00	2.00	3.00	1.00	5.00	4.00	1.00	5.00	5.00	3.00
207.00	5.00	4.00	3.00	2.00	2.00	4.00	2.00	2.00	4.00
208.00	2.00	2.00	1.00	5.00	5.00	1.00	4.00	2.00	-
209.00	2.00	5.00	1.00	3.00	2.00	4.00	4.00	4.00	3.00
210.00	5.00	5.00	3.00	4.00	5.00	4.00	4.00	3.00	4.00
301.00	2.00	2.00	1.00	5.00	5.00	1.00	4.00	1.00	3.00
302.00	2.00	2.00	1.00	4.00	4.00	4.00	3.50	4.00	2.00
303.00	2.00	2.00	1.00	5.00	5.00	2.00	4.00	4.00	3.00
304.00	2.00	2.00	1.00	5.00	5.00	2.00	5.00	3.00	2.00
305.00	4.00	3.00	1.00	3.00	4.00	4.00	4.00	2.00	3.00
306.00	2.00	2.00	1.00	2.00	2.00	4.00	5.00	2.00	4.00
307.00	4.00	5.00	3.00	4.00	4.00	2.00	4.00	2.00	4.00
308.00	5.00	5.00	3.00	5.00	4.00	2.00	5.00	4.00	3.00
309.00	4.00	5.00	3.00	3.00	3.00	4.00	3.50	4.00	4.00
310.00	2.00	2.00	1.00	4.00	3.00	3.00	4.00	3.00	4.00

#2 Check Frequencies

- Out of range values are errors that need to be fixed
- Look for problems of low variability.
- {See examples of frequencies in doc file}

Low Variability is Always a Problem

- If variables do not vary, they cannot have statistical association with other variables. **This is always a problem in statistical analysis**
- Low-variability items may indicate biased questions
- Low-variability items may indicate that you unfortunately got a biased sample
- Low-variability items may indicate that people just do not vary much on that opinion or behavior (e.g. oxygen-breathing). May be important, but cannot be studied using statistical associations.

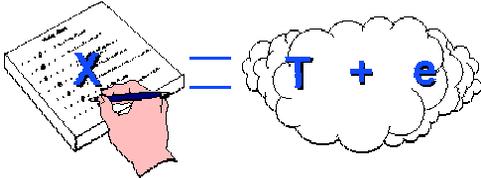
#3 Examine Reliability Analysis

The reliability analysis tells us whether your closed-ended dependent variable items appear to be measuring the same concept.

True-Score Theory (Simplified)

Answer to any question is due to a combination of “true score” plus error.

$$\text{Observed Score} = \text{True Ability} + \text{Random Error}$$

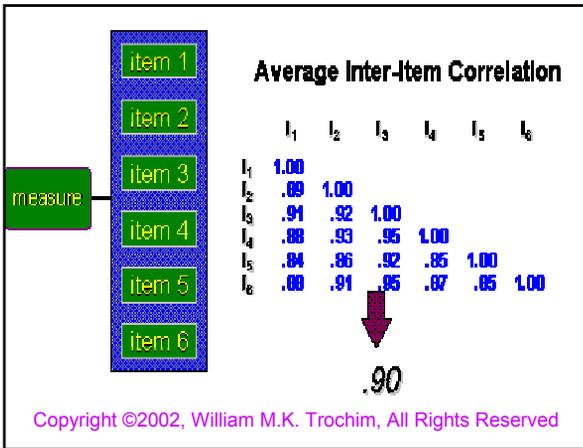


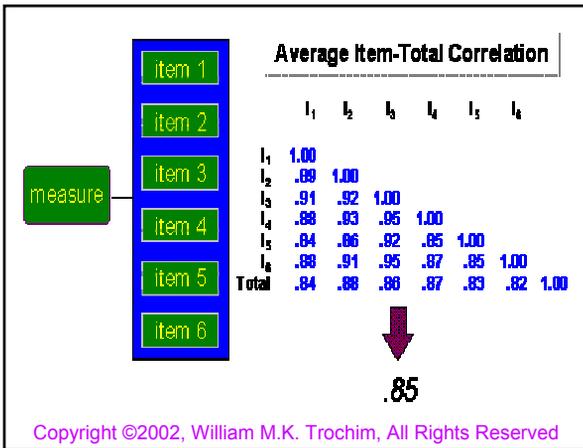
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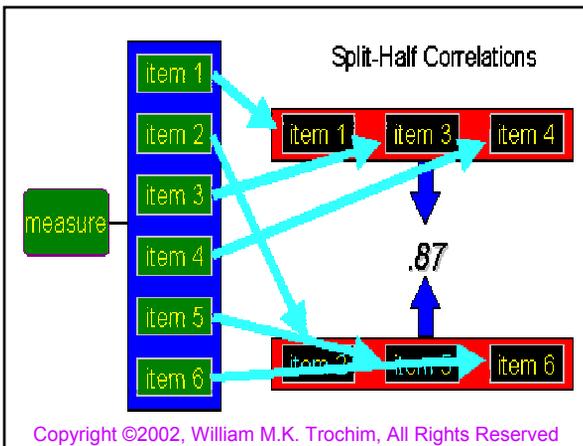
Inter-Item Correlations are an Estimate of Proportion of Variability Due to “True Score” Rather Than Error

Ways of Assessing Reliability from Inter-Item Correlations

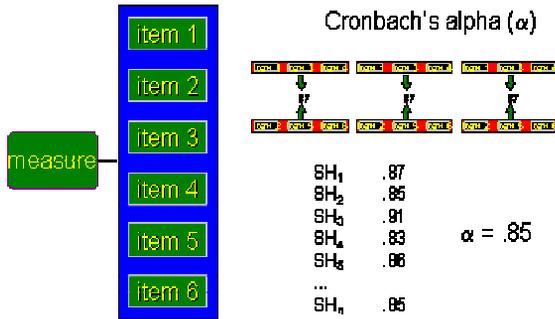
- Could assess average inter-item correlation
- Could assess average item-total correlation
- Could assess split-half correlation
- Alpha is the equivalent of all possible split-half correlations (although not how it is computed)
- Following graphics are from William M.K. Trochim’s on-line methods book, Copyright ©2002, All Rights Reserved
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Cronbach's Alpha is basically a way of summarizing the correlations among all items.



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Results of Reliability Analysis

- {See examples in doc file}
- **GOOD** = all positive moderate to strong correlations, alpha pretty high (> .7 or so)
- **OK** = some positive correlations, no negative correlations, alpha not awful (> .4 or .5 anyway), items not noticeably different from each other
- **PROBLEMS** = some negative correlations (<-.1) AND/OR all correlations are near zero. The items “do not scale”

Solutions to “Problems” in Reliability (Get Help From Me)

- Most correlations positive with high item-total correlations, but a few items have negative correlations with the others indicates you need to drop a few items from the index
- Mixture of strong positive and negative correlations usually indicates that some need to be reverse-scored
- All low mixed positive and negative correlations often indicates coding errors, especially team members reverse scored-differently

If the Items Do Not Scale

- Low mixed positive and negative correlations may indicate that the items “do not scale.” That is, they are not measuring the same concept.
- In this case, you pick the one question that best measures what you had in mind, and any that correlate with it, for your dependent variable.
- The open-ended question can sometimes be helpful in deciding what to do.

Need Original Questionnaires

- If there are problems with your reliability, we will probably need to look at your original questionnaires and how they were coded
- This is the way to detect coding errors and figure out what patterns of response may “mean”

Forming the Index

- We are not studying statistical reliability in depth, just using it as a tool to pick out DV questions that have the highest possible inter-item correlations
- **Index = item1 + item2 + item3 + item4 {etc.}**
- The theory is that the random errors in the items will cancel out, so the sum of the items (the index) will have LESS ERROR of measurement than just one item at a time
- **Your index IS your measure of your dependent variable concept. The “love scale” IS the measure of being in love**

Index = Dependent Variable

- We told the computer to compute your index as the sum of your closed-ended questions.
- You can check this by adding up the scores for one person and seeing if you get the same index.
- (We should have documented this better.)

Convergent Validity with Open-Ended Question

- You can check your open-ended question and the index against each other
- You MUST know what the MEANING of the different categories of the open-ended question is to do the interpretation.
- {See example in doc file of one that “works”}

Testing Your Hypothesis

- Difference of means: dependent variable index by categories of independent variables
- Correlations between dependent variable index and interval-level independent variables

Write-Up Questionnaire

Refer to Assignment
This is just a short outline of points to
emphasize

Style Notes

- #1 Refer to variables by consistent names that reflect question content and are linked to computer variable names. E.g. “abortion is murder” (ABMUR)
- #2 Tables must be labeled
 - Variable names sufficiently explained
 - Content of open-ended categories listed next to numbers

Beginning

- Title Page
- Abstract
- Introduction
- AS BEFORE

Sampling

- Explain how you got the subjects
- Don't worry about convenience sample
- Do consider whether you think you got a good mixture of people for the topic you are studying.

Measures

- Independent variables: these are the questions you used. Brief evaluation of whether there were any problems.
- Dependent variable closed-ended questions.
 - Discuss development
 - Define high end of scale
 - Explain reverse scoring, with two examples
- Dependent variable open-ended question: give details on coding (how you grouped the answers, with explanations of how you decided who went into each group)

Validity of Dependent Variable

- Variability: either discuss problems or say why OK and give example of variable with the worst variability
- Brief summary of reliability, index construction
- Open by index: recopy table with LABELS for the open categories (OK to rearrange them). Discuss whether they are consistent

Results

- Univariate: Brief discussion of frequencies.
- Bivariate: Test of hypothesis with difference of means (for index) or correlation. PREPARE TABLES
- Other bivariate results. PREPARE TABLES
- Discussion
