

TO: Students in CJ 605, SP)4
 FROM: RBT
 DATE: 2/16/04
 RE: Answers to some of your questions

Here are some of the questions that I received, and attempts at answers. You folks had a lot of good questions. I will endeavour to answer just some of them at this point.

When viewing within and between data how do you interpret them in relation to one another? In the following way. You can express each as a part of the total. Look at the ANOVA for HEALTHA. The outcome has a certain amount of TOTAL variance, which you get by adding up the variances of the Rijs and the U0js (.69552). The program is saying that the variance of the item is due to two sources – between groups and within groups (plus error). You can talk about the relative size of each, expressed as a percentage of the total. But the relation is one of independence – these are two separate variance components that are separated out at the beginning of the analysis.

Final estimation of variance components:

Random Effect		Standard Deviation	Variance Component	df	Chi-square	P-value
INTRCPT1,	U0	0.17276	0.02985	44	253.54053	0.000
level-1,	R	0.81588	0.66567			

So from this table you need to do some calculations, like the following:

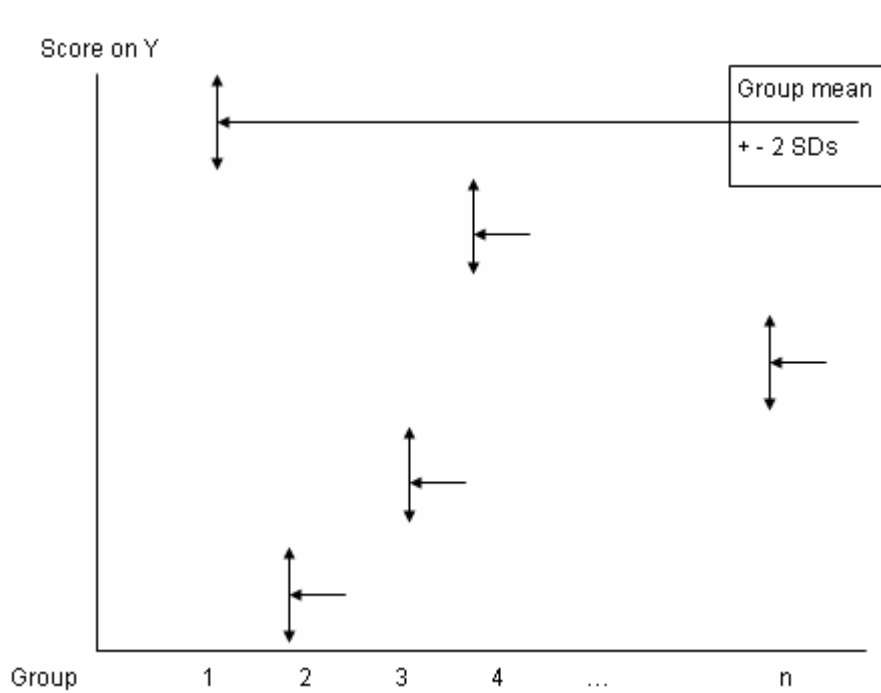
Between	0.02985	4.29%
Within	0.66567	95.71%
Total	0.69552	100.00%

The reliability estimate: Is higher always necessarily good? Is it analogous to correlation? Do we get a reliability estimate for each variable? How will a reliability estimate lower than .50 effect our outcome.

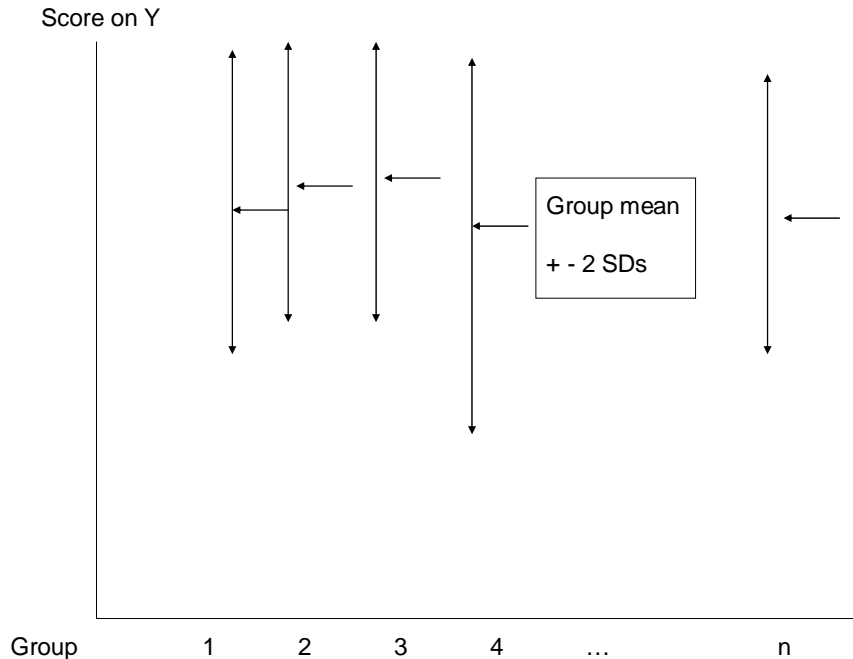
Reliability is concerned with the reliability of the group mean scores on the outcome.

IN THE ANOVA MODEL reliability (also referred to as Lambda) “measures the ratio of the true score or parameter variance, relative to the observed score or total variance of the sample mean Y_j . The reliability Lambdaj will be close to 1 when (a) the group means B_{0j} , vary substantially across level-2 units (holding constant the sample size per group); or (b) the sample size N_j is large.” (R&B, p. 46).

Stated a little less technically: if there are a lot of people in the group, and the scores in each group agree well with each other, and if the group means are quite different from one another, reliability will be high:



Alternatively: if group sizes are smaller, and group means are not as clearly different from one another, and people within most groups disagree with one another on the outcome variable, then reliability will be low.



Empirical Bayes?

The group means estimated by HLM (B^*0j) are not the observed group means (R&B, p. 46). Rather they are group means which have been “shrunk” toward the grand mean ($G00$). The Bayes estimator “is an optimal weighted combination of these two.”

The Empirical Bayes (EB) estimators for group means are more likely to be shrunk more toward the grand mean when:

- group size is smaller
- the group mean is farther from the grand mean
- people in the group disagree more with one another on the outcome

The EB estimators for group means are less likely to be shrunk more toward the grand mean when:

- group size is larger
 - the group mean is closer to the grand mean
- people in the group agree more with one another on the outcome

I am a little confused about where the predictors are going to show up; i.e., how are they interpreted? It depends if the predictor is a Level 1 predictor or a Level 2 predictor and how the predictor is centered.

I understand the difference between ecological and contextual models but I am confused as to how HLM fits into that distinction. Somewhere in the middle? No; actually HLM represents a whole different variety. HLM represents a multilevel model. Here is the distinction:

ECOLOGICAL MODEL

Aggregate Level $X \rightarrow Y$

Individual Level

CONTEXTUAL MODEL

Aggregate Level X
 Individual Level $X \rightarrow y$

MULTI-LEVEL MODEL

Aggregate Level $X \rightarrow Y$
 Individual Level $X \rightarrow \rightarrow y$

Please talk more about the idea of creating the theories behind a contextual variable. How do you decide which variables are relevant? This question is too broad; read the suggested papers by Hauser.

What are we actually doing when we weight the variables? We don't weight the variables; we weight the CASES. The idea is to have groups of people in the sample in the same proportion as they exist in the population. See Taylor (1994) Research Methods in Criminal Justice New York: McGraw Hill p. 200.

Would you use the variance components as an R squared value? In the ANOVA model we have not yet entered any predictors, so nothing is yet explained. All that we know is that a certain percentage arises from between-group differences. In the example

above with health status we know that 4.29% comes from differences between groups. If we could find group-level variables that could explain ALL of those between-group differences, then we could explain 4.29% of the total variance.

What you will want to do is to look at the RESIDUAL variance at each level, AFTER you have entered predictors, and calculate how much variance remains at each level.

Centering?