

## Interaction in MLM

(Tabachnick & Fidell, 2013)

Interactions of interest in MLM can be within a level or across levels. The small-sample example has only one predictor at each level. Had there been another level-1 predictor, such as skier age, the interaction between skill and age (if included in the model) would be a within-level interaction. However, if the interaction between skill and mountain is added to the small-sample example it is across levels, because skill is measured at level one and mountain at level two.

Inclusion of interactions is straightforward in MLM and follows the conventions of multiple regression: continuous predictors from which interactions are formed are centered and the interaction term is added. The interaction is formed in the small sample data set from the centered level-1 predictor, SKILL, and the level-2 predictor, MOUNTAIN (DEV\_SKL\*MOUNTAIN). This interaction tests whether the relationship between skill and speed (measured at the skier level) differs for the two mountains or not. Note that the interaction is added to the model equation after the main effects included in it. Changing the order of entry can affect parameter estimates for fixed effects even when Type III (default) sums of squares are used.

Table 17 shows SAS syntax and selected output for a model which includes the skill by mountain interaction. The table of fixed effects shows that there is no statistically significant difference in the relationship between skill and speed between the two mountains ( $p = .8121$ ). (Note that this cross-level interaction is indeed predictive of the DV in the full NELLS-88 data set from which this small sample was taken and relabeled.)

Reference:

Tabachnick, B. G., & Fidell, L. S. (2013). *Using Multivariate Statistics*. Pearson Education.

<https://books.google.com/books?id=ucj1ygAACAAJ>