

Exercise 13: Analysis of Multi-way Tables

Due December 3 2013



Three birds present in Colombia's coffee growing regions, with different levels of vulnerability - *Grallaria guatemalensis* (Scaled Antpitta; VI=1), *Melanerpes formicivorus* (Acorn Woodpecker; VI=5), and *Thraupis episcopus* (Blue-gray Tanager; VI=8).

The rarity of a species can be classified according to three factors: (1) geographical distribution (wide or narrow); (2) habitat specificity (broad or restricted); and (3) local abundance (abundant or scarce) (Rabinowitz *et al.* 1986), and from this, a vulnerability index can be constructed to reflect conservation priority (Kattan 1992). The data in the file *VI.txt* (Sánchez-Clavijo *unpublished*) contains the classification according to these levels of rarity of 198 species of birds that live in Colombia's coffee growing regions. The idea behind constructing this dataset was to evaluate whether the three categories of rarity were independent for this set of birds.

1. Test the hierarchical models and provide a table with your results in the same format as shown in class (see **slide 39** of the Categorical Data presentation for an example) - 4 points.
2. Test the significance of hypotheses including three-factor interaction, two-factor interactions as conditional independence, and the marginal independence - 4 points.
3. Using this information, interpret the biological relevance of your findings - 2 points.

References

Kattan, G. H. 1992. Rarity and Vulnerability: the Birds of the Cordillera Central of Colombia. *Conservation Biology* 6: 64–70.

Rabinowitz, D., S. Cairns & T. Dillon. 1986. Seven Forms of Rarity and their Frequency in the Flora of the British Isles. In Soule, M. E. (Ed.) 1986. *Conservation Biology: The Science of Scarcity and Diversity*. Sinauer Associates, Inc. Publishers, Sunderland, Massachusetts, U.S.A.