Chapter Five

- Four Dimensional and higher tables
- The 3 sampling schemes again
- Stepwise methods
- Looking at all possible effects (Skip Section 5.4 for now)

Four (and higher) dimensional tables

- Same basic principles apply.
- Now there are lots of models: 113 hierarchical models for a 4-way table (all include the four main effects).
- Makes model selection more difficult.
- Makes selecting a hierarchy of models in advance especially tough (but see the detergent example in the text).

The 3 main sampling schemes

1. Poisson
2. Multinomial
3. Product multinomial

All lead to the same MLEs provided "… we include in our model the μ terms fixed in scheme 3 (p. 73)." This refers To the μ terms corresponding to (joint) marginals fixed by

This means include all interactions among explanatory variables, whether or not it helps model fit. Applies to 3-d tables too (p. 31). More in Chapter 6.

The 3 main sampling schemes

- All lead to the same MLEs provided "… we include in our model the μ terms fixed in scheme 3 (p. 73)."
- This refers to the μ terms corresponding to (joint) marginals fixed by the product multinomial design.
- In other words, to fit a product multinomial model, use a standard log-linear model that includes all interactions among explanatory variables, whether or not they help model fit. Applies to 3-d tables too (p. 31).
- More detail in Chapter 6

Stepwise model selection

- Forwards
- Backwards
- Mixed

$$\begin{aligned}\log m_{ijk} = \mu \quad &+ \quad \mu_{1(i)} + \mu_{2(j)} + \mu_{3(k)} \\ &+ \quad \mu_{12(ij)} + \mu_{13(ik)} + \mu_{23(jk)} \\ &+ \quad \mu_{123(ijk)}\end{aligned}$$

"Should not be thought of as automatic devices for deciding upon appropriate log-linear models." (p. 80)

Try the detergent data of Table 5-1

1. Water softness (Soft Medium Hard)
2. Previous use of detergent *M* (Yes No)
3. Water temperature (High Low)
4. Brand preference in a blind test (*X M*)

- No peeking
- Don’t automatically include interactions among explanatory variables, though that would simplify matters.