**Log Linear Models – degrees of freedom**

Example – all possible outcomes for A\*B\*C (4x2x2)

|  |  |  |  |
| --- | --- | --- | --- |
| **Model** | **Effects** | **df** (equation) | **df** (calculated) |
| 1 | A + B + C | df1 = a\*b\*C-(a-1)-(b-1)-(c-1)-1 | 10 |
| 2 | A\*B + C | df2 = df1-(a-1)\*(b-1) | 7 |
| 3 | A\*C + B | df3 = df1-(a-1)\*(c-1) | 7 |
| 4 | A + B\*C | df4 = df1-(b-1)\*(c-1) | 9 |
| 5 | A\*B + A\*C | df5 = df2-(a-1)\*(c-1) | 4 |
| 6 | A\*B + B\*C | df6 = df2-(b-1)\*(c-1) | 6 |
| 7 | A\*C + B\*C | df7 = df3-(b-1)\*(c-1) | 6 |
| 8 | A\*B + A\*C +B\*C | df8 = df7-(a-1)\*(b-1) | 3 |
| 9 | A\*B\*C | df9 = df8-(a-1)\*(b-1)\*(c-1) | 0 |

* Model 1
  + Full independence (A + B + C)
  + Degrees of freedom is product of all categorical outcomes (N) minus the degrees of freedom for each individual variable minus 1.
* When you add an interaction term, the portion you subtract from the degrees of freedom set the product of degrees of freedom (e.g. (a-1)\*(b-1)
* Whenever you add an interaction term (e.g. A \* B) to an independent term (e.g. A\*B  **+** C), you need to subtract the value from a model with one less interaction term (for this model, there are a maximum of 3 interaction terms)
* Model 9
  + Full dependence (A \* B \* C)
  + Degrees of freedom is zero;