

Burrito Exercise

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Research Question

- How does hunger level and cost effect the overall rating of the burrito?

Data processing

- We prepared the data by removing the rows that didn't have a data entry.

```
stopifnot(complete.cases(y) != is.na(y))  
ok = complete.cases(x, y)  
x = x[ok,]  
y = y[ok]  
z = x[,3]
```

Model

1. BLMM

2. BLM

Block Gibbs sampler

$$Y_{ij}|\alpha, \beta, \gamma_j, \sigma^{-2} \sim N(\alpha + X_{ij}^T \beta + \gamma_j, \sigma^2)$$

$$\alpha \sim Flat$$

$$\beta \sim N(0, \tau^2 I)$$

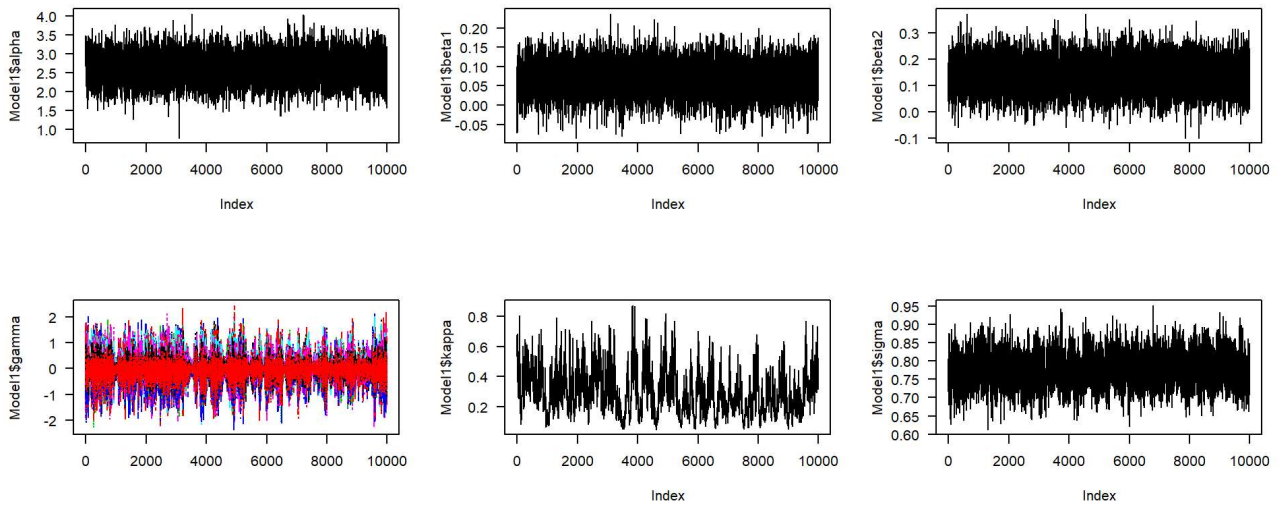
$$\gamma_j|\kappa^{-2} \sim N(0, \kappa^2)$$

$$\sigma^{-2} \sim Gamma(a_1, a_2)$$

$$\kappa^{-2} \sim Gamma(b_1, b_2)$$

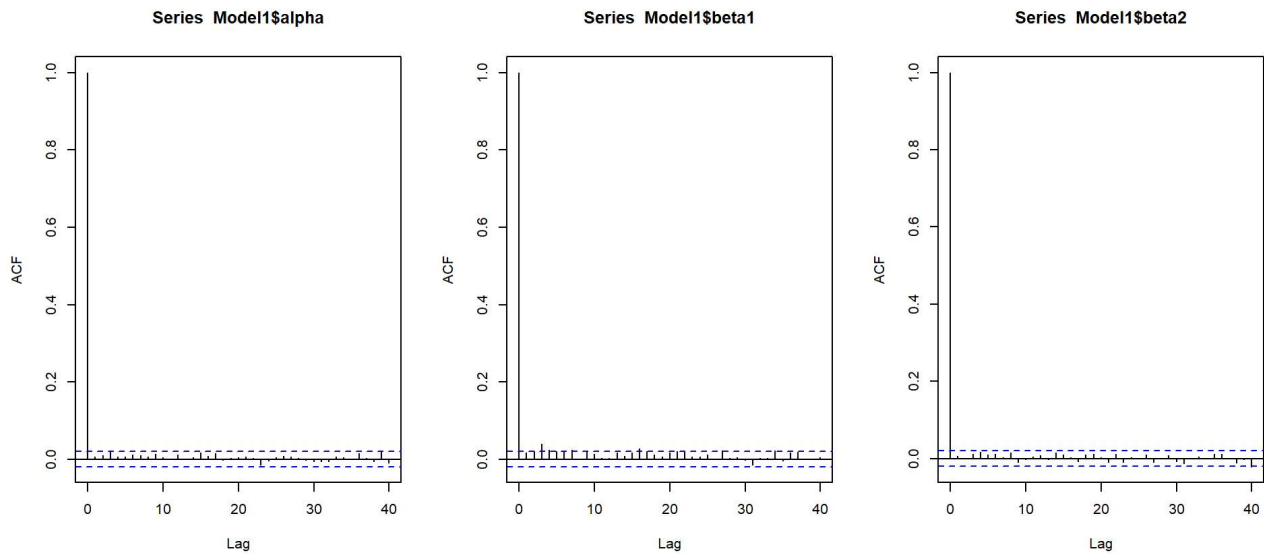
Diagnostics

- Check convergence



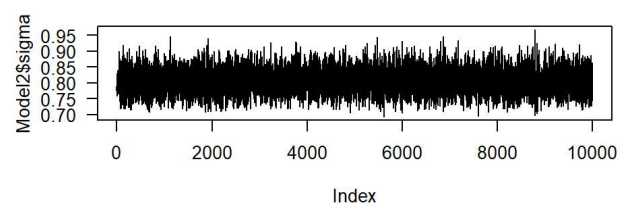
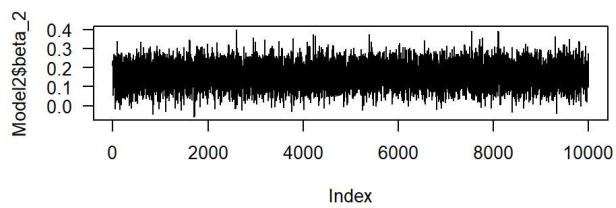
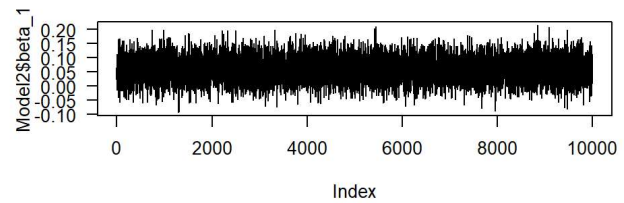
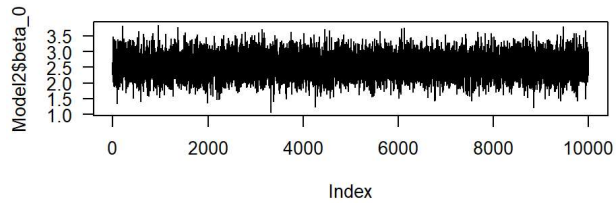
Diagnostics

- ACF



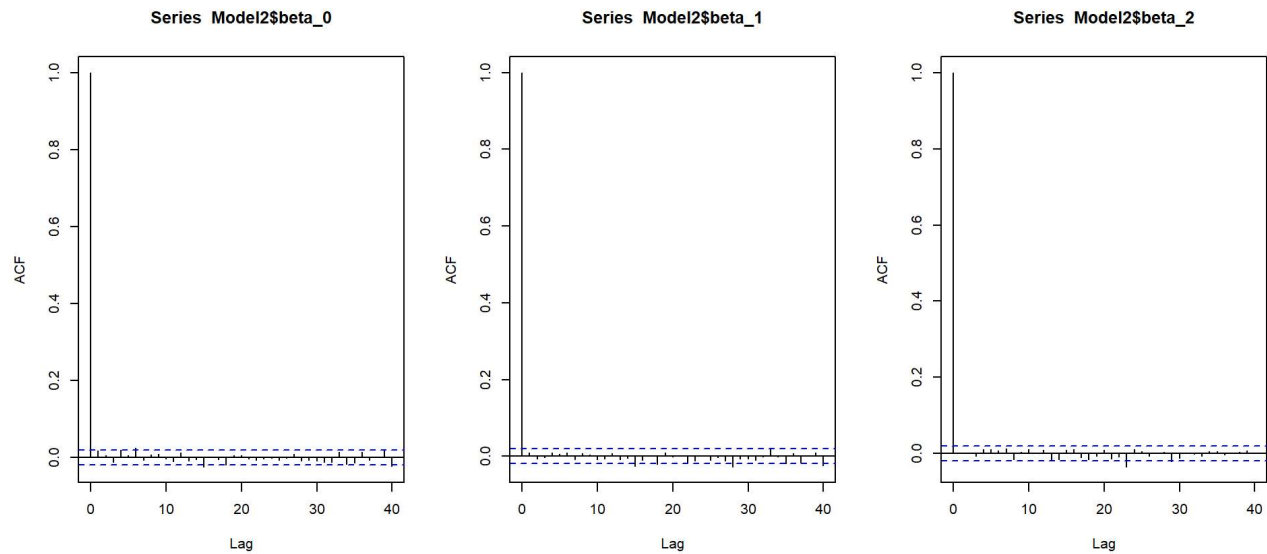
Diagnostics

- Check convergence



Diagnostics

- ACF



Results

##		mean	sd	quantile_lower	quantile_upper
##	alpha	2.6285	0.3717	1.8802	3.354
##	beta1	0.0677	0.0416	-0.0132	0.149
##	beta2	0.1404	0.0608	0.0224	0.259
##	kappa	0.2954	0.1396	0.0797	0.598
##	sigma	0.7720	0.0431	0.6902	0.859

##		mean	sd	quantile_lower	quantile_upper
##	beta0	2.5578	0.3599	1.8573	3.263
##	beta1	0.0603	0.0423	-0.0221	0.143
##	beta2	0.1593	0.0588	0.0447	0.276
##	sigma	0.8064	0.0370	0.7366	0.883

Conclusions

The reviewer did not greatly effect the outcome of the overall rating of the burrito. We found that the hunger level was over twice as important as the cost of the burrito.