

## Appendix R

### Interaction analysis for exclusive vs rating

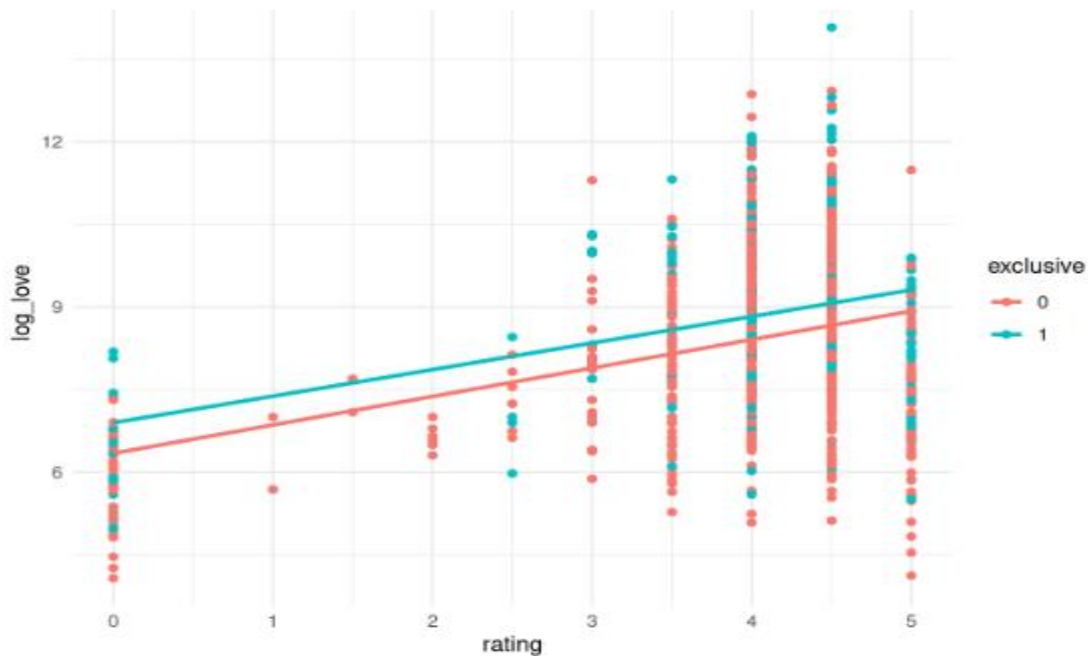
The interaction test between exclusive vs rating predictors suggests no statistically significant interaction effect. The F-test yielded an F-value of 0.124, with a corresponding p-value of 0.725. We fail to reject the null hypothesis at a significance level of  $\alpha = 0.01$ , indicating no significant interaction effect between these two predictors on log love. Therefore, the regression lines for exclusive vs rating are parallel across different levels of these predictors.

### Interaction plot for exclusive vs rating

```

{r}
ggplot(data = sephoraData, aes(y = log_love, x = rating, color = exclusive))+
  geom_point() +
  geom_smooth(se = FALSE, method = "lm") +
  theme_minimal()

```



## Analysis of variance

```

```{r}
inter_model1 <- lm(log_love ~ rating*exclusive, data = sephoraData)

anova_model1 <- anova(inter_model1)
kbl(anova_model1) %>%
kable_classic_2(full_width = F)
```

```

|                    | Df  | Sum Sq  | Mean Sq | F value | Pr(>F) |
|--------------------|-----|---------|---------|---------|--------|
| rating             | 1   | 290.27  | 290.27  | 132.90  | 0.00   |
| exclusive          | 1   | 35.51   | 35.51   | 16.26   | 0.00   |
| Rating * exclusive | 1   | 0.27    | 0.27    | 0.12    | 0.73   |
| Residuals          | 996 | 2175.43 | 2.18    | NA      | NA     |

## F-test Analysis

```

```{r}
F_start <- round(qf(.99, anova_model1$Df[3], anova_model1$Df[4]), 3)
```

```

$$H_0 : \beta_1 = 0$$

$$H_A : \beta_1 \neq 0$$

$$\alpha = 0.05$$

$$\text{Reject if } F^* > F(0.99, 1, 996) = 6.66$$

$$F^* = 0.124$$

$$P_{value} = 0.725$$

From the ANOVA output, we have  $F^* = 0.124$ , we fail to reject  $H_0$  and conclude that the interaction terms should be dropped from the model. The p-value associated with this test is 0.725