DO ONLINE RESTAURANT REVIEWS REALLY HELP?

Chen Xuan May 2025
COMP2501

XIAMEN (AMOY)

My hometown<3 A tourist city with great food

THERE'S NO GOOD FOOD IN XIAMEN!

tourists

plenty of information here ->

大众点评
发现品质生活

DON'T KNOW HOW TO PICK?

RATING...?

Michelin selected list 2024 (33 restaurants)

NEWS & VIEWS 5 minutes 03 DECEMBER 2024

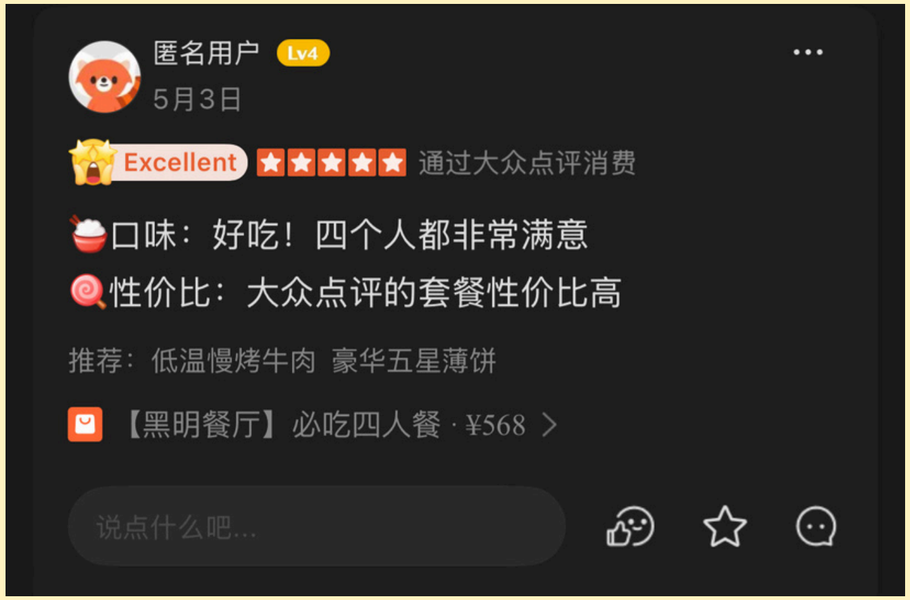
The First MICHELIN Guide for Fujian Province Unveils 5 New Stars and Highlights Affordable Local Gems

Local restaurant recommendation list 2024 (66 restaurants)

```
> amoy_michelin |>
+   summarise(avg_rating = round(mean(rating),2))
  avg_rating
1       4.47
> amoy_local |>
+   summarise(avg_rating = round(mean(rating),2))
  avg_rating
1       4.21
```

REVIEWS...?

V.S.

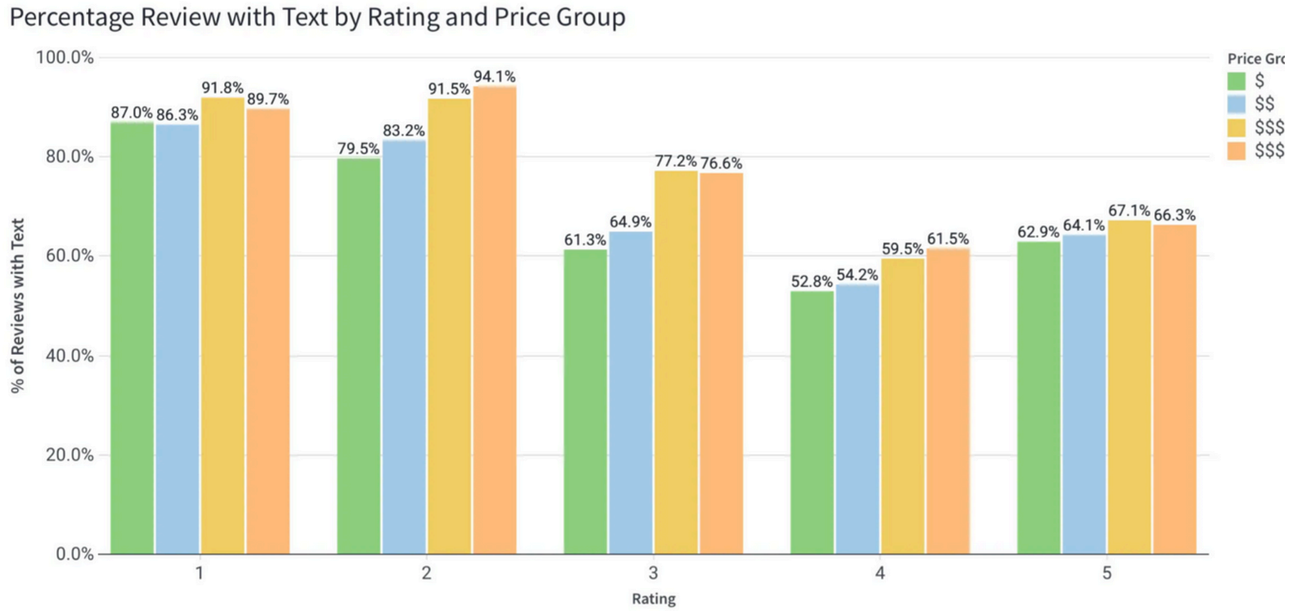


well-drafted negative reviews & brief positive reviews?

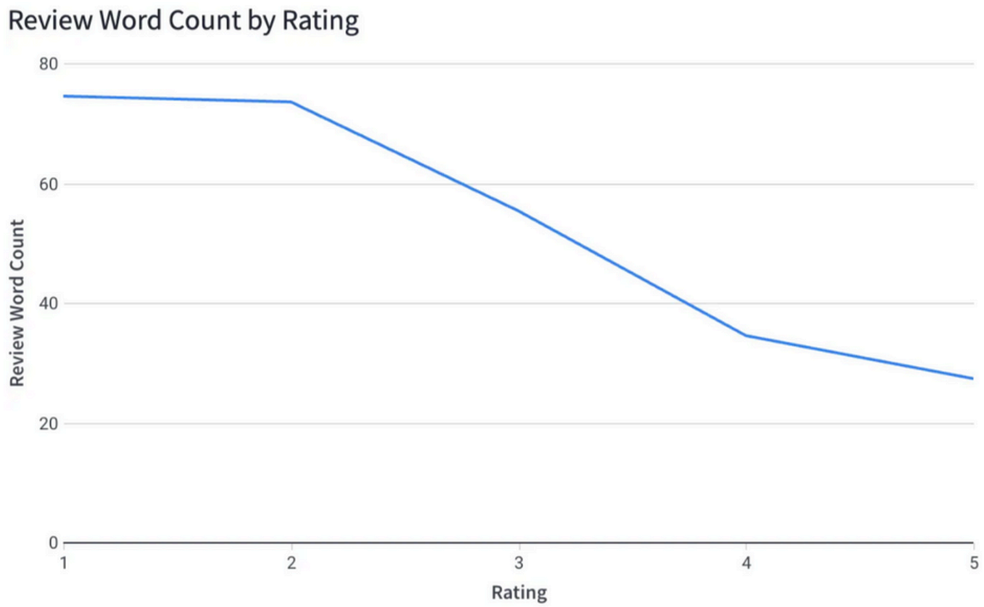
EXISTING STUDIES

Low rating reviews:
text-rich, more word counts

The Vocal Minority: Text-rich Feedback in Low Ratings



Expressive Dissatisfaction: More Words in Lower Ratings



KEY QUESTION

Are online restaurant reviews truly helpful for consumers' decisions? Or there're biases that we need to be aware of?

make better use of the information available

DATA + TOOLS

北京大学 开放研究数据平台
Peking University Open Research Data

大众点评评论数据.csv Version 1.0

This file is part of "Restaurant review data on Dianping.com".

Dataset Citation

李, 通, 2018, "Restaurant review data on Dianping.com", https://doi.org/10.18170/DVN/GCIUN4, Peking University Open Research Data Platform, V1

49579 reviews
from 18 canto restaurants
in Guangzhou, 2018

data	49579 obs. of 23 variables

WEICIYUN

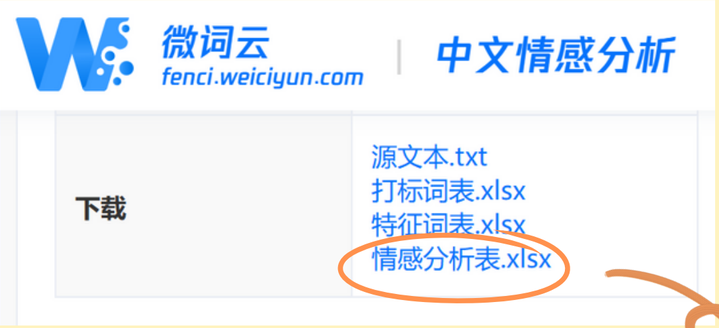
Word segmentation
and sentiment analysis
for Mandarin Chinese

RSTUDIO

Data wrangling and analysis

```
library("dplyr")
library("readxl")
library("ggplot2")
library("ggthemes")
library("tidyverse")
```

SENTIMENT ANALYSIS



positive/neutral/negative

positive - negative

A	B	C	D	E
Content_review	sentiment_polarity	sentiment_score	positive_score	negative_score
来广州出差，住在附近的康莱德酒店，晚上	0	20	35.75	15
?•??•??前言本来是朋友约我们来的，结	-1	8	14.75	7.8
朋友结婚选择在这里摆酒，在猎德A出口出	-1	10	23.25	13.8
据说是个老子号，听名字就感觉很广东??，	-1	12	18.75	10.75
周末不煮饭的日子，偶来啦??。中午12点多	-1	11	5.5	6.25
环境特别优雅，一进门让人感觉特别舒服，	-1	4	11.25	7
晚上看小蛮腰，坐公交坐到这块，然后搜了	1	25	32.95	7.5
交通便利，昨天是放假前一天，不敢开车去	-1	3	11.75	8
晚上差不多七点半到的那里，要排队，表示	0	10	18	6
先说环境不错！不会想其他分店桌与桌之间	-1	-6	14	13.8
慕名而来，环境非常高大上，但是空调不给	0	-1	24.25	10
领导请客吃炳胜，环境可以，我地坐3楼大	0	18	21.5	7
鼎鼎大名的食肆，仿佛人气有所滑落，门前	-1	2	8	5
来广州游玩朋友招待我们说这家是在广州很	-1	24	15.55	14.2
国庆日来省博参观，中午来医肚，近一点都	-1	-2	6.5	9

DATA WRANGLING

```r
#data wrangling
sentiment <- read_excel("C:\\Users\\Ryleigh Chen\\Desktop\\sentiment_analysis.xlsx")
write.csv(sentiment,"C:\\Users\\Ryleigh Chen\\Desktop\\sentiment_analysis.csv", row.names = FALSE
data <- read.csv("C:\\Users\\Ryleigh Chen\\Desktop\\dianping_pku.csv", fileEncoding = "GB18030")
sentiment_analysis <- read.csv("C:\\Users\\Ryleigh Chen\\Desktop\\sentiment_analysis.csv")
sentiment_analysis <- distinct(sentiment_analysis, Content_review, .keep_all = TRUE)
data <- data |>
  head(50000) |>
  distinct(Content_review, .keep_all = TRUE) |>
  inner_join(sentiment_analysis, by = "Content_review")
data <- data |>
  mutate(
    review_len = nchar(Content_review),
    sentiment_score = sentiment_score / review_len,
    Price_per_person = as.numeric(Price_per_person),
    Price_per_person = ifelse(Price_per_person > 10000, NA, Price_per_person),
    sentiment_type = case_when(
      sentiment_polarity == 1 ~ "Positive",
      sentiment_polarity == 0 ~ "Neutral",
      sentiment_polarity == -1 ~ "Negative"),
    Score_environment = as.numeric(Score_environment) + 1,
    Score_taste = as.numeric(Score_taste) + 1,
    Score_service = as.numeric(Score_service) + 1,
    sentiment_intensity = round((positive_score + negative_score)/review_len, 2),
    price_group = case_when(
      is.na(Price_per_person) ~ NA_character_,
      Price_per_person <= 60 ~ "low",
      Price_per_person <= 150 ~ "medium",
      TRUE ~ "high"
    ),
    price_group = factor(price_group,
                         levels = c("low", "medium", "high"))
  )
```

filtering out unrealistic prices

New Variables

review_len

length of the review content

sentiment_type

positive

neutral

negative

sentiment_intensity

positive + negative

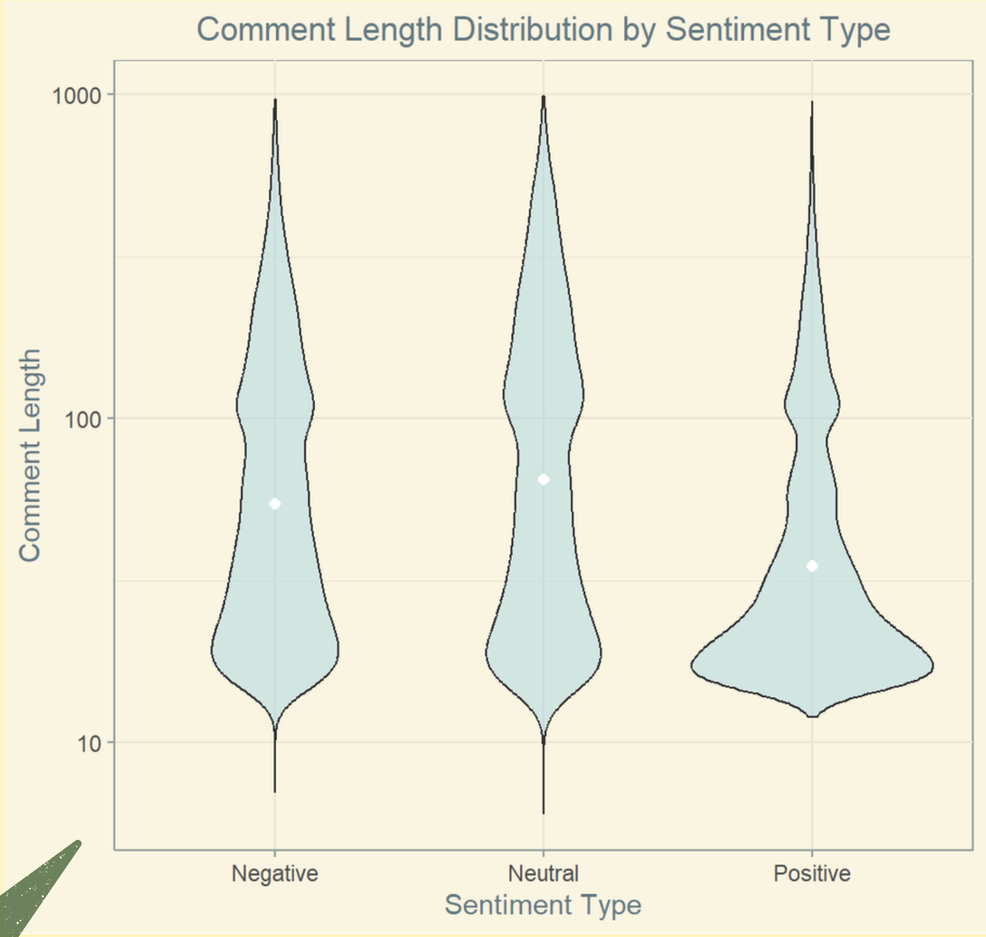
how intense the tone is

price_group

three price ranges for Price_per_Person

ANALYSIS

STRUCTURAL BIAS IN REVIEWS




```r
#Comment Length Distribution by Sentiment Type
ggplot(data, aes(factor(sentiment_polarity), review_len)) +
  scale_y_log10() +
  geom_violin(fill = "lightblue", alpha = 0.5) +
  stat_summary(fun = "mean", geom = "point", shape = 16,
               size = 2, color = "white")+
  labs(title = "Comment Length Distribution by Sentiment Type",
       x = "Sentiment Type",
       y = "Comment Length") +
  theme_solarized() +
  theme(plot.title = element_text(hjust = 0.5))
```

```
> cor.test(data$sentiment_type, data$review_len, method = "spearman")

        Spearman's rank correlation rho

data:  data$sentiment_type and data$review_len
S = 2.5304e+13, p-value < 2.2e-16
alternative hypothesis: true rho is not equal to 0
sample estimates:
       rho
-0.2457926
```

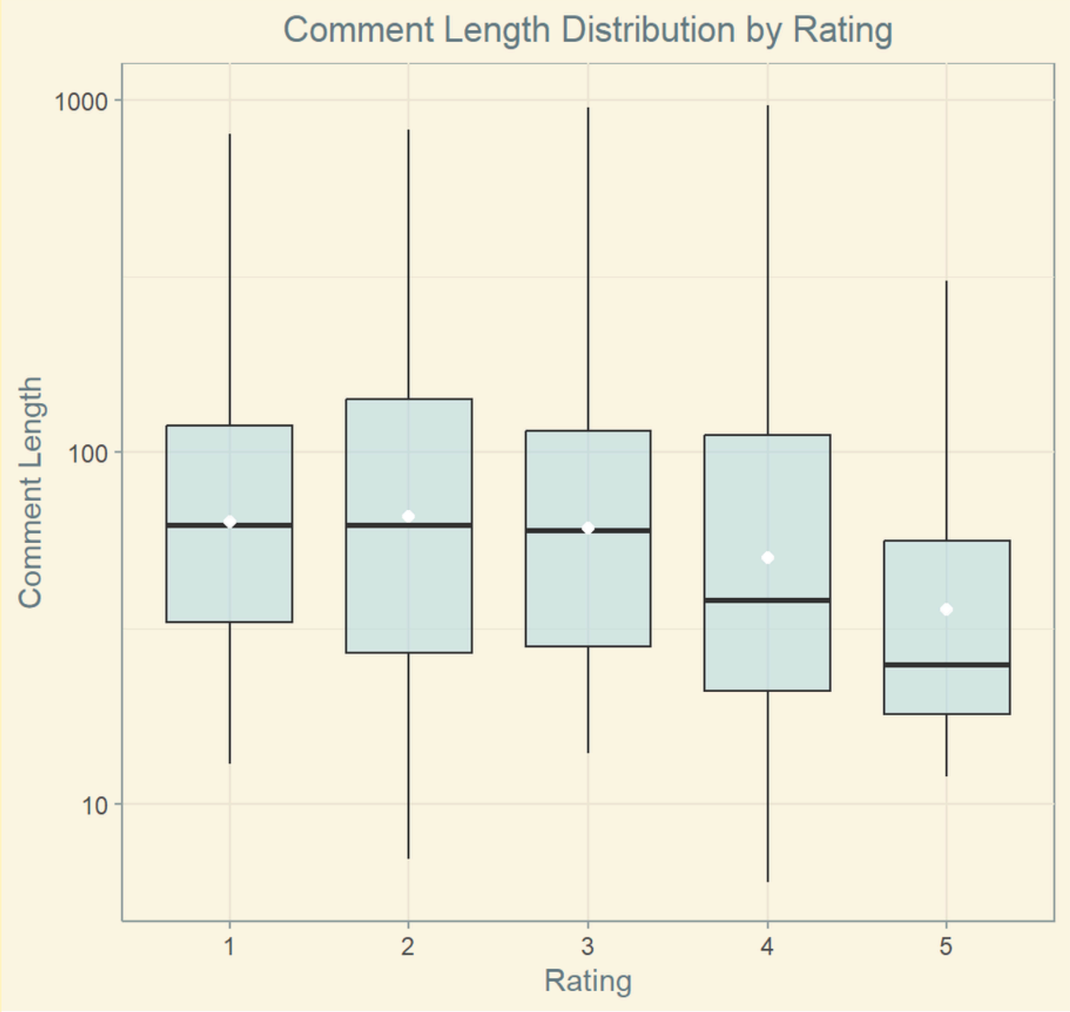
STRUCTURAL BIAS IN REVIEWS

```r
#Comment Length Distribution by Rating
ggplot(data, aes(factor(Rating), review_len)) +
  scale_y_log10() +
  geom_boxplot(fill = "lightblue", width = 0.7, alpha = 0.5, outlier.shape = NA) +
  stat_summary(fun = "mean", geom = "point", shape = 16,
               size = 2, color = "white")+
  labs(title = "Comment Length Distribution by Rating",
       x = "Rating",
       y = "Comment Length") +
  theme_solarized() +
  theme(plot.title = element_text(hjust = 0.5))
```

```
> cor.test(data$Rating , data$review_len, method = "spearman")

        Spearman's rank correlation rho

data:  data$Rating and data$review_len
S = 2.5279e+13, p-value < 2.2e-16
alternative hypothesis: true rho is not equal to 0
sample estimates:
       rho
-0.2445577
```



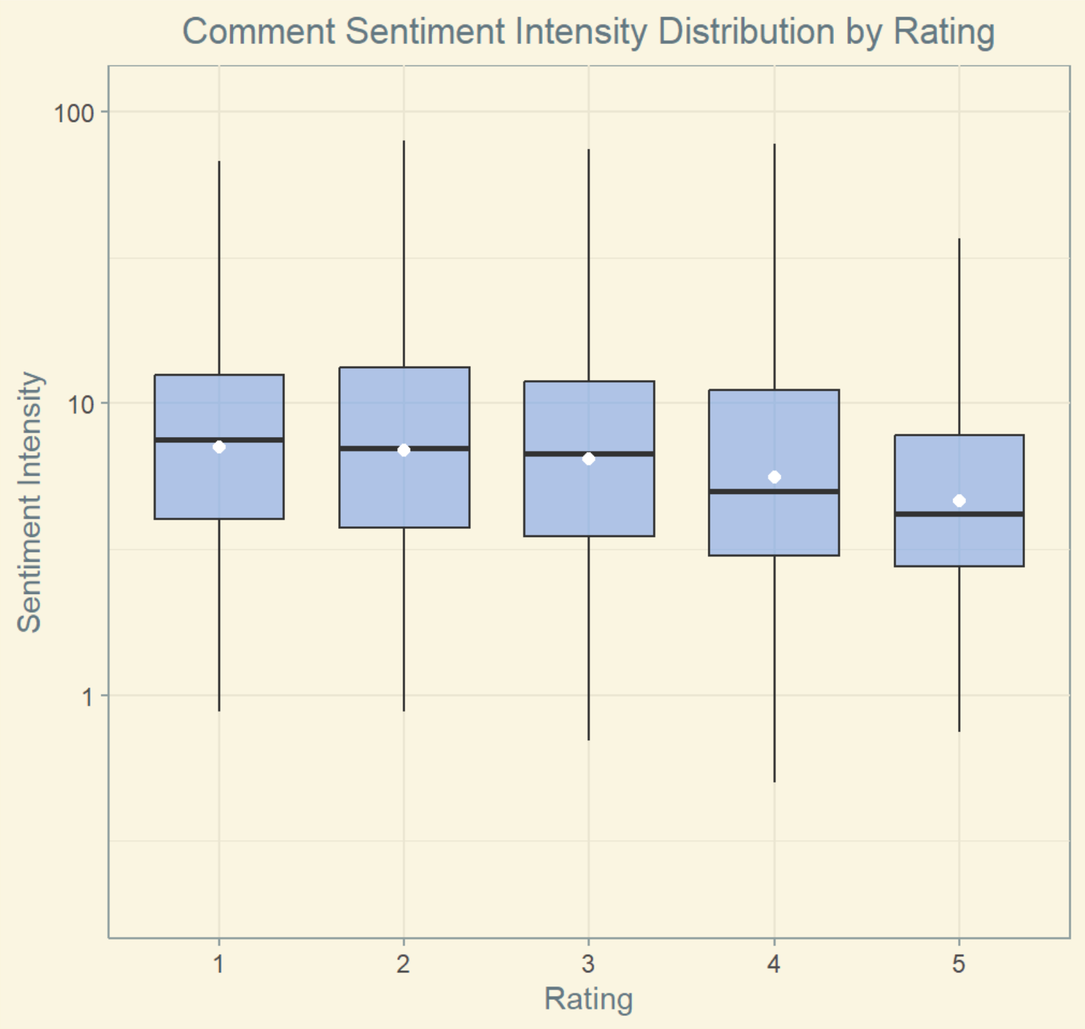
STRUCTURAL BIAS IN REVIEWS

```r
#Comment Sentiment Intensity Distribution by Rating
ggplot(data, aes(factor(Rating), sentiment_intensity)) +
  scale_y_log10() +
  geom_boxplot(fill = "cornflowerblue",
               width = 0.7,
               alpha = 0.5,
               outlier.colour =NA) +
  stat_summary(fun = "mean", geom = "point", shape = 16,
               size = 2, color = "white")+
  labs(title = "Comment Sentiment Intensity Distribution by Rating",
       x = "Rating",
       y = "Sentiment Intensity") +
  theme_solarized() +
  theme(plot.title = element_text(hjust = 0.5))
```

```
> cor.test(data$Rating , data$sentiment_intensity, method = "spearman")

        Spearman's rank correlation rho

data:  data$Rating and data$sentiment_intensity
S = 2.3329e+13, p-value < 2.2e-16
alternative hypothesis: true rho is not equal to 0
sample estimates:
       rho
-0.1485597
```



WHAT DO CONSUMERS CARE MORE ABOUT?

Taste 5.0 ★★★★★

Environment 5.0 ★★★★★

Service 5.0 ★★★★★

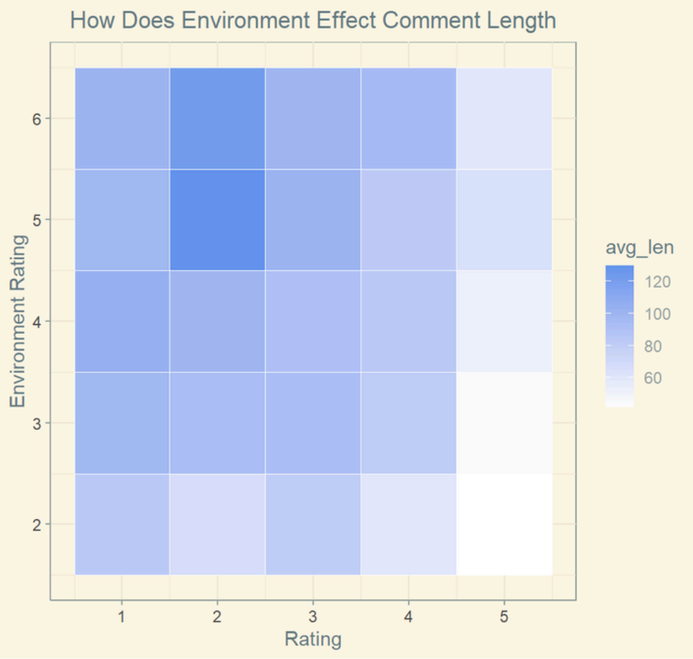
Which aspect contributes more on the structural bias?

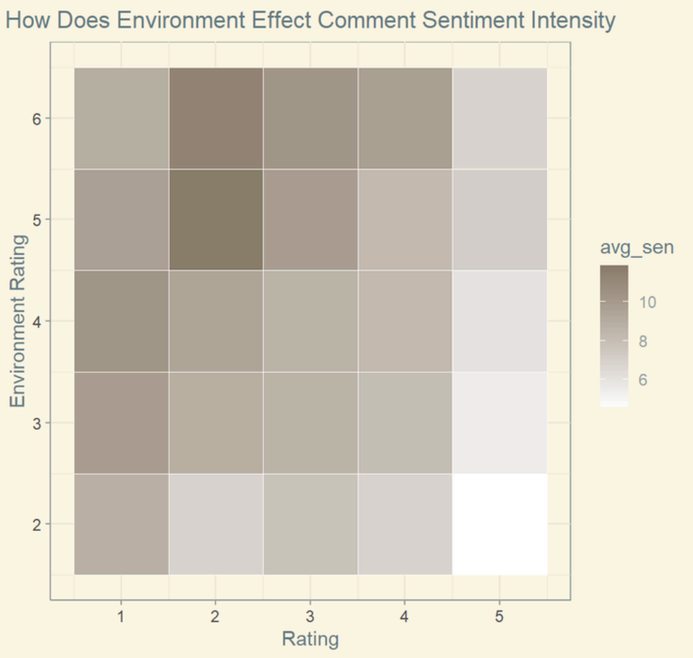
```
> names(data)
 [1] "Review_ID"          "Merchant"           "Rating"             "Score_taste"
 [5] "Score_environment"  "Score_service"      "Price_per_person"   "Time"
 [9] "Num_thumbs_up"      "Num_.response"      "Content_review"     "Reviewer"
[13] "Reviewer_value"     "Reviewer_rank"      "Favorite_foods"     "sentiment_polarity"
[17] "sentiment_score"    "positive_score"     "negative_score"     "review_len"
[21] "sentiment_intensity" "price_group"       "sentiment_type"
```

SUB-RATINGS' EFFECT

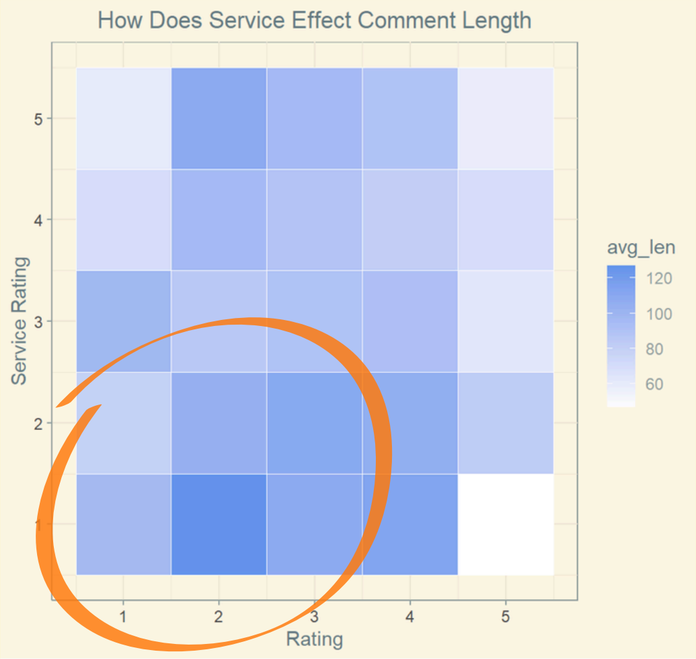
```r
environment_data <- data |>
  filter(!is.na(Score_environment)) |>
  group_by(Score_environment, Rating) |>
  summarise(avg_len = round(mean(review_len),2),avg_sen = round(mean(sentiment_intensity),2))
ggplot(environment_data, aes(Rating, Score_environment, fill = avg_len)) +
  geom_tile(color = "white") +
  scale_fill_gradient(low = "white", high = "cornflowerblue")+
  theme_solarized()+
  labs(title = "How Does Environment Effect Comment Length",
       x = "Rating",
       y = "Environment Rating")+
  theme(plot.title = element_text(hjust = 0.5))
ggplot(environment_data, aes(Rating, Score_environment, fill = avg_sen)) +
  geom_tile(color = "white") +
  scale_fill_gradient(low = "white", high = "bisque4")+
  theme_solarized()+
  labs(title = "How Does Environment Effect Comment Sentiment Intensity",
       x = "Rating",
       y = "Environment Rating")+
  theme(plot.title = element_text(hjust = 0.5))
```

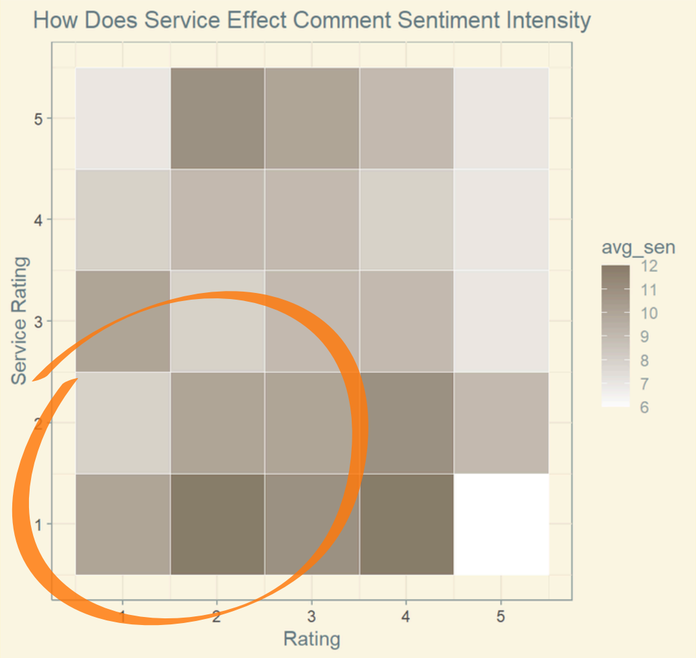
ENVIRONMENT



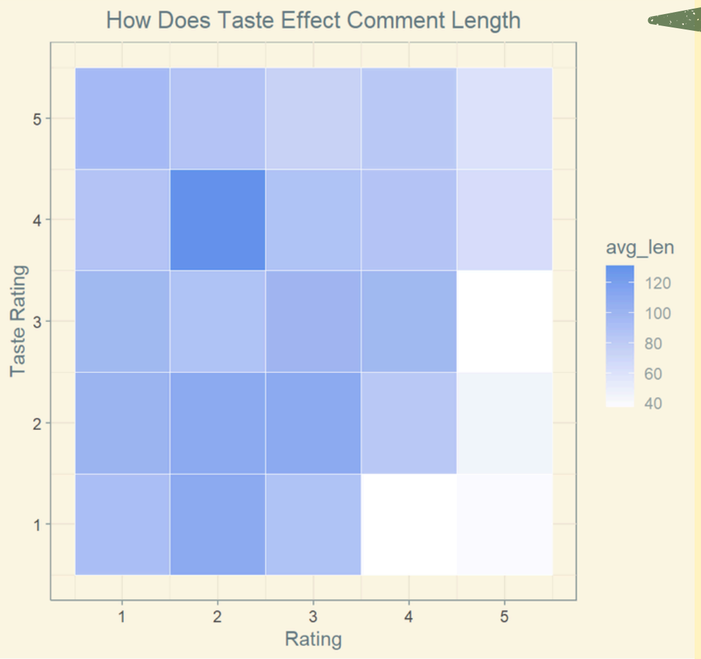


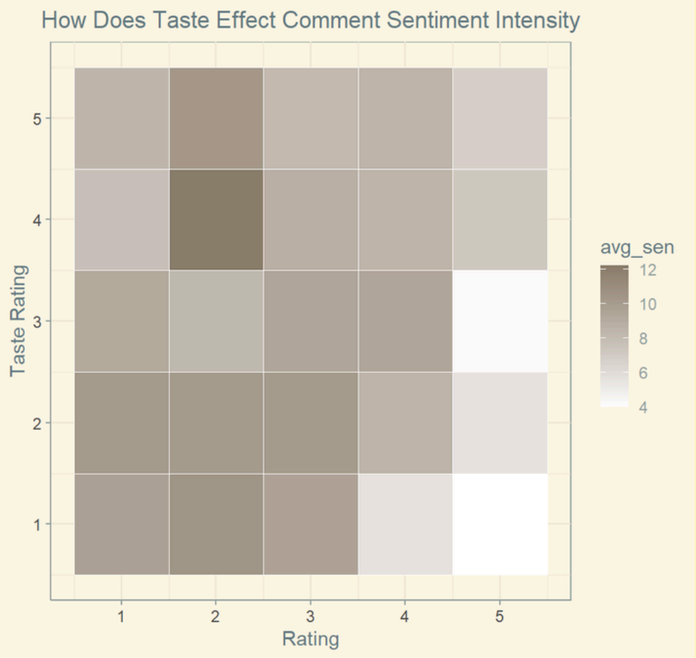
SERVICE





TASTE



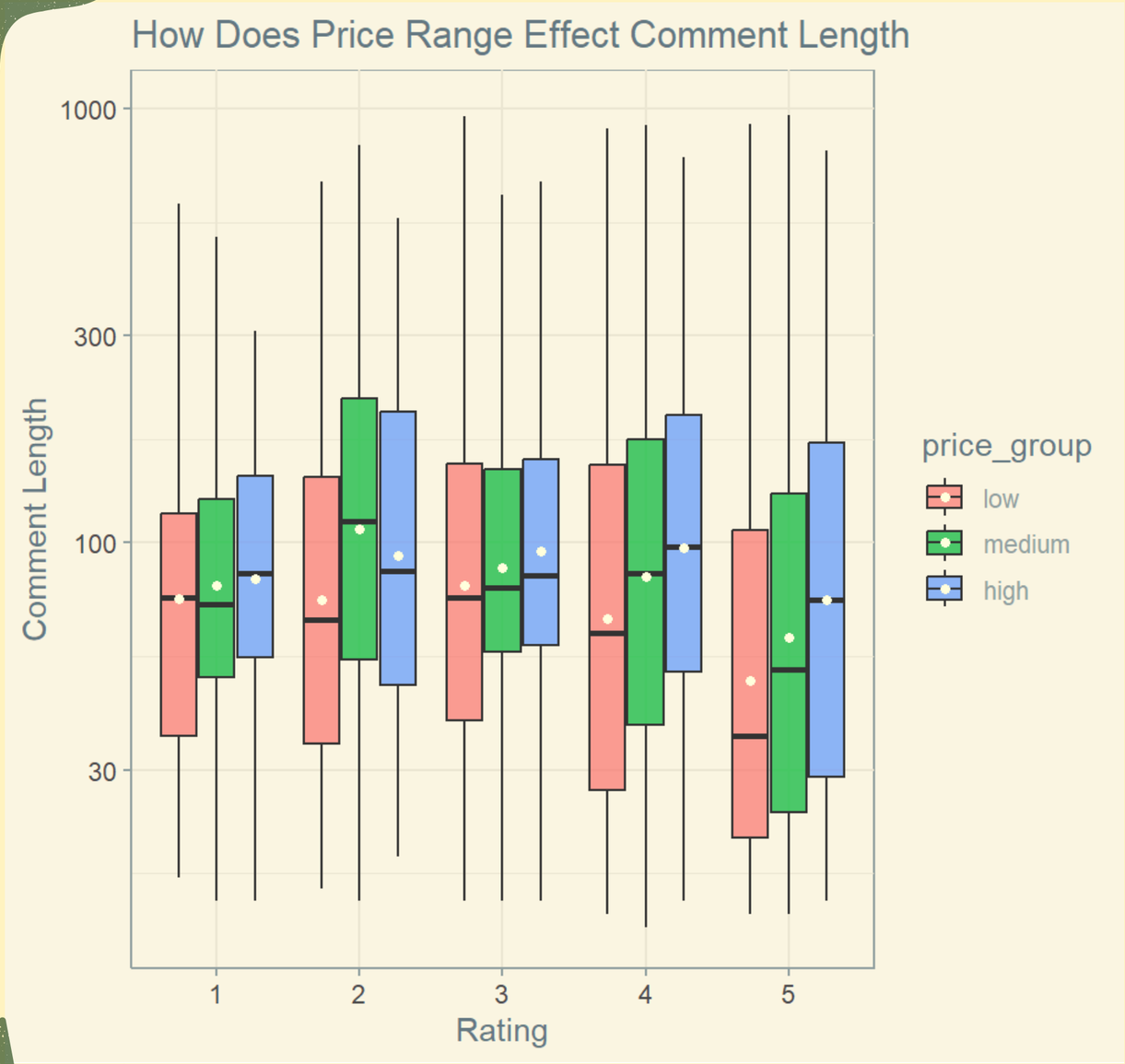


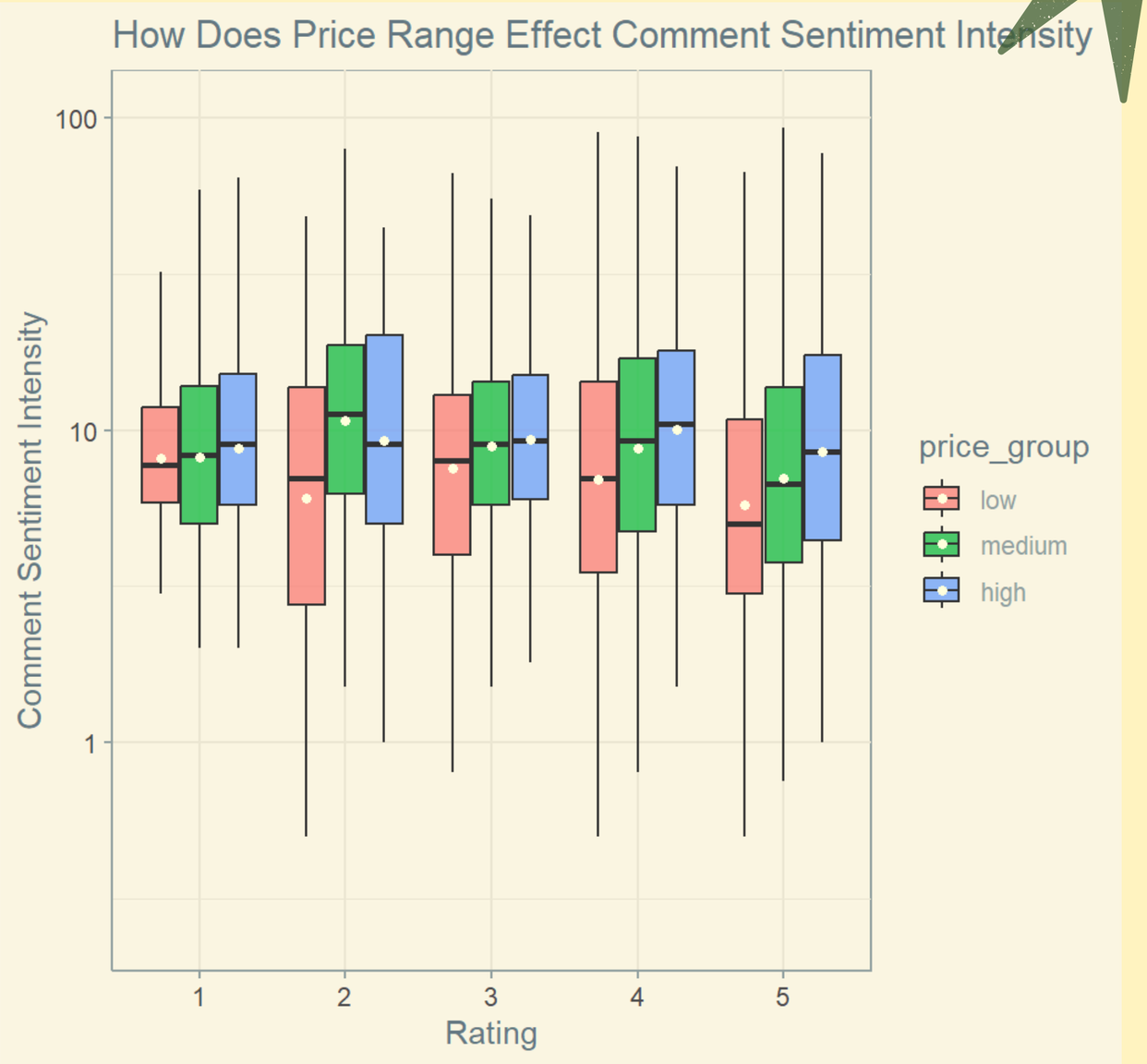
PRICE: MODERATING EFFECT

People expect more when they pay more?

```
> cor(data_wprice$Price_per_person,data_wprice$review_len)
[1] 0.04939647
```

```
data |>
  filter(! is.na(Price_per_person)) |>
  ggplot(aes(factor(Rating), sentiment_intensity, fill = price_group))+
  scale_y_log10()+
  geom_boxplot(position = position_dodge(width = 0.8),
               outlier.shape = NA, alpha = 0.7) +
  stat_summary(fun = mean, geom = "point", shape = 16,
               position = position_dodge(width = 0.8), col = "lightyellow") +
  scale_color_manual(values = c("low" = "darkseagreen",
                                "medium" = "cornflowerblue",
                                "high" = "coral3"))+
  theme_solarized()+
  labs(title = "How Does Price Range Effect Comment Sentiment Intensity",
       x = "Rating",
       y = "Comment Sentiment Intensity")
```


How Does Price Range Effect Comment Length
Comment Length
1000
300
100
30
1
2
3
4
5
Rating
price_group
low
medium
high


How Does Price Range Effect Comment Sentiment Intensity
Comment Sentiment Intensity
100
10
1
1
2
3
4
5
Rating
price_group
low
medium
high

KEY FINDINGS

Negative ratings lead to longer and more emotionally intense reviews

Poor service shows the strongest link to longer and more emotional restaurant reviews

Price moderates how consumers write online reviews, only the satisfied consumers are more expressive when they've paid more

LIMITATIONS & FUTURE WORKS

innacurate sentiment analysis
language detection

	Content_review	Review
0	不知道是不是我饱还是怎样，反正我觉得没有太大的惊喜，作为它比较出名的，可能期望太高了，好像没有什么特	
0	服务。环境，菜式，均可以，但算不上很好	
0	好耐冇过来＂大炳胜＂食饭，今天组队过来食饭！新装修设计风格，环境好靓。因为同事一早就打电话订好位，所	

Cantonese

incentivized 5 star reviews

中国市场监管新闻网
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一瓶饮料换一个好评？大众点评持续处罚“刷单炒信”

18 Jan 2024 — “出门吃个饭，餐厅送个免费甜品，饭还没吃就让写好评，这种诱导行为挺不好的。”采访中，消费者李然告诉笔者。 当搜攻略、看评分成为消费新习惯，一些商家 ...

encouraging low-effort, overly positive reviews

a recent trend:
Restaurants offering free desserts in exchange for a five-star review.

THANK YOU

REFERENCES

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https://guide.michelin.com/hk/en/article/news-and-views/fujian-province-2025-starred-restaurants
https://www.rightresponseai.com/blog/100000-restaurant-reviews#part-1-voices-at-the-table-dissecting-the-details-in-diner-reviews