I can't Yelp but Google if customers are McHappy

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McDonald's is a globally recognized fast-food conglomerate that feeds about 68 million people worldwide per day. With this sheer volume of consumers, the fast-food chain is bounded by the presence of its online following. Primarily, the online reviews for McDonald's can be found on two major websites; Google and Yelp. With this in mind, a sample of McDonald's restaurants in Ontario will be focused on to answer the following question; do the reviews of McDonald's vary between these two websites?

To break it down further, the primary questions of interest of this analysis are as follows:

1. Does the star rating of McDonalds vary between Google and Yelp in Ontario?
2. Are there more positive/negative comments of McDonalds in Google or Yelp reviews? What are the most common words used among the two review sites?
3. Among the three most populated cities in Ontario; Toronto, Mississauga, and Ottawa, is there a difference in star ratings of McDonald's? Do the star ratings in each city differ by review site?

From the primary questions of interest, this analysis will ensure that some of the significant differences between Yelp's and Google's review systems will be outlined and in-turn, an insightful understanding of what the significant results may mean to the average McDonald's consumer will be clarified.

Data Collection Methodology

The collection of data was done using Google's and Yelp's APIs. These APIs were used to access the published reviews on McDonald's that consumers have posted about the various locations. The Google and Yelp reviews were collected from 54 and 50 Ontario McDonald's locations, respectively. Then, additional searches were conducted using both websites' API's to collect reviews from three major Ontario cities, namely Toronto, Mississauga, and Ottawa.

Exploratory Data Analysis

This section will be assessing the 3 primary questions of interest.

1. Does the star rating of McDonalds vary between Google and Yelp in Ontario? After finding the average rating between Google and Yelp, notice from **Figure 1**, Google has a higher average rating comparative to Yelp with an explicit star rating of 2.93 over 2.52, respectively.
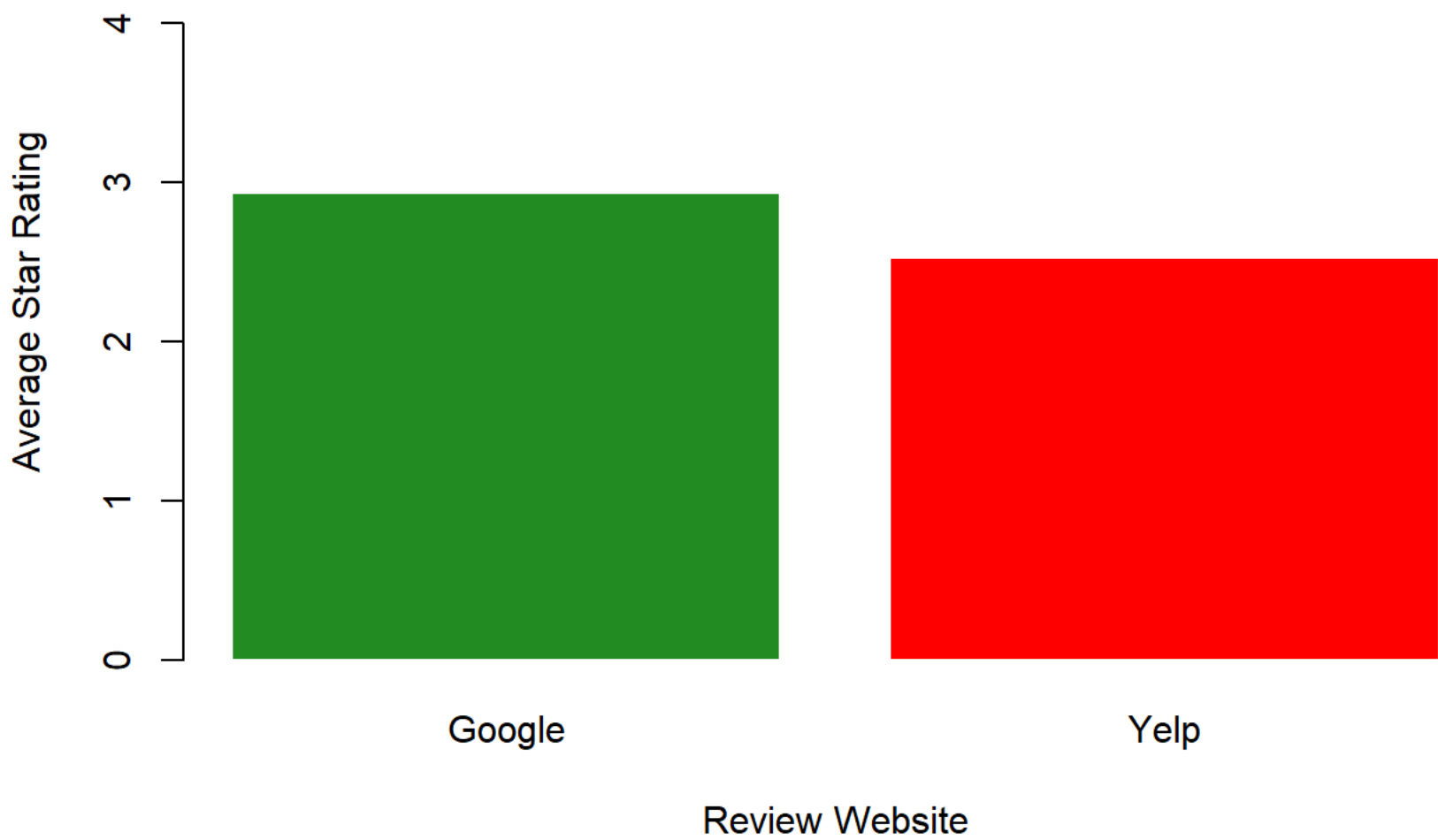
Figure 1. A comparative bar graph of the average star ratings found from Google (2.93/5) and Yelp (2.52/5) of McDonald's restaurants.

Then to further analyze these average star ratings, **Figure 2.** and **Figure 3.** below show each consumers' individual ratings from the 277 and 150 locations reviewed on Google and Yelp, respectively. From these plots, there seems to be fewer three and four star ratings on Yelp in comparison to Google whereas more one star ratings can be found on Google than Yelp. Although the sample sizes may differ, each plot suggests that there is some difference between each websites' reviewers' ratings. This may imply that a generally better consumer experience is more likely to be reviewed on Google.
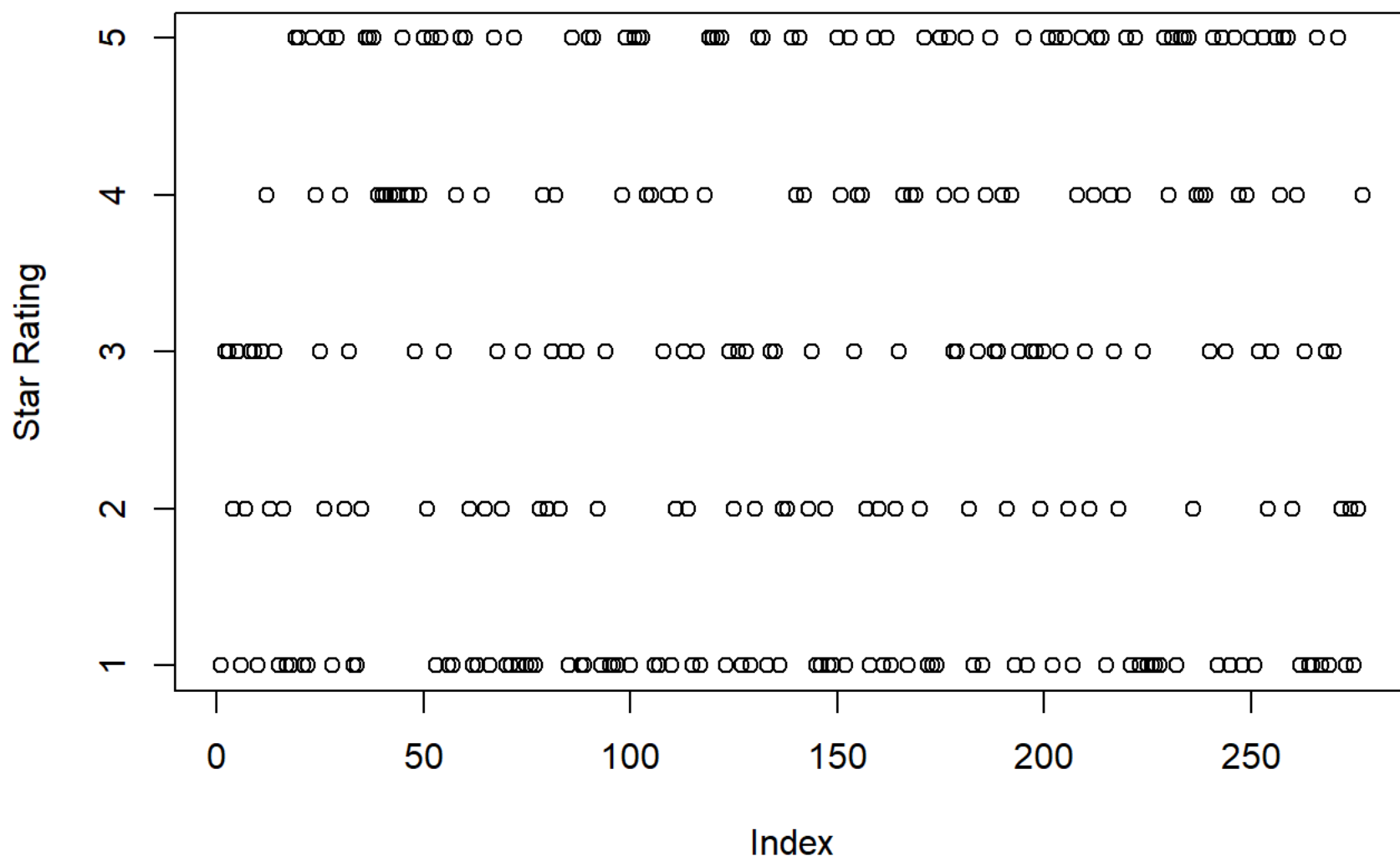
Figure 2. A plot of consumer star ratings for 277 Google Reviews for McDonald's restaurants in Ontario.
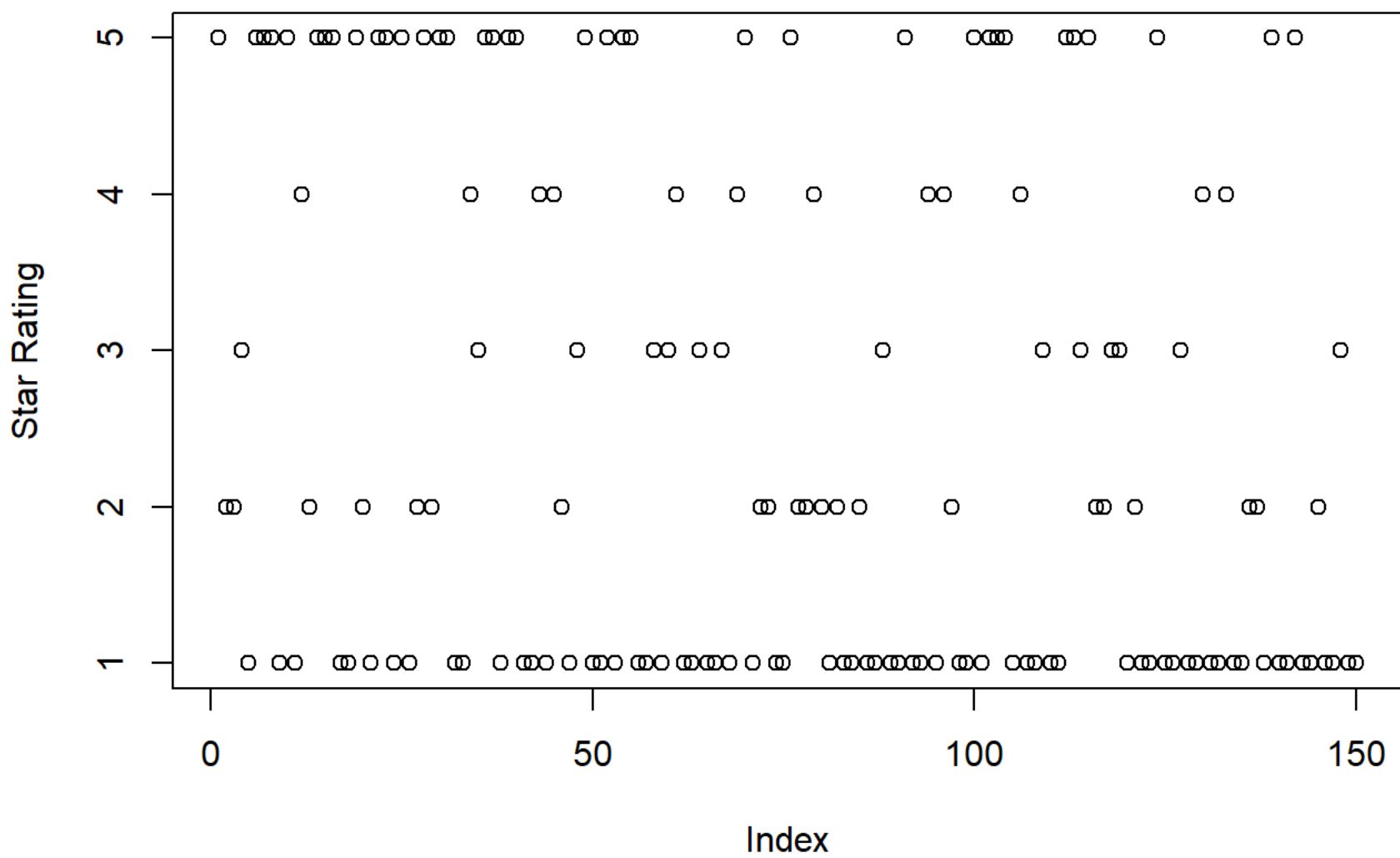
Figure 3. A plot of consumer star ratings for 150 Yelp Reviews for McDonald's restaurants in Ontario.

With further statistical analysis, the standard deviation of each average star rating was determined. These values gave a verification of whether this difference based on the sample of reviews from both websites is meaningful. The standard deviation for the average star ratings for Google and Yelp are 1.54 and 1.66, respectively. This means that the average ratings for Ontario restaurants among each website are very spread. From **Table 1.**, a var-test was conducted to show that there is insufficient evidence to claim that one website has higher variation over the other. It is safe to assume that the spread among the 2 websites are the same.

Table 1. Variance Test between the variances of the average star ratings of McDonald's for Google and Yelp in Ontario

Ratio of Variation in Star Rating in Ontario (Google/Yelp)	P-value	Lower 95% CI	Upper 95% CI
0.8578202	0.2768356	0.6427047	1.13118

Then a T-Test was conducted and shown in **Table 2.** The results below show that there is a significant difference in average star ratings of McDonald's between each website. Google seems to provide a higher star rating on average over Yelp for locations in Ontario. Thus, when a review is seen for a particular location of

McDonald's, the average star rating tends to be higher on Google than on Yelp.

Table 2. Student's T-Test between the average star ratings of McDonald's for Google and Yelp in Ontario

Difference in Mean Star Rating (Google - Yelp)	P-value	Lower 95% CI	Upper 95% CI
0.4047413	0.0142834	0.0815748	0.7279078

After this portion of the analysis, it was found that the star rating of McDonald's does vary between Google and Yelp in Ontario based the sample size of 54 and 50 McDonald's locations collected from Google's and Yelp's APIs, respectively. Conclusively, Google tends to show consumers a higher star rating on average for a given location. Thus, a consumer is more likely to be persuaded positively about a particular McDonald's location if the rating is viewed on Google over Yelp.
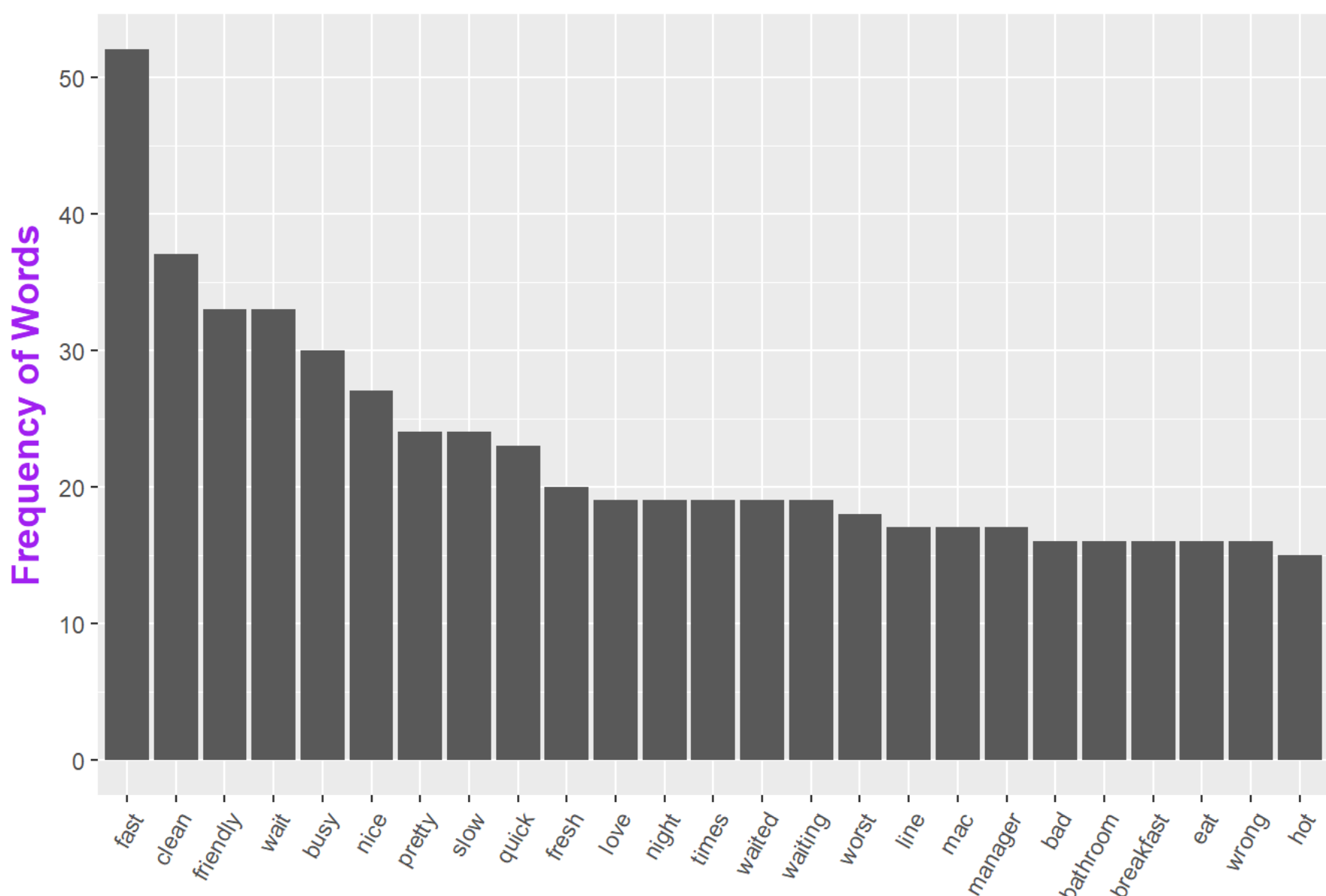
Although star rating is a strong indication of how consumer's opinion will change about a given McDonald's location, a consumer also looks up user written reviews for a McDonald's location as well. This primarily gives the consumer a factual basis to why it may carry a particular star rating. Then by analyzing these reviews using the given APIs, comments can be categorized as positive or negative. This allows the second question to considered:

2. Are there more positive/negative comments of McDonalds in Google or Yelp reviews? What are the most common words used among the two review sites?

An analysis was conducted to compare the frequency of words used in written consumer reviews between Google and Yelp. Then a comparison was made between the associated positive and negative sentiments used between the two websites within each review.

Figure 4. and **Figure 5.** below are barplots for Google and Yelp displaying the frequency of the most common words found in their reviews, respectively. It can be seen that the words counted and displayed between the figures tend to be relatively the same.

When analyzing the set of reviews from Google and Yelp, a list of stop words were implemented by removing unimportant and article words such as "I", "was", and "mcdonalds" to ensure that only subjective words and nouns are counted. The most common words in Google reviews were "fast", "clean", "friendly", "location", and "wait". Doing the same analysis with the Yelp reviews, the most common words found were "friendly", "worst", "nice", and "clean" which outlines the word similarity. Thus the most common words seen in McDonald's reviews on either website was "nice".

Figure 4. A barplot of the common words used in McDonald's Google Reviews.
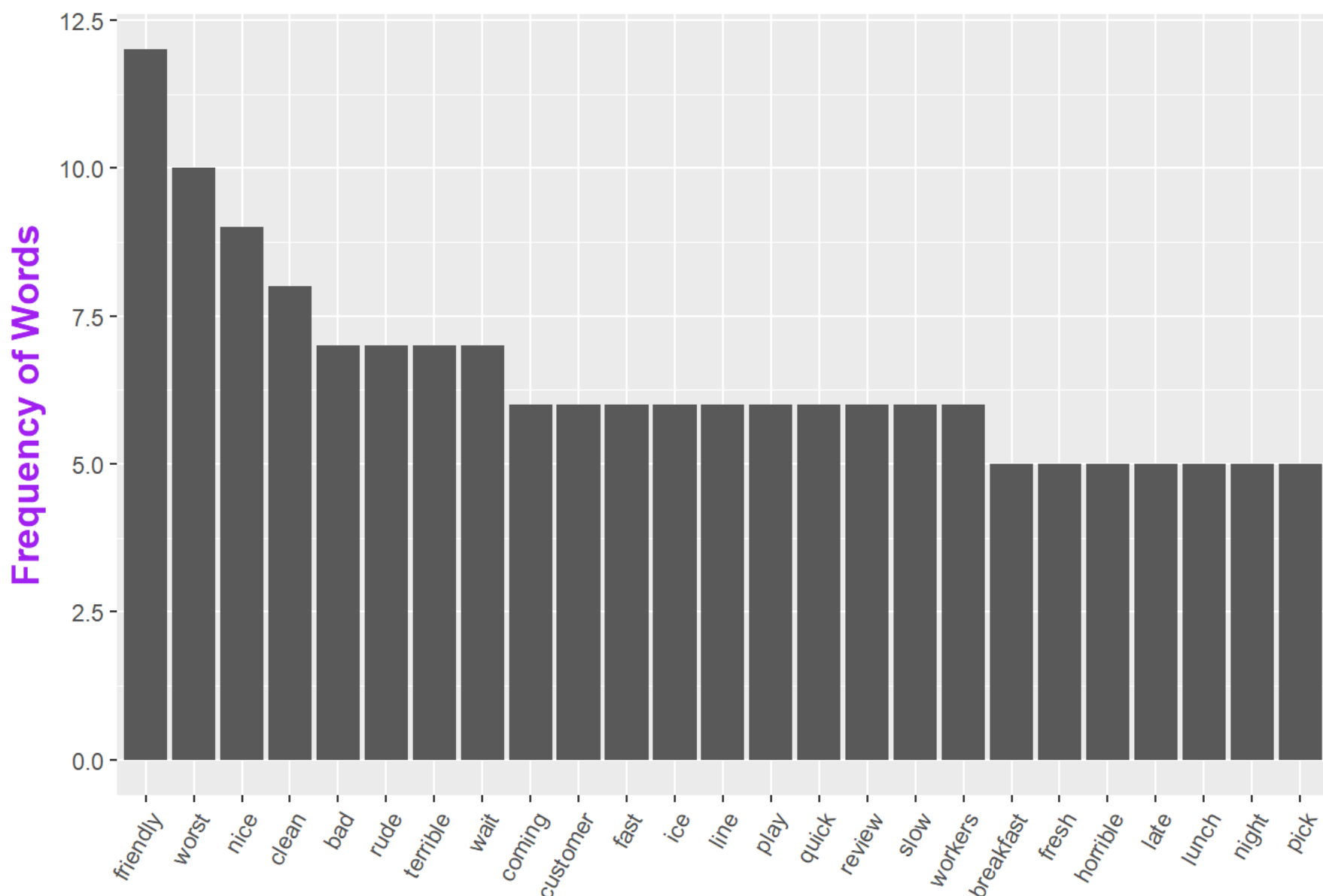
Figure 5. A barplot of the common words used in McDonald's Yelp Reviews.

With this result a further to analysis was conducted to determine the sentiments of the words used in each review. The classification of words was done using the NRC Emotion Lexicon which uses a dictionary of English words and determines their association with different emotional connotation. Then the 10 most frequent emotions/sentiments were compared between Google and Yelp as a percentage of total words classified among the reviews from each website as seen in **Figure 6.** and **Figure 7.**, respectively. Finding that "positive" and "negative" sentiments were the highest among both websites, it is noteworthy to narrow in on a comparison of those classifications.
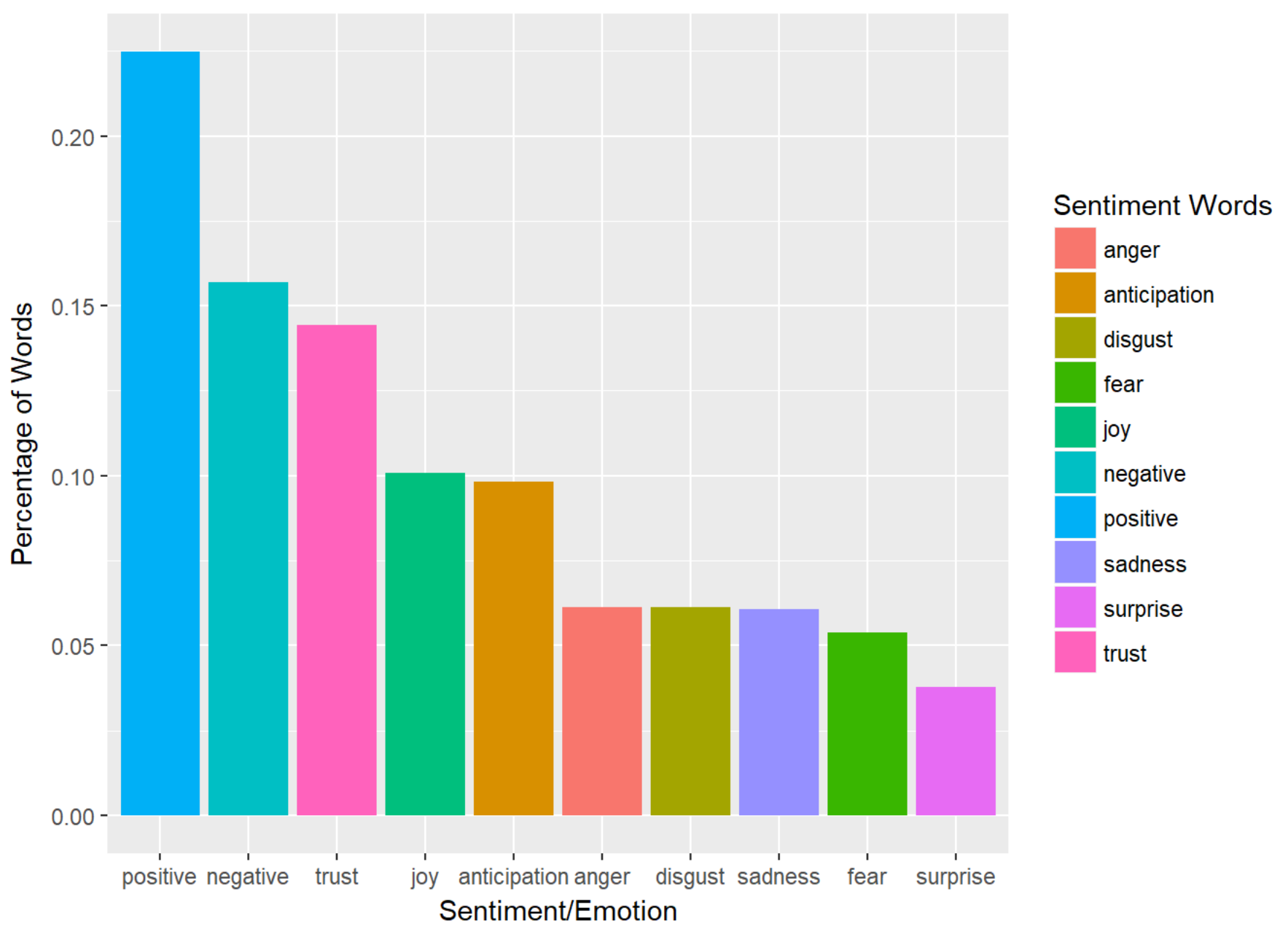
Figure 6. A barplot of the Percentage of sentiments/emotions in Google Reviews.
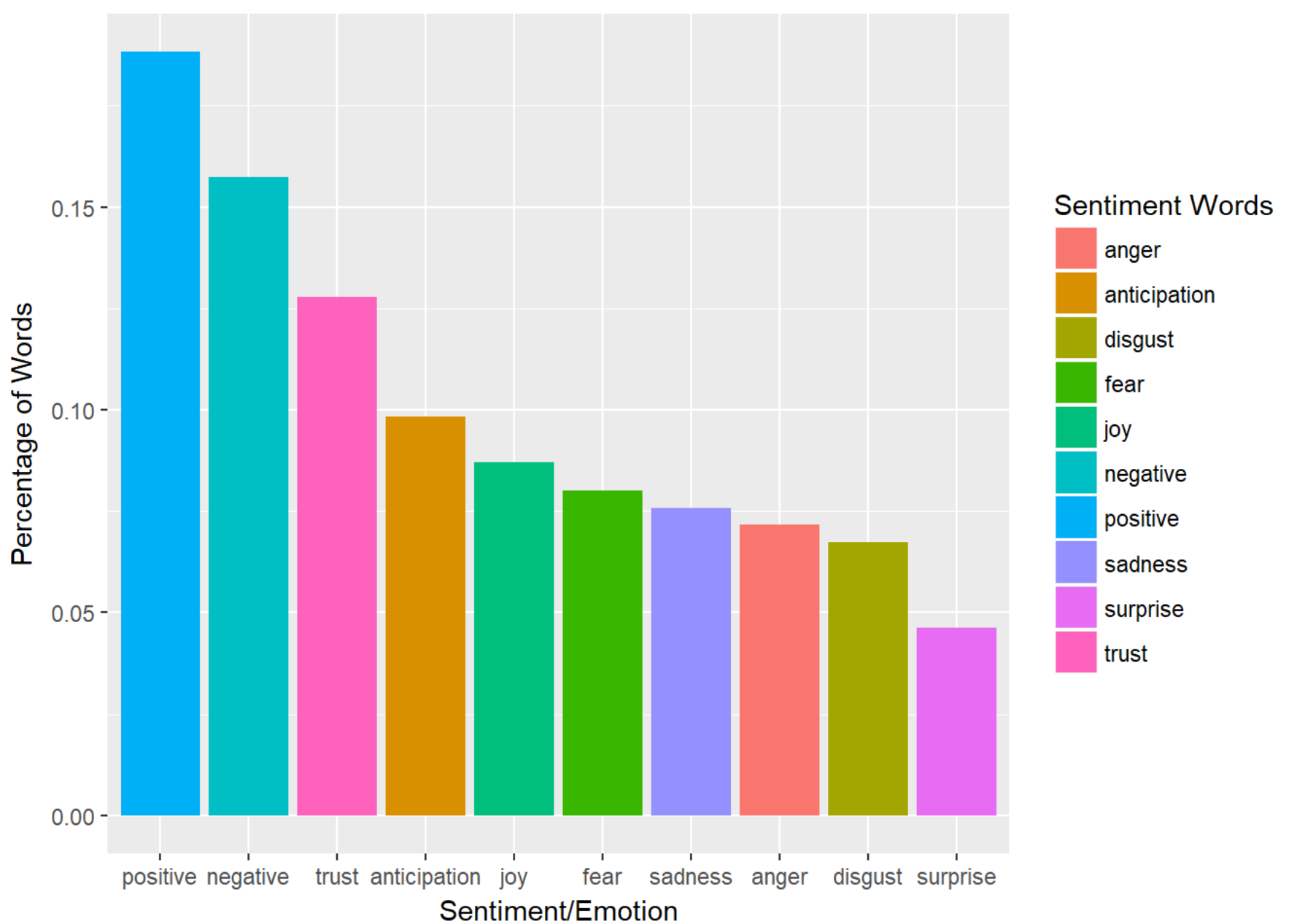
Figure 7. A barplot of the Percentage of sentiments/emotions in Yelp Reviews.

Then a comparison was made between the proportion of positive and negative words as a whole that were found in each of the reviews. **Figure 8.** and **Figure 9.** below are the barplot comparison of positive words and negative words, respectively, between Google and Yelp.
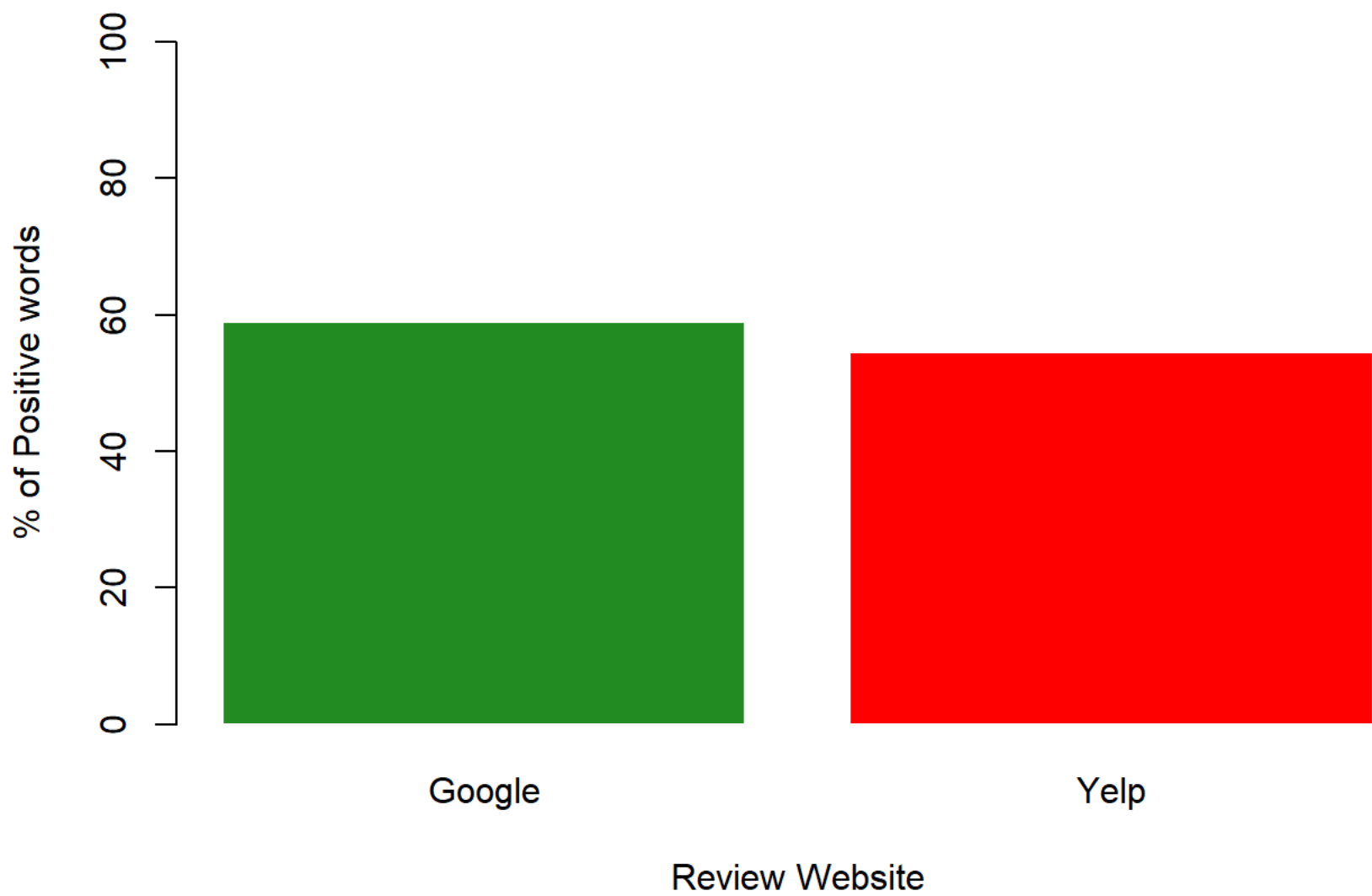
Figure 8. A barplot of the proportion of Positive Words between Google and Yelp.
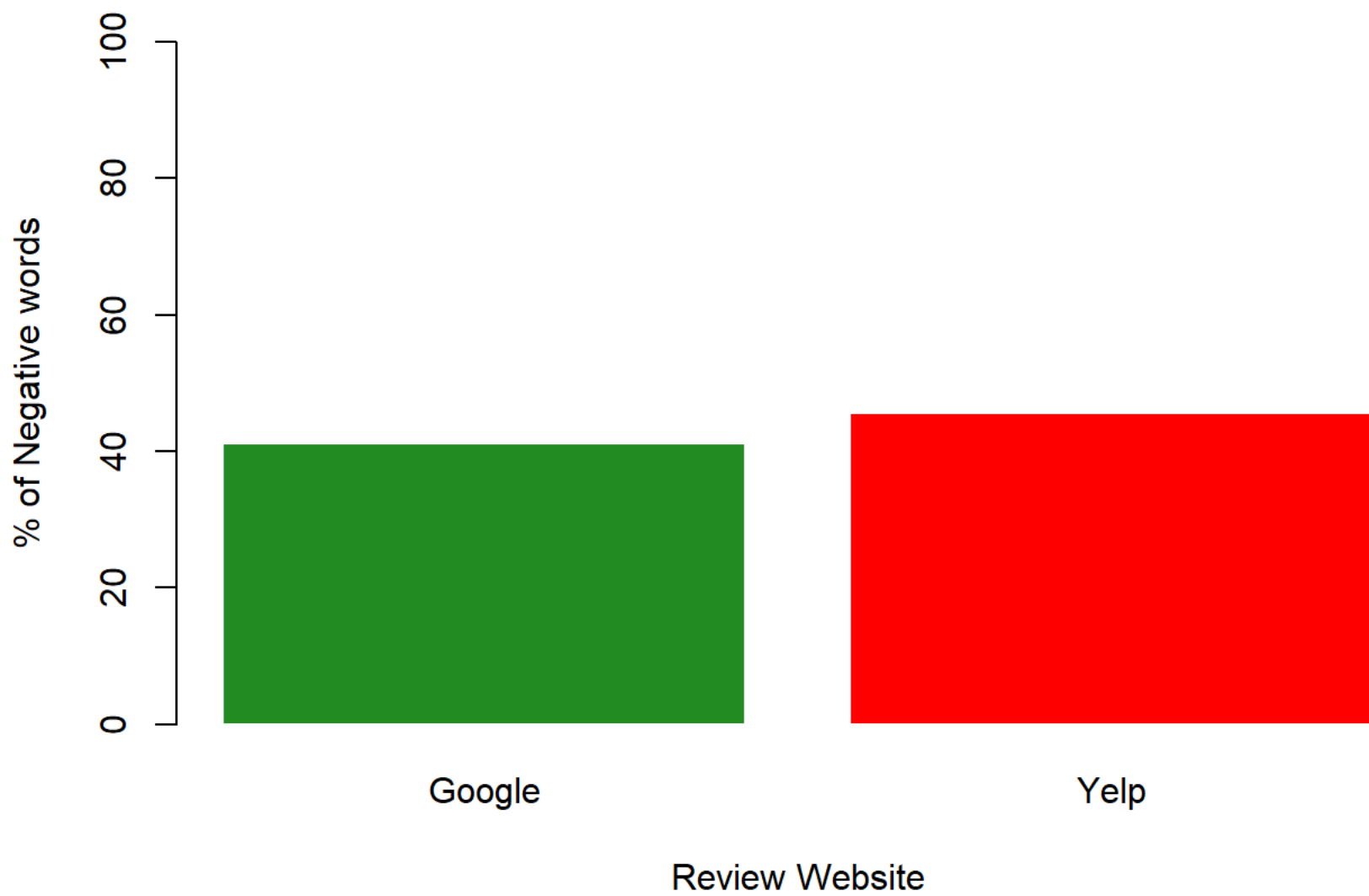
Figure 9. A barplot of proportion of Negative Words between Google and Yelp.

From the resulting figures, the proportion of positive and negative words between Google and Yelp are seen to vary. The number of positive words in Google and Yelp reviews were 560 (58%) and 134 (54%), respectively. Whereas the negative words in Google and Yelp reviews were 391 (41%) and 112 (45%), respectively.

This shows that it seems Google may have "nicer" reviews on average which is consistent with the previous result that Google has a higher average star rating for McDonald's locations. However, since Yelp has about only 25% of the total number of words Google does, the proportion of positive and negative words may not be very accurate since only 150 characters per review were considered. (This will be discussed further in the limitation section.) Thus, the same conclusion can be made as previously mentioned; a consumer is more likely to be persuaded positively about a particular McDonald's location if the rating and written reviews are viewed on Google over Yelp.

Lastly, to further analyze this result the final question of interest will be considered:

3. Among the three most populated cities in Ontario; Toronto, Mississauga, and Ottawa, is there a difference in star ratings of McDonald's? Do the star ratings in each city differ by review site?

By assessing this question of interest, a comparison of the average star rating of McDonald's between Google and Yelp for 3 major cities: Toronto, Mississauga, and Ottawa will be conducted. This will allow for a more concise understanding of whether Google actually has higher reviews than Yelp on average. **Figure 10.** shows the resulting means for each city within their respective website.
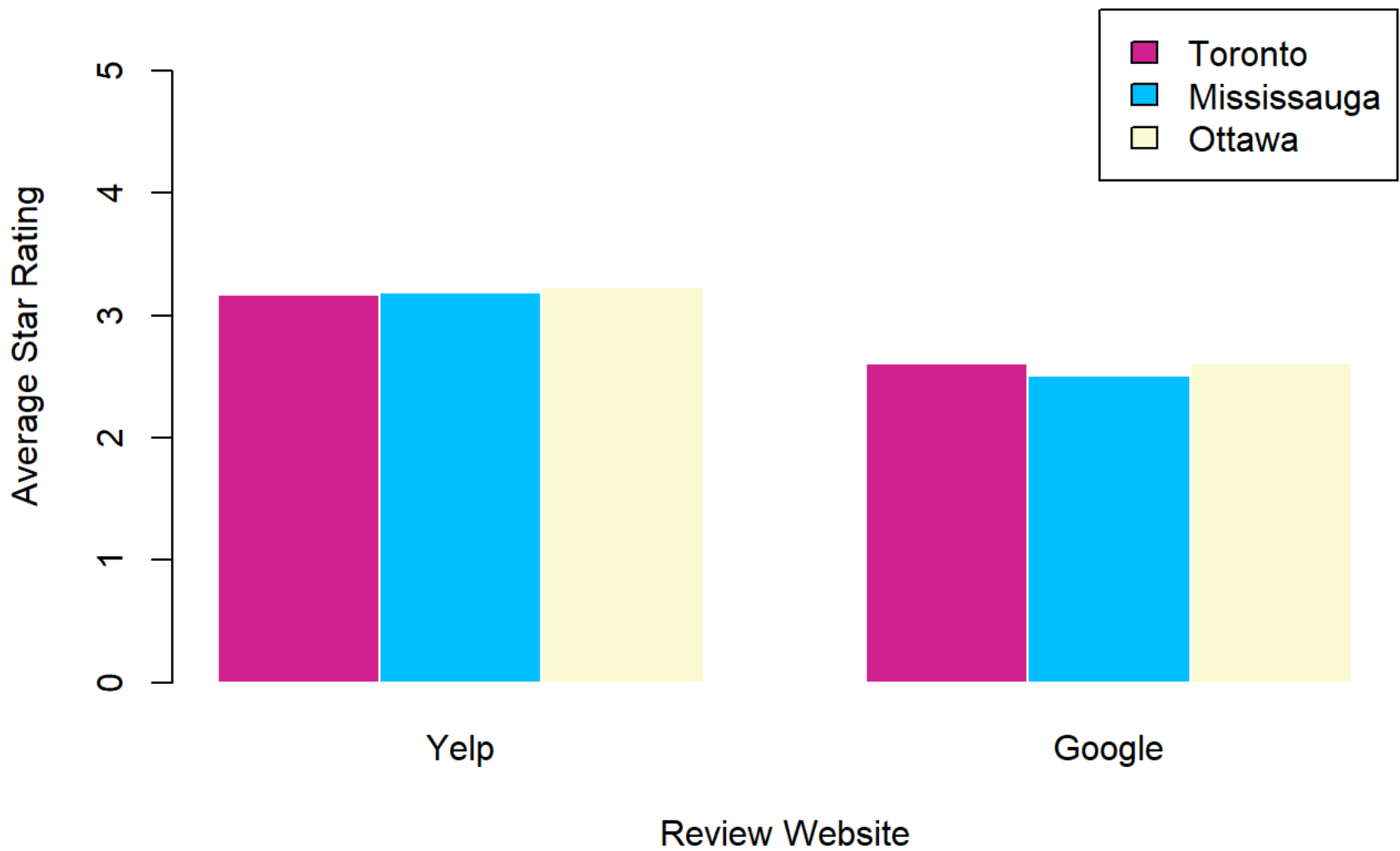
Figure 10. Average Star Rating of McDonald's for Toronto, Mississauga and Ottawa

After performing the same analysis for the 3 cities as mentioned previously, **Table 3.** and **Table 4.** display the results as follows:

Table 3. The average star ratings of McDonald's for Google and Yelp between Toronto, Mississauga, and Ottawa

Website	Toronto Mean	Mississauga Mean	Ottawa Mean
Google	2.61	2.51	2.61
Yelp	3.166667	3.1875	3.229167

Table 4. Standard Deviations of star rating for Google and Yelp between Toronto, Mississauga, and Ottawa for the average star ratings of McDonald's

Website	Toronto Deviation	Mississauga Deviation	Ottawa Deviation
Google	1.294081	1.527492	1.516875
Yelp	1.397437	1.282555	1.417813

This seems to suggest that Google's average star ratings is lower comparative to Yelp's among the three major cities, respectively. Ottawa locations seems to have, on average, higher star ratings than Toronto and Mississauga between both review sites. It is also worth noting that there is a large amount of variation among average star ratings for each city. This suggests that there is quite a lot of variation within average star rating for each location within each city for both review sites. This means that customers are seen to have potentially drastic differences in opinions on certain McDonald's locations depending on the city they're in or reviewing for.

Testing the variability of average star rating of cities between review sites can show whether Google or Yelp has larger variation in average star rating among the three major cities. **Table 5.** below shows the results determied from the var-tests for each of the cities. There was insufficient evidence to conlcude that there is more variation in average star ratings for each city between review sites. Therefore the spread among the two websites for each city were the same.

Table 5. Variance Test between the variances of the average star ratings of McDonald's locations between Google and Yelp for Toronto, Mississauga, and Ottawa

City	Ratio of Rating variation in (Google/Yelp)	P-value	Lower 95% CI	Upper 95% CI
Toronto	0.8575484	0.5058794	0.523646	1.356569
Mississauga	1.418424	0.183712	0.8450435	2.277939
Ottawa	1.14462	0.6149756	0.6819212	1.838219

Table 6. shows a T-Test between the average star ratings of McDonald's for Google and Yelp in Toronto, Mississauga and Ottawa, assuming equal variances among the cities for each website. The results show that there is sufficient evidence to conclude that there is a difference in average star ratings between Google and Yelp for each city. It also shows that Yelp's average star ratings for each city are higher than Google's respectively. Implying that consumers tend to rate higher on Yelp than Google within each city. This will inherently influence consumer opinions more positively for McDonald's reviews seen within each respective city.

Table 6. Student's T-Test between the average star ratings of McDonald's for Google and Yelp in Toronto, Mississauga and Ottawa

City	Difference in Mean Rating (Yelp - Google)	P-value	Lower 95% CI	Upper 95% CI
Toronto	0.5566667	0.01436268	0.1125762	1.000757

Mississauga	0.6775	0.00880778	0.1732043	1.181796
Ottawa	0.6191667	0.01892885	0.1035748	1.134759

Overall, these results are particularly interesting since Google on average has a higher overall star rating for Ontario locations than Yelp. As a hypothesis, this may be due to the potential influence of the rural McDonald's locations which may bring the Ontario's average star rating up on Google and lowering Yelp's overall.

Limitations

A few limitations of this analysis are as follows:

- The API limits from Google and Yelp limit the number of Ontario locations to 54 and 50 respectively that the reviews can be collected from. This causes the analysis to have a relatively small sample size compared to the population of all McDonald's in Ontario. This also caused the number of reviews to be limited to 277 and 150 for Google and Yelp respectively which is again relatively small and hence, possibly not the most reflective of the population. Also, since the sample was so small analysis of the major cities within the same single search of Ontario locations was not possible. It turns out that there were only a few Ottawa and Mississauga locations captured in the Ontario searches from each website.

- Google's API limited the number of reviews for each location to five whereas Yelp limited it to three which did not help to provide a more "accurate" average star rating among each location. This then may have distorted a bunch of individual locations star ratings and hence, could have played a big role of causing large variation both within each websites average star ratings and between websites average star ratings per city.

- The number of characters is limited to 150 per review from Yelp so comparison of words between the websites is also limited since Yelp reviews did not contain the full content of each consumer's review. This leads to an overall lesser word count which inherently distorts the percentage of words in the reviews collected with positive/ negative sentiments.

- NRC Emotion Lexicon evaluates individual words rather than the sentiment of the entire review, meaning it is possible for the review to have more negative words but overall be positive, as an example.

Conclusion

Overall, McDonald's locations throughout all of Ontario have a higher average star rating on Google over Yelp whereas among the three major cities, locations have higher average star ratings on Yelp than that on Google. Google seems to have a higher proportion of positive and lower proportion of negative words comparative to Yelp but this may be due to the limitations mentioned above. Ottawa clearly has the highest average star rating between the three cities on Google and Yelp. In conclusion, it seems there is variation between

McDonald's reviews among the two review websites. A consumer may therefore get a more accurate view of a particular McDonald's location by viewing the locations average rating on both Google and Yelp. Also, it would be recommended that the consumer reads reviews by active users. This means that users who tend to rate locations more frequently would have a more honest sentiment towards a particular location giving a more accurate review.