The Great British Bake-Off

Kaatje Matthews-vanKoetsveld[1], Alie Hall[1], Olivia Kurani[1], Hailey Ernest[1]

[1]Department of Statistics, Cal Poly - SLO

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Abstract

Unlocking the secret recipe for viewer engagement, this report delves into the dynamic world of television ratings. Any show's success is fully reliant on its viewership and audience response. Determining the main factors related to an increase or decrease in viewers can be immensely beneficial for a show to sustain its profits and progress, and entertain viewers. Each episode of the series in 'The Great British Bake Off' has varying viewership trends. Some of the trends that seemed most critical to research in the show's success were the viewership for Final versus Non-Finale episodes, as well as the overall viewership for series 8 and after. OUr analyses show that there is statisitcally significant evidence that finale episodes have a higher viewership than non-finale episodes. During series 8 of 'The Great British Bake Off', the popular cooking show saw a drop in viewership during this and subsequent series, which we suspect is due to production changes. Our analysis of series 8, 9, and 10 compared to the earlier series shows that there is a considerable decline in viewership compared to the earlier series. These results can give producers of the show an idea of what will best draw the attention of their audience and make adjustments to up the viewership for 'The Great British Bake Off'.

1 Introduction

Season after season, 'The Great British Bake Off' is loved by its fans – but are all series and episodes of the show created equal? Or is there a secret ingredient to the show's success? 'The Great British Bake Off' (GBBO) is a popular baking show that has run from 2010 to the present and features ten to twelve amateur bakers that hail from the Great Britain area. Each episode consists of three different challenges: the signature challenge, the technical challenge, and the showstopper challenge. In each episode, one baker is eliminated until there are three bakers left in the final episode, and then one series winner is chosen, the Star Baker of the season.

We examined two different questions about the trends within the viewership of

this show. The first question is if there is a statistically significant difference in finale viewership compared to other episodes, which was investigated visually and with a formal t-test. The second question is whether a linear regression model predicting viewership by series is different when series 8 through 10 are included. We investigated this question with comparative linear models and visually. We also discussed the series 8 changes within the production of the show. This report will include an overview of the statistical methods used to analyze the significance of our research questions, then give an insight and visualization of the results of these tests and how the results can be used in the future of 'The Great British Bake Off'.

2 Data and Methods

2.1 Data

We sourced our data on 'The Great British Bake Off' from TidyTuesday, an online community that posts weekly datasets to a public repository for people to share their visualizations and analyses. Included in the Great British Bake Off package (Hill, Ismay, and Iannone 2022), posted on October 25, 2022, are four datasets, consisting of data from Wikipedia and PBS collected by Alison Hill, Chester Ismay, and Richard Iannone. The data includes information on individual episode challenges, the bakers themselves, the episode ratings, and further information on the episodes. This project only utilizes the "ratings'' datasets. All of our data analysis will be done in R Version 4.3.2 (R Core Team 2023), with the packages: Broom (Robinson, Hayes, and Couch 2023), kableExtra (Zhu 2024), tidyverse (Wickham et al. 2019), here (Müller 2020), and scales (**scales?**). The Ratings dataset has each of the 94 aired episodes from seasons 1-10 as observations and records the episode's viewers in millions for the first 7 days and the first 28 days. Specifically, we are interested in the weekly episode viewership for each episode.

2.2 Methods

2.2.1 Data Cleaning and Manipulation

Although we did not truly manipulate any of our variables, we did add one indicator variable determining if an episode was a finale episode or not. This was a boolean variable that we later modified to be a character variable to create the difference in means for our t-test. In our statistical analysis, we created two linear models, one linear model that used the full dataset, and one linear model with a reduced number of observations. To create our reduced linear model we subsetted a section of the data to only include observations from series one through seven.

2.2.2 Statistical Analysis

We used various methods to analyze viewership trends in 'The Great British Bake Off'. Firstly, this included a paired t-test to determine if there was a statistically significant difference in viewership between finale and the average of the non-finale episodes. For this paired t-test, we examined a p-value and a confidence interval of the mean difference between average ratings of the non-finale and finale episodes.

Next, we applied two linear models to our data, one to a subset of our data from the first seven series, and a second one to the full data of all 10 series. These linear models used series as a predictor and 7-day viewership as the response. As part of this analysis, we looked at the comparative r-squared values for both of the linear models and the p-values from their model utility tests. We also compared the coefficients for the intercepts and slopes of the models.

3 Results

3.1 Finale versus Non-Finale Viewership

Firstly, we examined if there was a difference in finale vs non-finale viewership. For each of these groups, we initially started with looking at summary statistics.

Table 1: Summary Stats for Non Finale and Finale Episodes

type	mean	sd	median	q1	q3	observations
Non Finale Episodes	8.424	3.129	8.945	6.375	10.160	84
Finale Episodes	9.889	4.223	10.045	7.417	12.718	10

As the table shows, the finale episodes have a higher mean and median viewership than non-finale episodes. However, finale episodes have more variation than the non-finale episodes, which does make sense, as there are many more non-finale episodes (84 non-finale episodes versus 10 finale episodes).

To get a better understanding of the distribution of viewership across the series, we made a scatterplot displaying total viewership in the first 7 days of release by series number.

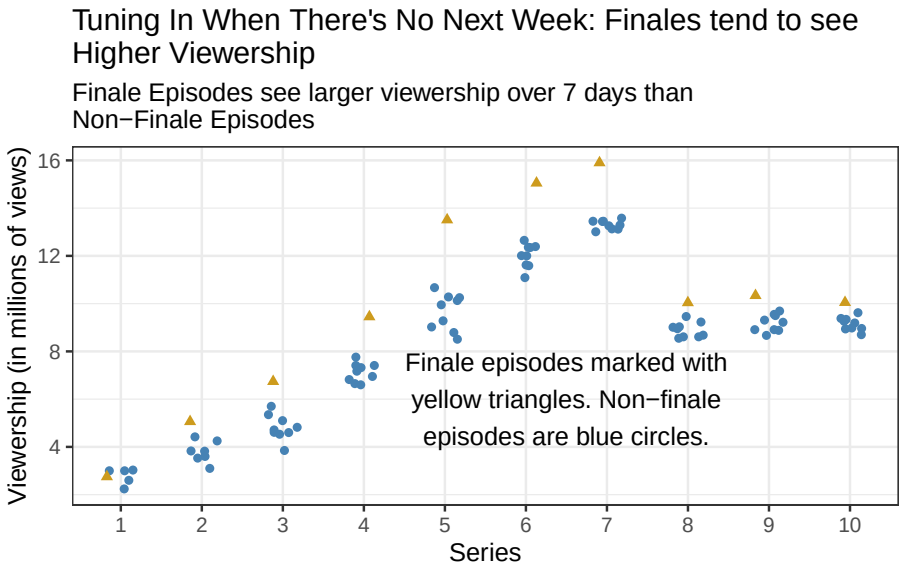

Figure 1: This graph displays the viewership by series of the Great British Bake Off, with blue dots representing the viewership for non-finale episodes and yellow triangles viewership of finale episodes, with finale episodes having consistantly higher viewership than non-finale episodes.

The data visualization highlights finale episodes as the yellow triangles. We can see in the graph that since series 2, there has been a trend of higher viewership for finale episodes of 'The Great British Bake Off' than non-finale episodes.

The results from our paired t-test indicate we have a discernible average difference in ratings between finale and non-finale episodes ($t = -4.99$, $df = 9$, p-value $= 0.0004$).

In addition to these results, our t-test also provides us with a difference in means confidence interval with 95% confidence. Please note that while we used a one-sided t-test for the calculation of the p-value, this confidence interval was calculated from a two-sided t-test to find the mean difference in ratings between finale and non-finale episodes to be -2.64 and -0.99 points.

3.2 Season 8 Viewership — Viewership Over Time

As seen in Figure 1, series 8 and subsequent series saw a massive dip in viewership. This was a departure from the original trend that saw an increase in viewership for every series. It is worth noting that after the initial drop in series 8, series 9 and series 10 stayed consistent in viewership. To investigate this phenomenon further, we ran two simple linear regression models fitting viewership in the first 7 days by the series number. The first, shown in Figure 2 as the

dashed blue line, is only using the first 7 series. The second model, shown as the solid orange line, uses all 10 series.

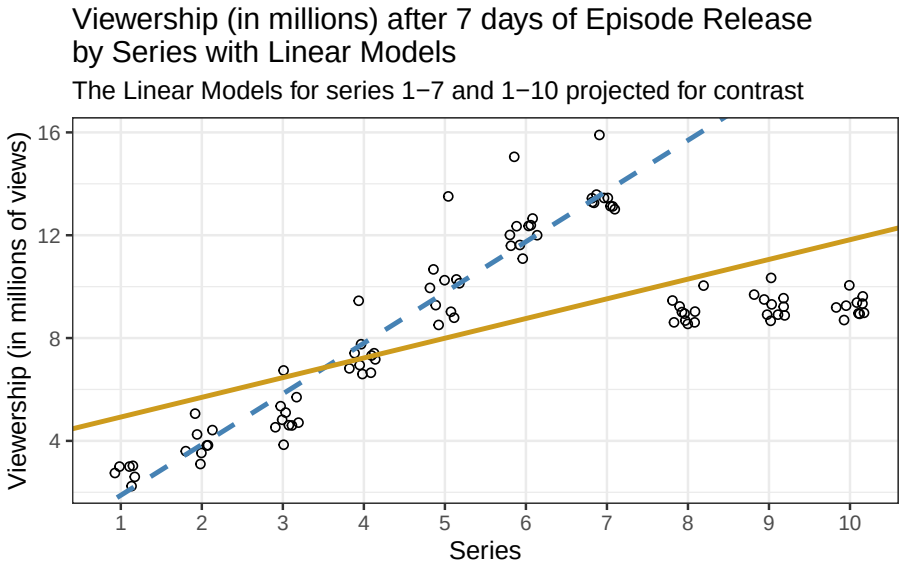

Figure 2: Graph of viewership for every episode with two lines projected onto it. Blue line is projected onto the graph showing the subsetted linear model. Yellow line is projected onto the line showing the full linear model. This graph shows how the subsetting linear model fits the first seven series extremely well, showing that series 8, 9, and 10 have a different trend.

As shown in this graph, both of these linear models fit our observations. However, the blue dashed line shows a much stronger association between series and viewership than the orange solid line. We see this reflected further below after examining our R^2 values for both linear models, shown with other summary statistics.

Table 2: Summary Statisitcs for Comparitive Linear Models

type	intercept	slope	r.squared	p.value
full	4.161	0.766	0.422	<0.001
reduced	-0.089	1.973	0.931	<0.001

We can see that from Table 2, there is no difference in the model significance, as for both models, we have a p-value of <0.001. However, the R^2 for the reduced model is much higher than the full model, suggesting that while series remains

a statistically significant predictor for viewership, it accounts for less variability within the full model.

4 Discussion

Our results from our paired t-test p-value indicated that there is a statistically significant evidence that finale episodes have higher viewership than non-finale episodes. From our results, we know that the mean viewership 7 days after an episode airs is higher for the finale episodes with 9.89 average million viewers than for non-finale episodes with 8.42 million average viewers. In addition, we do not have a statistically significant p-value, our p-value is small. Our t-test also provided a confidence interval for the true mean difference. After performing a two-sided paired t-test, we are 95% confident that the true difference in average viewership is that non-finale episodes have 2.64 million to 0.99 fewer million viewers than finale episodes. Note that this interval (-2.64 and -0.99) does not align with 0, which is consistent with our significant p-value. Although we would ideally be able to replicate these results, this would be extremely difficult to do in real life due to the need for subject bias. These results could potentially be replicated with simulation of data, but at this point, we decided not to investigate further. Although our evidence is not statistically significant, there is some evidence that the finales of 'The Great British Bake Off' have higher viewership, both from a moderately small p-value and from seeing the data visually, as we can see in Figure 1. This may be because in each Finale episode of the series, the series winner is determined after the final three bakers compete for the title of Star Baker. It is also likely that this episode has a larger audience because the Star Baker receives a reputation that is important and honorable in the Great Britain area. While both of these reasons seem probable, but we do not feel comfortable speculating further.

The contrast in viewership in series 8 and beyond compared to the earlier series is also a critical detail that producers of 'The Great British Bake Off' should take into consideration. Our models provide strong evidence that there was a notable decline in viewership of series 8 and stagnation of viewership following. Similar to the difference in Finale and Non-Finale episodes, we cannot conclude causation here, but we can speculate that this decline in viewers is associated with the change of hosts and judges that occurred in between the production of series 7 and 8. Given that the producers decide who the emcee and judges of the show will be, they should be aware of the consequences these decisions could have on viewership. The R^2 values for both of these models differed greatly, with the reduced model having an R^2 value of 0.931 and the full model having an R^2 value of 0.422. While we did not run a formal test specifically comparing these two models, we do feel confident that there is a difference in strength between these two models, although currently, we do not have the statistical knowledge to assess these differences with a formal statistical test. The R^2 values are notably different in the amount of variability captured by each linear

model.

If viewership continues to stay at these decreased levels, the producers of the show need to know how much this will affect the show's revenue. Because this is an analysis based on observations, and not a formal experiment, we cannot conclude the exact reason for this decline in viewership. However, given the production changes between series 7 and 8, we can speculate that the decline in viewership is in some way associated with the production changes in the show. Lack of causation or correlation evidence limits us from fully crediting the series 8 production changes with the decline in viewership, meaning we can not recommend reversing those changes in order to bring viewership up to its previous numbers.

It is important to note that we had census-like data because our datasets included information on every episode from all the series in 'The Great British Bake Off' to date. Having access to all of this information greatly supports our conclusions and speculations because it allows us to generalize in making predictions for future series in this show. However, more episodes have been released since this time so updated data could lead to slightly different conclusions or even more research questions.

5 Conclusion

We explored the differences in viewership for the finale and non-finale episodes of 'The Great British Bake Off', as well as the sudden decrease in viewership during series 8. In order to answer these questions, we utilized a paired t-test and linear models to get a better sense of the data and their statistical significance. Overall, our analyses have shown that there is evidence of a higher viewership rate for finale episodes over non-finale episodes. This evidence is statistically significant. In addition, we have evidence that the viewership of 'The Great British Bake Off' has declined between series 7 and series 8. These differences in viewership may have real consequences for the overall revenue of 'The Great British Bake Off'. For example, this may affect how budgets are planned for future series, with higher emphasis on finale episodes, given potentially larger audiences. Additionally, producers could try to negotiate for better airing times in an effort to bring viewership throughout the series back up. In the future, it would be intriguing to investigate the ratings based on series or baker backgrounds. Furthermore, researching whether the baker's background affects the show's success will provide insight into the show's winners and possibly even the viewership trends we have explored. Finally, although this would require an expanded dataset, we would like to explore the American viewership trends, and see how they contrast compared to the UK viewership trends we have explored in this report.

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