A Research on the Distribution of the Proportions of the AP Students in BNDS Who Hate Each Weekday the Most

Your Name

1 Introduction

We will investigate whether the distribution of the proportions of the AP students in BNDS who hate each weekday the most is consistent with the data collected from a research carried out by a Japanese magazine in 2015, as shown in Table 1. Because the five weekdays have distinct implications and so evoke different emotions for people, we think it is interesting to know the preference of people for each day of the week and suspect that we might get a distribution different from that of what the magazine states.

Weekday	Monday	Tuesday	Wednesday	Thursday	Friday
Proportion	0.57	0.14	0.11	0.10	0.08

Table 1: Investigated distribution of the proportions of each weekday which is hated the most by a Japanese magazine in 2015

Therefore, our null hypothesis and alternative hypothesis are as follows:
H_0: $p_{Monday} = 0.57$, $p_{Tuesday} = 0.14$, $p_{Wednesday} = 0.11$, $p_{Tuesday} = 0.1$, $p_{Friday} = 0.08$;
H_a: at least one of the proportions above is not correct;
where p_i is the population proportion of people hate the weekday i among the weekdays the most.

2 Research

There were many relevant scientific results regarding which one of the weekdays is hated the most and why. The first related work is carried out by Wenzhou Business Daily, which surveyed the distribution of the day of a week which people hate the most and found that more than half of the participants dislike Mondays the most, while from Tsinghua University Behavior and Big Data Lab, people have the most negative feelings on Wednesdays. However, a second study backs up the attitude that Monday is hate-able by listing the psychological reasons why people may hate Mondays. For instance, Monday may refer to messed-up natural body rhythm, lost freedom, the lack of love for people's work, social anxiety, and culture influences. Thirdly, according to the researchers of the London School of Economics, the mean reported happiness dropped significantly from Monday to Tuesday and strictly increased throughout the rest of the weekdays, which gave the lowest average response on Tuesday. In conclusion, the different opinions of the existing researches about the most hated weekday with a slightly stronger inclination toward Monday leave us a research gap to carry out further investigation.

3 Methods and Procedures

3.1 Data Collection (Sampling method)

We performed a simple random sampling with replacement, in which we first labelled the (400) AP students in BNDS each with a distinct number generated by the RAND() function in Excel, and selected the 64 students with the largest numbers. We collected data from a questionnaire that we asked them to fill out.

3.2 Inference: Hypothesis Test

We will conduct a chi-square goodness-of-fit test for the population distribution of the proportion of AP students in BNDS who hate each weekday the most.
The sample size is 64, while the population is 400 AP students.

H_0: $p_{Monday} = 0.57$, $p_{Tuesday} = 0.14$, $p_{Wednesday} = 0.11$, $p_{Tuesday} = 0.1$, $p_{Friday} = 0.08$;
H_a: at least one of the proportions above is not correct;
where p_i is the population proportion of people hate the weekday i among the weekdays the most.
significance level $\alpha = 0.05$

Check conditions:
1)Independence: Since the sample is chosen randomly with replacement, it is reasonable to assume that the responses are independent.

2)Random: The statistic is unbiased, thereby assuring us that the results can be generalized to the population.
3)The expected counts are all at least 5, so the sample is large enough to assume that the use of chi-square distribution is appropriate.
The observed and expected counts of each weekday being hated the most are shown in Table 2 and are visualized in **Figure 1.**

Weekday	Monday	Tuesday	Wednesday	Thursday	Friday
Observed Counts (Expected Counts)	22(36.48)	9(8.96)	12(7.04)	18(6.4)	3(5.12)

Table 2: Observed and Expected Counts

The contributions of each weekday to the χ^2 test statistic is shown below in **Table 3.** As can be seen, the population proportion of people who hate Thursday deviates the most from the research conducted by the Japanese magazine.

Weekday	Monday	Tuesday	Wednesday	Thursday	Friday
Contribution	5.7475	1.7857×10^{-4}	3.4945	21.025	0.8778

Table 3: Contribution of each weekday to χ^2 test statistic

4 Results

The data collected (observed counts) are shown below in **Figure 1.**

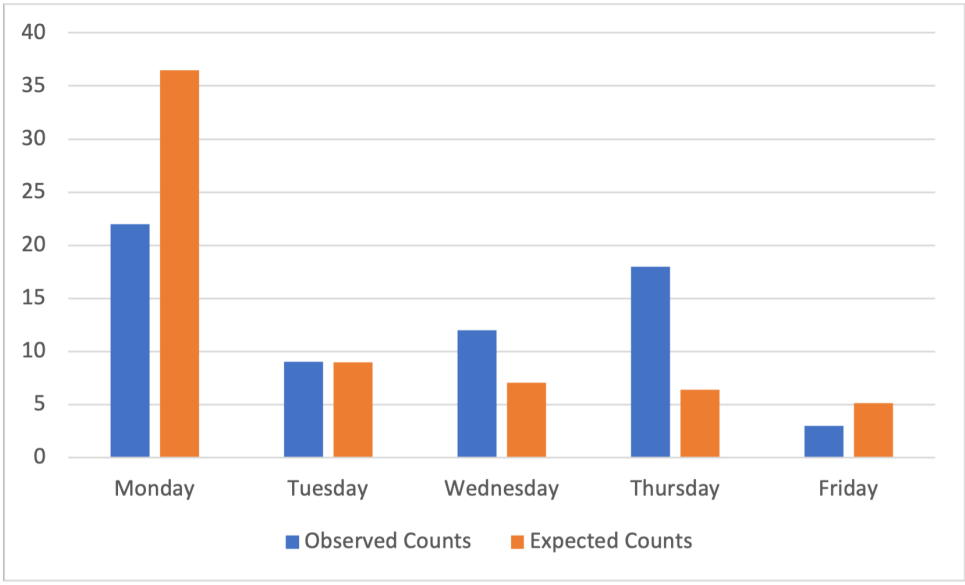

Figure 1: Observed and Expected Counts

chi-square standardized test statistic $\chi^2_{sta} = 31.1450804$
$p - value = 2.8597 \times 10^{-6}$
degree of freedom $df = 5 - 1 = 4$

Because the p-value (2.8597×10^{-6}) is smaller than the significance level α (0.05), we reject H_0. We have convincing evidence that the population distribution of the proportion of AP students in BNDS who hate each weekday the most is inconsistent with the research carried out by the Japanese magazine.