Daily Bus Wait Time

GROUP 01
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Outline

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3. Pilot Study
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Introduction

Understand how the time of the day and the day of the week influence the bus wait time.

Motivation

1) Issues with current mobile application updates

2)Need to know the wait time

Factors Affecting

1) Response variable

Wait time (Minutes)

2) Control Variable

Time of the day, Day of the week

3) Constant Factors

Route 7 bus, NW 29th/Grant street bus stop, Corvallis Bus Application

4)Nuisance Factors

Environmental and Traffic conditions, Type and Number of Passengers, the Bus and Phone

Pilot Study

Purpose:

Clarify the uncertainties associated with the design of the experiment

Method:

Before the final experiment began, our team first designed a pilot experiment.

Collection of the arrival time of the bus every morning from Monday to Saturday

(7:15, 8:15, 9:15, 10:15, 11:15, 12:15).

Lessons Learned

1) Challenge to collect all data

2) Challenge to gather all the data within the quarter

3) Understanding the nuisance variables and try to mitigate the variability

Data Modeling

1.Reduced the amount of data we need to collect

Three distinct times of the day were chosen (8:15am, 10:15am, 12:15pm)

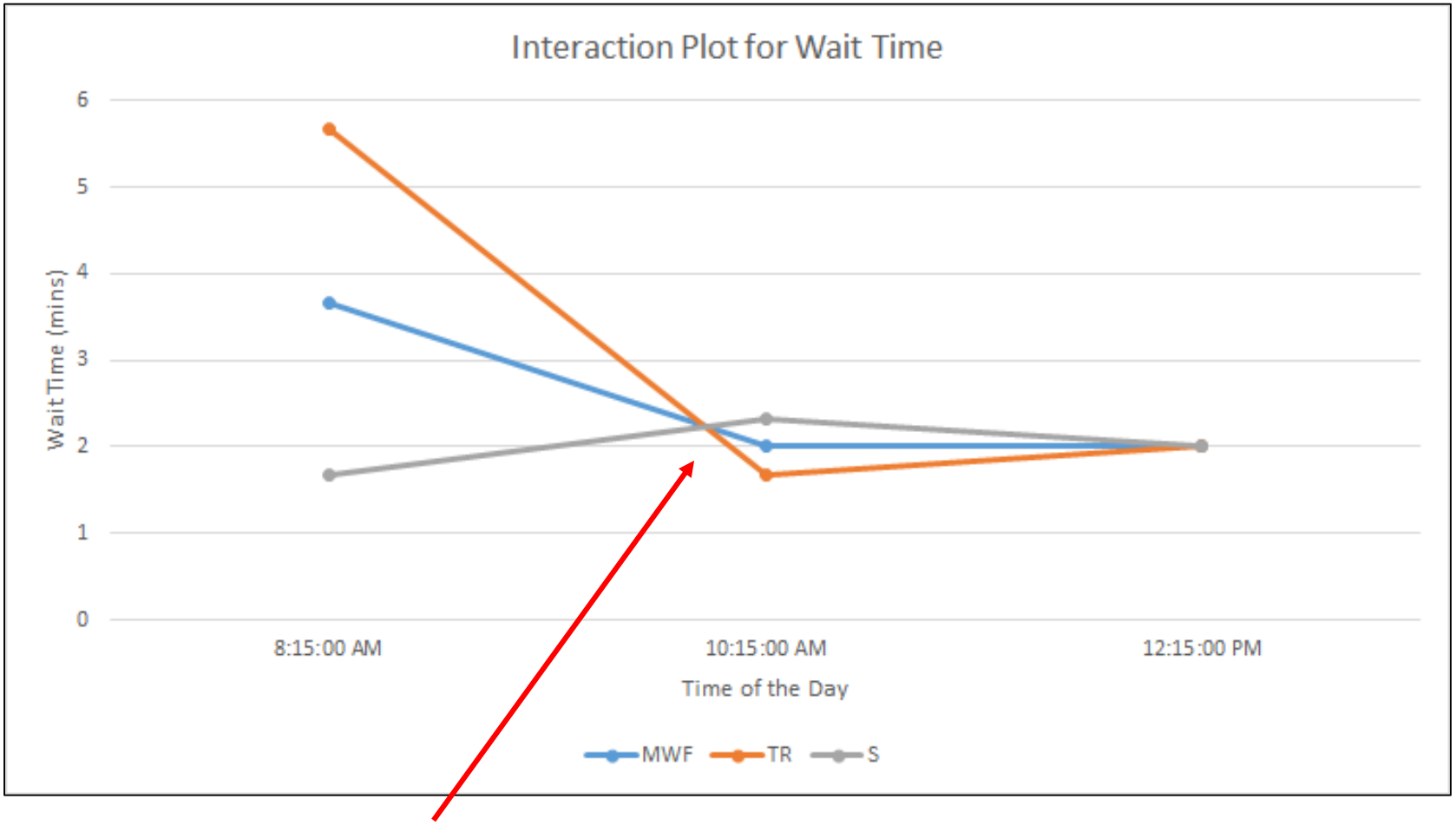
2. Regrouping experiments

Block 1: Monday, Wednesday, and Friday

Block 2: Tuesday and Thursday

Block 3: Saturday

Interaction Plot



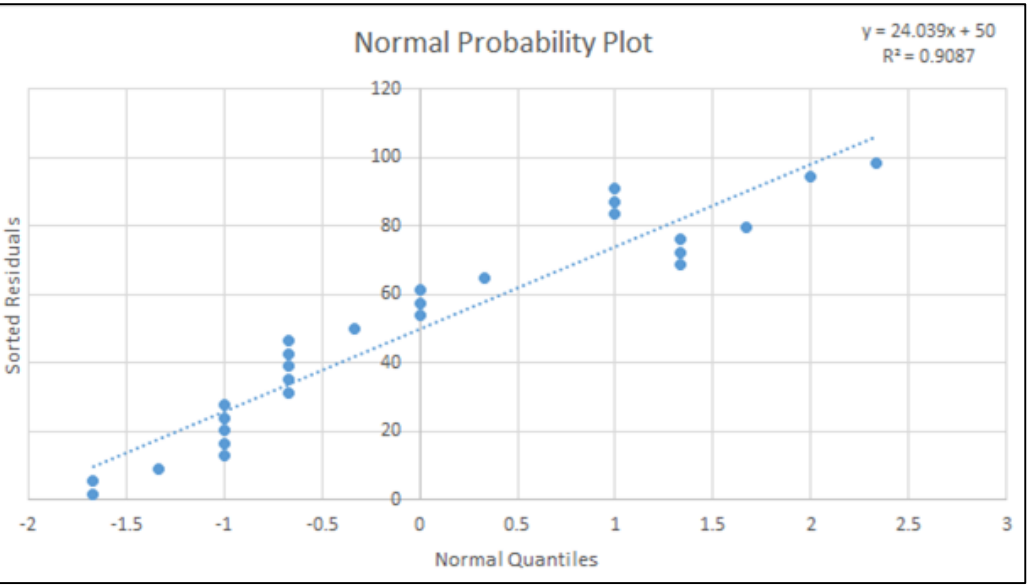
Expected interaction effects

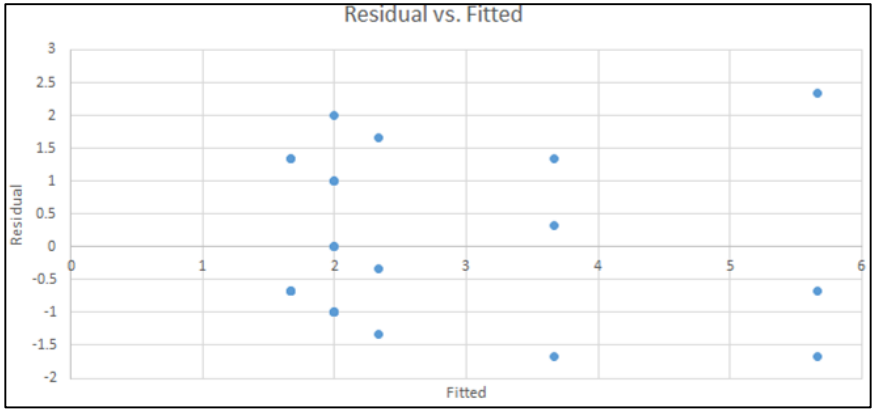
Two-way Repeated ANOVA

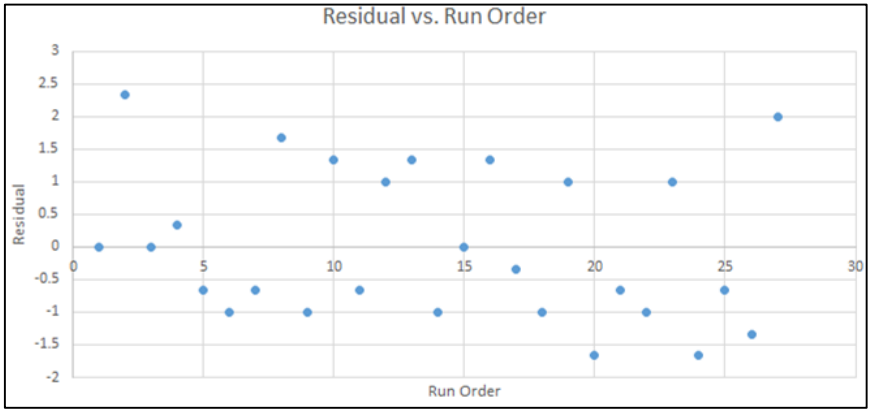
ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Time of Day	16.66666667	2	8.33333	4.245283019	0.03087674	3.554557146
Day of Week	5.555555556	2	2.77778	1.41509434	0.26866662	3.554557146
Interaction	19.11111111	4	4.77778	2.433962264	0.08493515	2.927744173
Within	35.33333333	18	1.96296			
Total	76.66666667	26				

Time of the day produced a significant effect, assuming a significance level of 0.05

Residuals Plots







- Normal Assumption appropriate
- Equal Variance Assumption appropriate
- No serial correlation

Tukey Test

$$T_3 = q_{0.05}(3,18)\sqrt{\frac{1.963}{3}} = 2.92$$

$$\overline{wait\ time}_{8:15am} - \overline{wait\ time}_{10:15am} = |3.667 - 2| = 1.667 < T_3$$

$$\overline{wait\ time}_{10:15am} - \overline{wait\ time}_{12:15pm} = |2 - 2| = 0 < T_3$$

$$\overline{wait\ time}_{12:15pm} - \overline{wait\ time}_{8:15am} = |2 - 3.667| = 1.667 < T_3$$

No significant mean differences were observed

Discussion

- Time of the day had a significant effect on bus wait time
  - No significant differences between the means was found
    - 8:15am differed the most compared to 10:15am and 12:15pm
- No significant interaction
- Nuisance factors limitations

If someone uses the Route 7 bus to Oregon State University the longest wait times are on Monday, Wednesday, Friday mornings at 8:15am