

A STUDY OF ORDERING HABITS IN FAST FOOD RESTAURANTS IN ANGELS CAMP

Do people walk-in or drive-thru?

By

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INTRODUCTION

We want to find out if there is a relationship between the number of walk-ins and the number of drive-thrus at fast food restaurants in Angels Camp.

DEFINITIONS AND ASSUMPTIONS

We will define a walk-in as one order placed inside at the register, regardless of the order size. We will define drive-thrus as the number of cars that drive by the drive-thru window. We expect that more customers will use the drive-thru than walk-in to place their order. We expect the proportion of orders to be greater for the drive-thru than for walk-ins. We expect that more customers will visit a chosen restaurant on Sunday than Saturday.

METHODOLOGY

Using a completely randomized design, we assigned each weekend day, Saturday and Sunday, from October twenty-first through November twelfth, restaurant, and each thirty minute time interval. Then using random.org we made a table to plot out which day we would be going on, what time, and to which restaurant we would be going to; this action was repeated thirty-two times for each section we randomized for a total of 16 hours of data. The earliest we began was 10:30 because that is the latest any one location is open, and the latest we stayed in a restaurant to record our data was 8:30. To keep our results fair we have kept all possible recording times the same.

Open Hours

Restaurant	Opening Time	Closing Time
Burger King	Saturday: 6:00 Sunday: 7:00	Saturday: 12:00 Sunday: 12:00
Chicken Barn	Saturday: 10:30 Sunday: 10:30	Saturday: 9:00 Sunday: 9:00
McDonalds	Saturday: 5:00 Sunday: 5:00	Saturday: 12:00 Sunday: 12:00
Starbucks	Saturday: 5:00 Sunday: 5:00	Saturday: 10:00 Sunday: 9:00
Taco Bell	Saturday: 7:00 Sunday: 7:00	Saturday: 11:00 Sunday: 11:00

RESULTS AND ANALYSIS

The following are the total counts of drive-thrus and walk-ins for all locations, as well as each separate location.

TOTAL CUSTOMERS AT EACH LOCATION:

Chicken Barn = 52

Burger King = 72

McDonald's = 132

Starbucks = 114

Taco Bell = 103

TOTAL = 473

TOTAL DRIVE-THRU CUSTOMERS AT EACH LOCATION:

Chicken Barn = 10

Burger King = 35

McDonald's = 75

Starbucks = 61

Taco Bell = 61

TOTAL = 242

TOTAL WALK-IN CUSTOMERS AT EACH LOCATION:

Chicken Barn = 38

Burger King = 37

McDonald's = 57

Starbucks = 53

Taco Bell = 46

TOTAL = 231

We shall analyze our data by comparing the proportion of walk-ins and drive-thru orders and the proportion of visitors on Saturday and Sunday.

Ho: $P_{WI} = P_{DT}$

Ho: $P_{SAT} = P_{SUN}$

Ha: $P_{WI} < P_{DT}$

Ha: $P_{SAT} < P_{SUN}$

WALK - IN VS DRIVE - THRU PROPORTIONS

\hat{p}_{DT}

\hat{p}_{WI}

242 / 473 = 0.512 → 51.2%

231 / 473 = 0.488 → 48.8%

SATURDAY VS SUNDAY PROPORTIONS

\hat{p}_{SAT}

\hat{p}_{SUN}

158 / 473 = 0.334 → 33.4%

315 / 473 = 0.666 → 66.6%

TEST OF SIGNIFICANCE

Drive-In

Sample Size:	$n = 473$
Sample Proportion:	$\hat{p} = 0.512$
Standard Error:	$SE_{\hat{p}} = 0.023$
Critical z Value:	$z^* = 1.96$
≈95% Confidence Interval:	(0.467, 0.557)
z Statistic:	$z = 0.5221$
p value:	$p = 0.6016$

Interpretation: Assuming that the true population proportion is $p=0.5$, the probability of seeing a test statistic as far out as $z=0.5221$ is 0.6016. We accept the null hypothesis. That is, there is no evidence that walk-in orders are less common than drive through orders.

Analyzing our data for which day is most popular, we have the following summary statistics:

Saturday

Sample Size:	$n = 473$
Sample Proportion:	$\hat{p} = 0.334$
Standard Error:	$SE_{\hat{p}} = 0.0217$
Critical z Value:	$z^* = 1.96$
$\approx 95\%$ Confidence Interval:	$(0.2915, 0.3765)$
z Statistic:	$z = -7.6547$
p value:	$p = 0$

Interpretation: Assuming that the true population proportion is $p=0.5$, the probability of seeing a test statistic as far out as $z=-7.6547$ is 0. We reject the null hypothesis. That is, there is very good evidence that Sunday is a more popular day than Saturday.

CHI-SQUARED - IS ORDER TYPE RELATED TO ORDER DAY OR NOT?

In order to understand if order type is somehow related to which day of the weekend an order is placed, we ran a chi-square test on our data. The summary output from Holt.Blue is given below:

Chi-Square Statistic: 2.97; DF: 1; p-value: 0.085

Interpretation: Assuming that null hypothesis is true, the probability of seeing a chi-square statistic of 2.97 or greater is 0.085. That is, if there really is no relationship, then 8.5% of similarly collected samples will have a chi-square statistic of 2.97 or greater.

		Walk-In	Drive-Thru	Row Totals
Saturday	Observed:	86	72	158
	Expected:	77.163	80.837	
	Chi Square Contribution:	1.012	0.966	
Sunday	Observed:	145	170	315
	Expected:	153.837	161.163	
	Chi Square Contribution:	0.508	0.485	
	Column Totals	231	242	473

With $p=0.08$, there is some evidence that the weekend day on which an order is placed has an influence on the type of order placed, but since p is greater than our 0.05 level of significance, we keep the null hypothesis; we conclude that order type and day are not related.

POTENTIAL LIMITATIONS OF OUR STUDY

On November 4, 2017 there was a regional cross country meet at the Calaveras County Fairgrounds in Angels Camp. This resulted in numerous buses from out of the area visiting the local fast food restaurants. Future efforts along these lines should use a broader time frame for results which may be more representative at year-round visitations.

CONCLUSIONS

Through our research, we found no statistically significant difference between the number of Drive-thru's and Walk-ins for fast food restaurants in Angels Camp. However, we do have

good evidence that Sunday is a more popular day to place an order. We also found weak, evidence that there may be some relationship between the they day an order is placed, and the type of order that is placed, but it is not statistically significant. Future studies may want to investigate this possible relationship by collecting more data over a more representative time frame.

REFERENCES

Holt, Benjamin. "Mr. Holt's Courses." *Mr. Holt's Homepage*, holt.blue/.

APPENDIX: THE DATA

Date	Time	Location	Group Member	# Walk in	# DriveThru
10/21	1:00-1:30	Chicken Barn	Kristi Smylie	4	4
10/21	8:00-8:30	Taco Bell	Darrien Parker	5	8
10/21	2:30-3:00	Burger King	Samantha Jordan	7	4
10/22	8:30-9:00	Taco Bell	Ryan Crawford	4	7
10/22	7:30-8:00	McDonalds	Kristi Smylie	10	16
10/22	5:00-5:30	McDonalds	Ryan Crawford	19	20
10/22	2:00-2:30	Burger King	Jacqueline Pierce	7	8
10/22	2:30-3:00	Chicken Barn	Jacqueline Pierce	2	0
10/28	12:30-1:00	Taco Bell	Samantha Jordan	8	12
10/28	8:30-9:00	Chicken Barn	Kristi Smylie	0	0
10/29	6:30-7:00	Starbucks	Darrien Parker	15	9
10/29	5:30-6:00	McDonalds	Samantha Jordan	12	21
10/29	12:30-1:00	Taco Bell	Ryan Crawford	6	8
10/29	8:00-8:30	Starbucks	Kristi Smylie	2	9
10/29	7:30-8:00	McDonalds	Darrien Parker	16	18
11/4	12:30-1:00	Burger King	Samantha Jordan	4	3
11/4	1:00-1:30	Chicken Barn	Darrien Parker	10	4
11/4	4:00-4:30	Burger King	Ryan Crawford	5	6
11/4	12:00-12:30	Chicken Barn	Darrien Parker	15	1

11/4	4:00-4:30	Starbucks	Samantha Jordan	8	11
11/4	4:00-4:30	Chicken Barn	Ryan Crawford	2	1
11/4	5:00-5:30	Taco Bell	Ryan Crawford	8	11
11/5	1:30-2:00	Chicken Barn	Samantha Jordan	0	1
11/5	5:30-6:00	Chicken Barn	Jacqueline Pierce	1	0
11/5	5:00-5:30	Burger King	Jacqueline Pierce	3	5
11/5	10:30-11:00	Starbucks	Darrien Parker	20	20
11/11	11:30-12:00	Chicken Barn	Kristi Smylie	4	3
11/11	11:00-11:30	Burger King	Samantha Jordan	6	4
11/12	10:30-11:00	Burger King	Jacqueline Pierce	5	5
11/12	3:00-3:30	Taco Bell	Jacqueline Pierce	11	5
11/12	10:30-11:00	Starbucks	Samantha Jordan	8	12
11/12	8:00-8:30	Taco Bell	Kristi Smylie	4	6