
Coffee: The Perfect Cup

A Statistical Analysis
Comparing
Temperature of
Coffee Served at
Bruegger's and
Panera Bread

By Michael Brinker

EXECUTIVE SUMMARY

The purpose of this analysis was to test two independent establishments consistency and accuracy in the temperature of coffee served. The standard optimal serving temperature is 160° F. A *t*-test was used to statistically analyze the variance between the average temperature of coffee served. A random sample was taken 32 times from each establishment.

The results show that Bruegger's average coffee temperature most accurately reflects the standard of 160° F, but their consistency is lower than Panera Bread's. Panera Bread consistently serves their coffee 10° F above optimal temperature through the day. If the customer sips his or her cup of coffee immediately after purchasing then Bruegger's is the superior choice, but if allowed for cool down time then Panera Bread is the more consistent option.

INTRODUCTION

Coffee is a growing industry in the United States. Coffee has shifted from being nothing more than a fuel for a modern work force to a specialty item for connoisseurs. Gone are the days when pre-ground coffee beans were purchased in metal can; stale prior to consumption. No, the new coffee industry implies a spirit of romanticism, trying new coffees from exotic origins and tasting nuanced flavors and scents.

Due to this shift, the growing elite group of coffee drinkers are often unsatisfied with the coffee that is available in public establishments. It's no longer alright for a restaurant to brew a pot of cheap Brazilian coffee and keep it warm for hours until the last drop is served. From this quest for the perfect cup of coffee, an official entity has formed known as the Specialty Coffee Association of America, or SCAA. Standards have been developed using scientific research in order to ensure the optimal cup. Factors like water temperature prior to brewing, coarseness of grind (extra fine, fine, medium, etc...) optimal serving temperature of coffee, and amount of time that hot water is in contact with coffee grounds have all been carefully calculated by the SCAA.

This study will analyze temperature of coffee served at two major food chains; Bruegger's and Panera Bread. The SCAA states that when brewing coffee, water should be heated to 200° F, and then *cupping* (the process of analyzing and tasting brewed coffee) should begin when the coffee is at 160° F. This temperature of 160° F is what we will use as the standard temperature at which coffee is optimally consumed.

32 data points have been collected from both Bruegger's and Panera Bread. On 32 separate occasions (for each establishment) coffee was purchased in a paper cup and immediately the temperature was measured using an analog cooking thermometer with an estimated reading accuracy of $\pm 1^\circ$ Fahrenheit. The samples were taken anywhere from 8:05 AM to 2:45 PM. A *t*-test will be used to compare the means of the two data sets.

ANALYSIS OF MEAN VARIANCE

Hypothesis Test: Independent Groups (t-test, pooled variance)

Bruegger's	Panera Bread	
162.91	170.75	mean
8.63	5.33	std. dev.
32	32	n
		62 df
		-7.844 difference (Bruegger's - Panera Bread)
		51.399 pooled variance
		7.169 pooled std. dev.
		1.792 standard error of difference
		0 hypothesized difference
		-4.38 t
		4.72E-05 p-value (two-tailed)

Table 1, Comparative Statistic Analysis of Bruegger's and Panera Bread Data

Table 1 shows the results of the *t*-test. The test statistic, *t* value is -4.38. This tells us that the variances are most likely unequal. Furthermore, the small p-value of 4.72E-05 also indicates unequal means between the two sample groups. At this point, we can assume that the differences between average coffee temperature of Bruegger's and Panera Bread are not the same. This raises curiosity as to which restaurant a customer is more likely to get a coffee of consistent temperature.

At first look, it would appear that Bruegger's more closely conforms to SCAA standards of serving temperature (160° F). Bruegger's coffee averages 162.91° F and Panera Bread's coffee averages at 170.75° F. Next we will visually assess the data to learn more about the variances between means of the sample groups.

VISUAL ANALYSIS OF DATA

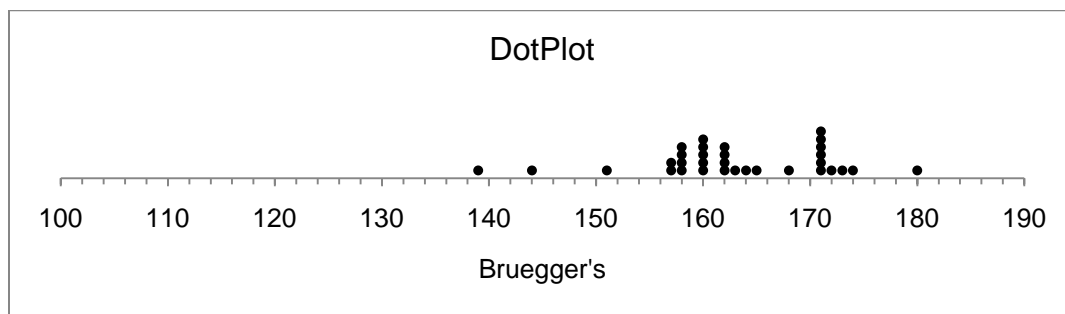


Table 2, DotPlot of Bruegger's Data

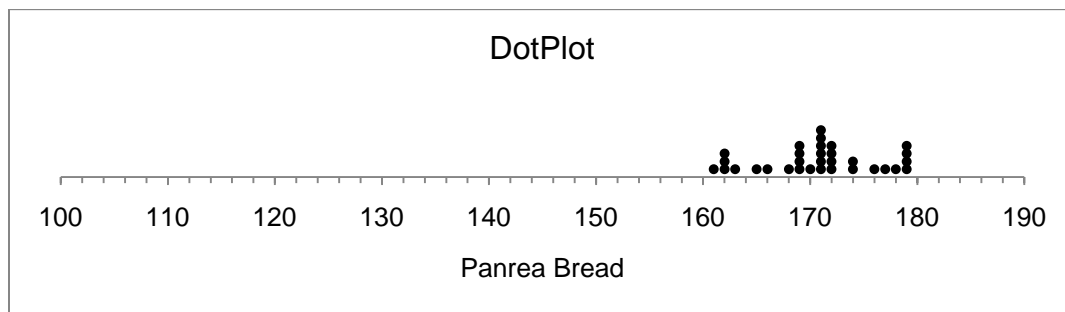


Table 3, DotPlot of Panera Bread Data

Tables 2 and 3 give a visual representation of how the data falls on number line. Bruegger's coffee contains outliers ranging from 140° F to 180° F. This shows a less consistent cup of coffee, but with more data in the 160° F range than Panera Bread. Panera's plot shows the data grouped closer together with greater consistency, but with most data in the 170° F range.

QUESTIONABLE OBSERVATIONS

The three low-temperature outliers in the Bruegger's data were observed at 12:00pm or later into the afternoon. If the analysis had been focused in the morning (when most customers are likely to purchase a cup of coffee) then Bruegger's would have fared better. Their average temperature is closer to the SCAA standard as well.

CONCLUSION

The purpose of this analysis was to test for temperature consistency of the coffee served at Bruegger's and Panera Bread. The SCAA standard for coffee serving temperature is 160° F. Bruegger's average coffee temperature was much closer to this standard than Panera's was, but conversely, Panera Bread was more consistent throughout the entire day.

In order to comprehensively assess quality of coffee from multiple establishments, then several additional factors need to be looked at such as coffee bean quality, degree of freshness, brewing method, and price. But as far as temperature consistency between these two businesses the results are quite conclusive.

In practice, Panera Bread serves their coffee with a more consistent temperature than Bruegger's, but if one prefers to receive their coffee at about 160° F and they are purchasing in the morning then Bruegger's would be the best choice.

Another factor to take into consideration is the cooling period. If you are planning to purchase your cup of coffee to go, and consume it once you get to work, then Panera Bread's temperatures allow for that. If you purchase coffee to go from Bruegger's then by the time you reach your destination it may be too cool.

All in all, the perfect cup of coffee is almost a mythical ideal for the coffee connoisseur. Sure, control over several factors can significantly improve a coffee, but controlling each one to idealistic perfection may not be possible, and is most likely not practical.