

## Analysis of the Meters in Lot X - Summer 1999

In the spring of 1999, parking services at UWSP installed meters in the largest commuter lot on campus (lot X). The meters replaced a system which had not worked well in the past years. During the summer of 1999, we designed a study to investigate the accuracy of these new meters.

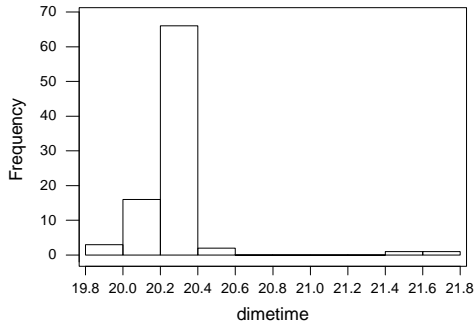
The new meters were setup to be 30 cents per hour. This means that a dime should give 20 minutes. There are about 500 meters on campus and each one has a number. In our investigation, we tried to sample every fifth meter and obtained 90 measurements. If the meter we wanted to sample was being used we sampled the meter next to it. Also, there were 30 members in our group and each member sampled 3 meters.

### Time for a Dime

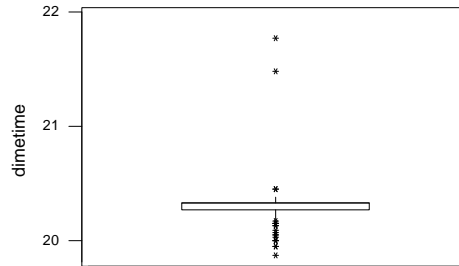
For each meter that we measured, we put a dime in and started a stopwatch as soon as the dime entered the meter. We stopped the stopwatch as soon as the meter read 0:00. Times were recorded as minutes and seconds and then converted to a decimal number of minutes. A few times were recorded with times close to 24 minutes. After talking with the person who collected this data, we determined that they waited until the 4 minute grace period was over. For these observations we subtracted 4 minutes. One meter did not register any time and it was omitted from the summary below.

minimum	Q1	Median	Q3	Maximum	mean	SD
19.78	20.29	20.33	20.33	21.77	20.30	0.235

Histogram



Boxplot



As you can see from the histogram and the boxplot, only 3 of the meters gave less than 20 minutes, and most of the meters gave between 20.2 and 20.4 meters. In fact, when we look closer at the data values, 44 of the 89 observations were 20 minutes and 20 seconds. Also, the standard deviation of the observations is about 20 seconds, which means that the meters are fairly accurate.

### Time for a Nickel

For each meter sampled, we also put in a nickel and measured how long until the meter read 0:00. The results for a nickel were very similar to those for a dime. Only one meter gave less than the required 10 minutes, the average time was 10.192 minutes. Again, one observation occurred a majority of the time. For nickels, 41 out of the 89 measurements were 10 minutes and 10 seconds.

It seems like it might not be a coincidence that a nickel resulted in about 10 minutes and 10 seconds, while a dime resulted in 20 minutes and 20 seconds. We think that the meters have an internal clock that uses a 61 second minute. This would mean that we would expect an average of 60 minutes and 60 seconds when we put in 30 cents. If we were to do another study, we would begin with this hypothesis.

## **Conclusion**

In conclusion, it looks like the meters on campus are accurate, and almost always give at least 20 minutes for a dime. However, in the fall of 1999, parking services raised the cost to 40 cents per hour. We will need to do another investigation.