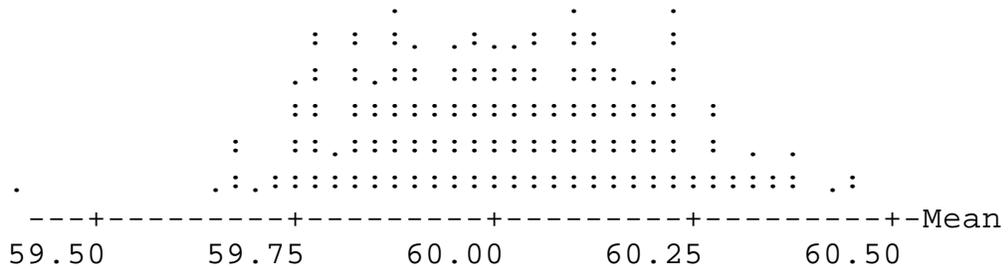


CONFIDENCE AND STANDARD ERRORS

The deal is ... it is NOT the standard error that determines the amount of confidence that a specific CI has in including or capturing the parameter. It is the number of error units you add and subtract from the statistic that determines this. To show this, consider another example similar to the book ... where the standard error is about .4. What I did below was to make a similar situation where the standard error was about half of that ... I did this by sampling from a population where the population standard deviation was 1 ... this would make the approximate standard error be: $1 / \text{sqrt} 25 = 1/5 = .2$. Look at the Minitab simulation.

```
MTB > rand 200 c1-c25;
SUBC> norm 60 1.
MTB > rmean c1-c25, c26
MTB > name c26='Mean'
MTB > dotp c26
```



```
MTB > desc c26
```

	N	MEAN	MEDIAN	TRMEAN	STDEV	SEMEAN
Mean	200	60.014	60.010	60.013	0.186	0.013
	MIN	MAX	Q1	Q3		
Mean	59.402	60.460	59.869	60.156		

Note that the standard error of the mean in this simulation is about half the previous one ... = .186. I put that in k1.

```
MTB > let k1=.186
MTB > let c28=c26-k1
MTB > let c30=c26+k1
MTB > set c29
DATA> 200(60)
DATA> end
MTB > let c31=(c28 lt c29) and (c30 gt c29)
```

```
MTB > prin c26 c28-c31
```

ROW	Mean	C28	C29	C30	C31
1	60.2483	60.0623	60	60.4343	0
2	60.1489	59.9629	60	60.3349	1
3	59.9742	59.7882	60	60.1602	1
4	59.8794	59.6934	60	60.0654	1
5	60.2215	60.0355	60	60.4075	0
6	60.1621	59.9761	60	60.3481	1
7	60.0967	59.9107	60	60.2827	1
8	60.1699	59.9839	60	60.3559	1
9	59.8943	59.7083	60	60.0803	1
10	59.9286	59.7426	60	60.1146	1
11	60.1535	59.9675	60	60.3395	1
12	59.9975	59.8115	60	60.1835	1
13	59.8863	59.7003	60	60.0723	1
14	59.9013	59.7153	60	60.0873	1
15	59.8979	59.7119	60	60.0839	1
16	59.9346	59.7486	60	60.1206	1
17	60.1676	59.9816	60	60.3536	1
18	59.7715	59.5855	60	59.9575	0
19	59.8352	59.6492	60	60.0212	1

```
MTB > sum c31
SUM      =      130.00
MTB > let k2=130/200
MTB > prin k2
K2       0.650000
```

In this simulation, about 65 percent of the CI's contained the parameter of 60. The fact is, it is not the standard error that drives confidence. I cut the standard error more than in half yet the confidence or percentage is still about 68.

The confusion is between width of the CI and amount of confidence. A CI in this case would look like ...

Mean +/- (# err units)(Stan err)

Clearly, the width of the CI will be affected by both the size of the stan err AND the number of units of err you go on either side of the mean. Bigger or smaller widths can be achieved by changing either # of err units OR size of stan err. However, what determines how many intervals will tend to capture the parameter is the number of err units ... NOT the stand err. While smaller stand errors will necessarily make narrower CI's

... that does not mean that narrower CI's yield more confidence!!!!!!!!!!!!!!!!!!!!!! How close the statistic is to the real parameter is a function to the standard error but ... that is NOT the same question one is addressing when asking what is the likelihood that the CI itself contains the parameter.