SPSS Chapter 6 Example 1 - Confidence Interval Simulation

In the course notes we see that researchers wish to quantify their uncertainty with respect to the location of the mean of the population. We use a confidence interval to help us do this. Perform the following simulation to help you understand confidence intervals.

Follow these steps to produce a 90% confidence interval simulation N=20 samples of size n=25, where the population is normal with a mean and standard deviation of 50 and 15, respectively:

- 1. Click File, click New, and click Syntax.
- 2. Enter the following syntax as you see it below.

🚰 P92syn~1 - SPSS Syntax Editor					
<u>File E</u> dit <u>V</u> iew <u>S</u> tatistics <u>G</u> raphs <u>U</u> tilities <u>R</u> un <u>W</u> indow <u>H</u> elp					
<u> </u>					
INPUT PROGRAM.					
SET SEED=99999.					
+ LOOP # = 1 TO 20.					
+ DO REPEAT RESPONSE = R1 TO R25.					
+ COMPUTE RESPONSE = RV.NORMAL(50,15).					
+ END REPEAT.					
+ COMPUTE AVG = MEAN(R1 TO R25).					
$+ \qquad CUMPUTE UINT = AVG + 1.645^{15}/SURT(25).$					
$+ \qquad CUMPUTE LINT = AVG - 1.645^{\circ}15/SURT(25).$					
$= 0 \text{ COMPUTE INSIDE = 0 \text{ INT } 50 \text{ AND LINT } 50.$					
DESCRIPTIVES VARIABLES=INSIDE					
/STATISTICS=MEAN STDDEV					
SUMMARIZE					
/TABLES=uint lint avg inside					
/FORMAT=VALIDLIST NOCASENUM TOTAL LIMIT=100					
/TITLE='Case Summaries' /FOOTNOTE "					
/MISSING=VARIABLE					
/CELLS=COUNT .					
SPSS Processor is ready					

3. Click **Run** and then click **All** (or use the mouse to highlight all the syntax, and then click the ▶ button).

The SPSS output for this Confidence Interval Simulation is the following:

Note that there are 20 samples of size 25.

Descriptive Statistics

	Ν	Mean	Std. Deviation
AVG Valid N (listwise)	20 20	.85	.37

The upper (UINT) and lower (LINT) should give an interval that will contain the population mean (i.e., 50) 90% of the time in the long-run. We can see that in 17 of 20 cases the confidence interval captures the population mean (i.e., 17/20 = 85%). In this example, cases 9,15 and 20 fall outside the 90% confidence interval. This is seen by looking at the INSIDE column ,a 0 indicates a value outside the interval.

Case Summaries^a

	UINT	LINT	AVG	INSIDE
1	59	49	54	1
2	51	41	46	1
3	54	44	49	1
4	56	46	51	1
5	57	47	52	1
6	58	48	53	1
7	54	44	49	1
8	55	45	50	1
9	49	39	44	0
10	56	46	51	1
11	53	43	48	1
12	54	44	49	1
13	60	50	55	1
14	59	49	54	1
15	60	50	55	0
16	53	43	48	1
17	56	46	51	1
18	56	46	51	1
19	59	49	54	1
20	61	51	56	0
Total N	20	20	20	20

a. Limited to first 100 cases

The Case Summaries table presents the mean ("AVG") upper and lower confidence intervals ("UINT" and "LINT" respectively) for each case (N=20).

Change 1.645 for the 90% interval value (8^{th} and 9^{th} lines of the Syntax Editor window) to the 95% value of 1.96 and repeat the simulation. What proportion of the time did you capture the mean?