

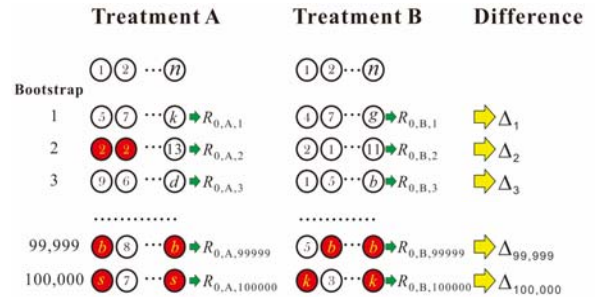
How to use “C: PT (1 by 1)” for the paired bootstrap test

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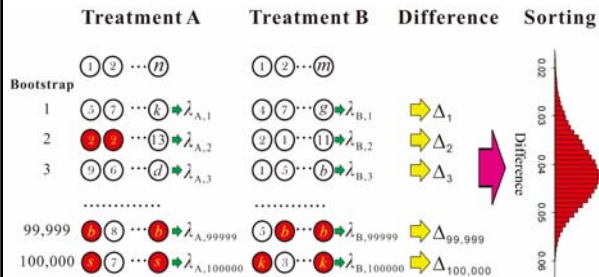
1

Paired bootstrap test of R_0



2

Paired bootstrap test of λ values



3

Note well!

- In TWSEX-MSChart (version 2015-001 or higher), I offer “Paired bootstrap test” in two ways. They are based on the percentile of differences and 95% CI of differences.
- If you use “C. PT (1 by 1)” to run paired bootstrap test, you don’t need to combine the files. You can select files one by one from the respective file folders. **This method is much easier than “D. PT (pooled)”**.
- If you use D. PT (pooled) “Paired bootstrap test”, you have to combine files of different treatments into a single big file.

4

Attention!

You should **NOT** use routine statistical functions in SAS, SPSS, or Excel to analyze the data files created by bootstrap. You can, however, use programs designed specifically for bootstraps to carry out advanced analysis of these data files.

5

Files for the paired bootstrap test

- There are 100~250 files generated from your life table data. Many of them are ready for bootstrap paired test. They have the file name “..._Effective Boots-r-in column.txt” or “..._Effective Boots-r-in row.txt”.
- If you use “Pick 1 by 1” paired bootstrap test, you can choose either files in “column” or “row” format.

6

There are files for the comparison of population parameters (r , R_0 , T and λ) and general statistics (mean longevity, development time, fecundity, etc.) For example, if you collect life table data at 20, 25 and 30°C and the filename are 20C.txt, 25C.txt and 30C.txt, respectively, you can find following files in the respective folder.

- 20C_Effective Bootstrap-Ro-in rows.txt
- 25C_Effective Bootstrap-Ro-in rows.txt
- 30C_Effective Bootstrap-Ro-in rows.txt



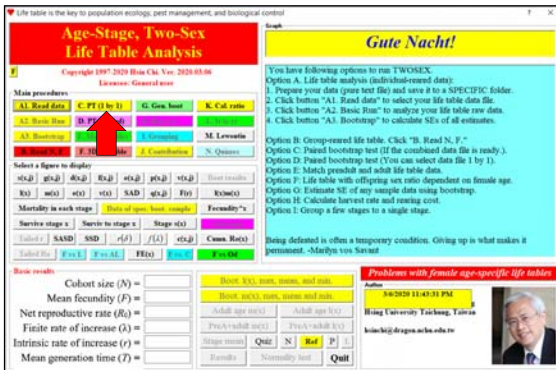
Example

25C_Effective Bootstrap-Ro-in column.txt

```
"25C"
"Next line is
71
"Next line is total effective Bootstrap number (B)"
100000
"Ro",71,18.2253521126761
22.1408450704225
13.5774647887324
.....
```

If you are using the new version of TWSEX, this line is your treatment code. If you are using an old version, you can change it. Don't use non ASCII code.

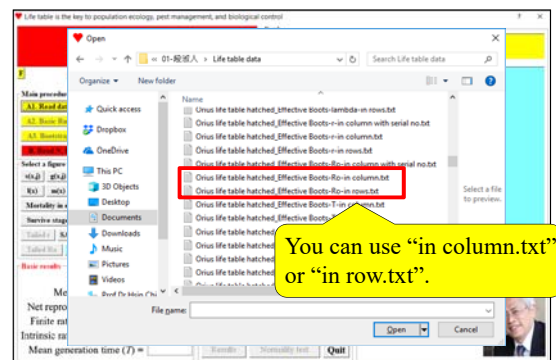
Paired bootstrap test "C. PT (1 by 1)"



Enter the number of treatments



Pick the file for comparison



Quick sort or selection sort?



Enter quicksort classes

Dear General user. Please select quicksort classes (2, 4, 8, 16, 32, 64 or 128). If sample size is small, you cannot use 128 classes. You have to use 16 classes.

In most cases, you can use 128. It is very fast. However, if you receive error message, you should re-run the program and try 16, 8, 4, or 2 classes.

Not responding? Please wait!

I am running paired bootstrap test. Please wait! Don't touch me! (Comparing 1 with 2) (Sorting...)

Please wait!

I am running paired bootstrap test. Please wait! Don't touch me! (Comparing 1 with 2) (Sorting...)

Result (if there are three treatments, A, B, and C)

You can find detailed results in the file "24-Paired bootstrap test_Result.txt".

Paired bootstrap test

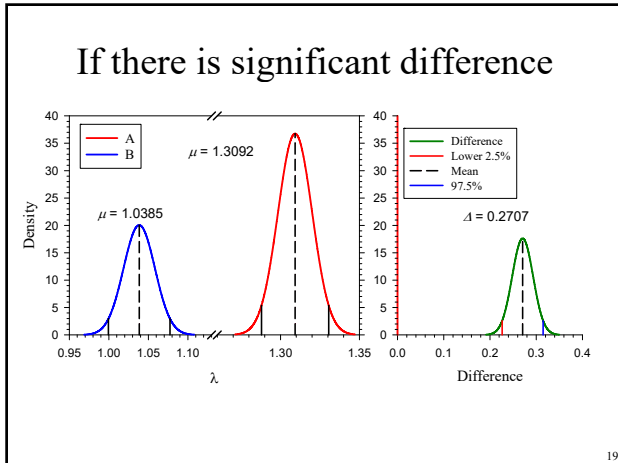
	B	C	A
B	---	644.53	676.82
C	63.51*	---	32.28
A	112.33*	-417.14	---

The mean difference between B and C is 644.53, the lower confidence interval of differences is 63.51. Because CI does not include 0, there is significant difference at the 5% level. The mean difference between C and A is 32.28, the confidence interval is -417.1~481.7. Because CI includes 0, there is no significant difference at the 5% level.

Output _CI of mean difference-Result.txt

```

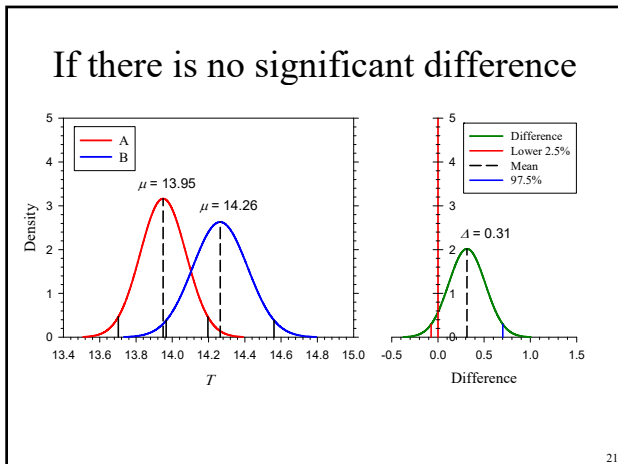
Comparison between B vs C
Bootstrap (B)= 100000
=====
B                                     C
-----
Original =                1420.12857142857      775.666666666667
Bootstrap mean =          1420.28142242857      775.747425733327
Variance =                 58978.8598168248      28461.854957399
SE =                       242.85635752652      168.706416467777
-----
Difference (A) =           644.533996695239
* With the increase of bootstrap number, B will close to A.
Mean differences (B) =    644.533996695233
SE of differences =       296.446137424365
-----
95% CI:
Lower                               Upper
***** 63.5102394044237 > 0 1225.55775398604 *****
* There is significant difference between B and C.
* Number of significant differences = 97030
* P-value = 0.0297
    
```



24-Paired bootstrap test_Result.txt

```

Comparison between C vs A
Bootstrap (B)= 100000
=====
C                               A
-----
Original =                       775.66666666667  743.904109589041
Bootstrap mean =                   775.747425733327  743.465641095899
Variance =                         28461.854957399  23882.9153426181
SE =                                 168.706416467777  154.540982728266
-----
Difference (A) =                   32.2817846374277
* With the increase of bootstrap number, B will close to A. *
Mean differences (B) =              32.2817846374428
SE of differences =                 229.303525650375
-----
95% CI:                            Lower                Upper
                                     -417.1448707103 < 0  481.708439985255
=====
* There is no significant difference between C and A. *
* If the CI includes 0, there is no difference. *
* Number of insignificant differences = 88903 *
* P-value = 0.88903
    
```



Differences and lower CI

Table 2. Differences between treatments and lower CI. [Upper right triangle: The difference between means (i,j)]. [Lower left triangle: Lower CI of difference between means (i,j)]

	B	C	A
B	----	644.534	676.8158
C	63.5102 *	----	32.2818
A	112.3282 *	-417.1449	----

*: Significant at 5% significance level

Differences and P-value

Table 3. Differences between treatments and P-value [Upper right triangle: The difference between means (i,j)]. [Lower left triangle: P-value of the test between (i,j)]

	B	C	A
B	----	644.534 *	676.8158 *
C	0.0297 *	----	32.2818
A	0.0197 *	0.889	----

*: Significant at 5% significance level

P-value and Differences

Table 4. Differences between treatments (Paired bootstrap test). [Upper right triangle: P-value of the test between (i,j)]. [Lower left triangle: The difference between means (i,j)]

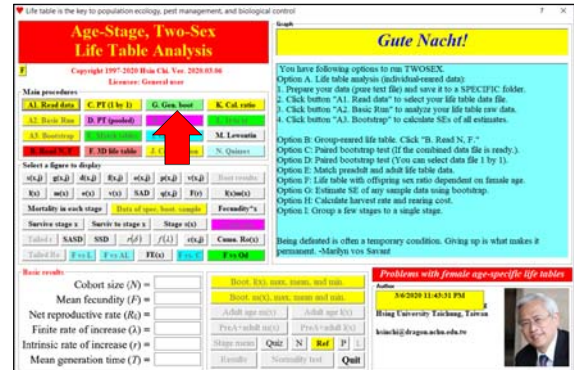
	B	C	A
B	----	0.0297 *	0.0197 *
C	644.534 *	----	0.889
A	676.8158 *	32.2818	----

*: Significant at 5% significance level

In case you cannot find the file you need for the paired bootstrap test

- You may need some special bootstrap data file for paired test. For example, if you want to compare the "oviposition period", you cannot find the bootstrap result (Because the oviposition period is not a good concept, I didn't offer you this bootstrap result).
- TWSEX listed the oviposition period for all females in the file "..._g_Oviposition period.txt". You can use it to run "General bootstrap" to get the bootstrap file for paired bootstrap test.

G. General B: Bootstrap for general statistics
一般統計資料可使用此 bootstrap



Data format for general bootstrap

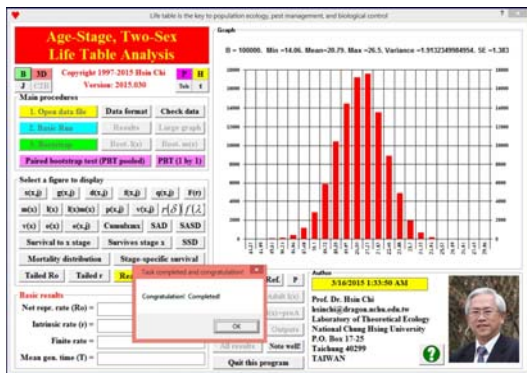
No serial number With serial number

"Project: .."	"Project:"	"Project:"	"Project:"
"Pupa weight"	"head width"	"i", "weight"	"i", "head width"
2.5	0.25	1,2.5	1,0.25
2.2	0.34	2,2.2	2,0.34
...
...
1.9	0.45	28,1.9	28,0.45
1.8	0.33	29,1.8	29,0.33
2.3	0.32	30,2.3	30,0.32
-1		-1,-1	

Sample frequency (variance=100.4)



Frequency of bootstrap means (variance=1.9)



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