Looking at Paired Data

Here is some paired sample data: [These values can be generated in R using the command **gnrnd4(key1=1434122510, key2=390004700251).]**

Table 1															
index	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Early	19.0	32.6	23.2	18.3	29.5	28.5	24.1	22.2	30.2	23.9	21.2	21.7	27.9	24.1	23.1
Later	18.3	32.7	27.6	21.8	29.1	31.8	27.3	27.2	33.9	27.1	20.7	19.9	32.0	21.7	24.8
index	16	17	18	19	20	21	22	23	24	25	26				
Early	25.6	30.5	30.2	17.5	27.6	27.5	21.9	33.5	35.4	24.4	18.3				
Later	24.9	32.2	29.3	20.8	28.4	27.4	24.8	36.6	38.3	28.1	16.9				

Editor

paired demo.R

Source on Save

```
1  # this is just a quick look at paired data
2  source("../gnrnd4.R")
3  gnrnd4( key1=1434122510, key2=390004700251 )
4  L1
5  L2
6  #  We want to look at  Later (L2) minus Earlier (L1)
7  L3 <- L2 - L1
8  L3
```

Console Terminal Jobs

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```
> # this is just a quick look at paired data
> source("../gnrnd4.R")
> gnrnd4( key1=1434122510, key2=390004700251 )
style= 10    size= 26    seed= 43412    num digits= 1    alt_sign= 1
[1] "DONE "
> L1
 [1] 19.0 32.6 23.2 18.3 29.5 28.5 24.1 22.2 30.2 23.9 21.2 21.7 27.9
[14] 24.1 23.1 25.6 30.5 30.2 17.5 27.6 27.5 21.9 33.5 35.4 24.4 18.3
> L2
 [1] 18.3 32.7 27.6 21.8 29.1 31.8 27.3 27.2 33.9 27.1 20.7 19.9 32.0
[14] 21.7 24.8 24.9 32.2 29.3 20.8 28.4 27.4 24.8 36.6 38.3 28.1 16.9
> #  We want to look at  Later (L2) minus Earlier (L1)
> L3 <- L2 - L1
> L3
 [1] -0.7  0.1  4.4  3.5 -0.4  3.3  3.2  5.0  3.7  3.2 -0.5 -1.8  4.1
[14] -2.4  1.7 -0.7  1.7 -0.9  3.3  0.8 -0.1  2.9  3.1  2.9  3.7 -1.4
```

```
10  # to find a 95% confidence interval for the mean
11  #  of the difference, L2 - L1
12  source("../ci_unknown.R")
13  ci_unknown( sd(L3), length(L3), mean(L3), 0.95)
```

```
> # to find a 95% confidence interval for the mean
> #  of the difference, L2 - L1
> source("../ci_unknown.R")
> ci_unknown( sd(L3), length(L3), mean(L3), 0.95)
    CI Low    CI High        MOE Std Error
 0.7108164 2.4968759 0.8930298 0.4336067
```

```
15  # To test the null hypothesis that the mean
16  #  difference in the paired values is 0 against
17  #  the alternative hypothesis that the Later
18  #  values are greater than the Earlier values,
19  #  that is, that the mean of L3 > 0, at the
20  #  0.02 level of significance.
21  #
22  source("../hypo_unknown.R")
23  hypoth_test_unknown( 0, 5, 0.02, length(L3),
24                       mean(L3), sd(L3) )
```

```
> # To test the null hypothesis that the mean
> #  difference in the paired values is 0 against
> #  the alternative hypothesis that the Later
> #  values are greater than the Earlier values,
> #  that is, that the mean of L3 > 0, at the
> #  0.02 level of significance.
> #
> source("../hypo_unknown.R")
> hypoth_test_unknown( 0, 5, 0.02, length(L3),
+                      mean(L3), sd(L3) )
                HO_mu                      H1:              std. error
                  "0"                  "mu >  0"   "0.433606726077224"
                    n                sig level                       t
                 "26"                   "0.02"     "2.16658663445277"
            samp mean               samp stdev               test stat
   "1.60384615384615"     "2.21096915749284"     "3.69884980418988"
              how far             critical low            critical high
  "0.939446537327734"                  "n.a."    "0.939446537327734"
             attained                 decision
"0.000534512639041581"                "Reject"
```