## Average Linkage Hierarchical Cluster Analysis

        This cluster procedure clusters objects based on their similarity (or dissimilarity) as recorded in a data matrix. The correlation among objects is often used as a measure of similarity. In this example, we first loaded the file labeled "cansas.os4". We then "rotated" the data using the rotate function in the Edit menu so that columns represent subjects and rows represent variables. We then used the Correlation procedure (with the option to save the correlation matrix) to obtain the correlation among the 20 subjects as a measure of similarity. We then closed the file. Next, we opened the matrix file we had just saved using the File / Open a Matrix File option. We then clicked on the Analyses / Multivariate / Cluster / Average
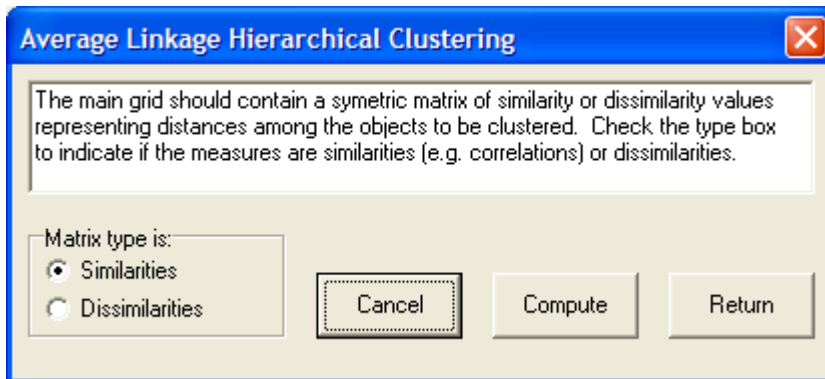
Linkage option. Shown below is the dialogue box for the analysis:

Figure 1. Average Linkage Dialog

Output of the analysis includes a listing of which objects (groups) are combined at each step followed by a dendogram of the combinations. You can compare this method of clustering subjects with that obtained in the previous analysis.

```
Average Linkage Cluster Analysis.  Adopted from ClusBas by John S.
Uebersax

Group  18 is joined by group  19. N is   2 ITER =   1 SIM =      0.999
Group   1 is joined by group   5. N is   2 ITER =   2 SIM =      0.998
Group   6 is joined by group   7. N is   2 ITER =   3 SIM =      0.995
Group  15 is joined by group  17. N is   2 ITER =   4 SIM =      0.995
Group  12 is joined by group  13. N is   2 ITER =   5 SIM =      0.994
Group   8 is joined by group  11. N is   2 ITER =   6 SIM =      0.993
Group   4 is joined by group   8. N is   3 ITER =   7 SIM =      0.992
Group   2 is joined by group   6. N is   3 ITER =   8 SIM =      0.988
Group  12 is joined by group  16. N is   3 ITER =   9 SIM =      0.981
Group  14 is joined by group  15. N is   3 ITER =  10 SIM =      0.980
Group   2 is joined by group   4. N is   6 ITER =  11 SIM =      0.978
Group  12 is joined by group  18. N is   5 ITER =  12 SIM =      0.972
Group   2 is joined by group  20. N is   7 ITER =  13 SIM =      0.964
Group   1 is joined by group   2. N is   9 ITER =  14 SIM =      0.962
Group   9 is joined by group  12. N is   6 ITER =  15 SIM =      0.933
Group   1 is joined by group   3. N is  10 ITER =  16 SIM =      0.911
Group   1 is joined by group  14. N is  13 ITER =  17 SIM =      0.900
Group   1 is joined by group   9. N is  19 ITER =  18 SIM =      0.783
Group   1 is joined by group  10. N is  20 ITER =  19 SIM =      0.558

No. of objects =  20
```

Matrix defined similarities among objects.

```
UNIT    1    5    2    6    7    4    8    11   20   3    14   15   17   9    12   13   16   18
 19   10
STEP    *    *    *    *    *    *    *    *    *    *    *    *    *    *    *    *    *    *
 *    *
  1     *    *    *    *    *    *    *    *    *    *    *    *    *    *    *    *    *
******    *
        *    *    *    *    *    *    *    *    *    *    *    *    *    *    *    *    *
 *         *
  2     ******    *    *    *    *    *    *    *    *    *    *    *    *    *    *    *
 *         *
        *    *    *    *    *    *    *    *    *    *    *    *    *    *    *    *    *
 *         *
  3     *    *    ******    *    *    *    *    *    *    *    *    *    *    *    *    *
 *         *
        *    *    *    *    *    *    *    *    *    *    *    *    *    *    *    *    *
 *         *
  4     *    *    *    *    *    *    *    *    *    ******    *    *    *    *
 *         *
        *    *    *    *    *    *    *    *    *    *    *    *    *    *    *    *
 *         *
  5     *    *    *    *    *    *    *    *    *    *    *    ******    *
 *         *
        *    *    *    *    *    *    *    *    *    *    *    *    *    *    *
 *         *
  6     *    *    *    *    ******    *    *    *    *    *    *    *    *
 *         *
        *    *    *    *    *    *    *    *    *    *    *    *    *    *
 *         *
  7     *    *    *    ********    *    *    *    *    *    *    *
 *         *
        *    *    *    *    *    *    *    *    *    *    *    *
 *         *
  8     *    ********    *    *    *    *    *    *    *    *
 *         *
        *    *    *    *    *    *    *    *    *    *    *
 *         *
  9     *    *    *    *    *    *    *    *    *********
 *         *
        *    *    *    *    *    *    *    *    *
 *         *
 10     *    *    *    *    *    ********    *    *
 *         *
        *    *    *    *    *    *    *    *    *
 *         *
 11     *    ****************    *    *    *    *    *
 *         *
        *    *    *    *    *    *    *
 *         *
 12     *    *    *    *    *    *    *
************    *
        *    *    *    *    *    *         *
 *
 13     *    ********************    *    *    *         *
 *
        *    *    *    *    *         *
 *
 14     ****************************    *    *    *         *
 *
        *    *    *    *         *
 *
 15     *    *    *    ****************
 *
        *    *    *         *
 *
 16     ****************************    *         *
 *
        *    *         *
 *
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 17                        ***********************                    *
*
*                                                    *                      *
*
 18                        *******************************
*
                                                    *
*
 19
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