

# Adjusted P-values User's Guide

Pierre Legendre  
Département de sciences biologiques  
Université de Montréal  
C.P. 6128, succursale Centre-ville  
Montréal, Québec H3C 3J7, Canada

January 2002

Internet: [Pierre.Legendre@umontreal.ca](mailto:Pierre.Legendre@umontreal.ca)  
Web site: <http://www.fas.umontreal.ca/biol/legendre/>

## **What does the program *Adjusted P-values* do?**

This program computes three forms of adjustments to a list of probability values in cases of multiple testing: the Bonferroni, Holm, and Hochberg corrections. The theory underlying these corrections was reviewed by Wright (1992) and by Legendre & Legendre (1998). A page from Legendre & Legendre (1998) explaining how the calculations are done is provided in appendix to this user's guide.

## **Input file**

A list of p-values, one per line. See example.

## **Output file**

See example below.

## **Disclaimer**

This program is provided without any explicit or implicit warranty of correct functioning. It has been developed as part of a university-based research program. If, however, you should encounter problems with this program, the author will be happy to help solve them. Researchers may use this program for scientific purposes, but the source code remains the property of Pierre Legendre. Users of the program may refer to the present user's manual as follows:

Legendre, P. 2002. Adjusted P-values user's guide. Département de sciences biologiques, Université de Montréal. 4 pages.

## **Technical notes**

The program is available in a variety of forms:

- FORTRAN source code for Macintosh (file ADJUSTED\_P-VALUES.F), which can be compiled using a FORTRAN compiler. The user may modify the Parameter statement at the beginning of the program, which fixes the size of the largest list of probabilities that can be analysed (kmax = maximum number of probabilities).
- FORTRAN source code for DOS or Windows (file ADJUSTP.FOR), which can be compiled using a FORTRAN compiler. The user may modify the Parameter statement at the beginning of the program, which fixes the size of the largest list of probabilities that can be analysed (kmax = maximum number of probabilities).

- Compiled version for PowerPC processors for Macintosh (file ADJUSTED\_P-VALUES/PPC). The program is dimensioned to handle 500 probabilities.
- Compiled version for IBM compatible PC (file ADJUSTP.EXE). The program is dimensioned to handle 500 probabilities.

## References

Wright, S. P. 1992. Adjusted P-values for simultaneous inference. *Biometrics* 48: 1005-1013.

Legendre, P. & L. Legendre. 1998. *Numerical ecology*, 2nd English edition. Elsevier Science BV, Amsterdam.

## Appendix: Test run

Here are 10 values of probabilities obtained from a series of tests of statistical significance. They are written to a file which will be used as the input file of the program. The probabilities can be written in any order in the input file. They will be sorted by the program.

```
0.00200
0.19700
0.02600
0.00600
0.00200
0.00100
0.00100
0.02500
0.24000
0.05400
```

When using the Macintosh version of the program, the dialogue window contains the following input and output information:

```
Name of the input file?
Input file: 10P-values.txt
How many values in that file ?
10
```

	Prob.	p(Bonf.)	adj.p	adj.Holm	adj.Hochberg
1	0.00100	0.01000	0.01000	0.01000	0.00900
2	0.00100	0.01000	0.00900	0.01000	0.00900
3	0.00200	0.02000	0.01600	0.01600	0.01400
4	0.00200	0.02000	0.01400	0.01600	0.01400
5	0.00600	0.06000	0.03600	0.03600	0.03600
6	0.02500	0.25000	0.12500	0.12500	0.10400
7	0.02600	0.26000	0.10400	0.12500	0.10400
8	0.05400	0.54000	0.16200	0.16200	0.16200
9	0.19700	1.97000	0.39400	0.39400	0.24000
10	0.24000	2.40000	0.24000	0.39400	0.24000

The results are also written to file 'PValues.out'  
End of the program.

## **Output file**

In the Macintosh version of the program, an output file (PVALUES.OUT) contains the same output information as was printed on the screen.

In the DOS version, the calculations results are not printed to the screen; they are only found in the output file. This is because the DOS window cannot be scrolled back, so that any output information written to it would be lost.

-----

User's notes prepared by Philippe Casgrain –

### **How to start a DOS program**

- (1) To open a DOS window: from the Start menu, choose Programs    Accessories    MS-DOS.
- (2) At the DOS prompt (e.g., C:\WINDOWS\>), type “cd c:\path\to\the\program” where “\path\to\the\program” represents the directory where the program is found.  
Examples: c:\tmp, or c:\windows\desktop, etc. Press the *Return* key.
- (3) Type the name of the program to start it.  
Example: adjustp.exe. Press the *Return* key.
- (4) Follow the on-screen instructions.