Polytomous DIF Analysis

The purpose of the differential item functioning programs are to identify test or attitude items that "perform" differently for two groups - a target group and a reference group. Two procedures are provided and selected on the basis of whether the items are dichotomous (0 and 1 scoring) or consist of multiple categories (e.g. Likert responses ranging from 1 to 5.) The latter case is where the Polytomous DIF Analysis is selected. When you initiate this procedure you will see the dialogue box shown below:

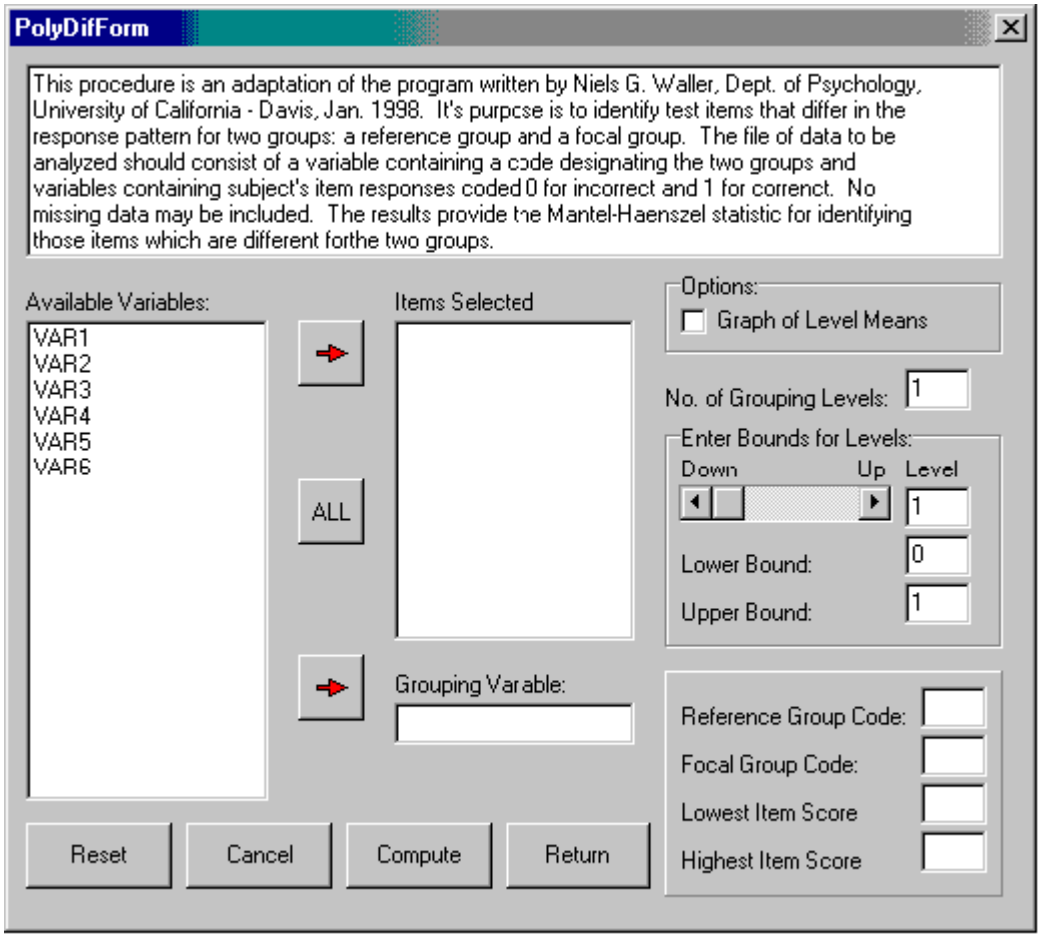

Figure 1 Polytomous Item Differential Item Functioning Dialog

The results from an analysis of three items with five categories that have been collapsed into three category levels is shown below. A sample of 500 subject's attitude scores were observed.

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Polytomous Item DIF Analysis adapted by Bill Miller from
Procedures for extending item bias detection techniques
by Catherine Welch and H.D. Hoover, 1993
Applied Measurement in Education 6(1), pages 1-19.

Conditioning Levels
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```
Lower        Upper
    0            1
    2            3
    4            5
```

For Item 1:

```
Observed Category Frequencies
Item  Group  Level  Category Number
                         1         2         3         4         5
  1   Ref.    1        46        51        39        64        48
  1   Focal   1        40        41        38        46        42
  1   Total   1        86        92        77       110        90

  1   Ref.    2         2         0         0         0         0
  1   Focal   2         1         0         0         0         0
  1   Total   2         3         0         0         0         0

  1   Ref.    3        12         8         1         0         0
  1   Focal   3        15         6         0         0         0
  1   Total   3        27        14         1         0         0

t-test values for Reference and Focus Means for each level
Mean Reference =      3.069 SD =     24.396 N =   248
Mean Focal     =      3.043 SD =     21.740 N =   207
Level   1 t =   -0.011 with deg. freedom =   453
Mean Reference =      2.000 SD =      2.000 N =     2
Mean Focal     =      1.000 SD =      1.000 N =     1
Level   2 t =    0.000 with deg. freedom =     0
Mean Reference =      1.476 SD =      4.262 N =    21
Mean Focal     =      1.286 SD =      4.088 N =    21
Level   3 t =   -0.144 with deg. freedom =    40
Composite z statistic = -0.076. Prob. > |z| =  0.530
Weighted Composite z statistic = -0.248. Prob. > |z| =  0.598
Generalized Mantel-Haenszel =      0.102 with D.F. = 1 and Prob. > Chi-
Sqr. =  0.749
```

For Item 2:

```
Observed Category Frequencies
Item  Group  Level  Category Number
                         1         2         3         4         5
  2   Ref.    1        56        46        47        48        51
  2   Focal   1        37        38        49        35        48
  2   Total   1        93        84        96        83        99

  2   Ref.    2         2         0         0         0         0
  2   Focal   2         1         0         0         0         0
  2   Total   2         3         0         0         0         0

  2   Ref.    3        12         8         1         0         0
  2   Focal   3         9        11         1         0         0
  2   Total   3        21        19         2         0         0

t-test values for Reference and Focus Means for each level
```

```
Mean Reference =      2.968 SD =     23.046 N =   248
Mean Focal     =      3.092 SD =     22.466 N =   207
Level   1 t =    0.058 with deg. freedom =   453
Mean Reference =      2.000 SD =      2.000 N =     2
Mean Focal     =      1.000 SD =      1.000 N =     1
Level   2 t =    0.000 with deg. freedom =     0
Mean Reference =      1.476 SD =      4.262 N =    21
Mean Focal     =      1.619 SD =      5.094 N =    21
Level   3 t =    0.096 with deg. freedom =    40
Composite z statistic =  0.075. Prob. > |z| =  0.470
Weighted Composite z statistic =  0.673. Prob. > |z| =  0.250
Generalized Mantel-Haenszel =      1.017 with D.F. = 1 and Prob. > Chi-
Sqr. =  0.313
```

For item 3:

```
Observed Category Frequencies
Item  Group  Level  Category Number
                        1         2         3         4         5
  3   Ref.    1        35        38        52        68        55
  3   Focal   1        42        41        37        42        45
  3   Total   1        77        79        89       110       100

  3   Ref.    2         2         0         0         0         0
  3   Focal   2         1         0         0         0         0
  3   Total   2         3         0         0         0         0

  3   Ref.    3         8        10         3         0         0
  3   Focal   3         7        10         4         0         0
  3   Total   3        15        20         7         0         0

t-test values for Reference and Focus Means for each level
Mean Reference =      3.282 SD =     26.866 N =   248
Mean Focal     =      3.034 SD =     21.784 N =   207
Level   1 t =   -0.107 with deg. freedom =   453
Mean Reference =      2.000 SD =      2.000 N =     2
Mean Focal     =      1.000 SD =      1.000 N =     1
Level   2 t =    0.000 with deg. freedom =     0
Mean Reference =      1.762 SD =      4.898 N =    21
Mean Focal     =      1.857 SD =      5.102 N =    21
Level   3 t =    0.060 with deg. freedom =    40
Composite z statistic = -0.023. Prob. > |z| =  0.509
Weighted Composite z statistic = -1.026. Prob. > |z| =  0.848
Generalized Mantel-Haenszel =      3.248 with D.F. = 1 and Prob. >
ChiSqr. =  0.071
```