APPENDIX E

Variable (t,d), internal and external factors together

This models a combination of internal and external factors. I have configured the occupation factor group so as to keep the blue collar category 'W' distinct from the rest. Follow the education factor group, now group #6, through the regression and note how the factor weights shift slightly as the regression progresses. Points of interest are highlighted with three stars, '***'.

The factor group of 'education' figures in the regression in sixteen contexts: runs 7, 13, 18, 23, and 26 on the step-up and runs 27, 28, 29, 30, 31, 32, 34, 35, 36, 37, 38, and 40 on the step-down. The regression begins with less educated speakers very slightly favouring [t,d] deletion at .504. When education is considered with preceding and following phonological segment in run 18, look what happens to the factor weights. Now educated speakers favour [t,d] deletion at .505. This is likely interaction with one (or more) of the factor groups being considered in the run. Continue following the factor group through the regression. Educated speakers continue to favour [t,d] deletion when factor group 7, occupation, is added. But in run 26 when sex is also added, the factor weights flip around again. Now, educated speakers favour retention of the (t,d) suffix at .505 again. Similarly, when education is considered with all the factor groups in run 27, it stays the same and remains so for the remainder of the step-up analysis. Note however, that throughout the step-up the factor weights hover near .50. The effect is very small throughout the regression. It is discarded on the step-up and if you trace this factor group through the step-down, you will observe the same pattern in reverse. In the end, neither the step-up nor the step-down retain education as statistically significant.

What is education interacting with? Typically, one would look for which factor groups are in play when the reversal of factor weights takes place. However, in this case, this is difficult to tell. There is no consistent relationship between the reversal of the factor weights and any one factor. Instead, there appears to be combined effects arising from a number of factor groups together. In any case, the interaction is not severe enough to severely hamper the regression. Despite the small amount of interaction, education simply is not a significant factor group in the analysis of variable (t,d) in York English.

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• BINOMIAL VARBRUL • 6/26/04•9:05 AM ••••••••••••••••••••••••••••••••••••••••••••

Name of cell file:  ch10.eg.11.Cel


Using fast, less accurate method.

Averaging by weighting factors.

Threshold, step-up/down: 0.050001


Stepping Up…
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```
---------- Level # 0 ----------

Run # 1, 1 cells:
Iterations:  1 2
Convergence at Iteration 2
Input 0.253
Log likelihood = -633.091

---------- Level # 1 ----------

Run # 2, 5 cells:
Iterations:  1 2 3 4 5
Convergence at Iteration 5
Input 0.239
Group # 1 -- L: 0.463, F: 0.300, N: 0.453, S: 0.678, P: 0.378
Log likelihood = -600.597  Significance = 0.000

Run # 3, 6 cells:
Iterations:  1 2 3 4 5
Convergence at Iteration 5
Input 0.187
Group # 2 -- O: 0.892, V: 0.290, G: 0.725, Q: 0.203, L: 0.592, R: 0.623
Log likelihood = -465.021  Significance = 0.000

Run # 4, 3 cells:
Iterations:  1 2 3 4
Convergence at Iteration 4
Input 0.249
Group # 3 -- M: 0.562, P: 0.419, A: 0.455
Log likelihood = -625.398  Significance = 0.000

Run # 5, 2 cells:
Iterations:  1 2 3 4
Convergence at Iteration 4
Input 0.251
Group # 4 -- F: 0.454, M: 0.560
Log likelihood = -628.241  Significance = 0.003

Run # 6, 4 cells:
Iterations:  1 2 3
Convergence at Iteration 3
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```
Input 0.252
Group # 5 -- 5: 0.524, 1: 0.484, 3: 0.481, 7: 0.524
Log likelihood = -632.336  Significance = 0.682

Run # 7, 3 cells:
Iterations:  1 2 3
Convergence at Iteration 3
Input 0.260
Group # 6 -- -: 0.504, +: 0.490
Log likelihood = -632.861  Significance = 0.499

Run # 8, 6 cells:
Iterations:  1 2 3 4 5
Convergence at Iteration 5
Input 0.249
Group # 7 -- L: 0.564, M: 0.462, S: 0.443, P: 0.451, W: 0.704
Log likelihood = -624.982  Significance = 0.005

Add Group # 2 with factors OVGQLR

---------- Level # 2 ----------

Run # 9, 29 cells:
Iterations:  1 2 3 4 5 6
Convergence at Iteration 6
Input 0.176
Group # 1 -- L: 0.388, F: 0.293, N: 0.495, S: 0.670, P: 0.381
Group # 2 -- O: 0.896, V: 0.298, G: 0.695, Q: 0.195, L: 0.510, R: 0.614
Log likelihood = -443.524  Significance = 0.000

Run # 10, 18 cells:
Iterations:  1 2 3 4 5 6
Convergence at Iteration 6
Input 0.183
Group # 2 -- O: 0.895, V: 0.294, G: 0.716, Q: 0.185, L: 0.566, R: 0.632
Group # 3 -- M: 0.576, P: 0.417, A: 0.398
Log likelihood = -457.405  Significance = 0.000

Run # 11, 12 cells:
Iterations:  1 2 3 4 5 6
Convergence at Iteration 6
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```
Input 0.184
Group # 2 -- O: 0.895, V: 0.291, G: 0.724, Q: 0.190, L: 0.588, R: 0.632
Group # 4 -- F: 0.436, M: 0.583
Log likelihood = -458.739  Significance = 0.000

Run # 12, 24 cells:
Iterations:  1 2 3 4 5 6
Convergence at Iteration 6
Input 0.187
Group # 2 -- O: 0.895, V: 0.289, G: 0.721, Q: 0.201, L: 0.602, R: 0.620
Group # 5 -- 5: 0.482, 1: 0.483, 3: 0.550, 7: 0.487
Log likelihood = -464.123  Significance = 0.621

Run # 13, 17 cells:
Iterations:  1 2 3 4 5 6 7
Convergence at Iteration 7
Input 0.189
Group # 2 -- O: 0.892, V: 0.290, G: 0.725, Q: 0.202, L: 0.591, R: 0.624

Log likelihood = -464.903  Significance = 0.643

Run # 14, 35 cells:
Iterations:  1 2 3 4 5 6
Convergence at Iteration 6
Input 0.179
Group # 2 -- O: 0.896, V: 0.290, G: 0.714, Q: 0.192, L: 0.597, R: 0.642
Group # 7 -- L: 0.576, M: 0.444, S: 0.450, P: 0.463, W: 0.757
Log likelihood = -455.771  Significance = 0.001

Add Group # 1 with factors LFNSP

---------- Level # 3 ----------

Run # 15, 71 cells:
Iterations:  1 2 3 4 5 6 7 8
Convergence at Iteration 8
Input 0.175
Group # 1 -- L: 0.386, F: 0.314, N: 0.478, S: 0.663, P: 0.411
Group # 2 -- O: 0.896, V: 0.299, G: 0.691, Q: 0.194, L: 0.498, R: 0.617
Group # 3 -- M: 0.534, P: 0.443, A: 0.513
Log likelihood = -442.033  Significance = 0.229
```

```
Run # 16, 55 cells:
Iterations:  1 2 3 4 5 6
Convergence at Iteration 6
Input 0.173
Group # 1 -- L: 0.397, F: 0.299, N: 0.495, S: 0.668, P: 0.372
Group # 2 -- O: 0.898, V: 0.299, G: 0.693, Q: 0.184, L: 0.504, R: 0.615
Group # 4 -- F: 0.440, M: 0.579
Log likelihood = -438.170  Significance = 0.001

Run # 17, 100 cells:
Iterations:  1 2 3 4 5 6
Convergence at Iteration 6
Input 0.176
Group # 1 -- L: 0.389, F: 0.291, N: 0.492, S: 0.672, P: 0.381
Group # 2 -- O: 0.897, V: 0.297, G: 0.691, Q: 0.193, L: 0.521, R: 0.616
Group # 5 -- 5: 0.507, 1: 0.467, 3: 0.546, 7: 0.491
Log likelihood = -442.535  Significance = 0.582

Run # 18, 71 cells:
Iterations:  1 2 3 4 5 6 7
Convergence at Iteration 7
Input 0.178
Group # 1 -- L: 0.388, F: 0.293, N: 0.494, S: 0.670, P: 0.380
Group # 2 -- O: 0.896, V: 0.298, G: 0.695, Q: 0.195, L: 0.509, R: 0.614

Log likelihood = -443.358  Significance = 0.579

Run # 19, 131 cells:
Iterations:  1 2 3 4 5 6 7
Convergence at Iteration 7
Input 0.168
Group # 1 -- L: 0.376, F: 0.280, N: 0.491, S: 0.677, P: 0.392
Group # 2 -- O: 0.900, V: 0.299, G: 0.683, Q: 0.180, L: 0.512, R: 0.633
Group # 7 -- L: 0.596, M: 0.438, S: 0.411, P: 0.470, W: 0.751
Log likelihood = -433.376  Significance = 0.000

Add Group # 7 with factors LMSPW

---------- Level # 4 ----------
```

Run # 20, 237 cells:

Iterations: 1 2 3 4 5 6 7 8 9

Convergence at Iteration 9

Input 0.167

Group # 1 -- L: 0.373, F: 0.296, N: 0.475, S: 0.671, P: 0.422

Group # 2 -- O: 0.900, V: 0.300, G: 0.680, Q: 0.180, L: 0.500, R: 0.637

Group # 3 -- M: 0.533, P: 0.441, A: 0.524

Group # 7 -- L: 0.598, M: 0.438, S: 0.401, P: 0.472, W: 0.750

Log likelihood = -431.796 Significance = 0.207

Run # 21, 206 cells:

Iterations: 1 2 3 4 5 6 7

Convergence at Iteration 7

Input 0.167

Group # 1 -- L: 0.386, F: 0.285, N: 0.491, S: 0.675, P: 0.383

Group # 2 -- O: 0.901, V: 0.300, G: 0.684, Q: 0.174, L: 0.508, R: 0.631

Group # 4 -- F: 0.455, M: 0.559

Group # 7 -- L: 0.591, M: 0.441, S: 0.413, P: 0.493, W: 0.706

Log likelihood = -430.787 Significance = 0.024

Run # 22, 243 cells:

Iterations: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

No Convergence at Iteration 20

Input 0.166

Group # 1 -- L: 0.373, F: 0.282, N: 0.490, S: 0.676, P: 0.395

Group # 2 -- O: 0.903, V: 0.296, G: 0.677, Q: 0.178, L: 0.527, R: 0.635

Group # 5 -- 5: 0.486, 1: 0.456, 3: 0.568, 7: 0.508

Group # 7 -- L: 0.591, M: 0.431, S: 0.457, P: 0.476, W: 0.767

Log likelihood = -431.519 Significance = 0.295

Run # 23, 222 cells:

Iterations: 1 2 3 4 5 6 7

Convergence at Iteration 7

Input 0.169

Group # 1 -- L: 0.377, F: 0.281, N: 0.491, S: 0.676, P: 0.391

Group # 2 -- O: 0.900, V: 0.299, G: 0.683, Q: 0.180, L: 0.510, R: 0.634

Group # 7 -- L: 0.596, M: 0.441, S: 0.407, P: 0.457, W: 0.758

Log likelihood = -433.058 Significance = 0.441

Add Group # 4 with factors FM

```
---------- Level # 5 ----------

Run # 24, 338 cells:
Iterations:  1 2 3 4 5 6 7 8 9
Convergence at Iteration 9
Input 0.165
Group # 1 -- L: 0.381, F: 0.299, N: 0.477, S: 0.670, P: 0.411
Group # 2 -- O: 0.901, V: 0.301, G: 0.681, Q: 0.174, L: 0.496, R: 0.633
Group # 3 -- M: 0.531, P: 0.443, A: 0.528
Group # 4 -- F: 0.456, M: 0.558
Group # 7 -- L: 0.593, M: 0.441, S: 0.404, P: 0.494, W: 0.705
Log likelihood = -429.284  Significance = 0.226

Run # 25, 341 cells:
Iterations:  1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
No Convergence at Iteration 20
Input 0.163
Group # 1 -- L: 0.382, F: 0.287, N: 0.491, S: 0.674, P: 0.387
Group # 2 -- O: 0.904, V: 0.297, G: 0.679, Q: 0.172, L: 0.522, R: 0.634
Group # 4 -- F: 0.456, M: 0.557
Group # 5 -- 5: 0.488, 1: 0.456, 3: 0.564, 7: 0.511
Group # 7 -- L: 0.586, M: 0.435, S: 0.458, P: 0.497, W: 0.724
Log likelihood = -429.029  Significance = 0.323

Run # 26, 296 cells:
Iterations:  1 2 3 4 5 6 7 8
Convergence at Iteration 8
Input 0.167
Group # 1 -- L: 0.385, F: 0.286, N: 0.491, S: 0.675, P: 0.383
Group # 2 -- O: 0.901, V: 0.300, G: 0.684, Q: 0.173, L: 0.507, R: 0.631
Group # 4 -- F: 0.452, M: 0.562

Group # 7 -- L: 0.590, M: 0.441, S: 0.414, P: 0.501, W: 0.698
Log likelihood = -430.567  Significance = 0.510

No remaining groups significant

Groups selected while stepping up:  2  1  7  4
Best stepping up run:  #21
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Stepping Down…

---------- Level # 7 ----------

Run # 27, 534 cells:
Iterations: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
No Convergence at Iteration 20
Input 0.164
Group # 1 -- L: 0.378, F: 0.302, N: 0.479, S: 0.668, P: 0.414
Group # 2 -- O: 0.904, V: 0.298, G: 0.677, Q: 0.172, L: 0.510, R: 0.637
Group # 3 -- M: 0.529, P: 0.447, A: 0.528
Group # 4 -- F: 0.454, M: 0.560
Group # 5 -- 5: 0.478, 1: 0.463, 3: 0.569, 7: 0.503

Group # 7 -- L: 0.588, M: 0.435, S: 0.444, P: 0.505, W: 0.714
Log likelihood = -427.215

---------- Level # 6 ----------

Run # 28, 269 cells:
Iterations: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
No Convergence at Iteration 20
Input 0.172
Group # 2 -- O: 0.905, V: 0.292, G: 0.702, Q: 0.166, L: 0.583, R: 0.648
Group # 3 -- M: 0.573, P: 0.417, A: 0.409
Group # 4 -- F: 0.447, M: 0.569
Group # 5 -- 5: 0.448, 1: 0.482, 3: 0.579, 7: 0.493

Group # 7 -- L: 0.575, M: 0.438, S: 0.448, P: 0.530, W: 0.696
Log likelihood = -442.669 Significance = 0.000

Run # 29, 266 cells:
Iterations: 1 2 3 4 5 6 7 8 9 10 11 12
Convergence at Iteration 12
Input 0.233
Group # 1 -- L: 0.449, F: 0.310, N: 0.434, S: 0.681, P: 0.406
Group # 3 -- M: 0.526, P: 0.445, A: 0.544
Group # 4 -- F: 0.473, M: 0.536
Group # 5 -- 5: 0.533, 1: 0.461, 3: 0.489, 7: 0.542
***

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Group # 7 -- L: 0.570, M: 0.460, S: 0.450, P: 0.459, W: 0.666
Log likelihood = -586.206  Significance = 0.000

Run # 30, 375 cells:
Iterations:  1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
No Convergence at Iteration 20
Input 0.164
Group # 1 -- L: 0.382, F: 0.288, N: 0.491, S: 0.674, P: 0.387
Group # 2 -- O: 0.904, V: 0.297, G: 0.680, Q: 0.172, L: 0.521, R: 0.635
Group # 4 -- F: 0.454, M: 0.560
Group # 5 -- 5: 0.485, 1: 0.453, 3: 0.573, 7: 0.506

Group # 7 -- L: 0.583, M: 0.436, S: 0.461, P: 0.501, W: 0.720
Log likelihood = -428.418  Significance = 0.301

Run # 31, 475 cells:
Iterations:  1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
No Convergence at Iteration 20
Input 0.164
Group # 1 -- L: 0.370, F: 0.296, N: 0.477, S: 0.671, P: 0.421
Group # 2 -- O: 0.903, V: 0.297, G: 0.676, Q: 0.178, L: 0.512, R: 0.646
Group # 3 -- M: 0.529, P: 0.447, A: 0.524
Group # 5 -- 5: 0.506, 1: 0.435, 3: 0.572, 7: 0.514

Group # 7 -- L: 0.583, M: 0.438, S: 0.462, P: 0.451, W: 0.781
Log likelihood = -429.061  Significance = 0.057

Run # 32, 449 cells:
Iterations:  1 2 3 4 5 6 7 8
Convergence at Iteration 8
Input 0.166
Group # 1 -- L: 0.381, F: 0.300, N: 0.477, S: 0.670, P: 0.412
Group # 2 -- O: 0.901, V: 0.301, G: 0.682, Q: 0.173, L: 0.496, R: 0.634
Group # 3 -- M: 0.531, P: 0.443, A: 0.527
Group # 4 -- F: 0.453, M: 0.561

Group # 7 -- L: 0.592, M: 0.441, S: 0.405, P: 0.501, W: 0.698
Log likelihood = -429.074  Significance = 0.295

Run # 33, 501 cells:
Iterations:  1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
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```
No Convergence at Iteration 20
Input 0.163
Group # 1 -- L: 0.378, F: 0.300, N: 0.479, S: 0.669, P: 0.414
Group # 2 -- O: 0.904, V: 0.298, G: 0.677, Q: 0.172, L: 0.510, R: 0.636
Group # 3 -- M: 0.529, P: 0.447, A: 0.528
Group # 4 -- F: 0.457, M: 0.556
Group # 5 -- 5: 0.483, 1: 0.463, 3: 0.560, 7: 0.509
Group # 7 -- L: 0.591, M: 0.434, S: 0.442, P: 0.498, W: 0.721
Log likelihood = -427.807  Significance = 0.281

Run # 34, 400 cells:
Iterations:  1 2 3 4 5 6 7 8 9 10
Convergence at Iteration 10
Input 0.174
Group # 1 -- L: 0.397, F: 0.313, N: 0.480, S: 0.663, P: 0.400
Group # 2 -- O: 0.900, V: 0.299, G: 0.685, Q: 0.181, L: 0.505, R: 0.618
Group # 3 -- M: 0.529, P: 0.449, A: 0.521
Group # 4 -- F: 0.435, M: 0.584
Group # 5 -- 5: 0.496, 1: 0.480, 3: 0.555, 7: 0.469

Log likelihood = -434.892  Significance = 0.006

Cut Group # 3 with factors MPA

---------- Level # 5 ----------

Run # 35, 133 cells:
Iterations:  1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
No Convergence at Iteration 20
Input 0.176
Group # 2 -- O: 0.902, V: 0.288, G: 0.710, Q: 0.180, L: 0.609, R: 0.641
Group # 4 -- F: 0.444, M: 0.573
Group # 5 -- 5: 0.452, 1: 0.474, 3: 0.586, 7: 0.494

Group # 7 -- L: 0.569, M: 0.439, S: 0.481, P: 0.519, W: 0.704
Log likelihood = -449.284  Significance = 0.000

Run # 36, 129 cells:
Iterations:  1 2 3 4 5 6 7 8 9 10 11 12 13 14
Convergence at Iteration 14
Input 0.234
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Group # 1 -- L: 0.454, F: 0.297, N: 0.448, S: 0.684, P: 0.380
Group # 4 -- F: 0.473, M: 0.535
Group # 5 -- 5: 0.539, 1: 0.453, 3: 0.493, 7: 0.545
 ***
Group # 7 -- L: 0.566, M: 0.461, S: 0.463, P: 0.455, W: 0.671
Log likelihood = -588.221  Significance = 0.000

Run # 37, 324 cells:
Iterations:  1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
No Convergence at Iteration 20
Input 0.165
Group # 1 -- L: 0.373, F: 0.281, N: 0.490, S: 0.677, P: 0.394
Group # 2 -- O: 0.903, V: 0.296, G: 0.679, Q: 0.178, L: 0.523, R: 0.644
Group # 5 -- 5: 0.514, 1: 0.426, 3: 0.575, 7: 0.518
 ***
Group # 7 -- L: 0.579, M: 0.439, S: 0.479, P: 0.447, W: 0.785
Log likelihood = -430.266  Significance = 0.056

Run # 38, 296 cells:
Iterations:  1 2 3 4 5 6 7 8
Convergence at Iteration 8
Input 0.167
Group # 1 -- L: 0.385, F: 0.286, N: 0.491, S: 0.675, P: 0.383
Group # 2 -- O: 0.901, V: 0.300, G: 0.684, Q: 0.173, L: 0.507, R: 0.631
Group # 4 -- F: 0.452, M: 0.562

Group # 7 -- L: 0.590, M: 0.441, S: 0.414, P: 0.501, W: 0.698
Log likelihood = -430.567  Significance = 0.235

Run # 39, 341 cells:
Iterations:  1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
No Convergence at Iteration 20
Input 0.163
Group # 1 -- L: 0.382, F: 0.287, N: 0.491, S: 0.674, P: 0.387
Group # 2 -- O: 0.904, V: 0.297, G: 0.679, Q: 0.172, L: 0.522, R: 0.634
Group # 4 -- F: 0.456, M: 0.557
Group # 5 -- 5: 0.488, 1: 0.456, 3: 0.564, 7: 0.511
Group # 7 -- L: 0.586, M: 0.435, S: 0.458, P: 0.497, W: 0.724
Log likelihood = -429.029  Significance = 0.274

Run # 40, 256 cells:
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Iterations:  1 2 3 4 5 6 7 8 9 10
Convergence at Iteration 10
Input 0.175
Group # 1 -- L: 0.400, F: 0.298, N: 0.493, S: 0.668, P: 0.374
Group # 2 -- O: 0.900, V: 0.298, G: 0.688, Q: 0.181, L: 0.515, R: 0.617
Group # 4 -- F: 0.434, M: 0.585
Group # 5 -- 5: 0.498, 1: 0.476, 3: 0.557, 7: 0.471

Log likelihood = -436.133  Significance = 0.006

Cut Group # 6 with factors -+

---------- Level # 4 ----------

Run # 41, 117 cells:
Iterations:  1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
No Convergence at Iteration 20
Input 0.174
Group # 2 -- O: 0.902, V: 0.288, G: 0.710, Q: 0.181, L: 0.609, R: 0.643
Group # 4 -- F: 0.452, M: 0.563
Group # 5 -- 5: 0.469, 1: 0.465, 3: 0.574, 7: 0.506
Group # 7 -- L: 0.570, M: 0.440, S: 0.486, P: 0.496, W: 0.726
Log likelihood = -450.164  Significance = 0.000

Run # 42, 110 cells:
Iterations:  1 2 3 4 5 6
Convergence at Iteration 6
Input 0.233
Group # 1 -- L: 0.456, F: 0.297, N: 0.448, S: 0.683, P: 0.381
Group # 4 -- F: 0.469, M: 0.540
Group # 5 -- 5: 0.525, 1: 0.471, 3: 0.484, 7: 0.541
Group # 7 -- L: 0.573, M: 0.457, S: 0.449, P: 0.473, W: 0.655
Log likelihood = -589.253  Significance = 0.000

Run # 43, 243 cells:
Iterations:  1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
No Convergence at Iteration 20
Input 0.166
Group # 1 -- L: 0.373, F: 0.282, N: 0.490, S: 0.676, P: 0.395
Group # 2 -- O: 0.903, V: 0.296, G: 0.677, Q: 0.178, L: 0.527, R: 0.635
Group # 5 -- 5: 0.486, 1: 0.456, 3: 0.568, 7: 0.508
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Group # 7 -- L: 0.591, M: 0.431, S: 0.457, P: 0.476, W: 0.767
Log likelihood = -431.519  Significance = 0.028

Run # 44, 206 cells:
Iterations:  1 2 3 4 5 6 7
Convergence at Iteration 7
Input 0.167
Group # 1 -- L: 0.386, F: 0.285, N: 0.491, S: 0.675, P: 0.383
Group # 2 -- O: 0.901, V: 0.300, G: 0.684, Q: 0.174, L: 0.508, R: 0.631
Group # 4 -- F: 0.455, M: 0.559
Group # 7 -- L: 0.591, M: 0.441, S: 0.413, P: 0.493, W: 0.706
Log likelihood = -430.787  Significance = 0.323

Run # 45, 173 cells:
Iterations:  1 2 3 4 5 6
Convergence at Iteration 6
Input 0.173
Group # 1 -- L: 0.400, F: 0.296, N: 0.493, S: 0.669, P: 0.373
Group # 2 -- O: 0.900, V: 0.298, G: 0.690, Q: 0.181, L: 0.515, R: 0.618
Group # 4 -- F: 0.439, M: 0.579
Group # 5 -- 5: 0.511, 1: 0.467, 3: 0.545, 7: 0.487
Log likelihood = -437.177  Significance = 0.005

Cut Group # 5 with factors 5137

---------- Level # 3 ----------

Run # 46, 64 cells:
Iterations:  1 2 3 4 5 6 7
Convergence at Iteration 7
Input 0.178
Group # 2 -- O: 0.898, V: 0.291, G: 0.715, Q: 0.183, L: 0.594, R: 0.645
Group # 4 -- F: 0.451, M: 0.564
Group # 7 -- L: 0.570, M: 0.449, S: 0.449, P: 0.488, W: 0.709
Log likelihood = -452.486  Significance = 0.000

Run # 47, 55 cells:
Iterations:  1 2 3 4 5 6
Convergence at Iteration 6
Input 0.235
Group # 1 -- L: 0.461, F: 0.299, N: 0.449, S: 0.681, P: 0.380
```

```
Group # 4 -- F: 0.470, M: 0.540
Group # 7 -- L: 0.575, M: 0.460, S: 0.418, P: 0.469, W: 0.659
Log likelihood = -590.357  Significance = 0.000

Run # 48, 131 cells:
Iterations:  1 2 3 4 5 6 7
Convergence at Iteration 7
Input 0.168
Group # 1 -- L: 0.376, F: 0.280, N: 0.491, S: 0.677, P: 0.392
Group # 2 -- O: 0.900, V: 0.299, G: 0.683, Q: 0.180, L: 0.512, R: 0.633
Group # 7 -- L: 0.596, M: 0.438, S: 0.411, P: 0.470, W: 0.751
Log likelihood = -433.376  Significance = 0.024

Run # 49, 55 cells:
Iterations:  1 2 3 4 5 6
Convergence at Iteration 6
Input 0.173
Group # 1 -- L: 0.397, F: 0.299, N: 0.495, S: 0.668, P: 0.372
Group # 2 -- O: 0.898, V: 0.299, G: 0.693, Q: 0.184, L: 0.504, R: 0.615
Group # 4 -- F: 0.440, M: 0.579
Log likelihood = -438.170  Significance = 0.007

All remaining groups significant

Groups eliminated while stepping down:  3  6  5
Best stepping  up  run:  #21
Best stepping down run:  #44

Execution time:  1 min, 13.6 sec
```