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/*****
/* Multinomial data - Ordinal */
/* Bowley text book Example 8.4 */
*****/

Data first;
  length variety $12.;
  input variety$ @@;
  do block=1 to 2;
    do category="0", "1", "2", "3", "4", "5";
      input count @@;
      output;
    end;
  end;
  datalines;
Narragansett 3 1 8 40 17 58 3 2 14 33 18 69
Vernal 7 37 31 16 3 29 13 43 34 25 4 19
A4197 22 44 21 6 2 29 15 15 19 30 16 35
;
Run;

Proc print data=first;
Run;

Proc glimmix data=first method=quad;
  class variety block;
  model category = variety / dist=multi link=cumlogit s
oddsratio(diff=all);
  random intercept / subject=block;
  freq count;
  contrast "A4197 vs Narragansett"  variety 1 -1 0;
  contrast "A4197 vs Vernal"  variety 1 0 -1;
  contrast "Narragansett vs Vernal"  variety 0 1 -1;

/* Are varieties different from each other? One by one comparison */
  estimate "class 0: A4197" intercept 1 0 0 0 0 0 variety 1 0 0 /ilink;
  estimate "class 0,1: A4197" intercept 0 1 0 0 0 0 variety 1 0 0 /ilink;
  estimate "class 0,1,2: A4197" intercept 0 0 1 0 0 0 variety 1 0 0
/ilink;
  estimate "class 0,1,2,3: A4197" intercept 0 0 0 1 0 0 variety 1 0 0
/ilink;
  estimate "class 0,1,2,3,4: A4197" intercept 0 0 0 0 1 0 variety 1 0 0
/ilink;
  estimate "class 0: Narragan" intercept 1 0 0 0 0 0 variety 0 1 0
/ilink;
  estimate "class 0,1: Narragan" intercept 0 1 0 0 0 0 variety 0 1 0
/ilink;
  estimate "class 0,1,2: Narragan" intercept 0 0 1 0 0 0 variety 0 1 0
/ilink;
  estimate "class 0,1,2,3: Narragan" intercept 0 0 0 1 0 0 variety 0 1 0
/ilink;
  estimate "class 0,1,2,3,4: Narragan" intercept 0 0 0 0 1 0 variety 0 1 0
/ilink;
  estimate "class 0: Vernal" intercept 1 0 0 0 0 0 variety 0 0 1 /ilink;

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estimate "class 0,1: Vernal" intercept 0 1 0 0 0 variety 0 0 1
/ilink;
estimate "class 0,1,2: Vernal" intercept 0 0 1 0 0 variety 0 0 1
/ilink;
estimate "class 0,1,2,3: Vernal" intercept 0 0 0 1 0 variety 0 0 1
/ilink;
estimate "class 0,1,2,3,4: Vernal" intercept 0 0 0 0 1 variety 0 0 1
/ilink;
Run;
```