

Randomizing Item within Condition

```
> rm(list=ls()); options(scipen=999) # To avoid scientific notation
> horizon2 = read.table("horizontal2.data.txt",header=T)
> # It's very horizontal. Eliminate columns we will not be using for now.
> Resp = as.matrix(horizon2[,18:47]) # This eliminates e6, always zero.
> head(Resp) # Note 0.5 values
      ala alb a2 a3 a4 a5 a6 b1 b2 b3 b4 b5 b6 c1 c2 c3 c4 c5 c6 d1 d2 d3 d4 d5 d6 e1 e2 e3 e4 e5
[1,]  1  0  0  0  0  0.5  0  1  0  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0.5  0  0
[2,]  1  1  1  0  0  1.0  0  0  0  1  0  1  1  0  1  0  0  0  0  0  0  1  1  1  0  0  0  0.0  0  0
[3,]  1  0  0  0  0  1.0  0  1  1  0  0  0  1  0  0  0  0  1  1  1  1  0  0  1  0  0  0  0.0  1  0
[4,]  1  1  0  1  0  0.0  0  0  0  0  0  0  0  0  0  0  1  0  0  0  0  0  1  0  0  0  0  0.0  0  0
[5,]  1  1  0  0  0  1.0  0  1  0  1  0  1  1  0  0  1  0  1  1  1  0  1  0  1  0  0  1.0  0  0
[6,]  0  1  0  0  0  0.0  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0.0  0  0
>
> Imeans = apply(Resp,2,mean) # Apply mean function to dimension 2 (columns)
> as.matrix(round(Imeans,3))
      [,1]
ala 0.667
alb 0.435
a2  0.226
a3  0.244
a4  0.119
a5  0.369
a6  0.298
b1  0.524
b2  0.179
b3  0.405
b4  0.226
b5  0.524
b6  0.321
c1  0.060
c2  0.214
c3  0.119
c4  0.119
c5  0.262
c6  0.190
d1  0.369
d2  0.238
d3  0.381
d4  0.393
d5  0.488
d6  0.071
e1  0.048
e2  0.143
e3  0.196
e4  0.131
e5  0.060
>
> # There are apparent item differences within conditions. Try to capture
> # this with a sum of squares within.
>
> SSwithin =
+ (7-1)*var(Imeans[1:7]) + # A
+ (6-1)*var(Imeans[8:13]) + # B
+ (6-1)*var(Imeans[14:19]) + # C
+ (6-1)*var(Imeans[20:25]) + # D
+ (5-1)*var(Imeans[26:30]) # E
> SSwithin
[1] 0.4482089
```

```

> # Randomize
>
> n = dim(Resp)[1]; n
[1] 84
> set.seed(7777); nsim = 10000
> sswithin = numeric(nsim) # To hold simulated test statistics
>
> for(j in 1:nsim)
+ {
+   resp = Resp
+   for(i in 1:n)
+   {
+     rowi = resp[i,]
+     a = sample(rowi[1:7])
+     b = sample(rowi[8:13])
+     c = sample(rowi[14:19])
+     d = sample(rowi[20:25])
+     e = sample(rowi[26:30])
+     # Now replace the row
+     resp[i,] = c(a,b,c,d,e)
+   }
+   # Calculate and store the test statistic
+   imeans = apply(resp,2,mean)
+   sswithin[j] =
+     (7-1)*var(imeans[1:7]) + # A
+     (6-1)*var(imeans[8:13]) + # B
+     (6-1)*var(imeans[14:19]) + # C
+     (6-1)*var(imeans[20:25]) + # D
+     (5-1)*var(imeans[26:30]) # E
+   } # Next simulation j
>
> # Item within condition
> pval = length(sswithin[sswithin>=SSwithin])/nsim
> c(SSwithin,pval)
[1] 0.4482089 0.0000000
>
>
> summary(sswithin)
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
0.01198 0.03388 0.04118 0.04237 0.04968 0.10184

```

```
> hist(sswithin)
```

