# Brogan-Kutner Data see http://www-stat.stanford.edu/~rag/ed351longit/brogkut.dat

Cell means

```r
tapply(urea, list(method, prepost), mean)
```

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>46.37500</td>
<td>47.12500</td>
</tr>
<tr>
<td>2</td>
<td>43.53846</td>
<td>31.46154</td>
</tr>
</tbody>
</table>

Recreate repeated measures anova (nesting)

```r
# within-group anova to obtain the 2 error terms

## within group 1 subjXtime

```r
bkrepaovW1 = aov(urea[method == "1"] ~ as.factor(prepost[method == "1"])*as.factor(subj[method == "1"]))
```

```
Df Sum Sq Mean Sq F value  Pr(>F)
as.factor(prepost[method == "1"])                                 1   2.25    2.25
as.factor(subj[method == "1"])                                    7 915.00  130.71
```

piece of subjects within groups  Between subjects error term

```
as.factor(prepost[method == "1"])]:as.factor(subj[method == "1"])  7 331.75   47.39
```

piece of subjectsxrepeated measure  within group interaction Within subjects error term

## within group 2 subjXtime

```r
bkrepaovW2 = aov(urea[method == "2"] ~ as.factor(prepost[method == "2"])*as.factor(subj[method == "2"]))
```

```
Df Sum Sq Mean Sq
as.factor(prepost[method == "2"])                                 1 948.0 948.0
as.factor(subj[method == "2"])                                   12 3525.0 293.7
```

piece of subjects within groups  Between subjects error term

```
as.factor(prepost[method == "2"])]:as.factor(subj[method == "2"]) 12 349.5  29.1
```

piece of subjectsxrepeated measure  within group interaction Within subjects error term

# ignore within-subjects, get

```r
bkrepaovBase = aov(urea ~ as.factor(prepost)*as.factor(method))
```

```
Df Sum Sq Mean Sq F value  Pr(>F)
as.factor(prepost)                    1  542.9 542.90  4.0282 0.05190 .  #repeated measure (Within subj part)
as.factor(method)                     1  847.5 847.50  6.2884 0.01654 *  #Group  (Between subjects part)
as.factor(prepost):as.factor(method)  1  407.4 407.40  3.0230 0.09019 .  #GroupxRepeated measure Interaction
Residuals                            38 5121.2 134.80
```

# Brogan-Kutner Section 5 Equivalences

### Groups, pooling over occasion

```r
sumtime = pre + post
t.test(sumtime ~ as.factor(method), var.equal = TRUE)                         
```

```
Two Sample t-test data:  sumtime by as.factor(method)

pre post method
1   51   48      1
95 percent confidence interval: -1.832786 38.832786
mean in group 1 mean in group 2
93.5            75.0
```

```
t = 1.9044, df = 19, p-value = 0.07212                                  1   51   48      1
95 percent confidence interval:  -1.832786  38.832786
mean in group 1 mean in group 2
93.5            75.0
```

```
> 1.904^2  
[1] 3.625216  # matches F-stat for Groups (bet subj)                 1   51   48      1
```

```r
imp = post - pre                                                              
```

```
t.test(imp ~ as.factor(method), var.equal = TRUE)                             
```

```
Two Sample t-test data:  imp by as.factor(method)                             

pre post method
1   51   48      1
95 percent confidence interval:  -1.832786  38.832786
mean in group 1 mean in group 2
93.5            75.0
```

```
t = 3.3709, df = 19, p-value = 0.003209                                     1   51   48      1
95 percent confidence interval:  -1.832786  38.832786
mean in group 1 mean in group 2
93.5            75.0
```

```
> 3.3709^2  
[1] 11.362976  # matches F-stat for Groups X prepost                       1   51   48      1
```

### Groups, pooling over occasion

```r
bkrepaov1 = aov(urea ~ as.factor(prepost)*as.factor(method)+ Error(as.factor(subj)))
```

```
Error: as.factor(subj)
Df Sum Sq Mean Sq F value  Pr(>F)
 1  847.5 847.50  6.2884 0.01654 *  #Group (Between subjects part)
```

```
Error: Within
Df Sum Sq Mean Sq F value  Pr(>F)
 1  847.5 847.50  6.2884 0.01654 *  #GroupxRepeated measure Interaction
```