3. Look at the Mean Sq column in the ANOVA table above. Show how they calculated these numbers.

$\frac{SSA}{df(A)} = \frac{30.5}{4} = 7.63 = MSA$ $\frac{SSE}{Rdf} = \frac{173.3}{65} = 2.67 = MSE$

4. Now show how they calculated the F-statistic.

$F = \frac{MSA}{MSE} = \frac{7.63}{2.67} = 2.86$ The variation in the group averages around the grand mean is larger than the variation in the responses around the group averages

5. Think about what pieces go into the F-statistic. If the F-statistic is small, what does that suggest?

   (a) If the F-statistic is small, the deviation in the group averages around the grand mean is small compared to the variation in the responses around the group averages.

   (b) If the F-statistic is small, the separate means model is better.

   (c) If the F-statistic is small, the deviation in the group averages around the grand mean is large compared to the variation in the responses around the group averages.

   (d) If the F-statistic is small, the variation in the responses around the group averages is small.

6. At the 0.05 significance level, what is your decision?

   Reject the null

7. Write your conclusion in the context of the problem.

   There is sufficient evidence of at ~~difference in~~ least one difference in the mean qualification scores across the 5 types of handicaps (p-value = 0.03).

8. Based on your conclusion above, would you use a single mean model or a separate means model for these data? Separate Means Model

9. Label the following formulas as SSE, SSA, or SST for the separate means model.

$\sum_{j=1}^{J}\sum_{i=1}^{n_j}(y_{ij} - \bar{\bar{y}})^2$ SST $\sum_{j=1}^{J}\sum_{i=1}^{n_j}(y_{ij} - \bar{y}_j)^2$ SSE $\sum_{j=1}^{J}\sum_{i=1}^{n_j}(\bar{y}_j - \bar{\bar{y}})^2$ SSA

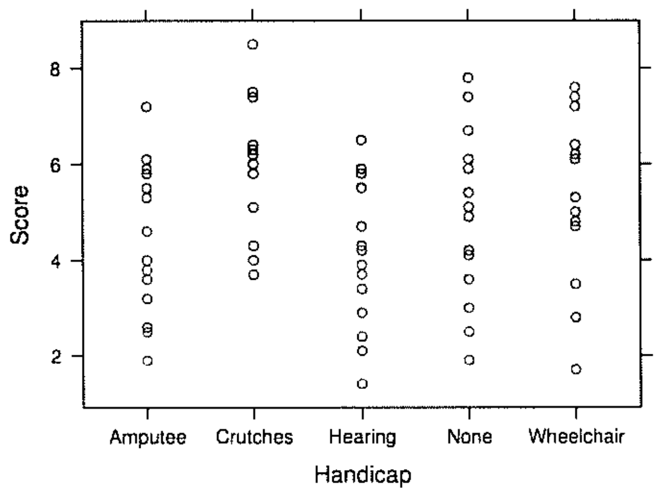
Note: SST = SSA + SSE

10. EXTRA CREDIT (up to 10pts) Due Monday, September 15th. Think back to the formula you used to calculate variance (σ^2) in Stat 216. Calculate σ^2 for the age-row data we collected in class today (I will post data to D2L). Find this quantity on the ANOVA table. What does σ^2 measure? Why do we see this quantity in the ANOVA table?

Solutions

Quiz 6

Study explores how physical handicaps affect peoples perception of employment qualifications. Researchers prepared 5 videotaped job interviews using actors with a script designed to reflect an interview with an applicant of average qualifications. The 5 tapes differed only in that the applicant appeared with a different handicap in each one. Seventy undergraduate students were randomly assigned to view the tapes and rate the qualification of the applicant on a 0-10 point scale. See the plot below. "Score" is the score each student gave to the applicant. "Handicap"is a factor variable with 5 levels.



1. Recall the handicap data from last class. I fit a linear model and the ANOVA is below. What type of model did I fit?

   A Cell means model

   B Single mean model

   C Means only model

   D Reference coded model

```
lm.1 <- lm(Score~Handicap, data=handicap.data)
anova(lm.1)
```

```
## Analysis of Variance Table
##
## Response: Score
##            Df Sum Sq Mean Sq F value Pr(>F)
## Handicap    4   30.5    7.63    2.86   0.03 *
## Residuals 65  173.3    2.67
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

2. What are N and J in this example?

   $N = 70 \quad J = 5$