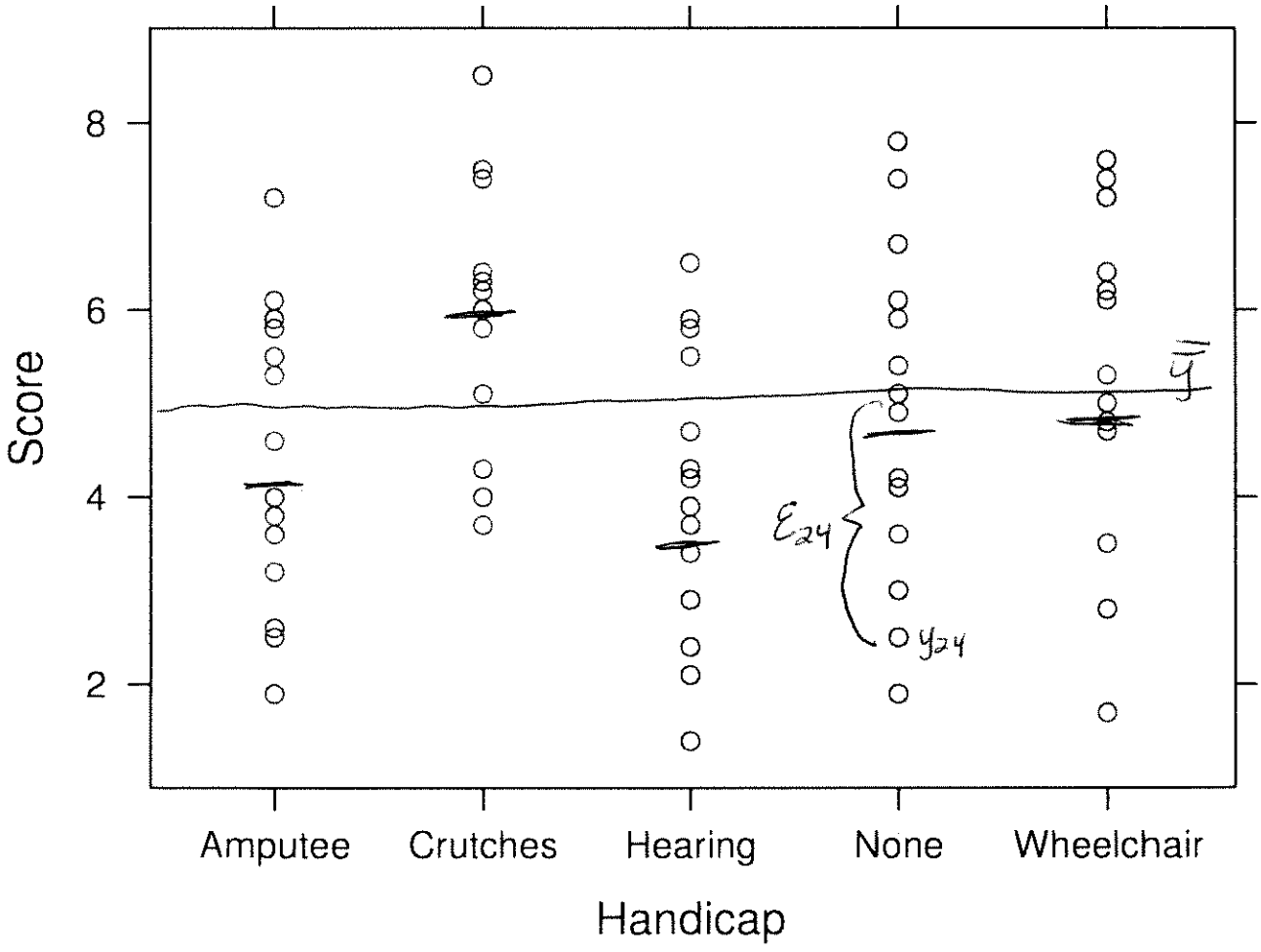
Solutions

Quiz 5

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. What is the response variable and what is the explanatory variable? Identify each as categorical or quantitative.

Response - score - quantitative why? 1) numeric 2) adding + averaging make sense 3) Decimals included

Note: some groups saw the point scale as a fixed # of categories 1,2,3,4,5,6,7,8,9,10 I also accepted categorical as an answer

Explanatory - Handicap - categorical

2. Suppose you want to know whether score depends on the type of handicap. Set up hypotheses to answer this question.

$H_0: \mu_A = \mu_C = \mu_H = \mu_N = \mu_W$

H_A: Not all μ_j are equal

OR

$H_0: \tau_A = \tau_C = \tau_H = \tau_N = \tau_W = 0$

H_A: Not all τ_j are equal to zero

3. Write out the null model. What do we call this model?

"Single Mean Model"

$y_{ij} = \mu + \varepsilon_{ij} \quad i = 1, 2, \ldots, 14 \quad j = 1, 2, 3, 4, 5$

4. Draw a long horizontal line at the grand mean, $\bar{y}$ above.

5. Label the y_{24} response on the plot above. Assume the numbering starts at the bottom and goes up.

6. Now label the residual, ϵ_{24}, on the plot above (for the null model).

7. We learned about three models in class today, the single mean model, the cell means model, and the reference coded model. I fit each of these three models in the code below. Label them.

```
lm.hand1 <- lm(Score~Handicap-1, data=handicap.data)
```
Cell Means Model

```
lm.hand2 <- lm(Score~Handicap, data=handicap.data)
```
Reference Coded Model

```
lm.hand3 <- lm(Score~1, data=handicap.data)
```
Single Mean Model

8. Now let's consider the alternative, separate means model. Draw short horizontal lines on the plot above at the averages for each group.

9. We haven't yet learned how to formally test the hypotheses in (b). Just by looking at the plot, do you think score depends on handicap? Explain why. Be sure to discuss the variation within each group in your response.

Although we may not find differences between all of the group means, there does appear to be a difference between the means of the crutches and hearing group. Even though there is "a lot" of variation in the responses within each group, we can still see from the plot that the crutches group tends to be greater than the hearing group on average.