Questions to Explore

a. Report the sample medians and the point estimate of the difference between the population medians.

b. Report and interpret the 95% confidence interval for the difference between the population medians.

Recall

From the discussion before the example, the **point estimate** of the difference between the population medians equals the median of the differences between responses from the two groups. ◀

Think It Through

a. The median reaction times were 569 milliseconds for the cell phone group and 530 milliseconds for the control group. For the cell phone group, for example, half of the reaction times were smaller than 569 milliseconds and half were larger than 569. Table 15.6 reports a point estimate of the difference between the population medians for the two groups of 44.5 milliseconds. (*Note*: This is not the same as the difference between the two sample medians, which is an alternative estimate.)

b. Table 15.6 reports that the 95% confidence interval for the difference between the population medians is (9, 79). Since zero is not contained in the 95% interval, this interval supports that the median reaction times are not the same for the cell phone and control groups. We infer from the interval that the population median reaction time for the cell phone group is between 9 milliseconds and 79 milliseconds larger than for the control group. This inference agrees with the conclusion of the Wilcoxon test that the reaction time distributions differ for the two groups (P-value = 0.02).

Insight

Example 9 in Chapter 10 estimated the difference between the population *means* to be 51.5, with a 95% confidence interval of (12, 91). However, those results were influenced by the outlier of 960 for the cell phone group. When estimation focuses on medians rather than means, outliers do not influence the analysis. *The lack of an influence of outliers is an advantage of the analysis reported here for the medians.*

Try Exercise 15.5

The Proportion of Better Responses for a Group

For comparing two groups, here's another way to summarize the results: Look at all the pairs of observations, such that one observation is from one group and the other observation is from the other group. Then find the proportion of the pairs for which the observation from the first group was better.

We illustrate for the tanning experiment described in Examples 1 and 2. The tanning lotion got ranks (2, 4, 5) and the tanning studio got ranks (1, 3). Figure 15.3 depicts all the pairs of participants (subjects), such that one participant used the tanning lotion and one participant used the tanning studio. The tanning lotion gave a better tan when we pair the participants who got ranks 2 and 3. That is, the participant using the tanning lotion got the better rank, namely, rank 2. However, for all other pairs, the participant who used the tanning studio got the better tan. This is the case when we pair those who got ranks 1 and 2, ranks 1 and 4, ranks 1 and 5, ranks 3 and 4, and ranks 3 and 5. With three participants using the tanning lotion and two participants using the tanning studio, there are $3 \times 2 = 6$ pairs to consider. The tanning studio gave the better tan in five of the six pairs, a sample proportion of 5/6.