

You may work with one other person on this assignment, submitting one report with both names, provided that both of you contribute substantially to the work.

Competitive Advantage from Uniform Color? (cont.)

Recall the study of 457 matches in four combat sports (boxing, tae kwon do, Greco-Roman wrestling, freestyle wrestling) at the 2004 Olympic Games. Competitors in these sports were randomly assigned to wear either a red or a blue uniform. The researchers found that the competitor wearing red defeated the competitor wearing blue in 248 matches, and the competitor wearing blue emerged as the winner in 209 matches.

- a) Identify the observational units and variable in this study.
- b) Verify the conditions for using the Wald (z -) procedure to determine a 95% confidence interval for the probability that the competitor wearing red wins a match.
- c) Calculate this 95% confidence interval.
- d) Interpret what this interval reveals: We are 95% confident that ...
- e) Interpret what the 95% confidence *level* means in this context.
- f) Repeat c) for a 99% confidence interval.
- g) Describe how these two intervals compare, in terms of both their midpoints and widths.
- h) Do these intervals suggest that one uniform color or the other provides a competitive advantage? Explain.
- i) Suppose that the sample size had been four times as large, and the sample proportion had been identical to the actual study. Determine a 95% confidence interval in this case, and comment on how it compares to the interval in (c). [*Hint*: Be as specific as possible, and be sure to comment on both midpoint and width.]
- j) Determine how large a sample size would be necessary to estimate the actual probability to within 5 percentage points with 90% confidence.