

Comparing ability in two different contexts using confidence intervals

Chapter 9 Investigation Guide

Before you begin the written report,

1. Choose an athlete or team for whom you can estimate their overall *ABILITY* and compare their *ABILITY* in two different contexts.
2. Choose a categorical variable or a numerical variable that you will use to estimate the overall *ABILITY* (and difference in *ABILITY*) of the athlete or team that you chose in step 1. For example, you could estimate a batter's ability to get a hit and then compare his or her *ABILITY* to get a hit at home and on the road. Or, you could estimate a basketball player's *ABILITY* to score and then compare his or her *ABILITY* to score after a day off and not after a day off.
3. Find the relevant data on the internet or another source. Do not include playoff games in the data, as these games are played in different circumstances than regular season games.

To complete the written report,

1. Write an introduction which states the questions of interest and briefly describes the context of the athlete or team's *PERFORMANCES*, including noteworthy accomplishments that year and why you chose to use a particular variable to measure the *PERFORMANCES*. Describe how and where you obtained your data and summarize the data in a two-way table (for categorical data) or list the raw data from both contexts (for numerical data).
2. Make a single graph that summarizes the entire set of *PERFORMANCES* and another graph that compares the *PERFORMANCES* from each context. *Make sure to consider if you are using categorical or numerical data!* Compare the graphs in detail and include appropriate summary statistics. Give a preliminary answer to the questions of interest.
3. Calculate and interpret a 95% confidence interval for the athlete's overall *ABILITY*. Show work!
4. Calculate and interpret a 95% confidence interval for the difference in the athlete's *ABILITY* in two different contexts. Show work!
5. Discuss if the second interval provides convincing evidence that the athlete has a greater *ABILITY* in one context than the other.
6. Discuss any limitations or possible errors you may have made in your conclusion. If there is convincing evidence of a difference in *ABILITY*, discuss possible causes.

Web sites with data for multiple sports include:

- www.sports-reference.com
- www.espn.com
- www.usatoday.com/sports
- sports.yahoo.com
- www.si.com

Rubric for Chapter 9 Investigation	4 = Complete	3 = Substantial	2 = Developing	1 = Minimal
Introduction and Data Collection	<ul style="list-style-type: none"> Describes the context of the research (sport, player, team, year, etc.) and includes reasons for variable choice Has clearly stated questions of interest (about overall <i>ABILITY</i> and difference in <i>ABILITY</i>) Specifically describes how the data was collected (including source) Includes raw data in an appropriate form 	<ul style="list-style-type: none"> Has specific questions of interest, but doesn't include raw data, adequately introduce the context, or describe how the data was collected 	<ul style="list-style-type: none"> Has questions of interest and uses appropriate type of data, but has several other problems 	<ul style="list-style-type: none"> Has a question of interest
Graphs and Summary Statistics	<ul style="list-style-type: none"> Includes correct graph of overall <i>PERFORMANCE</i> Includes correct graphs to compare <i>PERFORMANCES</i> in two contexts Graphs are discussed/compared correctly Appropriate summary statistics are calculated and discussed 	<ul style="list-style-type: none"> Appropriate graphs and summary statistics are included, but graphs are not well done, graphs are not compared, or summary statistics are not discussed 	<ul style="list-style-type: none"> Includes appropriate graphs and summary statistics, but there are several problems or one graph is omitted completely 	<ul style="list-style-type: none"> Some graphs are included or some summary statistics are calculated
Calculation of Intervals	<ul style="list-style-type: none"> Chooses appropriate methods for computing both confidence intervals Correctly calculates both intervals Shows appropriate work for both intervals 	<ul style="list-style-type: none"> Calculates both intervals using appropriate methods, but doesn't show work or has an error in the calculation 	<ul style="list-style-type: none"> Attempts to calculate two intervals using appropriate methods, but has several major errors or correctly calculates one interval and shows work 	<ul style="list-style-type: none"> Attempts to calculate a confidence interval
Interpretations and Conclusions	<ul style="list-style-type: none"> Interprets both intervals correctly Correctly uses the confidence interval for a difference in <i>ABILITY</i> to draw an appropriate conclusion Shows evidence of critical reflection (discusses possible errors, shortcomings, limitations, alternate explanations, etc.) 	<ul style="list-style-type: none"> Interprets the interval(s) correctly but doesn't make a correct conclusion about the difference in <i>ABILITY</i> or shows little evidence of critical reflection 	<ul style="list-style-type: none"> Interprets the interval(s) correctly but doesn't attempt a conclusion about a difference in <i>ABILITY</i> or has no evidence of critical reflection 	<ul style="list-style-type: none"> Attempts to interpret the confidence interval(s)
Overall Presentation/ Communication	<ul style="list-style-type: none"> Clear, holistic picture of the investigation as a two-step process (e.g., includes preliminary and final conclusions) Investigation is well organized, neat and easy to read Ideas are well communicated, including appropriate transitions between sections Clearly contrasts the concepts of <i>PERFORMANCE</i> and <i>ABILITY</i> in context 	<ul style="list-style-type: none"> Investigation is organized, easy to read, and has appropriate transitions, but lacks clear communication, a holistic picture of the investigation, or does not clearly contrast the concepts of <i>PERFORMANCE</i> and <i>ABILITY</i> 	<ul style="list-style-type: none"> Investigation is somewhat organized, but has several major problems 	<ul style="list-style-type: none"> Communication and organization are poor