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Measures to Ensure Assessment Consistency

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Ensuring Assessment Consistency

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Ensuring Assessment Consistency

- CPSC203; Introduction to Problem Solving
- Targeted at Undergraduate Non-Majors*
- Large, Multi-Section Course

Number of Students

min: 197 (W2014)	mean: 526 (st. dev.: 161)	max: 814 (F2008)

Number of Tutorial Sections

min: 12 (W2013)	mean: 25 (st. dev.: 6.4)	max: 35 (F2008)

Ensuring Assessment Consistency

- Unify Lecture Topics across Sections
- Sections Teach the Same Material at the Same Pace
- Sections Use/Provide the Same Resources
- Requires Co-operation between Instructors
- Necessary Step for Standardizing Other Materials

Ensuring Assessment Consistency

- Unify Assignment Specifications across Sections

- Large Cohorts often entail Overlapping Submissions
- Can Obscure cases of Academic Misconduct

- Open-Ended Assignments Reintroduce Variation
- Requires a Framework for Valid Submissions
- Can Complicate Evaluation and Marking

Ensuring Assessment Consistency

- Unify Examination Specifications across Sections

- Mutiple Sections entail Several Exam Periods
- Can Complicate Invigilation

- Randomly Generated Initial Data Sets are Useful
- Equivalently Difficult Operations can be Exchanged
- Can Complicate Evaluation

Ensuring Assessment Consistency

- (Operationally) Define Inter-Rater Reliability:

  "The Degree to which a Set of Evaluators Agree upon the Mark that should be Assigned"

- Often require Evaluators mark the Same Materials
- Inefficient Use of Resources (in this Context)

- "Spot-Checking" Techniques can be Useful* (**assuming experienced evaluators are available*)

Ensuring Assessment Consistency

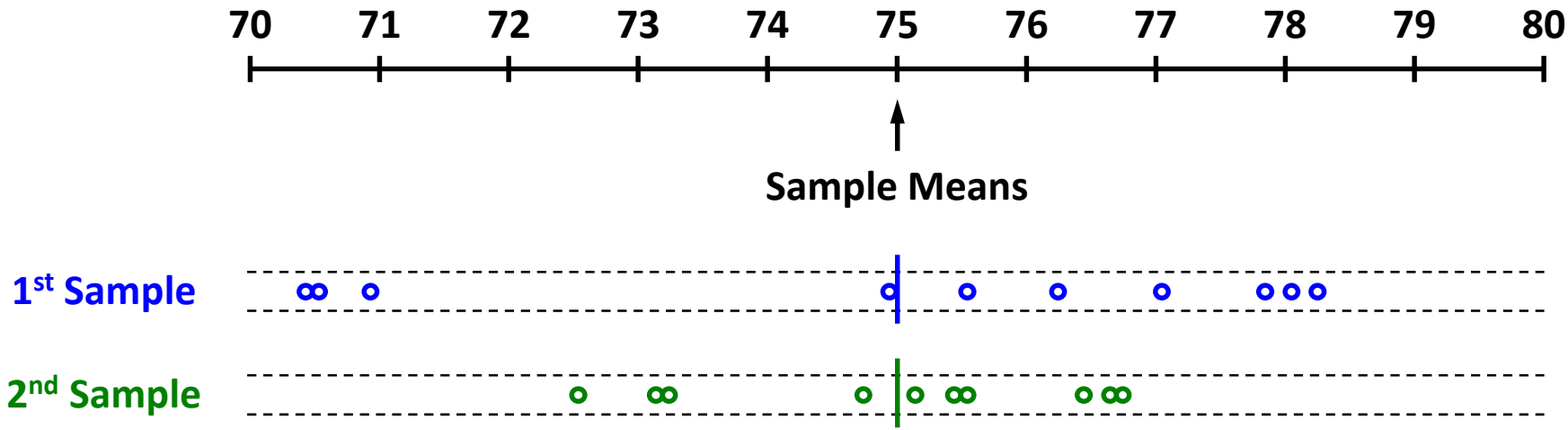
- Assessment Consistency → Detection and Response

- Response is Often as Simple as Remarking
- Extensive Retraining is Rarely Necessary
- Experienced Evaluators are an Asset

- Detection is Far More Challenging
- Outlying Data Points must be Carefully Considered
- Several Simple Statistical Techniques are Available

Ensuring Assessment Consistency

- Comparison of Means is Insufficient
- Variance in Evaluation Criteria is Obscured



- Mean w/ Standard Deviation is Minimum Required

Ensuring Assessment Consistency

- (Operationally) Define Standard Deviation:

"The Square Root of the Mean of the Squared Deviation of Each Grade from the Mean"

- Squaring Each Deviation Exaggerates Differences
- Measures Spread (and Suggests Evalutor Problems)

- Confidence Intervals are Easier to Interpret
- 95% Confidence → Estimate $\pm$ 2 * Standard Error

Ensuring Assessment Consistency

- (Operationally) Define 95% Confidence Interval:

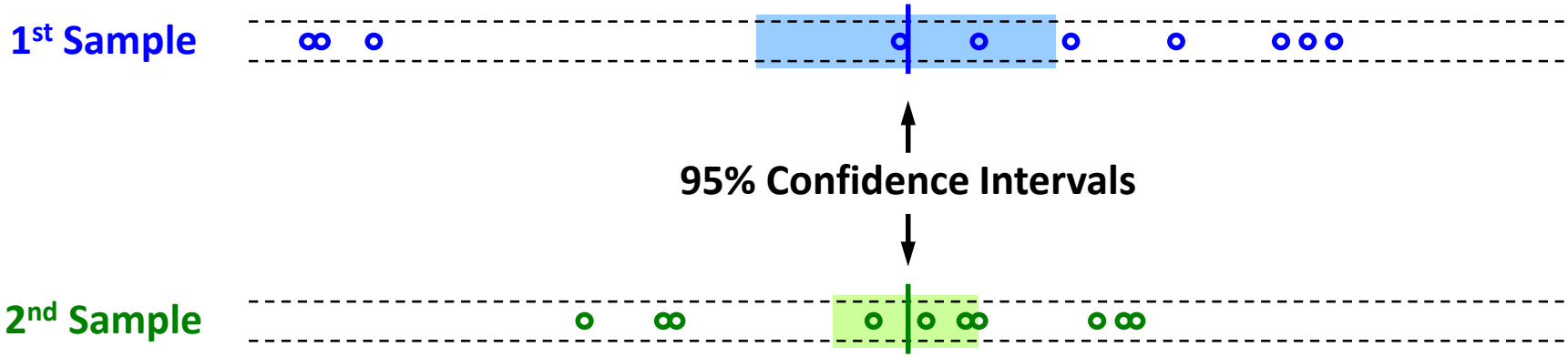
"The Probability that the True Mean lies within the Specified Range around the Sample Mean is 0.95"

- If Each Evaluator Marked Infinite Submissions, Then the Average Grades Assigned should be Equal

- Disjoint Intervals Suggest Significant Differences (n.b., overlapping intervals do not)

Ensuring Assessment Consistency

- Disjoint Intervals may Indicate Evaluator Problems
- Outlying Data Points may also cause Disjointedness



Ensuring Assessment Consistency

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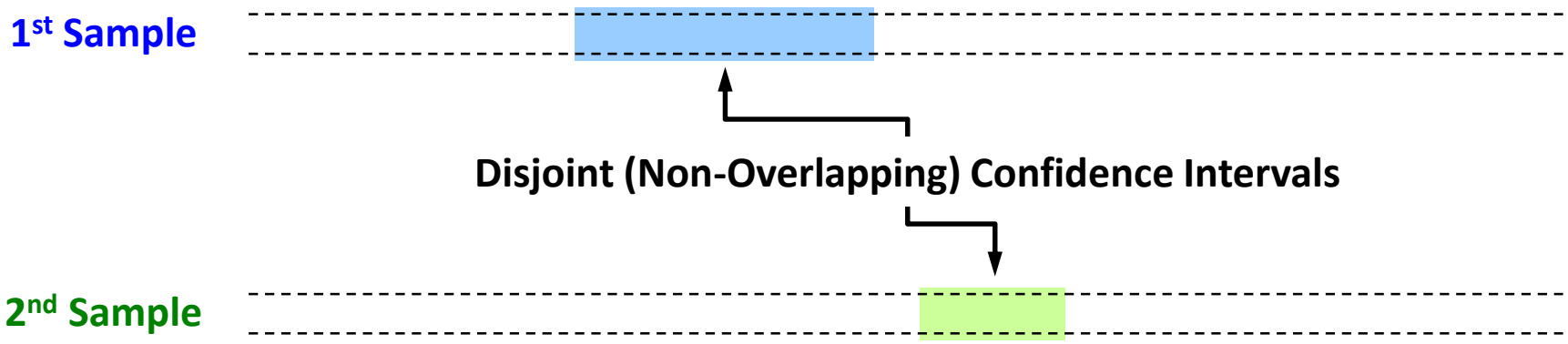
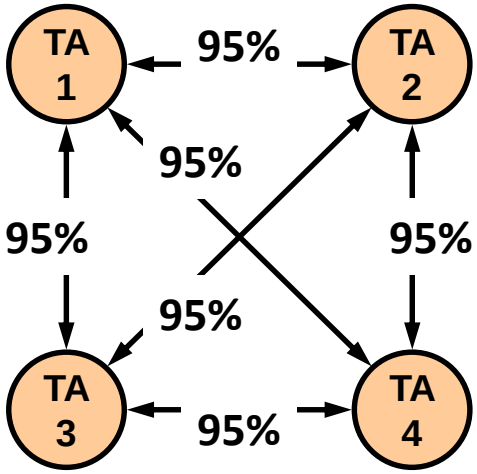


- ~90% Confidence Observed Difference is Significant
- ($0.95^2 = 0.9025 \rightarrow$ 90.25% chance intervals correct)

Ensuring Assessment Consistency

- Multiple Comparisons still Reduce Confidence
- 95% → 5% Chance of an Incorrect Conclusion



4 Evalutors → 6 Comparisons

$(0.95)^6 = 0.735$

26.5% Chance of an Incorrect Conclusion

- Applies to Student T-Tests of Significance as well

Ensuring Assessment Consistency

- Confidence Levels can be Adjusted to Correct this
- Bonferroni's Correction is Simple and Effective
- Use Confidence Level of $1.00 - (\alpha / \text{Number of Comparisons})$

For the Example with 6 Comparisons...

$\alpha = 0.0500 \rightarrow (0.9500)^6 \approx 0.735$ 26.5% Error

$\alpha = 0.0083... \rightarrow (0.9917)^6 \approx 0.951$ 4.9% Error

Activity 1 of 5

List the Most Significant Obstacles to Maintaining Assessment Consistency

Activity 2 of 5

Group these Obstacles into Categories and Name Each Category

Activity 3 of 5

Rank these Categories from Most Important to Least Important

Activity 4 of 5

Propose Solution Techniques to Address the Most Important Categories

Activity 5 of 5

Evaluate the Proposed Solutions

Select the Best Solution for Each Category