

Using Simulations to Make Inferences: Come Learn How!

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**MIDDLE
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Our Professional Development

- Teaching Simulations for Inference
 - TN State Mathematics Standards Core Math III (CCSS.MATH.CONTENT.HSS.IC.B.5):
Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant. (CCSSI, 2010)

What is “Simulations for Inference?”

- Statistical Inference
 - Making a decision about a population based on sample data after analyzing that sample data
 - A process: involves assumptions and probability
- Assumes sample “looks like” the population
- Two options:
 - Reason using statistical models
 - Reason from the sample data itself

Our Professional Development

- Teacher Practices - Principles to Actions (NCTM 2014)
 - Build procedural fluency from conceptual understanding,
 - Implement tasks that promote reasoning and problem solving,
 - Support productive struggle in learning mathematics,
 - Use and connect mathematical representations,
 - Facilitate meaningful mathematical discourse,
 - Pose purposeful questions,
 - Elicit and use evidence of student thinking

A Six-Phase Structure for Simulation for Inference Lessons

1. Commitment to a position in a rich context
2. Statement of possible hypotheses
3. Statement of expected results assuming the null hypothesis is true
4. Revelation of study results
5. Simulation under the null hypothesis
6. Making a conclusion

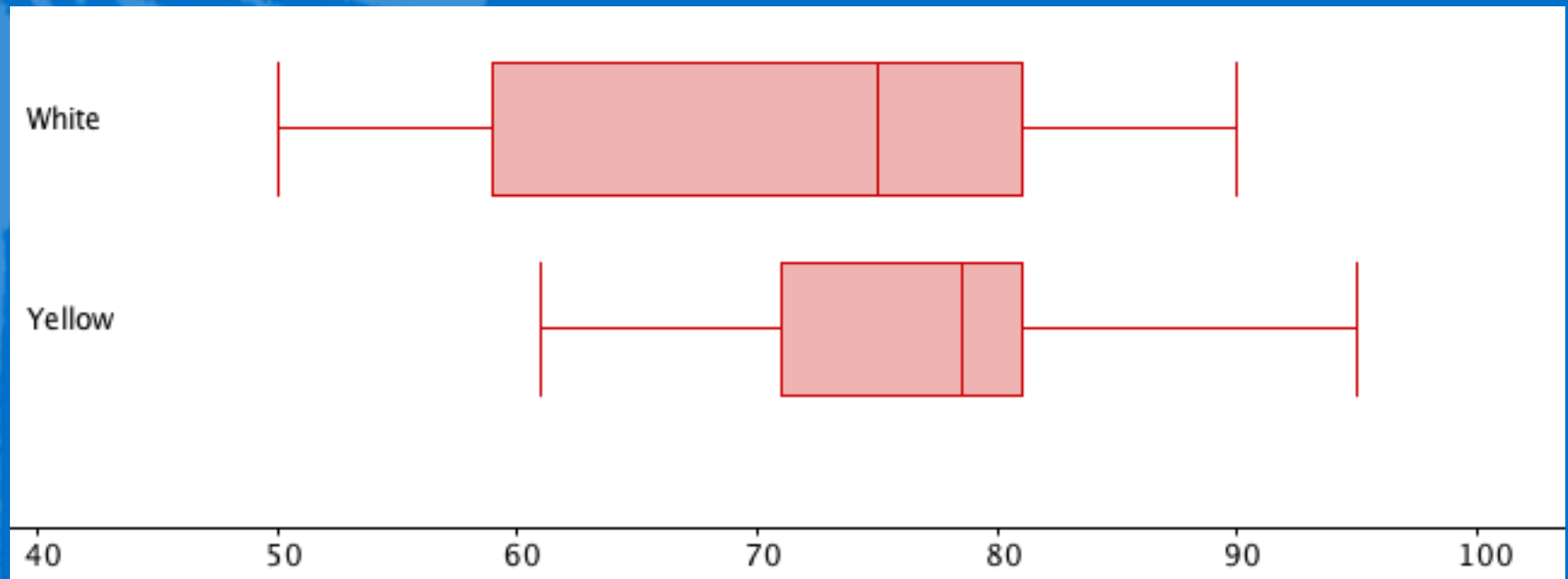
Do We Look Like Our Dogs?



Does the Color of an Exam Affect Students' Scores?



Does the Color of an Exam Affect Students' Scores?



	n	Mean	σ	s	Min	Q1	Median	Q3	Max
White	10	71	13.1909	13.9044	50	59	75	81	90
Yellow	10	77.3	9.6545	10.1768	61	71	78.5	81	95

Does Swimming with Dolphins Improve Depression Levels?



References

- Rossman, Allan J. 2008. "Reasoning about Informal Statistical Inference: One Statistician's View." *Statistics Education Research Journal* 7 (2): 5–19.]
- Strayer, J.F., Matuszewski, A.L. (2016). Inferential statistical literacy: Simulations with dolphins!, *Mathematics Teacher* 109 (9), 662-668.