

Binomial Test

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Focus: Conducting a binomial test and constructing binomial confidence intervals in R

Overview: For this lesson we will use swirl, an interactive R package, to learn how to analyze binomial data. Students will learn how to open swirl, load courses, and use the interactive environment by using a lesson focused on analyzing binomial data.

Learning objectives:

- Ability to download and open swirl package
- Ability to input new course material into swirl
- Ability to carry out one- and two-sided binomial tests
- Ability to construct Agresti-Coull confidence intervals for binomial data

Computational thinking practices: Fill in this table with the computational thinking practices from the Weintrop et al. (2016) taxonomy that are addressed with your lesson.

Data Practices	Modeling & Simulation Practices	Computational Problem Solving Practices	Systems Thinking Practices
Analyzing data	Using computational models to understand a concept	programming	
		trouble -shooting and debugging	

Lesson sequence: Provide a numbered, ordered list of the activities within your swirl lesson. This list can be taken from step 4 in your initial lesson design, with any modifications that were introduced.

1. Conduct two-sided binomial test and analyze results
2. Conducted sided binomial test and analyze results
3. Compare sided and two-sided analyses

4. Construct 95% confidence intervals for binomial data
5. Construct 90% confidence intervals for binomial data
6. Compare confidence interval ranges to understand how % confidence impacts overall intervals

Pre-lesson activities: Prior to the swirl lesson, I introduced ideas of hypothesis testing with a focus on binomial data (presentation @ https://docs.google.com/presentation/d/1o0_wbcZ0W_PAeGVmFF_C89jWdJU2htoMoPcVmIV8JPU/present#slide=id.g426b4e3a32_0_0). I then discussed swirl with students (who had been using R for approximately 3 weeks) and had them download and install the package and course (instructions on course website: <https://sites.google.com/view/biostats/lectures/hypothesis-testing-with-the-binomial-distribution>).

Post-lesson activities: After the swirl lesson students completed an assignment focused on the binomial distribution (https://docs.google.com/document/d/15Dk906z8L_pW9ySj9hlpRfwUdtl0L37Yx1IA7cmxZtg/edit).

Implementation notes:

- Note the full lesson (slides, assignments) also included a Bayesian perspective that was not part of the swirl course. These can be removed if focus is solely on traditional binomial analysis.
- Course is updated and housed on github; most recent version may be installed using R command:
 - `install_course_github("jsgosnell", "Swirl_Binomial")`

