

STAT 110: In-Class Activity (Just Bead It)

Fall 2017

NBC once aired a popular game show, *Minute to Win It*, on which contestants had to complete a task involving household items within 60 seconds. They were given two extra chances to repeat a task if they did not complete it on the first try. When they successfully completed a challenge, they could elect to move to a more difficult challenge with a higher monetary reward.

Suppose that you have been hired by producers of the show to field test a potential new game, *Just Bead It*. This game is being considered as the initial challenge for \$1000, the lowest monetary value on the show. The producers want 80% of potential contestants to be able to pass the challenge and have the opportunity to advance to the next round, and they are worried about the success rate falling below 80%.

Suppose that students in our class represent a random sample from a very large population of potential contestants on the show (even though in reality, our class is not a random sample). Each student will attempt the challenge and the results will be analyzed.

The Game

Begin with a wooden skewer threaded with one white pony bead on the bottom and 21 red pony beads on top. Hold the skewer vertically placing your fingers at the bottom to prevent the beads from falling off (keep the pointed end at the top). Remove the top bead and place it on the bottom of the skewer. Continue doing so, **one bead at a time**, until the white bead is on top. You have one minute to complete the task, and you can attempt this up to three times.

Your Group's Results

For each student in your group, count the number of beads successfully moved on each attempt and record the count in the table. *If a second or third attempt is not needed, leave the spaces blank.*

If a student in your group completes the task in at least one of the 3 one-minute attempts, record a success for that student in the table below. Otherwise, record a failure.

Student Number	Number of Beads Moved (Attempt #1)	Number of Beads Moved (Attempt #2)	Number of Beads Moved (Attempt #3)	Outcome (Success or Failure)
1				
2				
3				
4				

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The Entire Class's Results

Total number of successes = 16 } on the first trial
Total number of failures = 15 }

Questions:

1. Suppose that the producers are worried that that not enough contestants will be able to complete this task and move on to the next level. Do the data we collected as a class provide evidence that less than 80% of potential contestants can complete the task? Conduct a hypothesis test to investigate this.

Let π = the true proportion of contestants that can complete the <i>Just Bead It</i> challenge. H ₀ : $\pi = 0.80$ H _a : $\pi < 0.80$
p-value: 0.0004
Conclusion: The data provide evidence that the success rate is below 80%.

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- Construct a 95% confidence interval for π = the true proportion of contestants that can complete the *Just Bead It* challenge. Based on this interval, does 80% (their target) seem like a plausible value for π ? Explain.

$$\text{Point estimate: } 16/31 = .516$$

$$\begin{aligned} \text{Margin of error: } & 1.96 \sqrt{\frac{.516(1-.516)}{31}} \\ & = .176 \end{aligned}$$

$$95\% \text{ CI: } 0.34 \leq \pi \leq 0.692$$

Since the entire CI sits below 0.80, we have evidence the true success rate is

- As stated earlier, the students in this class aren't really a random sample of potential contestants; thus, these results might not be representative of the real population of all potential contestants. How might the sample in this case differ from the population, and how might this bias the results? below 80%.
- If the goal of the producers is to have 80% of potential contestants succeed at the challenge, do you have any recommendations for them based on these results? Should they leave the challenge as is, or should they change it some way? If you feel they should change it, provide specific recommendations.

Note: This activity was modified from *Statistics Play-by Play: Laboratory Experiments for Elementary Statistics* written by Maureen Petkewich and Don Edwards (Kendall Hunt Publishing Company, 2013).

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