

The confederate flag symbolizes different things to different people. To some, this symbolizes slavery and all its negative effects; to others this flag represents southern pride. The confederate flag is part of the Mississippi state flag, and until recently was also flown at the South Carolina state capitol.



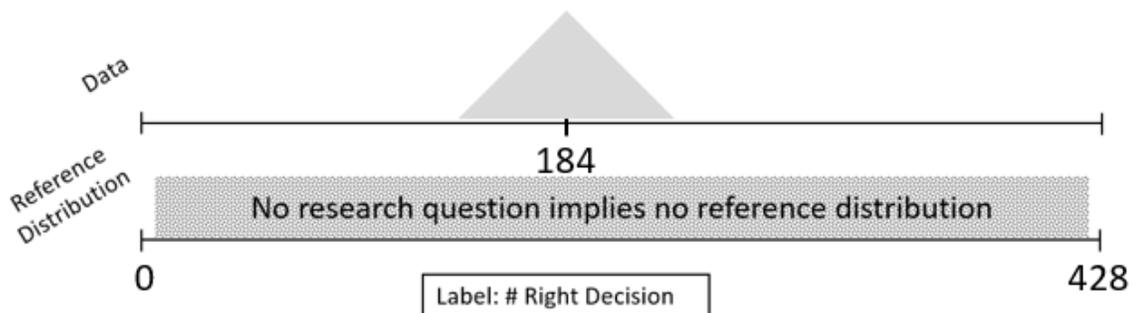
South Carolina governor Nikki Haley called for the confederate flag to be removed following the June 17, 2015 shooting at a church in Charleston, South Carolina in which the black pastor and 8 other church members were slain by a 21-year-old white man hoping to ignite a race war.

Support or opposition to this act varied across race and political ideology. The data provided here are based on a survey conducted by the [Pew Research Center](#) in July 2015. This survey asked almost 100 questions; the one in particular we are interested in is Question 83: “As you may know, the South Carolina state government recently voted to take down the Confederate flag from statehouse grounds. In your view, was this the right decision or wrong decision?”

Political Party Affiliation	Removing Flag was “Right Decision”	Removing Flag was “Wrong Decision”	Total
Republican	184	244	428
Democrat	476	167	643

Consider first an analysis for those that identified themselves as Republicans.

1. Provide a sketch of the pyramid that would be used to compute the margin-of-error via simulation for the Republican outcome. (3 pts)



2. Specify the probability of heads, number of tosses, and number of repetitions for the simulation that would be used to compute the margin-of-error for the Republican outcome. (3 pts)

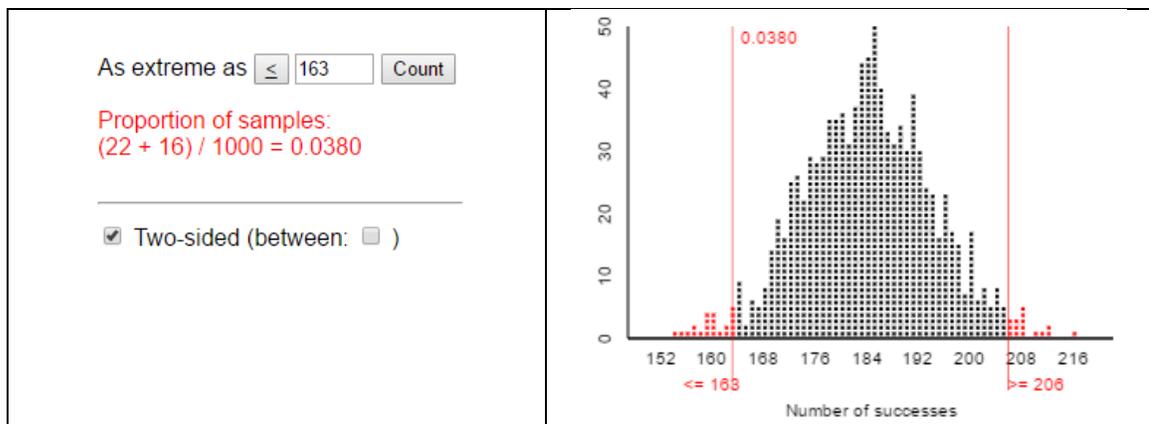
Probability of heads:

Number of tosses:

Number of repetitions:

3. The next step is to separate the likely outcomes (middle 95%) from the unlikely (outside 5%). Use the “As extreme as” box, labeled Box A below, to specify an appropriate lower (and upper) cutoff. Selecting two-sided with specify both sides. Delete my sample pyramid and replace it with yours. (3 pts)

[Simulation App](#)



4. Use the lower and upper endpoints to compute the – and + margin-of-error via simulation for the Republicans. (2 pts)

$$-MOE = \frac{\text{Lower Endpoint} - \text{Middle}}{\text{Total in Survey}} = \frac{163 - 184}{428} = -0.049$$

$$+MOE = \frac{\text{Upper Endpoint} - \text{Middle}}{\text{Total in Survey}} = \frac{206 - 184}{428} = +0.051$$

5. The more typical method of computing the margin-of-error is via the math formulas. Use the following formulas to compute MOE.

- a) Compute the value of  $\hat{\pi}$  for Republicans. (1 pt)

$$\hat{\pi} = \frac{184}{428} = 0.4299$$

- b) Compute the margin-of-error for Republicans. (2 pts)

$$\pm MOE: 1.96 * \sqrt{\frac{\hat{\pi} * (1 - \hat{\pi})}{n}} = 1.96 * \sqrt{\frac{0.4299 * (1 - 0.4299)}{428}} = 0.0469$$

so margin of error is  $\pm 4.7\%$

6. Use the math formulas to obtain the margin-of-error for the "Right Decision" for Democrats. (2 pts)

$$\hat{\pi} = \frac{476}{643} = 0.7403$$

$$\pm MOE: 1.96 * \sqrt{\frac{\hat{\pi} * (1 - \hat{\pi})}{n}} = 1.96 * \sqrt{\frac{0.7403 * (1 - 0.7403)}{643}} = 0.0339$$

so margin of error is  $\pm 3.4\%$  for the Democrats

7. Your friend decides to compute the margin-of-error for the "Wrong Decision" data instead. Interestingly, she gets exactly the same answer as you. Double check her math. Is she correct – do you get the same answer as well? (2 pts)

$$\hat{\pi}_{wrong} = \frac{167}{643} = 0.2597$$

$$\pm MOE: 1.96 * \sqrt{\frac{\hat{\pi}_{wrong} * (1 - \hat{\pi}_{wrong})}{n}} = 1.96 * \sqrt{\frac{0.2597 * (1 - 0.2597)}{643}} = 0.0339$$

Yes, she is correct, we get the same answer using either "right decision" or "wrong decision". This is because the margin-of-error is using the  $\hat{\pi}$  and  $(1 - \hat{\pi})$  in its calculation – so the formula is actually using both situations when computing the margin-of-error.

8. Your friend makes the following comment, "The % that said "Right Decision" for Democrats is higher than the % that said "Right Decision" for Republicans; therefore, the margin-of-error should be higher for Democrats." This statement is not correct. Why is the margin-of-error for Democrats lower? (2 pts)

Outcomes based on more observations, i.e. a larger study, will have a smaller margin-of-error - not larger margin-of-error. The MOE for Democrats is slightly lower because the number of Democrats is higher (643 vs 428) and a slightly larger value in the denominator will make the overall ratio smaller.