

examples

small sample
proportion

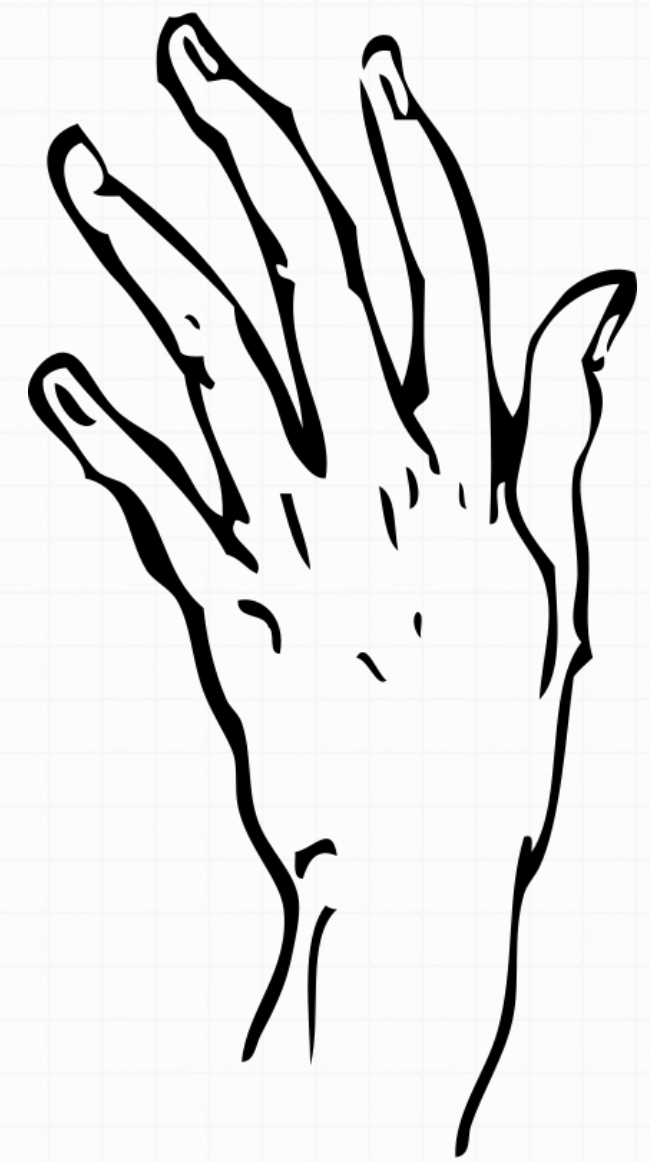
There is a saying in English “*to know something like the back of your hand*”, which means to know something very well. MythBusters (a popular TV show) put to test the validity of this saying.

They recruited 12 volunteers, each of whom were shown 10 pictures of backs of hands (while wearing gloves so they couldn't see their own hands), and asked them to identify their own hand among the 10 pictures. 11 out of 12 people completed the task successfully.

What are the hypotheses for evaluating whether these data provide convincing evidence of the validity of the saying, i.e. that people do better than random guessing when it comes to recognizing the back of their own hand?

$$H_0: p = 0.1$$

$$H_A: p > 0.1$$



Fill in the blanks below:

1. Use a 10-sided fair die to represent the sampling space, and call 1 a success (guessing correctly), and all other outcomes failures (guessing incorrectly).
2. Roll the die 12 times (each representing one of 12 people in the experiment), count the number rolls that resulted in ones, and calculate the proportion of correct guesses in one simulation of 12 rolls.
3. Repeat step (2) 100 times, each time recording the proportion of simulated successes in a series of 12 rolls of the die.
4. Create a dot plot of the simulated proportions from step (3) and count the number of simulations where the proportion is 11/12 or greater (the observed proportion).

R

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> source("http://bit.ly/dasi_inference")  
> back = factor(c(rep("correct", 11), rep("incorrect", 1)))  
> inference(back, est = "proportion", type = "ht", method = "simulation",  
success = "correct", null = 0.1, alternative = "greater", nsim = 100)
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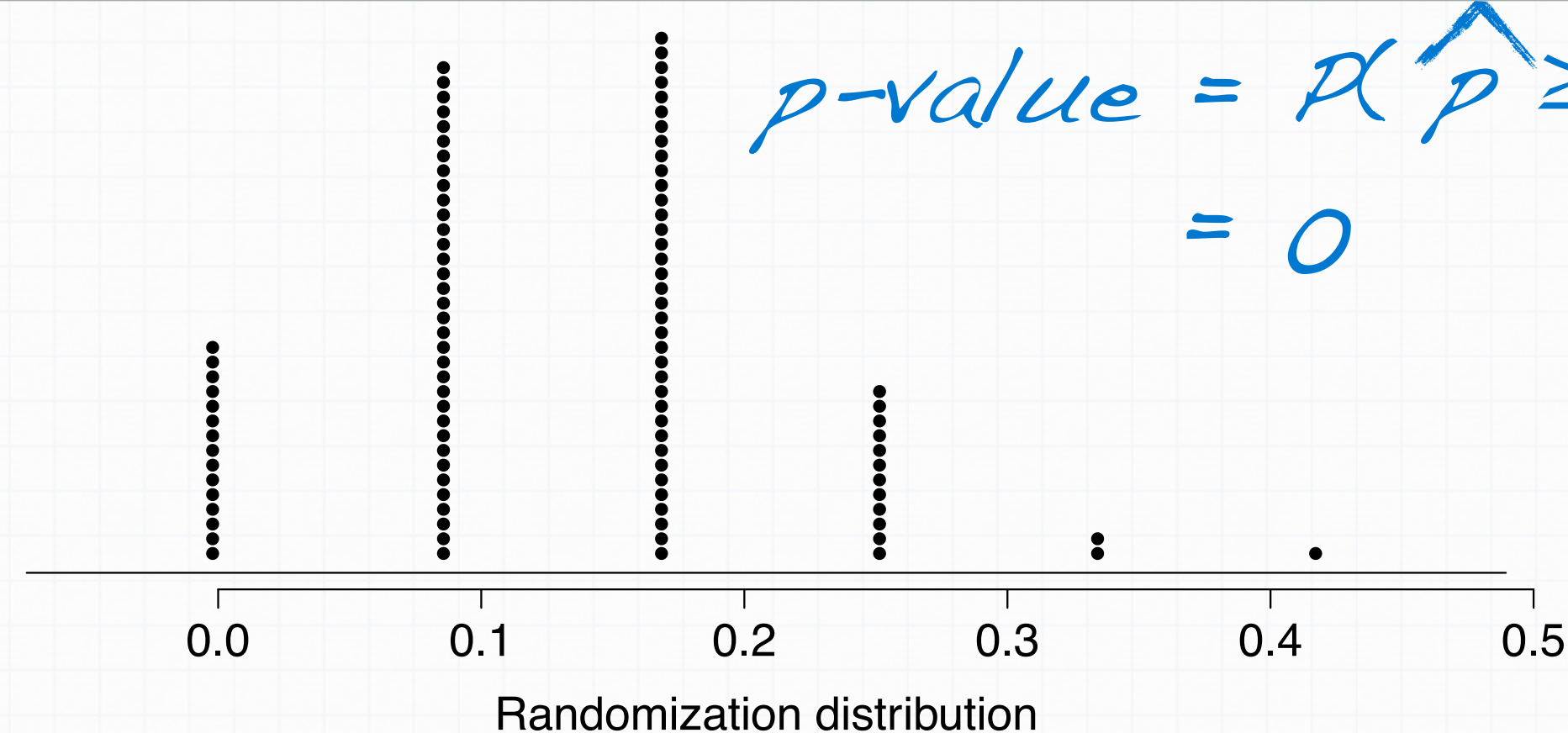
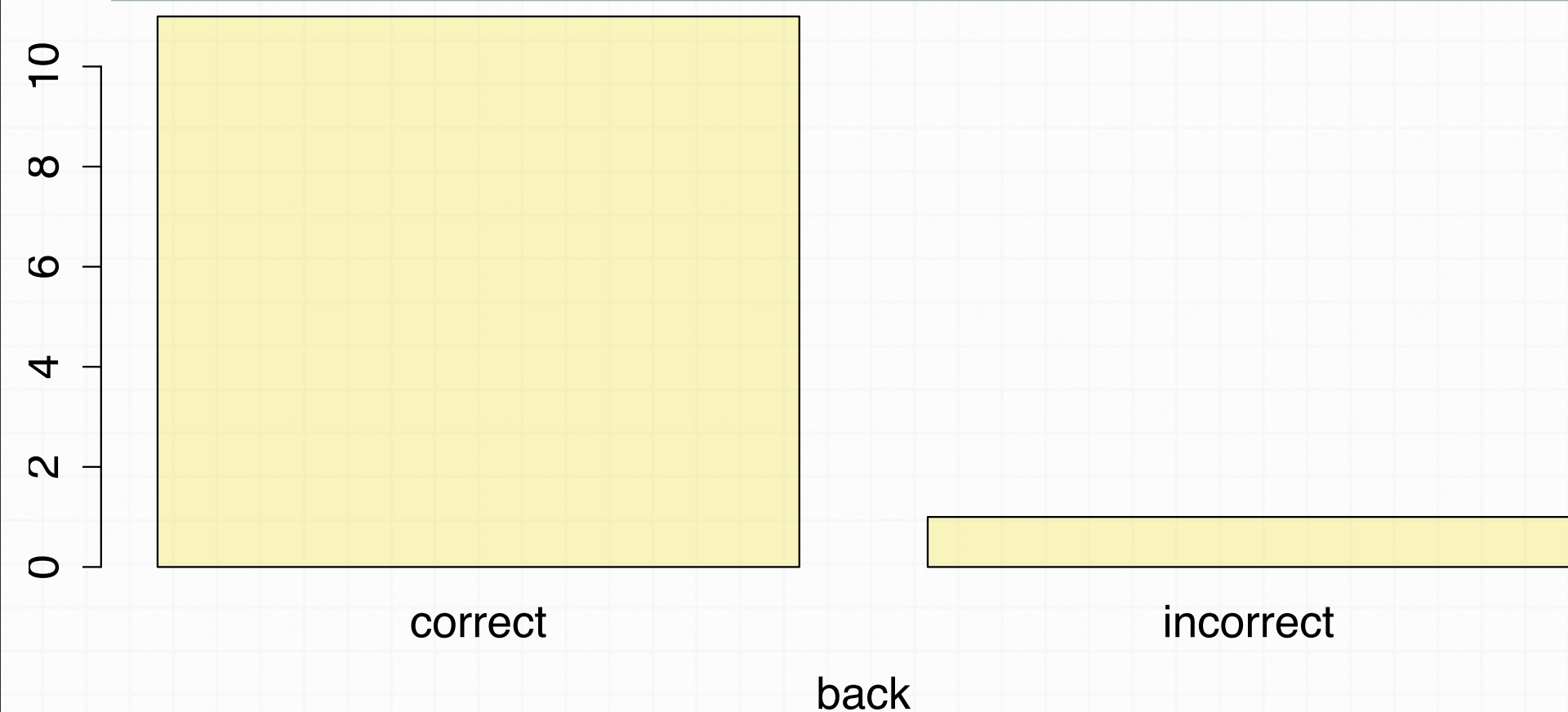
Single proportion -- success: correct

Summary statistics: p_hat = 0.9167 ; n = 12

H0: p = 0.1

HA: p > 0.1

p-value = 0



$$p\text{-value} = P(\hat{p} \geq 0.9167 \mid p = 0.10) = 0$$