# comparing two small sample proportions

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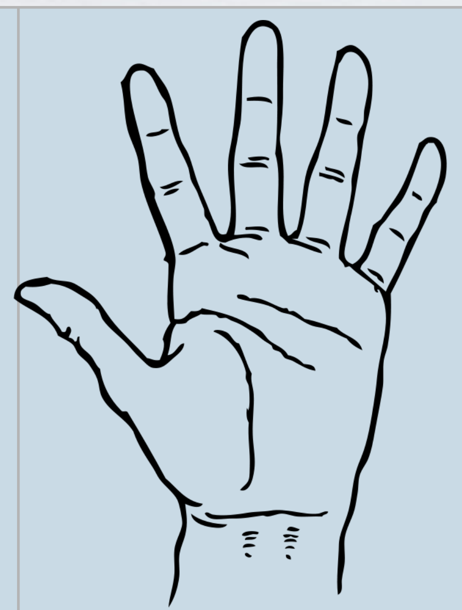
# from MythBusters

*“to know something like the back of your hand”*

| |  back |  palm | total |
|---|---|---|---|
| **correct** | 11 | 7 | 18 |
| **incorrect** | 1 | 5 | 6 |
| **total** | 12 | 12 | 24 |
| $\hat{p}$ | 0.9167 | 0.5833 | 0.75 |

MythBusters - Season 13, Episode 5 - Mini Myth Medley

Back of hand: http://openclipart.org/detail/7373/left-hand-by-johnny_automatic

Palm of hand: http://openclipart.org/detail/7087/hand---palm-facing-out-by-johnny_automatic-7087

Do these data provide convincing evidence that there is a difference in how good people are at recognizing the backs and the palms of their hands?

$H_0$: $p$ ... $p_{back} - p_{palm} \neq 0$

1. inde...

✓ w... ...oup we can assume that the guess ...t is independent of another.

✓ b... ...ople guessing – assume to be met for ...urposes

2. sam... ...= 9 and 12 × 0.25 = 3 – ...se simulation methods

| | back | palm | total |
|---|---|---|---|
| correct | 11 | 7 | 18 |
| incorrect | 1 | 5 | 6 |
| total | 12 | 12 | 24 |
| | 0.9167 | 0.5833 | **0.75** |

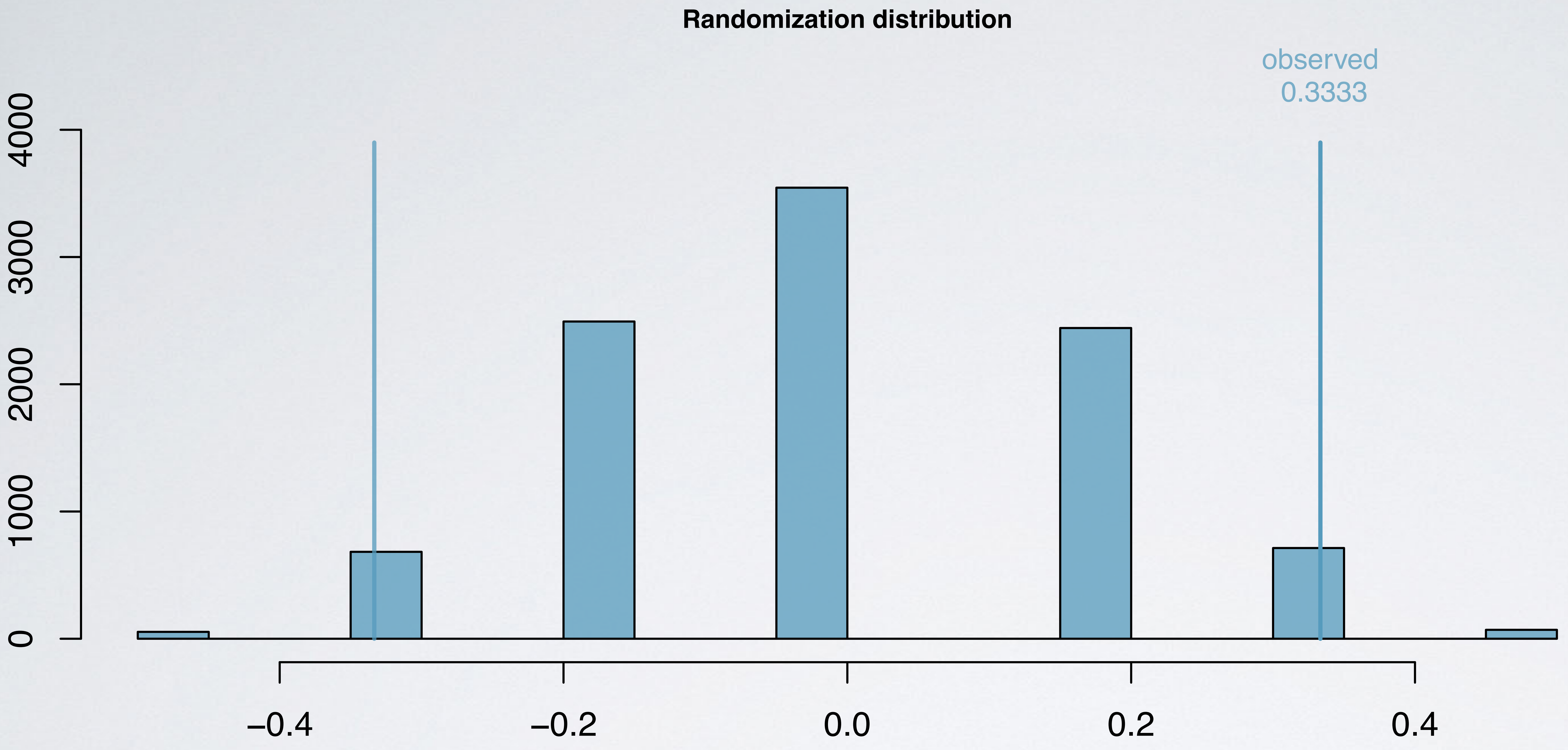
# simulation scheme

1. Use 24 index cards, where each card represents a subject.
2. Mark 18 of the cards as "correct" and the remaining 6 as "wrong".
3. Shuffle the cards and split into two groups of size 12, for back and palm.
4. Calculate the difference between the proportions of "correct" in the back and palm decks, and record this number.
5. Repeat steps (3) and (4) many times to build a randomization distribution of differences in simulated proportions.

# interpreting the simulation results

simulate the experiment under the assumption of independence, i.e. leaving things up to chance.

- results from the simulations look like the data → the difference between the proportions of correct guesses in the two groups was **due to chance**.
- results from the simulations do not look like the data → the difference between the proportions of correct guesses in the two groups was not due to chance, but because **people actually know the backs of their hands better**.




p-value = 0.1566