

Lecture 20: Single Proportion Test

Chapter 6.1

Discussion of Quiz

Question 1: Why did $\frac{1}{20}$ studies yield a positive/significant result i.e. that there is a link between jelly beans and acne?

Discussion of Quiz

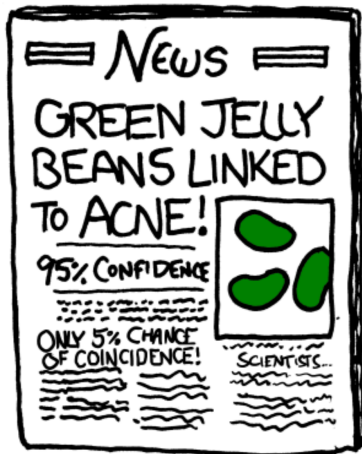
Question 1: Why did $\frac{1}{20}$ studies yield a positive/significant result i.e. that there is a link between jelly beans and acne?

Not that the p-value is 0.05, rather that $\alpha = 0.05$:

- ▶ significance level AKA
- ▶ type I error rate AKA
- ▶ false positive rate

i.e. we expect 1 out of 20 results to be significant even if there is no effect.

Publication Bias



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Journal of **Negative Results:** <http://www.jnrbm.com/>

Publication Bias



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From: Sterne JA, Davey Smith G (2001) Sifting the evidence - What's wrong with significance tests. *BMJ* 322: 226231.

Multiple Testing

A related issue is the statistical concept of [multiple testing](#).

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Say we are conducting many experiments, and H_0 is true for all of them. If you repeat experiments many times, you're bound to get a significant result eventually just by **chance alone**.

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Use the **Bonferroni correction** to α : If you are conducting n tests, use $\alpha^* = \frac{\alpha}{n}$. More later...

Discussion of Quiz

Question 2: Say a very successful entrepreneur named Jamie puts out an autobiography called "How to be a success in life." In it, Jamie details a plan to become a success along the various dimensions of life. Jamie states "I followed these steps, and look at me now! You should do the same!" Critique this statement keeping the comic in mind.

There might have been 9999 people who did the same things but perhaps aren't as successful. Those people generally don't get book deals so we don't know about them.

Relatedly <http://bit.ly/1EvIMOG>

Question for Today

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What are some next things to ask?

- ▶ What was n ?
- ▶ What is the **SE** of $\hat{p} = 44\% = 0.44$?
- ▶ What is the sampling distribution of \hat{p} ?

Question for Today

Just like with \bar{x} , if we want to use the normal model to

- ▶ build confidence intervals via z^*
- ▶ conduct hypothesis tests via the normal tables

we need the **sampling distribution** of \hat{p} to be nearly normal.

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we need the **sampling distribution** of \hat{p} to be nearly normal.

This happens when the population distribution of 0's and 1's is not too strongly skewed. As the sample size $n \rightarrow \infty$, this is less of an issue by the CLT.

Conditions for Sampling Dist'n of \hat{p} Being Nearly Normal

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What p to use?

Confidence Intervals

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Hypothesis Tests

Thomas Carcetti is running for mayor of Baltimore. His campaign manager **claims** he has more than 50% support of the electorate.

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Thomas Carcetti is running for mayor of Baltimore. His campaign manager **claims** he has more than 50% support of the electorate.

The Baltimore Sun collects a random sample of $n = 500$ likely voters and finds that 52% support him. Does this provide convincing evidence for the claim of Carcetti's manager at the 5% significance level?

Hypothesis Tests

Hypothesis Tests

Next Time

Same as with the jump from

$$\mu \text{ to } \mu_1 - \mu_2$$

i.e. from one to two-sample tests for means, we make the jump from

$$p \text{ to } p_1 - p_2$$

i.e. from one to two-sample tests for proportions.