

Section 2.3

Case Study:

Gender Discrimination

Gender Discrimination

- In 1972, as a part of a study on gender discrimination, 48 male bank supervisors were each given the same personnel file and asked to judge whether the person should be promoted to a branch manager job that was described as “routine”.
- The files were identical except that half of the supervisors had files showing the person was male while the other half had files showing the person was female.
- It was randomly determined which supervisors got “male” applications and which got “female” applications.
- Of the 48 files reviewed, 35 were promoted.
- The study is testing whether females are unfairly discriminated against.

B.Rosen and T. Jerdee (1974), "Influence of sex role stereotypes on personnel decisions", J.Applied Psychology, 59:9-14.

Data

At a first glance, does there appear to be a relationship between promotion and gender?

		<i>Promotion</i>		Total
		Promoted	Not Promoted	
<i>Gender</i>	Male	21	3	24
	Female	14	10	24
	Total	35	13	48

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% of males promoted: $21 / 24 = 0.875 \Rightarrow 87.5\%$

% of females promoted: $14 / 24 = 0.583 \Rightarrow 58.3\%$

Practice

We saw a difference of almost 30% (29.2% to be exact) between the proportion of male and female files that are promoted. Based on this information, which of the below is true?

- A. If we were to repeat the experiment we will definitely see that more female files get promoted. This was a fluke.
- B. Promotion is dependent on gender, males are more likely to be promoted, and hence there is gender discrimination against women in promotion decisions. **Maybe**
- C. The difference in the proportions of promoted male and female files is due to chance, this is not evidence of gender discrimination against women in promotion decisions. **Maybe**
- D. Women are less qualified than men, and this is why fewer females get promoted.

Two Competing Claims

1. “There is nothing going on.”

Promotion and gender are *independent*, no gender discrimination, observed difference in proportions is simply due to chance.

→ *Null Hypothesis*

2. “There is something going on.”

Promotion and gender are *dependent*, there is gender discrimination, observed difference in proportions is not due to chance.

→ *Alternative Hypothesis*

A Trial as a Hypothesis Test

Hypothesis testing is very much like a court trial.

- H_0 : Defendant is innocent
 H_A : Defendant is guilty
- We then present the evidence - collect data.
- Then we judge the evidence - "Could these data plausibly have happened by chance if the null hypothesis were true?"
 - If they were very unlikely to have occurred, then the evidence raises more than a reasonable doubt in our minds about the null hypothesis.
- Ultimately we must make a decision. How unlikely is unlikely?



Image from http://www.nwherald.com/_internal/cimg!0/oo1il4sf8zzaqbboq25oenvbg99wpot

A Trial as a Hypothesis Test (cont.)

- If the evidence is not strong enough to reject the assumption of innocence, the jury returns with a verdict of “not guilty”.
 - The jury does not say that the defendant is innocent, just that there is not enough evidence to convict.
 - The defendant may, in fact, be innocent, but the jury has no way of being sure.
- Said statistically, we fail to reject the null hypothesis.
 - We never declare the null hypothesis to be true, because we simply do not know whether it's true or not.
 - Therefore we never “accept the null hypothesis”.

A Trial as a Hypothesis Test (cont.)

- In a trial, the burden of proof is on the prosecution.
- In a hypothesis test, the burden of proof is on the unusual claim.
- The null hypothesis is the ordinary state of affairs (the status quo), so it's the alternative hypothesis that we consider unusual and for which we must gather evidence.

Recap: Hypothesis Testing Framework

- We start with a *null hypothesis* (H_0) that represents the status quo.
- We also have an *alternative hypothesis* (H_A) that represents our research question, i.e. what we're testing for.
- We conduct a hypothesis test under the assumption that the null hypothesis is true via theoretical methods
- If the test results suggest that the data do not provide convincing evidence for the alternative hypothesis, we stick with the null hypothesis. If they do, then we reject the null hypothesis in favor of the alternative.

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