

AP Stats

Chapter 1 1.1 (day 2) Outline

Marginal distribution tells us **NOTHING** about the relationship between the two variables. To describe a relationship between two categorical variables, we must calculate percents from the counts given in the body of the table. This is called a conditional distribution.

A **conditional distribution** of a variable describes the values of that variable among individuals who have a specific value of another variable. There is a separate conditional distribution for each value of the other variable.

Women's and Men's Opinions

Conditional distributions and relationships

PROBLEM: Based on the survey data, can we conclude that young men and women differ in their opinions about the likelihood of future wealth? Give appropriate evidence to support your answer.

Young adults by gender and chance of getting rich			
Opinion	Gender		Total
	Female	Male	
Almost no chance	96	98	194
Some chance but probably not	426	286	712
A 50-50 chance	696	720	1416
A good chance	663	758	1421
Almost certain	486	597	1083
Total	2367	2459	4826

Female

$$\frac{96}{2367} = 4.1\%$$

$$\frac{426}{2367} = 18\%$$

$$\frac{696}{2367} = 29.4\%$$

$$\frac{663}{2367} = 28\%$$

$$\frac{486}{2367} = 20.5\%$$

Male

$$\frac{98}{2459} = 4\%$$

$$\frac{286}{2459} = 11.6\%$$

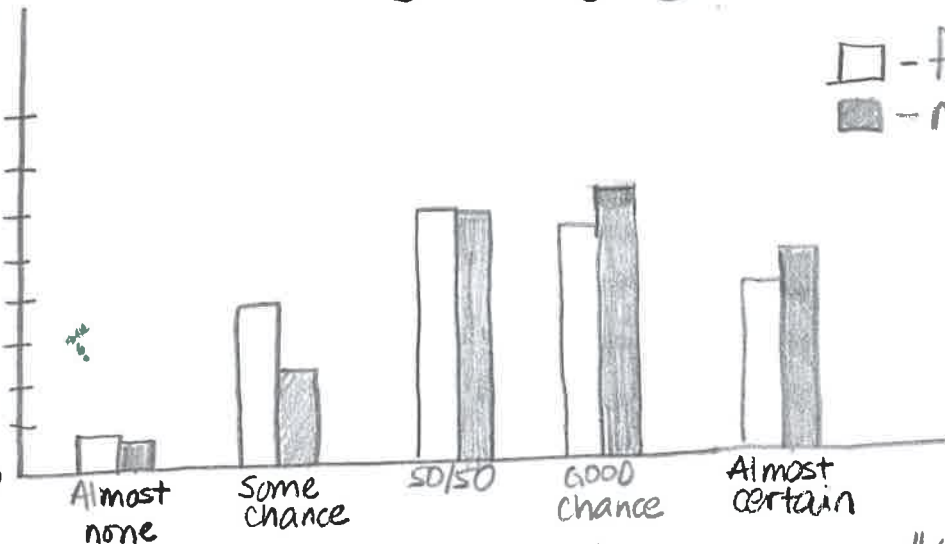
$$\frac{720}{2459} = 29.3\%$$

$$\frac{758}{2459} = 30.8\%$$

$$\frac{597}{2459} = 24.3\%$$

100%

Chance of being wealthy by 30



□ - female
■ - male

Based on the sample data, men seem somewhat more optimistic about their future income than women. Men were less likely to say they had "no chance" than women (11.6% vs. 18%). Men were more likely to say they have a "good chance" (30.8% vs 28%) or are "almost certain" (24.3% vs 20.5%) to have much more than a middle class income by age 30 than women are.

Both graphs provide evidence of an association (relationship) between gender and opinion about future wealth in this sample of young adults.

*** do not use correlation!**

We say that there is an association between two variables if knowing the value of one variable helps predict the value of the other. If knowing the value of one variable does not help you predict the value of the other, then there is no association between the variables.



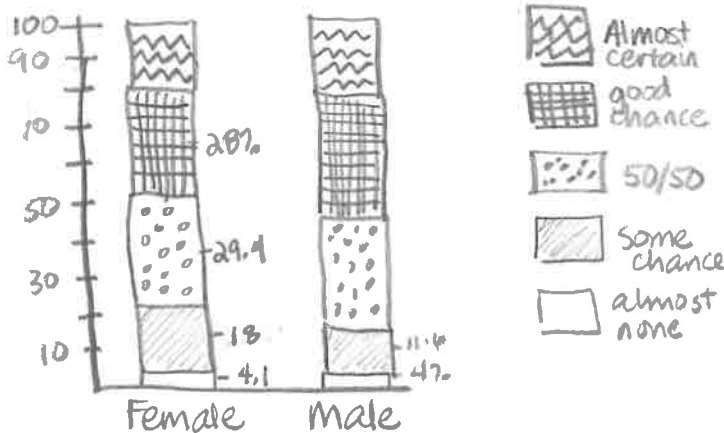
CHECK YOUR UNDERSTANDING

Let's complete our analysis of the data on superpower preferences from the previous Check Your Understanding (page 14). Here is the two-way table of counts once again.

Superpower	Country	
	U.K.	U.S.
Fly	54	45
Freeze time	52	44
Invisibility	30	37
Superstrength	20	23
Telepathy	44	66
	200	215
		415

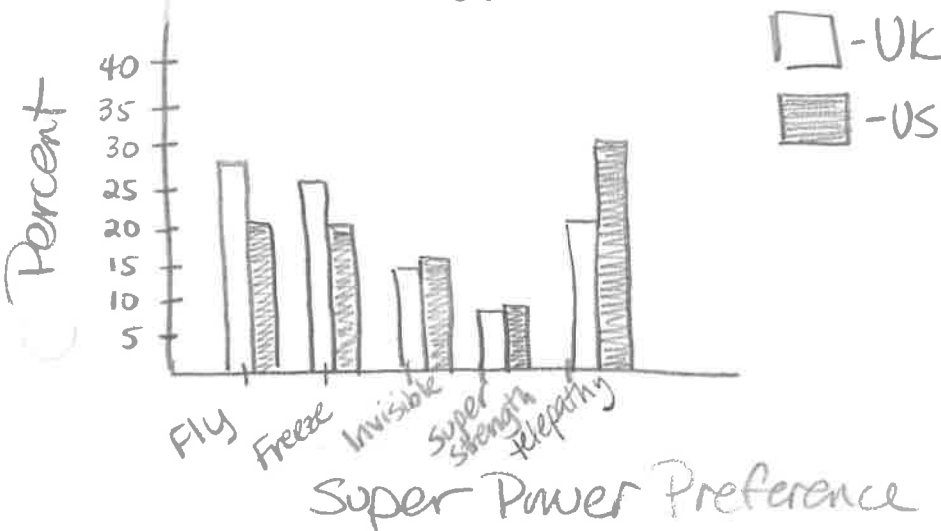
- Find the conditional distributions of superpower preference among students from the United Kingdom and the United States.
- Make an appropriate graph to compare the conditional distributions.
- Is there an association between country of origin and superpower preference? Give appropriate evidence to support your answer.

Segmented Bar Graph



	UK	US
① Fly	$\frac{54}{200} = 27\%$	$\frac{45}{215} = 20.9\%$
Freeze	$\frac{52}{200} = 26\%$	$\frac{44}{215} = 20.5\%$
Invisible	$\frac{30}{200} = 15\%$	$\frac{37}{215} = 17.2\%$
Super strength	$\frac{20}{200} = 10\%$	$\frac{23}{215} = 10.7\%$
telepathy	$\frac{44}{200} = 22\%$	$\frac{66}{215} = 30.7\%$
	100%	100%

② Superpower Preferences UK vs US



③ There is an assoc. between country of origin & superpower preference. Students in the UK are more likely to choose flying & freezing time (27% vs 20.9% & 26% vs 20.5% respectively), while the US students are more likely to choose invisibility or telepathy (17.2 vs 15% & 30.7 vs 22% respectively). Super strength is equally unpopular for both countries.