KEY

AP STAT Chapter 1 (updated 9/5/2023)

Conditional vs Marginal Distribution Extra Example

- **Definitions made simple**
  - **Marginal distributions** – %'s on the outside of a 2-way table. The %'s describe the characteristics of the **entire sample** investigating.
  - **Conditional distributions** – %'s on the inside of a 2-way table. The %'s allow us to investigate the association between the 2 variables.
    - Use the variable that explains the other variable.
    - If the conditional %'s are the same then there is "NO" association between the 2 variables.
- **Example: Understand Marginal and Conditional distributions!**
  - Go to my website undet AP Stats Chapter 1 video "Getting Rich"
    https://www.macmillanlearning.com/studentresources/highschool/statistics/tps5e/workedexamplevideos/workedexamplevideoswomensandmensopinions.html

Young adults by gender and chance of getting rich

	Gender		
Opinion	Female	Male	Total
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

Joint
98/4826 = 2%
(males who say no chance to get rich)

Marginal
1416/4826 = 29%
(29% of sample say 50/50 chance to get Rich)

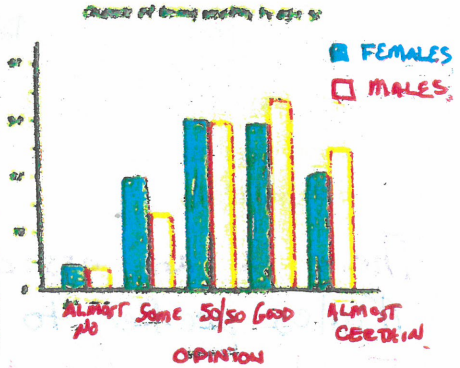
Conditional – looking AT only females
* 696/2367 = 29% of all females say 50/50 chance

Tpstx Example "I'm Gonna Be Rich" (pgs 12-19)

Example: Conditional distributions and relationships

We suspect that gender might influence a young adult's opinion about the chance of getting rich
We'll compare the conditional distributions of response for men alone and for women alone

RESPONSE	FEMALES	MALES
ALMOST NO CHANCE	4%	4%
SOME CHANCE	18	12
50/50 CHANCE	29	29
GOOD CHANCE	28	31
ALMOST CERTAIN	21	24
	100%	100%



Based on the sample data, men seem somewhat more optimistic about their future income than women

CYU - Conditional vs Marginal Distribution Extra Example

11. **Commuting to work** The table shows how a company's employees commute to work.

Job Class	Transportation: Car	Bus	Train	Total
Management	26	20	44	90
Labor	56	106	168	330
Total	82	126	212	420

Conditional (used to make comparisons)

Marginal (info about the entire sample)

82/420 126/420 212/420
20% 30% 50%

a. What is the marginal distribution (in %) of mode of transportation?

% should add to 100%

Car 20% Bus 30% Train 50%

b. What is the conditional distribution (in %) of mode of transportation for management?

den.

Car 29% Bus 22% Train 49%

26/90 20/90 44/90

CAR Given MGMT

17. The two-way table below shows the relationship between means of transportation to work and gender for a simple random sample of 250 working adults in the United States.

	Drive alone	Car Pool	Public transportation
Male	113	16	6
Female	85	23	7

Totals
135
115
250

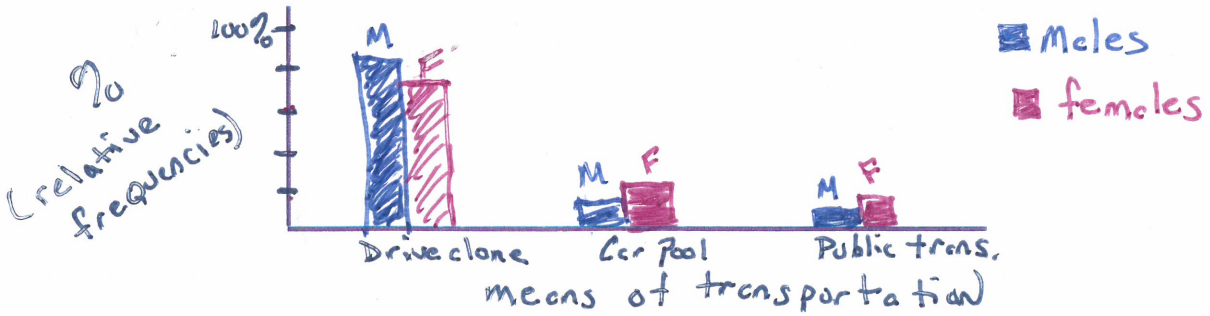
Discuss the relationship between gender and means of transportation to work for the working adults in this sample.

a) Which conditional distributions should you use. HINT: Does Gender predict Transportation or vice versa? Gender explains means of TRANSPORTATION
∴ Gender Conditional % (and in the denominator)

b) Create a table with the appropriate conditional probabilities.

Gender	Drive Alone	Car Pool	Public Transportation	Total %
Male	113/135 = 84%	16/135 = 12%	6/135 = 4%	100%
Female	85/115 = 74%	23/115 = 20%	7/115 = 6%	100%

c) Provide an appropriate graph. Label axes and provide a key.



d) Explain the relationship. 3 sentences. First is/is not an association. Two supporting statements that make comparisons.

- There is an association between gender and mode of transportation.
- Males prefer to drive alone compared to females.
- Females prefer car pools and public trans compared to males.