

Lesson 4: Simpson's Paradox

Class Data: Who was the better teacher?

	All Student Data		
	Pass	Fail	Total
Fraker	6 20%	24 80%	30 100%
Sroufe	10 33%	20 67%	30 100%
Total	16 27%	44 73%	60 100%

Broken Down by class

	Alg 1 B Data		
	Pass	Fail	Total
Fraker	4 14%	24 86%	28 100%
Sroufe	1 11%	8 89%	9 100%
Total	5 14%	32 86%	37 100%

	Alg 2 Data		
	Pass	Fail	Total
Fraker	2 100%	0 0%	2 100%
Sroufe	9 43%	12 57%	21 100%
Total	11 48%	12 52%	23 100%

Analysis:

Terms:

Simpson's Paradox - An association between two variables that holds for each individual value of a third variable can be changed or even reversed when the data for all values of the third variable are combined. The reversal is called Simpson's Paradox

Guided Practice:

Do Medical Helicopters Save Lives?

Reversing an association

Accident victims are sometimes taken by helicopter from the accident scene to a hospital. Helicopters save time. Do they also save lives? Let's compare the percents of accident victims who die with helicopter evacuation and with the usual transport to a hospital by road. Here are hypothetical data that illustrate a practical difficulty:⁷

	Helicopter	Road
Victim died	64	260
Victim survived	136	840
Total	200	1100

Serious Accidents		
	Helicopter	Road
Died	48	60
Survived	52	40
Total	100	100

Less Serious Accidents		
	Helicopter	Road
Died	16	200
Survived	84	800
Total	100	1000

I'm Gonna Be Rich!

Relationship between two categorical variables

A survey of 4826 randomly selected young adults (aged 19 to 25) asked, "What do you think are the chances you will have much more than a middle-class income at age 30?" The table below shows the responses, omitting a few people who refused to respond or who said they were already rich.⁶

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



Find the marginal distribution.

Find if an association exists between gender and opinion.