

Disc. Sec.  
week of  
6-10 Apr  
20

gender vs.  
MLP

STAT 131  
6 Apr 20

sample pop. size = 106

$y = \text{MLP}, \text{gender}$

Y	F
Y	M
N	M
Y	F
1	1

$n = \text{sample pop. size}$

1 row for each individual (subject)

1 column for each variable (sort)

Y	F	↑ 29 ↓
Y	F	
N	F	↑ 20 ↓
N	F	
Y	M	↑ 52 ↓
Y	M	
N	M	↑ 5 ↓
N	M	

Gender

MLP

	Y	N	
F	29	20	49
M	52	5	57
	81	25	106

2x2  
contingency  
table

Choose 1 <sup>student</sup> at random from 106: (2)

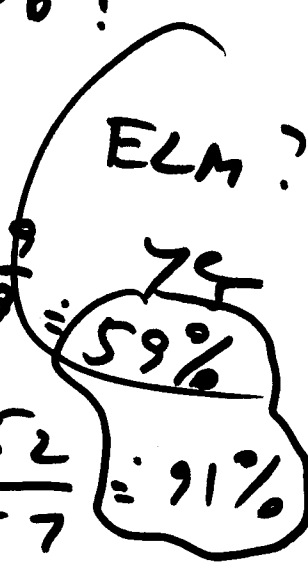
$$P(Y) = \frac{81}{106} = 76\%$$

unconditional

conditional

$$P(Y|F) = \frac{29}{49} = 59\%$$

$$P(Y|M) = \frac{52}{57} = 91\%$$



Q: Are gender & MUP independent of each other in this data set?

A: No, they're dependent; they are associated with each other; an association exists between them

Q2: Is assoc. strong ~~weak~~ ~~with~~ because 91% is quite different from 59% ~~to next text?~~

In reality ALL probabilities <sup>③</sup> are conditional, at least in the assumptions made in calculating them

$$P(Y) = P(Y \mid \text{1 student chosen at random from } 106)$$

Dr. Schram

P(int. on any single cut)

$$= p = \frac{1}{500}$$

# cuts	P(int.)
100	20% = np
500	100% = np
501	200% bullshit
1000	

surprising fact about

HIV: it's possible to be infected with HIV more than once

$P(\text{inf. in 100 qets}) = ?$  (4)

Math: All math can ever give is

If  $A$  then  $C$   
↑ assumptions      ↑ conclusions

2 ways to measure quality:

① process:  
how we solve problems

② outcome:

whether we succeeded in solving or not

useful process tip

When faced with a new problem,

try to find an old problem with

2 properties: { ① it's similar to <sup>in all relevant</sup> how prob.  
② you already know <sup>how</sup> to solve it

Q: Is Dr. Schram similar to any <sup>5</sup> problems we've already solved?

A: Our only success so far is

T-S disease  $\left( \begin{array}{l} \text{F-S} \\ p(1 \text{ or more T-S} \\ \text{in family of } 5, \\ \text{both p. carriers}) \end{array} \right)$

$P(\text{T-S on any one child}) = p = \frac{1}{4}$

Schram

$P(\text{inf. in } 100 \text{ oets}) =$   
 $P(1 \text{ or more inf. in } 100 \text{ unprotected oets})$

$P(\text{inf. on } 1 \text{ oet}) = \frac{1}{500} = p$

A  
 $P(1 \text{ or more inf. in } 100 \text{ oets})$

6

$$= 1 - P(\text{not } A)$$

$$= 1 - P(\text{no inf in } 100 \text{ qts})$$

$$= 1 - P(\text{not inf. on 1st}) \text{ and } (\text{not inf. on 2nd}) \dots \text{and } (\text{not inf. on } 100\text{th})$$

$$P(A \text{ and } B) = P(A) \cdot P(B|A) \\ = P(B) \cdot P(A|B)$$

Special case: if A, B indep.

$$\text{then } P(A \text{ and } B) = P(A) \cdot P(B) \\ = P(B) \cdot P(A)$$

indep

$$1 - P(\text{not inf. on 1st}) P(\text{not inf. on 2nd}) \dots P(\text{not inf. on } 100\text{th})$$

constant  
risk

$$1 - \left(1 - \frac{1}{500}\right) \left(1 - \frac{1}{500}\right) \dots \left(1 - \frac{1}{500}\right) \quad (7)$$

$$= 1 - \left(1 - \frac{1}{500}\right)^{100} = 1 - (1 - p)^n$$

n	P(1 or more in f.)	Schwarz
100	18%	20%
<u>500</u>	<u>62% (?)</u>	100%