

**THE ART (AND
SCIENCE?) OF
INTERPRETING
TABLES**

BACKGROUND READINGS

- Pollock, *Essentials*, chs. 3-4

OUTLINE

1. Components of statistical association
2. Cross-tabulation: format; comparing percentages and means
3. The gamma coefficient
4. Multivariate Relationships
5. Spurious, Enhancement, and Specification Relationships

The Analytical Challenge: Interpreting and Measuring Relationships

Components of Statistical Association:

- 1. Form** (e.g. positive or negative, varies from -1.0 to + 1.0)
- 2. Strength** (how much X says about Y, varies from zero to 1.0)
- 3. Significance** (i.e., probability of null hypothesis, such as $p < .05$)

Arts of Cross-Tabulation

- 1. Independent variable (X) is the “column” variable**
- 2. Dependent variable (Y) is the “row” variable**
- 3. In case of ordered nominal variables, be sure to array “low-low” values in upper-left hand corner, and “high-high” values in lower right-hand corner**
- 4. Compute percentages along the independent variable— NOT of the dependent variable**
- 5. For interpretation, compare percentages across columns at the same value of the dependent variable**

On Setting Up Tables

<u>Y</u>	<u>X</u>		
	Low	Medium	High
Low	(LL)		
Medium		(MM)	
High			(HH)

Cross-Tabulation I: Comparing Percentages

Table 3-5 Gun Control Opinions, by Partisanship (cross-tabulation)

Opinion on Gun Ban	Party Identification			Total
	<i>Democrat</i>	<i>Independent</i>	<i>Republican</i>	
Favor	52.9% (314)	46.6% (223)	37.9% (162)	46.6% (699)
Oppose	47.1% (280)	53.4% (256)	62.1% (265)	53.4% (801)
Total	100.0% (594)	100.0% (479)	100.0% (427)	100.0% (1,500)

Source: 1996 National Election Study.

Note: Question: "Do you favor or oppose a ban on the sale of all handguns, except those that are issued to law enforcement officers?"

Cross-Tabulation II: Comparing Percentages

Table 3-6 Smoking, by Income (cross-tabulation)

Smoker?	Income Categories					Total
	\$13,999 or less	\$14,000– \$24,999	\$25,000– \$39,999	\$40,000– \$59,999	\$60,000 or more	
Yes	32.5% (90)	27.0% (62)	24.6% (76)	21.8% (58)	16.4% (52)	24.2% (338)
No	67.5% (187)	73.0% (168)	75.4% (233)	78.2% (208)	83.6% (265)	75.8% (1,061)
Total	100.0% (277)	100.0% (230)	100.0% (309)	100.0% (266)	100.0% (317)	100.0% (1,399)

Source: 1996 National Election Study.

Note: Question: "Are you a smoker?"

Comparing Means: Format I

Table 3-7 Turnout Rates, by State Education Levels (mean comparison, format 1)

	State Education Level ^a				Total
	<i>Low</i>	<i>Medium- low</i>	<i>Medium- high</i>	<i>High</i>	
Mean turnout ^b	45.9	53.5	56.0	62.1	54.3
Number of states	(12)	(15)	(11)	(12)	(50)

Source: State Politics and Policy Data Archive, Illinois Legislative Studies Center, University of Illinois at Springfield.

^a Based on the percentage of state residents having at least a high school diploma.

^b Entries are mean turnouts in the 1992 congressional elections.

Comparing Means: Format II

Table 3-8 Turnout Rates, by State Education Levels
(mean comparison, format 2)

Education Level ^a	Mean Turnout ^b
Low	45.9 (12)
Medium-low	53.5 (15)
Medium-high	56.0 (11)
High	62.1 (12)
Total	54.3 (50)

Source: State Politics and Policy Data Archive.

^a Based on percentage of state residents having at least a high school diploma.

^b Entries are mean turnouts in the 1992 congressional elections.

Cross-Tabulation III: Comparing Percentages

Table 3-9 Gay Rights Opinions, by Age (cross-tabulation)

Opinion on Gay Rights Law	Age					Totals
	18-30	31-40	41-50	51-65	over 65	
Favor	69.2% (157)	60.9% (220)	68.5% (200)	63.4% (177)	59.0% (164)	63.9% (918)
Oppose	30.8% (70)	39.1% (141)	31.5% (92)	36.6% (102)	41.0% (114)	36.1% (519)
Totals	100.0% (227)	100.0% (361)	100.0% (292)	100.0% (279)	100.0% (278)	100.0% (1,437)

Source: 1996 National Election Study.

Note: Question: "Do you favor or oppose laws to protect homosexuals against job discrimination?"

The Gamma Coefficient

1. Appropriate for **ordered nominal** variables
2. Provides measure of **form** (positive or negative) and of **strength** (coefficient varies from -1.0 to $+1.0$)
3. Sample computations for 2×2 table
4. Does **not** provide measure of “significance”

Example and Sample Computation: Gun Control Attitudes and Gender

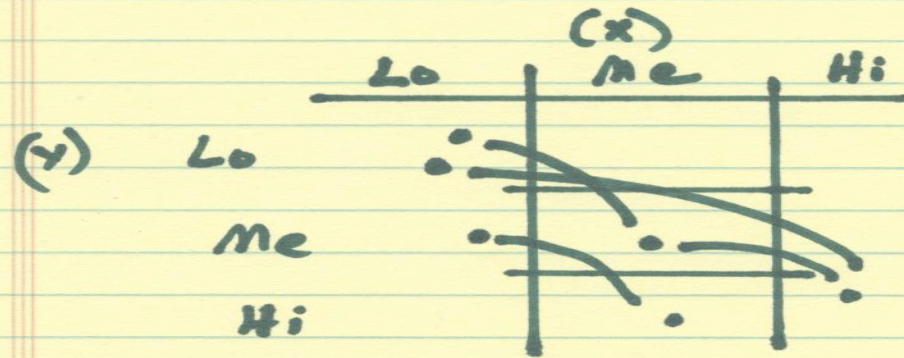
Gun Ban? _____	Gender		Total
	Male	Female	
Oppose	449[a]	358[b]	807
Favor	226[c]	481[d]	707
Total	675	839	1,514

Computing Gamma (AKA Yule's Q for 2x2 tables):

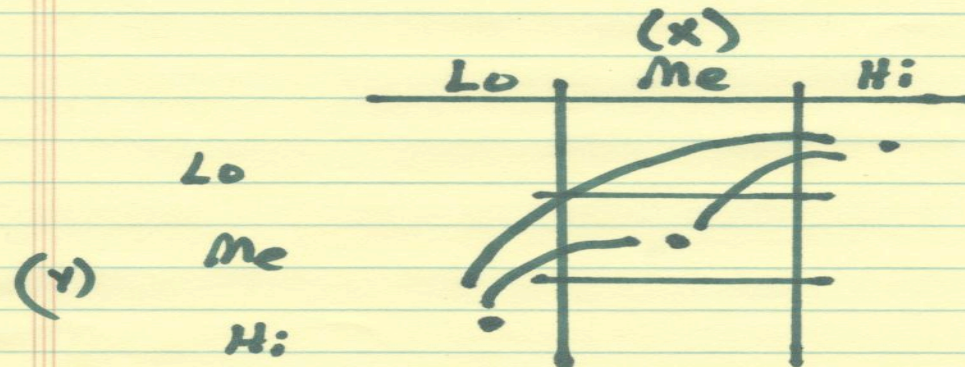
$$\begin{aligned}\Gamma &= \text{Yule's Q} = (ad - bc)/(ad + bc) \\ &= (449 \times 481 - 226 \times 358)/(449 \times 481 + 226 \times 358) \\ &= \mathbf{+.455}\end{aligned}$$

Thus a measure of form and strength

VISUALIZING GAMMA



∴ SAME-ORDERED PAIRS



∴ REVERSE-ORDERED PAIRS

DEFINING GAMMA

$$J = \frac{\text{SAME} - \text{REVERSE}}{\text{SAME} + \text{REVERSE}}$$

$$= \frac{n_s - n_r}{n_s + n_r}$$

EXCLUDING TIES

THUS A MEASURE OF

STRENGTH AND FORM

MULTIVARIATE RELATIONSHIPS

- The “How Else” Question
- Spurious, Enhancement, and Specification Relationships (a.k.a. “Interaction”)
- Example 1: Race, Education, and Turnout
- Example 2: Gender, Race, and Support for the Death Penalty

Examining Relationship between Y and X, Controlling for a Rival Cause Z

Potential Outcomes:

Spurious relationship—Y a function of Z and not X

Enhancement relationship—Y a function of both X and Z

Specification relationship—i.e., control variable (Z) specifies or defines conditions under which X affects Y [also known as “interaction”]

Figure 4-1 Spurious Relationship Between X and Y (arrow diagram)

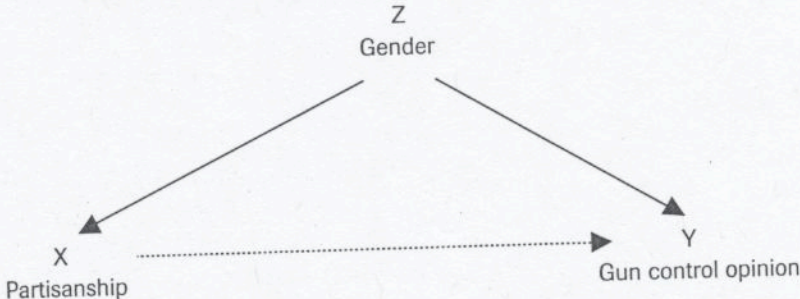
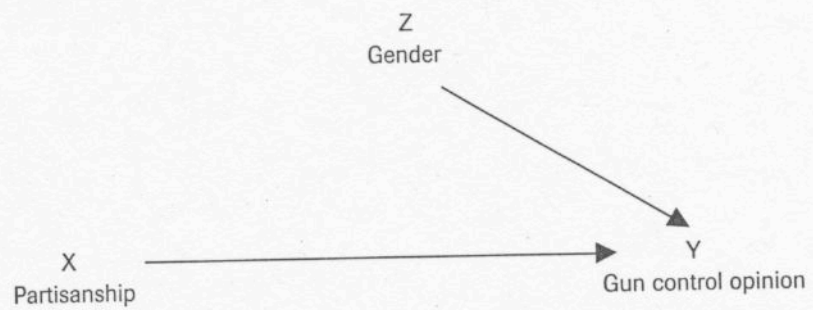


Figure 4-3 Enhancement Relationships Between X, Y and Z (arrow diagram)



... (X) ... (Y) such that Democrats are

Figure 4-5 Specification Relationships Between X, Y and Z (arrow diagram)

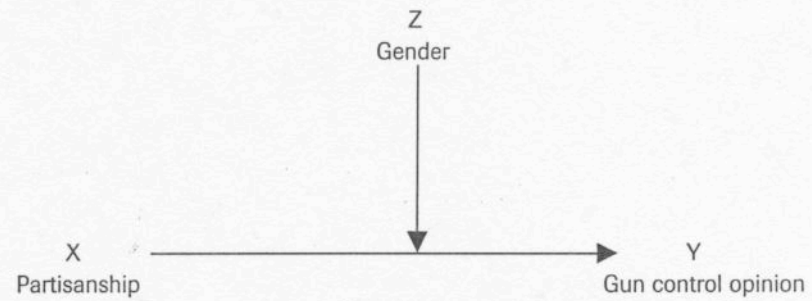


Table 4-1 Relationship Between Race (X) and Turnout (Y)

Voted? (Y)	Race (X)		Total
	White	Black	
No	22.0% (290)	32.2% (55)	23.2% (345)
Yes	78.0 (1,027)	67.8 (116)	76.8 (1,143)
Total	100.0% (1,317)	100.0% (171)	100.0% (1,488)

Source: National Election Study, 1996: Pre- and Post-election Survey; Steven J. Rosenstone, Donald R. Kinder, Warren E. Miller, and the National Election Studies (Ann Arbor: University of Michigan, Center for Political Studies, and Inter-university Consortium for Political and Social Research, 1997).

Table 4-2 Relationship Between Race (X) and Turnout (Y), Controlling for Education (Z)

Voted? (Y)	Level of Education (Z)					
	<i>High school or less</i>			<i>More than high school</i>		
	<i>Race (X)</i>			<i>Race (X)</i>		
	<i>White</i>	<i>Black</i>	Total	<i>White</i>	<i>Black</i>	Total
No	32.8% (184)	40.4% (40)	33.9% (224)	14.1% (106)	20.8% (15)	14.7% (121)
Yes	67.2% (377)	59.6% (59)	66.1% (436)	85.9% (647)	79.2% (57)	85.3% (704)
Total	100.0% (561)	100.0% (99)	100.0% (660)	100.0% (753)	100.0% (72)	100.0% (825)

Source: 1996 National Election Study.

Table 4-2 Relationship Between Race (X) and Turnout (Y), Controlling for Education (Z)

Voted? (Y)	Level of Education (Z)					
	<i>High school or less</i>			<i>More than high school</i>		
	<i>Race (X)</i>			<i>Race (X)</i>		
	<i>White</i>	<i>Black</i>	Total	<i>White</i>	<i>Black</i>	Total
No	32.8% (184)	40.4% (40)	33.9% (224)	14.1% (106)	20.8% (15)	14.7% (121)
Yes	67.2% (377)	59.6% (59)	66.1% (436)	85.9% (647)	79.2% (57)	85.3% (704)
Total	100.0% (561)	100.0% (99)	100.0% (660)	100.0% (753)	100.0% (72)	100.0% (825)

Source: 1996 National Election Study.

Table 4-3 Relationship Between Gender (X) and Support for the Death Penalty (Y), Controlling for Race (Z)

Favor Death Penalty? (Y)	Race (Z)					
	White			Black		
	Gender (X)		Total	Gender (X)		Total
Male	Female	Male		Female		
Favor	89.8% (474)	86.3% (528)	87.9% (1,002)	75.5% (40)	84.3% (59)	80.5% (99)
Oppose	10.2% (54)	13.7% (84)	12.1% (138)	24.5% (13)	15.7% (11)	19.5% (24)
Total	100.0% (528)	100.0% (612)	100.0% (1,140)	100.0% (53)	100.0% (70)	100.0% (123)

Source: *National Election Study, 2000: Pre- and Post-election Surveys*, Nancy Burns, Donald R. Kinder, Steven J. Rosenstone, Virginia Sapiro, and the National Election Studies, principal investigators (Ann Arbor: University of Michigan, Center for Political Studies, 2001).

Note: Question: "Do you favor or oppose the death penalty for persons convicted of murder?"