

## I. Short Review

### 1. Ordinal Data

- Concordant pairs ( $\uparrow, \uparrow$ ), Discordant pairs ( $\uparrow, \downarrow$ ), Tied pairs (=) : 2 kinds of table (1) in terms of respondents (2) ordinal response.

### 2. $\gamma$ , $\tau_b$ , $\tau_c$ , $d_{yx}$ , $r_s$

- $\gamma$ (Gamma) :  $\frac{C-D}{C+D}$ ,  $Z_{obs} = \gamma \sqrt{\frac{C+D}{N(1-\gamma^2)}}$ ,  $H_0: \gamma = 0$  : PRE interpretation.
- $\tau_b$ (Tau b) =  $\frac{C-D}{\sqrt{(C+D+T_R)(C+D+T_C)}}$
- $\tau_c = \frac{C-D}{\frac{N^2}{2} \times \frac{m-1}{m}}$ ,  $m$  : the lesser of # of rows or columns (think of ordinal response table)
- Test  $\tau$  :  $Z_{obs} = \frac{\tau_c}{\sigma_{\tau_c}}$ ,  $\sigma_{\tau_c} = \sqrt{\frac{4(R+1)(C+1)}{9 \times N \times R \times C}}$ ,  $H_0: \tau_c = 0$ .

Interpretation : We can rule out sampling error as the sole cause for the magnitude of the difference we see in our sample.

- Somer's  $d_{yx}$  :  $\frac{C-D}{C+D+T_R}$ ;  $y$  (DV)  $\rightarrow$  row,  $x$  (IV)  $\rightarrow$  column. So  $T_R$  is Ties of DV.

$$Z_{obs} : \frac{d_{yx}}{\sigma_{d_{yx}}}, \sigma_{d_{yx}} = \frac{2}{3R} \sqrt{\frac{(R^2-1)(C+1)}{N(C-1)}}$$

- Spearman's Rank Order Correlation Coefficient( $r_s$ )
  - 1<sup>st</sup> step : ranking answers. Tie Rank : take average rank, i.e.  $a^{th} + (a+1)^{th} / 2$ .
  - 2<sup>nd</sup> step : A's the ranking of one answer - A's the ranking of the other answer.
  - 3<sup>rd</sup> step :  $1 - \frac{6 \sum D^2}{N(N^2-1)}$
  - 4<sup>th</sup> step : for testing use the table( $N$ ,  $\alpha$ ).

### 3. STATA

- It will be covered in the session  
(`tab2 variables ,chi2 V col exp exact(2) gamma taub`)
- **chi2** : Pearson's chi-squared / **exact**[#] : Fisher's exact test / **gamma** : Goodman and Kruskal's gamma / **taub** : Kendall's tau-b / **V** : Cramer's V / **cchi2** : Pearson's chi-squared in each cell / **column** : relative frequency within its column of each cell / **row** : relative frequency within its row of each cell / **expected** : expected frequency in each cell.

II Problems

1. Key: frequency /expected frequency /chi2 contribution/ row %/ column %

	n	race of respondent			Total
		white	black	other	
lower class	119	37	13	169	
	(? )	23.5	8.9	169.0	
	(? )	7.8	1.9		
	(? )	21.89	7.69	(? )	
	(? )	9.23	8.55	5.86	
working class	1,005	222	75	1,302	
	1,052.3	181.0	68.6	1,302.0	
	2.1	9.3	0.6		
	77.19	17.05	5.76	100.00	
	43.11	55.36	49.34	45.15	
middle class	1,105	134	61	1,300	
	1,050.7	180.8	68.5	1,300.0	
	2.8	12.1	0.8		
	85.00	10.31	4.69	100.00	
	47.40	33.42	40.13	45.08	
upper class	102	8	3	113	
	91.3	15.7	6.0	113.0	
	1.2	3.8	1.5		
	90.27	7.08	2.65	100.00	
	4.38	2.00	1.97	3.92	
Total	2,331	401	152	2,884	
	2,331.0	401.0	152.0	2,884.0	
	.	.	.		
	80.83	13.90	5.27	100.00	
	(? )	100.00	100.00	100.00	

Pearson chi2(6) = (? ) Pr = 0.000 Cram?'s V = (? )

2. Calculate  $\gamma$ , test it, express PRE interpretation.

	Low Job security	Med	High
Low job satisfaction	16	8	14
Med	19	17	60
High	9	11	56

3. Calculate  $r_s$

Hours	8	5	11	13	10	5	18	15	2	8
Score	56	44	79	72	70	54	94	85	33	65

