

Ch. 4

4.6 Cochran's Test For Related observations

Ex.

In a comparison of different methods of soothing young babies, four methods (warm water, rocking, pacifier, sound) were applied to each of 12 neonates. Each of the 48 combinations was classified as successful (+) or unsuccessful (-), with the following results:

 $d = 5$

H_0 : No significant differences among the treatments

H_a : Significant difference

$$C = 4$$

$$r = 12$$

$$N = 24$$

subject	W	R	P	S	
1	-	-	-	-	0
2	-	+	-	-	1
3	-	-	+	-	1
4	-	-	-	-	0
5	+	+	+	+	4
6	-	+	+	+	3
7	+	+	-	-	2
8	-	+	-	+	2
9	-	+	+	+	3
10	-	-	+	-	1
11	+	+	-	+	3
12	+	+	+	+	4
	$c_1 = 4$	$c_2 = 8$	$c_3 = 6$	$c_4 = 6$	24

$$T = C(C-1) \frac{\sum_{j=1}^C (c_j - \frac{N}{C})^2}{\sum_{i=1}^r R_i (C - R_i)} = 4(3) \left[\right.$$

$$= 4(3) \left[\left(4 - \frac{24}{4}\right)^2 + \left(8 - \frac{24}{4}\right)^2 + \left(6 - \frac{24}{4}\right)^2 + \left(6 - \frac{24}{4}\right)^2 \right]$$

$$= 0 + 1\left(\frac{4-1}{3}\right) + 1\left(\frac{4-1}{3}\right) + 0 + 4\left(\frac{4-4}{0}\right) + 3\left(\frac{4-3}{3}\right) + 2\left(\frac{4-2}{4}\right) + 2\left(\frac{4-2}{4}\right) + 3\left(\frac{4-3}{3}\right) + 1\left(\frac{4-1}{3}\right) + 3\left(\frac{4-3}{3}\right) + 4\left(\frac{4-4}{0}\right)$$

$$\chi^2 = 7.85$$

$$\chi^2_{(3)} = 7.85$$

$$\frac{12(4+4+0+0)}{3+3+0+3+4+4+3+3+3} = \frac{96}{18+8} = \frac{96}{26} = 3.6923$$

$$3.6923 < 7.815$$

Do not reject H_0

∴ there is no significant differences among the treatment.