RIDIT Analysis

Ridit analysis was proposed by Bross for both the description of differences between groups on an ordered categorical scale, and the testing of the significance of those differences. The term ridit is derived from the initials of "relative to an identified distribution." The analysis begins with the identification of a population to serve as a standard or reference group. For the reference group, we estimate that the proportion of all cases with a value on the underlying continuum is falling at or below the midpoint of each interval, that is, each interval's ridit. The final values are the ridits associated with the various categories. The ridit for a category, then, is nothing but the proportion of all subjects from the reference group falling in the lower ranking categories, plus half the proportion falling in the given category.

Given the distribution of any other group over the same categories, the mean ridit for that group may be calculated. The resulting mean value is interpretable as a probability. The mean ridit for a group is the probability that a randomly-selected case from it will get better score than a randomly-selected case from the standard group. Mathematically, the mean ridit for the reference group must always be .5. This is consistent with the fact that, if two cases are randomly selected from the same population, the first case will be at least as high half the time, and will be at least as low also half the time.

Pairwise comparisons. -In most clinical studies the most sensible comparisons are those pairwise contrasts comparing one treatment group with another. There are, in general, K = k(k+1)/2 possible pairwise comparisons among the k+1 groups. Critical ratio tests are presented for comparing each group with the standard and each group with the others. As a control for the increased likelihood of falsely finding significance merely because several tests were performed, we recommend the Bonferroni criterion. If the desired overall significance level is α , each comparison should be tested at the significance level α/K . Thus, if $\alpha = 0.05$ and the number of groups is K = 6, $\alpha/K = 0.0083$ and the corresponding critical normal curve value is 2.64. This is the criterion used for adjudging the significance of each individual pairwise comparison.

Confidence intervals. - The standard errors defined explicitly or implicitly may be used to set confidence limits about the probability that a typical case in one group obtains a higher score than a typical case in another. In order to assure that the overall confidence in the entire set of intervals is at least $100(1 - \alpha\%)$ (usually 95%), the Bonferroni constant, say B, should be the factor multiplying the standard error, and not the usual 1.96.

An Example. A file labeled "TEETH.LAZ" contains results from a dental study of pain suffered by patients using four different pain relief treatments. The subjects indicated degree of pain felt after a given period of time following the dental work. Below is the image of the data file:

DpenSta	at May 26, 2	009							<u> </u>
EILES VAR	ILES VARIABLES EDIT ANALYSES SIMULATION UTILITIES OPTIONS HELP								
ROW	COL.	Cell E	dit (Return to f	inish) NC/	ASES No.	VAR.S	ASCII	STATUS:	
<u> </u>	<u> </u>	INONE]o	10		110	Priess Fit for help when on any menu item	·
UNITS	label	Ibuprofen_lo	Ibuprofen_Hi	Placebo	Aspirin				
CASE_1	None	0	1	0	1				
2	Poor	6	3	18	4				
3	Fair	10	5	10	11				
4	Good	17	25	37	25				
5	Very_Good	61	52	32	47				
Add Variat			and Settings\\	√illiam Miller\	MuDocume	nts\Pro	iects\Data\]		
	FILE: U:\Documents and Settings\William Miller\My Documents\Projects\Data\LEETH.TEX								

Figure 1. Sample Data for a RIDIT Analysis

The dialog form used in the analysis of this data is shown below:

Relative To An Identified	Relative To An Identified Distribution Analysis (RIDIT)					
Directions: Your data grid sl and M columns of data (inte 1. Enter the variable for the 2. Enter the variables repre: 3. Select the options desire 4. If only one variable is to t click on one of the Colun 5. If each variable is to be o	hould consist of a table of N rows and ger frequencies.) An example is in the row labels (defined as a string variable senting the columns of frequency data d. be considered as a reference variable nn Variables just selected to represent considered a reference distribution in tu	M+1 variables. Each row should have a string label file labeled TEETH.TEX. a.) (integers.) click the button "Use Only the Reference Selected" and the reference distribution. Irrn, select the button "Let Each Variable be a reference				
Variables:	Row Labels Variable Iabel Column Variables Ibuprofen_low Ibuprofen_Hi Placebo Aspirin	Options: Show Observed Frequencies Show Expected Frequencies Show Row and Column Proportions Show Cell Chi-square Values Use Yates' Correction for 2x2 table Show computational details Reference Variable: Let each variable be a reference Distribution. Use only the reference variable selected. Two-tailed Alpha level for significance: Use Bonferroni for contrasts Reset Cancel Compute Return				

Figure 2. RIDIT Analysis Dialogue Form

When the Compute button was clicked, the following results were obtained:

Chi-square Analysis Results No. of Cases = 365

OBSERVED FREQUENCIES

	Frequenc	cies				
	Ibuprofen_lowIbuprofen_Hi			acebo Asp	pirin To	tal
None	0	1	0	1	2	
Poor	6	3	18	4	31	
Fair	10	5	10	11	36	
Good	17	25	37	25	104	
Very_Good	61	52	32	47	192	
Total	94	86	97	88	365	

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EXPECTED FREQUENCIES
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Expected Values

	Ibuprofen_low	Ibuprofen_Hi	Placebo	Aspirin
None	0.515	0.471	0.532	0.482
Poor	7.984	7.304	8.238	7.474
Fair	9.271	8.482	9.567	8.679
Good	26.784	24.504	27.638	25.074
Very_Good	49.447	45.238	51.025	46.290

ROW PROPORTIONS

	Proportions	3			
	Ibuprofen low	Ibuprofen Hi	Placebo	Aspirin	Total
None	0.000	0.500 -	0.000	0.500	1.000
Poor	0.194	0.097	0.581	0.129	1.000
Fair	0.278	0.139	0.278	0.306	1.000
Good	0.163	0.240	0.356	0.240	1.000
Very Good	0.318	0.271	0.167	0.245	1.000
Total	0.258	0.236	0.266	0.241	1.000

COLUMN PROPORTIONS

	Proportion	5			
	Ibuprofen low	Ibuprofen Hi	Placebo	Aspirin	Total
None	0.000	0.012	0.000	0.011	0.005
Poor	0.064	0.035	0.186	0.045	0.085
Fair	0.106	0.058	0.103	0.125	0.099
Good	0.181	0.291	0.381	0.284	0.285
Very Good	0.649	0.605	0.330	0.534	0.526
Total	1.000	1.000	1.000	1.000	1.000

CHI-SQUARED VALUE FOR CELLS

Chi-square Values Ibuprofen_low Ibuprofen_Hi Placebo Aspirin 0.593 0.532 2.536 11.567 0.515 0.532 0.556 None 0.493 1.615 Poor 0.057 1.430 Fair 0.020 0.620 Good 3.574 0.010 3.171 0.000 1.011 2.700 7.093 Very Good 0.011 Chi-square = 38.103 with D.F. = 12. Prob. > value = 0.000 Liklihood Ratio = 38.318 with prob. > value = 0.0001 phi correlation = 0.3231Pearson Correlation r = -0.1158Mantel-Haenszel Test of Linear Association = 4.884 with probability > value = 0.0271 The coefficient of contingency = 0.307Cramer's V = 0.187ANALYSIS FOR STANDARD Ibuprofen low Frequencies Observed

F Ibup	requencies rofen_lowI	Placebo	Aspirin	
None	0	1	0	1
Poor	6	3	18	4
Fair	10	5	10	11
Good	17	25	37	25
Very_Good	61	52	32	47

Column Proportions Observed

	Proportions	5		
	Ibuprofen low	Ibuprofen Hi	Placebo	Aspirin
None	0.000	0.012 -	0.000	0.011
Poor	0.064	0.035	0.186	0.045
Fair	0.106	0.058	0.103	0.125
Good	0.181	0.291	0.381	0.284
Very Good	d 0.649	0.605	0.330	0.534

Ridit calculations for Ibuprofen_low

	CALCULATION	1S		
	Ibuprofen_low	Ibuprofen_Hi	Placebo	Aspirin
None	0.000	0.000	0.000	0.000
Poor	0.064	0.032	0.000	0.032
Fair	0.106	0.053	0.064	0.117
Good	0.181	0.090	0.170	0.261
Very_Good	0.649	0.324	0.351	0.676

Ridit calculations for Ibuprofen_Hi

	CALCULATION	IS		
	Ibuprofen low	Ibuprofen Hi	Placebo	Aspirin
None	0.012	0.006	0.000	0.006
Poor	0.035	0.017	0.012	0.029
Fair	0.058	0.029	0.047	0.076
Good	0.291	0.145	0.105	0.250
Very_Good	0.605	0.302	0.395	0.698

Ridit calculations for Placebo

		CALCULATION	IS		
		Ibuprofen low	Ibuprofen Hi	Placebo	Aspirin
None		0.000	0.000 -	0.000	0.000
Poor		0.186	0.093	0.000	0.093
Fair		0.103	0.052	0.186	0.237
Good		0.381	0.191	0.289	0.479
Very	Good	0.330	0.165	0.670	0.835

Ridit calculations for Aspirin

	CALCULATION	IS		
	Ibuprofen_low	Ibuprofen_Hi	Placebo	Aspirin
None	0.011	0.006	0.000	0.006
Poor	0.045	0.023	0.011	0.034
Fair	0.125	0.062	0.057	0.119

Good	0.284	0.142	0.182	0.324
Very Good	0.534	0.267	0.466	0.733

Ridits for all variables

	RIDITS			
	Ibuprofen low	Ibuprofen Hi	Placebo	Aspirin
None	0.000	0.006	0.000	0.006
Poor	0.032	0.029	0.093	0.034
Fair	0.117	0.076	0.237	0.119
Good	0.261	0.250	0.479	0.324
Very_Good	0.676	0.698	0.835	0.733

Mean RIDITS Using the Reference Values

Variables	Ibuprofen_low	Ibuprofen_Hi	Placebo	Aspirin
	0.500	0.492	0.340	0.451

Overall mean for RIDITS in non-reference groups = 0.4244 Chisquared = 27.695 with probability < 0.0000

z critical ratios

Variables Ibuprofen_low Ibuprofen_Hi Placebo Aspirin 0.000 -0.182 -3.823 -1.146

significance level used for comparisons = 2.394
Ibuprofen_Hi vs Ibuprofen_low not significant
Placebo vs Ibuprofen_low significant
Aspirin vs Ibuprofen_low not significant

. (two analyses omitted to conserve space)

ANALYSIS FOR STANDARD Aspirin

Frequencies Observed

		Frequencies			
	I	<pre>buprofen_lowI</pre>	profen_lowIbuprofen_Hi		Aspirin
	None	0	1	0	1
	Poor	6	3	18	4
	Fair	10	5	10	11
	Good	17	25	37	25
Very	Good	61	52	32	47

Column Proportions Observed

	Proportions	5		
	Ibuprofen_low	Ibuprofen_Hi	Placebo	Aspirin
None	0.000	0.012	0.000	0.011
Poor	0.064	0.035	0.186	0.045
Fair	0.106	0.058	0.103	0.125
Good	0.181	0.291	0.381	0.284

Ridit calculations for Ibuprofen_low

	CALCULATION	NS		
	Ibuprofen low	Ibuprofen Hi	Placebo	Aspirin
None	0.000	0.000 -	0.000	0.000
Poor	0.064	0.032	0.000	0.032
Fair	0.106	0.053	0.064	0.117
Good	0.181	0.090	0.170	0.261
Very_Good	0.649	0.324	0.351	0.676

Ridit calculations for Ibuprofen_Hi

	CALCULATION	1S		
	Ibuprofen_low	Ibuprofen_Hi	Placebo	Aspirin
None	0.012	0.006	0.000	0.006
Poor	0.035	0.017	0.012	0.029
Fair	0.058	0.029	0.047	0.076
Good	0.291	0.145	0.105	0.250
Very_Good	0.605	0.302	0.395	0.698

Ridit calculations for Placebo

	CALCUI	LATIONS			
	Ibuprofer	n low Ibupi	cofen Hi	Placebo	Aspirin
None	0.0	. <u> </u>	.000 (0.000	0.000
Poor	0.1	L86 0.	.093 (0.000	0.093
Fair	0.1	LO3 0.	.052 (0.186	0.237
Good	0.3	381 0.	.191 (0.289	0.479
Very Go	ood 0.3	330 0.	.165 (0.670	0.835

Ridit calculations for Aspirin

	CALCULATION	IS		
	Ibuprofen low	Ibuprofen Hi	Placebo	Aspirin
None	0.011	0.006 -	0.000	0.006
Poor	0.045	0.023	0.011	0.034
Fair	0.125	0.062	0.057	0.119
Good	0.284	0.142	0.182	0.324
Very Good	0.534	0.267	0.466	0.733

Ridits for all variables

	RIDITS			
	<pre>Ibuprofen_low</pre>	Ibuprofen_Hi	Placebo	Aspirin
None	0.000	0.006	0.000	0.006
Poor	0.032	0.029	0.093	0.034
Fair	0.117	0.076	0.237	0.119
Good	0.261	0.250	0.479	0.324
Very_Good	0.676	0.698	0.835	0.733

Mean RIDITS Using the Reference Values

Variables	Ibuprofen low	Ibuprofen Hi	Placebo	Aspirin
	0.549	0.546	0.384	0.500

Overall mean for RIDITS in non-reference groups = 0.4902 Chisquared = 20.447 with probability < 0.0001 z critical ratios Variables Ibuprofen_low Ibuprofen_Hi Placebo Aspirin 1.146 1.040 -2.730 0.000 significance level used for comparisons = 2.394 Ibuprofen_low vs Aspirin not significant Ibuprofen_Hi vs Aspirin not significant Placebo vs Aspirin significant

Notice that we chose to let *each* group be the comparison standard. This permitted comparisons among each of the groups. Typically however one would select only one group as a standard with which to compare to the other groups. If "aspirin" was the standard comparison group, only the "placebo" treatment group was significantly different.