

Developing Cut Off Scores

It is useful to be able to use the scores from the subtests to determine whether the score would place the respondent in a diagnostic group. For example, what score on the depression subtest would place the respondent in the depression category? Such cut scores are based on probabilities. If a person receives a score of 6.00 on the depression subtest is that high enough to indicate a depression diagnosis. What is the probability that the person suffers from depression? In the sample data there are 48 cases and 12 have the diagnosis of Anxiety. The Sanxious subtest score is used to indicate the probability that a respondent is has a Anxiety diagnosis. In the table below there is not cut-off score and all respondents are predicted to be Anxious. In actuality there are 12

	Predicted Not Anxious	Predicted Anxious	
Anxious	0	12 (25%)	12
Not Anxious	0	36 (75%)	36
	0	48 (100%)	48

who are anxious and 36 who are not. The result is that the prediction was 25% correct and 75% incorrect. For discussion purposes the cells of the table are labeled as follows:

	Predicted Not Anxious	Predicted Anxious
Anxiety	A	B
Not Anxiety	C	D

The cells B and C indicate correct predictions or “hits” made by using the Anxiety score to determine the diagnosis. The cells A and D indicate incorrect predictions or “misses.”

In the next example (table below) the cut score is set to 4.5 there are no cases below that score that have the diagnosis of Anxiety. Consequently, all of those cases are predicted to not have anxiety. There are 25 cases with a score of 4.5 or below and they would be placed in cell C.

	Predicted Not Anxious	Predicted Anxious	
Anxiety	0	12	12
Not anxiety	25	11	36
	25	23	48

The are correctly predicted because the are predicted to be Not Anxious and the are not. In the second table with the cut score of 4.5 (and below) there were no respondents with the diagnosis of Anxiety. The hit rate at that level is 12 predicted to have Anxiety and 25 to not have Anxiety (cells and B and C respectively). The overall hit rate is 37/48 or .77 or 77%. The amount of

increase from have no information from the Anxiety is 77% - 25% or 47%. The percent of population predicted to have Anxiety is $(25/48)*100$ or 52%. The following table computes the cut score and responding hit rates for all possible anxiety scores of the population.

SCORE	HIT	CELLA	CELLB	CELLC	CELLD	PCRCT	NETGAIN	PRCNTSEL
0	0	0	12	0	36	25	0	100
1.5	0	0	12	1	35	27.08	2.08	97.92
1.67	0	0	12	2	34	29.17	4.17	95.83
1.67	0	0	12	3	33	31.25	6.25	93.75
2	0	0	12	4	32	33.33	8.33	91.67
2	0	0	12	5	31	35.42	10.42	89.58
2	0	0	12	6	30	37.5	12.5	87.5
2.17	0	0	12	7	29	39.58	14.58	85.42
2.33	0	0	12	8	28	41.67	16.67	83.33
2.5	0	0	12	9	27	43.75	18.75	81.25
2.67	0	0	12	10	26	45.83	20.83	79.17
2.83	0	0	12	11	25	47.92	22.92	77.08
3	0	0	12	12	24	50	25	75
3	0	0	12	13	23	52.08	27.08	72.92
3.17	0	0	12	14	22	54.17	29.17	70.83
3.17	0	0	12	15	21	56.25	31.25	68.75
3.33	0	0	12	16	20	58.33	33.33	66.67
3.33	0	0	12	17	19	60.42	35.42	64.58
3.5	0	0	12	18	18	62.5	37.5	62.5
3.83	0	0	12	19	17	64.58	39.58	60.42
3.83	0	0	12	20	16	66.67	41.67	58.33
4	0	0	12	21	15	68.75	43.75	56.25
4	0	0	12	22	14	70.83	45.83	54.17
4.33	0	0	12	23	13	72.92	47.92	52.08
4.33	0	0	12	24	12	75	50	50
4.5	0	0	12	25	11	77.08	52.08	47.92
4.5	0	0	12	26	10	79.17	54.17	45.83
4.83	0	0	12	27	9	81.25	56.25	43.75
4.83	0	0	12	28	8	83.33	58.33	41.67
5	0	0	12	29	7	85.42	60.42	39.58

SCORE	HIT	CELLA	CELLB	CELLC	CELLD	PCRCT	NETGAIN	PRCNTSEL
5	0	0	12	30	6	87.5	62.5	37.5
5	0	0	12	31	5	89.58	64.58	35.42
5	0	0	12	32	4	91.67	66.67	33.33
5.5	0	0	12	33	3	93.75	68.75	31.25
5.5	0	0	12	34	2	95.83	70.83	29.17
5.5	0	0	12	35	1	97.92	72.92	27.08
5.5	1	1	11	35	1	95.83	70.83	25
5.67	0	1	11	36	0	97.92	72.92	22.92
6.17	1	2	10	36	0	95.83	70.83	20.83
6.67	1	3	9	36	0	93.75	68.75	18.75
7	1	4	8	36	0	91.67	66.67	16.67
7.17	1	5	7	36	0	89.58	64.58	14.58
7.33	1	6	6	36	0	87.5	62.5	12.5
7.33	1	7	5	36	0	85.42	60.42	10.42
7.5	1	8	4	36	0	83.33	58.33	8.33
7.67	1	9	3	36	0	81.25	56.25	6.25
7.83	1	10	2	36	0	79.17	54.17	4.17
7.83	1	11	1	36	0	77.08	52.08	2.08
7.83	1	12	0	36	0	75	50	0

The correct prediction at this is 77% with an increase of 52% increase over not using the Anxiety Scale to make the prediction. The task is to find the score that optimizes the prediction. The score of 5.67 appears to be the appropriate cut. Any score above 5.67 would be predicted to be in the anxiety category. At that level the predictions would 97.92% correct with an increase of 72.92 increase of predicting that everone has Anxiety.

The calculation of cut scores is obtained in the following manner. Use the following Syntax File to generate a field for each diagnostic category (indicates a “hit” on that diagnosis).

File Name = rcddiag.sps
recode diagn (1=1) (else=0) into danx. recode diagn (2=1) (else=0) into ddep. recode diagn (3=1) (else=0) into dbordl. recode diagn (4=1) (else=0) into dschiz. execute.

The above jobstream assumes that the diagnostic categories have recoded to numeric values. The next jobstream performs the same function and assumes that the diagnoses have been abbreviated at the time of input.

File Name = rcddiaga.sps
recode diag ("anx"=1) (else=0) into danx. recode diag ("dep"=1) (else=0) into ddep. recode diag ("pers"=1) (else=0) into dbordl. recode diag ("schiz"=1) (else=0) into dschiz. execute.

Using either jobstream four new fields or variables are generated; danx, ddep, dbordl, and dschiz they indicate that if the person is in the diagnostic category a 1 is place in the field. Each person has a score of anxiety, borderline, depression, and schizophrenia in the fields Sanxiety, Sdepression, Sborderl, and Sschiz. The data base (data file) should be saved as a dbase file.

Click on Save As.

Select dBase IV as the type of output

Open the Program Manager Window

Click on the Cutscore icon.

Click on File.

Click on Open and select the dBase file (*.DBF) that was saved in the SPSS program.

Select the Predictor and Criterion variables.

Click OK.

Additional computations may include different Predictor and Criterion variables.

The cut off score for each diagnosis is indicated by a solid line on the graph below. Notice that the anxiety subscale score is above the cut off score for the diagnosis of anxiety, indicated that the repondent is predicted to have the diagnosis of anxiety.

SD	Percent	SDEPRESS	SANXIOUS	SEORDERL	SSCHIZ	STOTAL
2	98	8	8	8	8	6.21
1.5	93	7.625	7.4	7.46	7.315	5.685
1	84	6.6	6.4	6.22	6.08	5.16
0.5	69	<u>5.575</u>	<u>5.48</u>	<u>4.98</u>	<u>4.845</u>	4.635
0	50	4.55	4.52	3.74	3.61	4.11
-0.5	31	3.525	3.56	2.5	2.375	3.585
-1	16	2.5	2.6	1.26	1.14	3.06
-1.5	7	1.475	1.64	0.08	0	2.535
-2	2	0.45	0.68	0	0	2.01

