Tables of Prediction Efficiencies

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Test users must commonly decide whether scores obtained on two different tests or on two administrations of the same test are sufficiently discrepant to warrant scrutiny. The following tables can inform such decisions. There are seven tables in all. Each shows the bivariate distribution of scores for a particular Pearson correlation coefficient for two normally distributed variables. Correlations range from a high of **r** = .90 (Table 1) to a low of **r** = .30 (Table 7). Each table shows the percentage of cases that fall in each decile of one variable for each decile of the other variable.

For example, suppose the two tests are correlated **r** = .8. An examinee obtains a score that has a percentile rank of 85 on the first test. What is the probability that her score on the second test will fall in the 80-90th PR on the second test? The table below shows that, given a correlation of **r** = .8, only 26.1 percent of the examinees that score in the 80-90th PR on one test also score in the 80-90th PR on the other test.

Tenth on Predictor **r = .80** Tenth on Criterion

	1	2	3	4	5	6	7	8	9	10
10			0.2	0.4	1.1	2.6	5.4	11.1	23.2	56.0
9		0.3	1.1	2.5	4.8	8.6	13.5	19.9	26.1	23.2
8	0.2	1.1	2.6	5.6	9.0	13.1	17.1	20.3	19.9	11.1
7	0.4	2.5	5.6	9.3	12.8	15.9	17.5	17.1	13.5	5.4
6	1.1	4.8	9.0	12.8	15.5	16.6	15.9	13.1	8.6	2.6
5	2.6	8.6	13.1	15.9	16.6	15.5	12.8	9.0	4.8	1.1
4	5.4	13.5	17.1	17.5	15.9	12.8	9.3	5.6	2.5	0.4
3	11.1	19.9	20.3	17.1	13.1	9.0	5.6	2.6	1.1	0.2
2	23.2	26.1	19.9	13.5	8.6	4.8	2.5	1.1	0.3	
1	56.0	23.2	11.1	5.4	2.6	1.1	0.4	0.2		

Another common scenario is when one test is used to screen applicants, who are then administered a second test. Again, assume that the two tests correlate **r** = .8. Suppose that only those examinees who score in the highest decile on test 1 are administered test 2. What will the distribution of scores on test 2 look like for these examinees? This is shown in the last column of the table above. Although 56 percent will obtain scores in the top decile on the second test, the remaining 44 percent will have lower scores. Note that such a procedure guarantees that the typical score obtained on the second test will be lower than the corresponding score on the first test.

In general, these tables show that even high correlations are much less precise than most people think.

Tenth on Predictor **r = .90** Tenth on Criterion

	1	2	3	4	5	6	7	8	9	10
10						0.4	1.8	6.6	22.4	68.8
9				0.1	0.5	4.8	11.5	23.6	37.1	22.4
8			0.4	2.7	6.8	12.8	21.1	26.0	23.6	6.6
7		0.1	2.7	6.2	12.9	20.0	23.7	21.1	11.5	1.8
6		0.5	6.8	12.9	19.3	22.5	20.0	12.8	4.8	0.4
5	0.4	4.8	12.8	20.0	22.5	19.3	12.9	6.8	0.5	
4	1.8	11.5	21.1	23.7	20.0	12.9	6.2	2.7	0.1	
3	6.6	23.6	26.0	21.1	12.8	6.8	2.7	0.4		
2	22.4	37.1	23.6	11.5	4.8	0.5	0.1			
1	68.8	22.4	6.6	1.8	0.4					

Tenth on Predictor **r = .80** Tenth on Criterion

	1	2	3	4	5	6	7	8	9	10
10			0.2	0.4	1.1	2.6	5.4	11.1	23.2	56.0
9		0.3	1.1	2.5	4.8	8.6	13.5	19.9	26.1	23.2
8	0.2	1.1	2.6	5.6	9.0	13.1	17.1	20.3	19.9	11.1
7	0.4	2.5	5.6	9.3	12.8	15.9	17.5	17.1	13.5	5.4
6	1.1	4.8	9.0	12.8	15.5	16.6	15.9	13.1	8.6	2.6
5	2.6	8.6	13.1	15.9	16.6	15.5	12.8	9.0	4.8	1.1
4	5.4	13.5	17.1	17.5	15.9	12.8	9.3	5.6	2.5	0.4
3	11.1	19.9	20.3	17.1	13.1	9.0	5.6	2.6	1.1	0.2
2	23.2	26.1	19.9	13.5	8.6	4.8	2.5	1.1	0.3	
1	56.0	23.2	11.1	5.4	2.6	1.1	0.4	0.2		

Tenth on Predictor **r = .70** Tenth on Criterion

	1	2	3	4	5	6	7	8	9	10
10		0.3	0.7	1.5	2.8	4.9	7.9	13.0	22.2	46.7
9	0.3	1.9	2.0	4.6	6.9	9.9	13.4	17.4	21.4	22.2
8	0.7	2.0	5.5	7.4	9.8	12.5	14.8	16.9	17.4	13.0
7	1.5	4.6	7.4	9.8	12.0	13.7	14.9	14.8	13.4	7.9
6	2.8	6.9	9.8	12.0	13.4	14.1	13.7	12.5	9.9	4.9
5	4.9	9.9	12.5	13.7	14.1	13.4	12.0	9.8	6.9	2.8
4	7.9	13.4	14.8	14.9	13.7	12.0	9.8	7.4	4.6	1.5
3	13.0	17.4	16.9	14.8	12.5	9.8	7.4	5.5	2.0	0.7
2	22.2	21.4	17.4	13.4	9.9	6.9	4.6	2.0	1.9	0.3
1	46.7	22.2	13.0	7.9	4.9	2.8	1.5	0.7	0.3	

Tenth on Predictor **r = .60** Tenth on Criterion

	1	2	3	4	5	6	7	8	9	10
10	0.2	0.9	1.8	3.0	4.5	6.7	9.5	13.8	20.8	38.8
9	0.9	2.5	4.3	6.1	8.1	10.4	12.8	15.6	18.5	20.8
8	1.8	4.3	6.3	8.3	10.0	11.8	13.4	14.7	15.6	13.8
7	3.0	6.1	8.3	10.0	11.3	12.4	13.2	13.4	12.8	9.5
6	4.5	8.1	10.0	11.3	12.1	12.7	12.4	11.8	10.4	6.7
5	6.7	10.4	11.8	12.4	12.7	12.1	11.3	10.0	8.1	4.5
4	9.5	12.8	13.4	13.2	12.4	11.3	10.0	8.3	6.1	3.0
3	13.8	15.6	14.7	13.4	11.8	10.0	8.3	6.3	4.3	1.8
2	20.8	18.5	15.6	12.8	10.4	8.1	6.1	4.3	2.5	0.9
1	38.8	20.8	13.8	9.5	6.7	4.5	3.0	1.8	0.9	0.2

Tenth on Predictor **r = .50** Tenth on Criterion

	1	2	3	4	5	6	7	8	9	10
10	0.7	1.9	3.1	4.5	6.0	8.0	10.5	13.9	19.1	32.3
9	1.9	4.0	5.6	7.2	8.8	10.5	12.2	14.2	16.5	19.1
8	3.1	5.6	7.3	8.8	10.0	11.3	12.4	13.4	14.2	13.9
7	4.5	7.2	8.8	10.0	10.8	11.6	12.0	12.4	12.2	10.5
6	6.0	8.8	10.0	10.8	11.3	11.7	11.6	11.3	10.5	8.0
5	8.0	10.5	11.3	11.6	11.7	11.3	10.8	10.0	8.8	6.0
4	10.5	12.2	12.4	12.0	11.6	10.8	10.0	8.8	7.2	4.5
3	13.9	14.2	13.4	12.4	11.3	10.0	8.8	7.3	5.6	3.1
2	19.1	16.5	14.2	12.2	10.5	8.8	7.2	5.6	4.0	1.9
1	32.3	19.1	13.9	10.5	8.0	6.0	4.5	3.1	1.9	0.7

Tenth on Predictor **r = .40** Tenth on Criterion

	1	2	3	4	5	6	7	8	9	10
10	1.6	3.2	4.5	5.9	7.3	9.0	11.0	13.5	17.4	26.6
9	3.2	5.4	6.7	8.0	9.2	10.5	11.7	13.2	14.7	17.4
8	4.5	6.7	8.0	9.2	10.0	10.8	11.6	12.5	13.2	13.5
7	5.9	8.0	9.2	9.8	10.4	11.0	11.4	11.6	11.7	11.0
6	7.3	9.2	10.0	10.4	10.8	11.0	11.0	10.8	10.5	9.0
5	9.0	10.5	10.8	11.0	11.0	10.8	10.4	10.0	9.2	7.3
4	11.0	11.7	11.6	11.4	11.0	10.4	9.8	9.2	8.0	5.9
3	13.5	13.2	12.5	11.6	10.8	10.0	9.2	8.0	6.7	4.5
2	17.4	14.7	13.2	11.7	10.5	9.2	8.0	6.7	5.4	3.2
1	26.6	17.4	13.5	11.0	9.0	7.3	5.9	4.5	3.2	1.6

Tenth on Predictor **r = .30** Tenth on Criterion

	1	2	3	4	5	6	7	8	9	10
10	2.8	4.8	6.0	7.2	8.3	9.7	11.1	12.9	15.5	21.7
9	4.8	6.6	7.7	8.6	9.5	10.3	11.2	12.3	13.5	15.5
8	6.0	7.7	8.6	9.3	9.9	10.5	11.1	11.7	12.3	12.9
7	7.2	8.6	9.3	9.9	10.2	10.6	10.8	11.1	11.2	11.1
6	8.3	9.5	9.9	10.2	10.4	10.6	10.6	10.5	10.3	9.7
5	9.7	10.3	10.5	10.6	10.6	10.4	10.2	9.9	9.5	8.3
4	11.1	11.2	11.1	10.8	10.6	10.2	9.9	9.3	8.6	7.2
3	12.9	12.3	11.7	11.1	10.5	9.9	9.3	8.6	7.7	6.0
2	15.5	13.5	12.3	11.2	10.3	9.5	8.6	7.7	6.6	4.8
1	21.7	15.5	12.9	11.1	9.7	8.3	7.2	6.0	4.8	2.8

Source:

Prediction efficiencies by deciles for various degrees of relationship. Undated, unpublished paper. Robert W. B. Jackson and Alexander J. Phillips