

PERSONALITY AND SCHOLASTIC ACHIEVEMENT IN THREE ETHNIC GROUPS

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SUMMARY. Scores on the Junior Eysenck Personality Inventory of some 2,000 white, Negro, and Mexican-American school children, ages 9 to 13, were examined in relation to measures of intelligence and home environment as predictors of scholastic achievement. The JEPI scales show quite low, but significant and systematic, correlations with achievement; Extraversion (E) correlates positively and Neuroticism (N) and the Lie (L) scale correlate negatively with achievement. The independent contributions separately of E, N, and L to achievement variance over the variance accounted for by the ability and background measures are negligible, but the three JEPI scales combined in a multiple regression equation along with measures of intelligence and home background independently contribute a small share of the predicted part of the scholastic achievement variance. In this the three ethnic groups do not differ appreciably or systematically, nor do the school grades from 4 to 8 (ages 9 to 13), although there are significant and systematic age and ethnic group differences in mean scores on the JEPI scales.

INTRODUCTION

THE far from perfect validity of tests of cognitive abilities for predicting scholastic achievement has caused numerous investigators to look to the personality domain for additional sources of variance in pupils' school performance. Since the introduction of the Junior Eysenck Personality Inventory (S. B. G. Eysenck, 1965), which measures extraversion (E scale) and neuroticism (N scale), probably no other measures of personality have been as extensively investigated in relationship to mental abilities and attainments.

A review of the major studies, all but two of which have been done in England, now reveals enough consistency to permit certain broad generalisations. First, there can be little doubt by now that E and N both show non-zero correlations with scholastic performance. It is equally clear that these correlations, though statistically significant, are quite low as compared, for example, with the correlations of mental test scores, such as IQ, or of indices of socio-economic status, with measures of scholastic performance. E shows a somewhat higher relationship than N to achievement. For both variables the degree and direction of correlation is not consistent from primary school pupils to university students.

A survey of recent work has been published by Entwistle (1972). As to E, a number of studies using children in the age range from about 8 to 11 years found a low but significant *positive* correlation with scholastic achievement (Eysenck and Cookson, 1969; Frost, 1969; Rushton, 1960; Savage, 1966). With slightly older children in secondary modern and grammar schools, Callard and Goodfellow (1962) found no significant correlation of E with achievement. In still older groups, comprised of college and university students, the correlation reverses, and a significant *negative* relationship is found between E and academic success (Bendig, 1960; Broadbent, 1958; Furneaux, 1962; Kline, 1966; Lynn, 1959). The age range in which the inversion of the relationship occurs has not been precisely investigated, but two studies appear relevant. Child (1964) found that after the 11+ examination the promoted children were less

extraverted than the demoted children; and Astington (1960) found that the academically more successful grammar school boys were less extraverted than the average. A reasonable hypothesis based on the sketchy evidence is that early puberty is the period of reversal of the correlation between E and achievement. Another possibility, however, is that the correlation is positive at all ages in the general population but is negative (at all ages) in the part of the population which in adolescence is selected for the more academic pursuits leading to university entrance.

E has been found to have little or no consistent relationship to intellectual ability *per se*. Lynn and Gordon (1961) found no significant correlation with Raven's Progressive Matrices, and S. B. G. Eysenck (1965) reported a lack of correlation between E and a verbal IQ test. A more detailed critique of the research on E and achievement is provided by Frost (1969), who also reports the results of a multiple regression analysis as showing that E made no independent contribution to the prediction of scholastic achievement when it was included among a host of other predictor variables. However, Frost's predictor variables included other personality measures which might also have been loaded with extraversion, so it was not a really fair test of the independent contribution of E to the prediction of scholastic achievement.

As to N, a similar picture emerges, although the correlations with achievement are negative and are generally smaller than for E. Studies with children up to 11 or 12 years of age have consistently found a weak but significant *negative* correlation between N and achievement (Astington, 1966; Callard and Goodfellow, 1962; Eysenck and Cookson, 1969; Rushton, 1966; Savage, 1966). One study, however, found no significant correlation of N with achievement (Frost, 1968). Studies with university students, on the other hand, report low *positive* correlations of N with academic performance (Furneaux, 1962; Kelvin *et al.*, 1965; Lynn, 1959). N has been found to have a slight negative correlation with verbal IQ in children (S. B. G. Eysenck, 1965), while the non-verbal Raven matrices, a good measure of *g*, showed no correlation at all with N.

The JEPI also includes a 12-item scale (L) for the detection of 'faking good.' High L scores probably reflect also a kind of moralistic naiveté or immaturity concerning 'good' or socially acceptable behaviour. L scores decline markedly from childhood to maturity. Interestingly, L shows a substantial negative correlation with scholastic performance, is not significantly related to E, and correlates negatively with N—perhaps a reflection of 'faking good' (Eysenck and Cookson, 1969). L also shows negative correlations between $-.2$ and $-.3$ with verbal IQ (S. B. G. Eysenck, 1965), again perhaps a reflection of immaturity and naiveté.

The present study examines the relationship of the JEPI scales to mental ability, achievement in various scholastic subjects, and socio-economic status (SES) in large representative samples of three quite dissimilar cultural and ethnic groups, ages 9 to 13, in a California school district.

THE STUDY

Subjects.

The subjects were representative samples of white, Negro and Mexican-American pupils in grades 4 through 8 (ages 9 to 13) in a California school district. The mean IQ and scholastic achievement in these three groups are very close to these groups' national averages on standardised tests. A total of more than 2,200 pupils were tested in their regular classrooms. The sample sizes of the various groups are given in Table 1.

The predictor tests were group-administered in the Fall, near the beginning of the school year, and the scholastic achievement tests in the Spring, near the end of the school year.

Tests and Measurements.

The predictor variables consisted of three intelligence tests, measures of socio-economic status (SES) and home background factors, the three scales of the JEPI, i.e., Extraversion, Neuroticism, and the Lie scale, and the subject's sex, treated as a quantised variable, with male=0, female=1.

The standardised intelligence tests were the Lorge-Thorndike Verbal and Non-verbal IQ tests, and Raven's Progressive Matrices (Coloured Progressive Matrices used in grades 4-6; Standard Progressive Matrices used in grades 7 and 8), a non-verbal reasoning test based upon figural materials.

The SES background of the subjects was assessed by the Home Index (Gough, 1949), a 24-item questionnaire which yields four scores reflecting different aspects of the home environment related to SES: educational and occupational level of the parents, material possessions in the home, degree of parental participation in middle-class social and civic activities, and formal exposure to cultural advantages such as music and other arts.

The personality measures were the scales of the Junior Eysenck Personality Inventory, which has been described in detail by S. B. G. Eysenck (1965). The Extraversion (E) scale represents the continuum of social extraversion-introversion. High scores reflect sociability, outgoingness and carefreeness. The Neuroticism (N) scale reflects emotional instability, anxiety proneness, and the tendency to develop neurotic symptoms under stress. The Lie (L) scale is a validity detector consisting of 12 items which are rarely answered in the keyed (i.e., 'lie') direction by the vast majority of subjects. A high L score indicates 'faking good.' The reading level required by the JEPI is quite easy and appropriate for the majority of children beyond third grade (age 8).

The dependent variable in this study, scholastic achievement, was assessed by the forms of the Stanford Achievement Test standardised for grades 4 to 8. These tests measure Reading Comprehension ('Paragraph Meaning'), Spelling, Grammar ('Language'), Mechanical Arithmetic ('Arithmetic Computation'), Arithmetic Concepts, and Applied Arithmetic. All of these basic subjects are taught in the schools.

RESULTS AND DISCUSSION.

Group Means and Standard Deviations.

These are shown in Tables 1 to 3. The significance of the group mean differences was determined by means of the *t* test, the values of which are also shown in Tables 1 to 3.

TABLE 1

EXTRAVERSION SCALE: MEANS AND STANDARD DEVIATIONS.

Grade	White			Negro			Mexican			<i>t</i> Tests		
	N	Mean	SD	N	Mean	SD	N	Mean	SD	W-N	W-M	N-M
4	113	16.18	3.34	129	15.23	3.19	145	15.01	2.97	2.25*	2.93†	.59
5	144	17.65	3.65	132	15.45	3.25	135	15.98	3.53	5.30†	3.88†	-1.28
6	131	18.52	3.41	124	17.05	3.07	126	15.81	4.05	3.62†	5.79†	2.37†
7	156	17.98	3.34	167	16.52	3.37	174	15.85	3.78	3.91†	5.43†	1.73
8	176	18.17	4.06	181	16.05	3.61	178	16.08	4.10	5.21†	4.82†	-.07
Total	720	17.78	3.41	733	16.07	3.41	758	15.76	3.74	9.56†	10.86†	1.67

* $P < .05$

† $P < .01$

TABLE 2
NEUROTICISM SCALE : MEANS AND STANDARD DEVIATIONS.

Grade	White		Negro		Mexican		<i>t</i> Tests		
	Mean	SD	Mean	SD	Mean	SD	W-N	W-M	N-M
4	15.46	5.02	15.34	4.75	15.57	5.08	.19	-.17	-.39
5	15.32	4.76	15.69	3.97	16.17	4.97	-.70	-1.45	-.87
6	18.37	5.64	14.35	4.69	15.12	5.17	6.18†	4.81*	-1.25
7	13.63	5.31	14.13	5.07	14.53	4.64	-.86	-1.63	-.76
8	13.50	4.97	13.29	4.98	13.33	5.12	.40	.32	-.07
Total	15.09	5.42	14.45	4.85	14.84	5.08	2.37*	.91	-1.52

* $P < .05$ † $P < .01$

TABLE 3
LIE SCALE : MEANS AND STANDARD DEVIATIONS.

Grade	White		Negro		Mexican		<i>t</i> Tests		
	Mean	SD	Mean	SD	Mean	SD	W-N	W-M	N-M
4	4.07	2.43	4.44	2.33	4.59	2.43	-1.20	-1.70	-.52
5	3.39	2.21	3.89	2.18	4.01	2.26	-1.89	-2.31*	-.44
6	3.15	2.04	3.71	2.49	3.37	2.32	-1.96*	-.81	1.12
7	2.36	1.94	3.68	2.84	3.49	2.26	-4.90†	-4.89†	.68
8	2.08	1.85	3.29	2.11	3.49	2.45	-5.96†	-6.11†	-.83
Total	2.91	3.06	3.76	2.44	3.77	2.40	-5.85†	-5.99†	-.08

* $P < .05$ † $P < .01$

On E, the means and sds of the white groups at each grade are very close to the English norms (S. B. G. Eysenck, 1965), usually differing less than 1.0 score points. The E means of the Negro and Mexican groups, however, are slightly but significantly lower. This is contrary to the popular stereotype of Negro children as being especially extraverted.

On N, the white groups are significantly higher than the English norms, by 3 to 5 points. The whites are significantly higher in N than the Negroes but do not differ significantly from the Mexicans. Negroes and Mexicans are both significantly higher, by 2 to 3 points, than the English norms.

The Lie scale results are somewhat more complex. For all groups, the L scores in the early grades are lower than the English norms for the same ages, but the American scores decline less rapidly than the English scores and by about age 13 the American and English means are about the same. The American white group tends to be a bit lower than the English and is very significantly lower, overall, than the Negro and Mexican groups. The L scale appears to reflect a kind of naiveté which is related to mental age; L is higher in younger children and also in older children with below-average IQs, which probably accounts for some of the difference between the mean L of whites,

on the one hand, and of Negroes and Mexicans (whose average IQs are 10 to 15 points lower than the white IQ) on the other. However, the fact that English children, with IQs presumably similar to that of American whites, have even higher L scores than the Negroes and Mexicans suggests that the L score must largely reflect certain cultural standards as well.

Correlations of JEPI With Other Measures.

Tables 4, 5 and 6 show the correlations of E, N and L with all the other variables in the study. Also, a principal components analysis was done on all the variables to determine the loadings of E, N and L on the first principal component (the general factor common to all the measures); these loadings are shown in the last row of Tables 4 to 6.

For all three of the JEPI scales, the correlations with the other variables are low and often non-significant.

E has negligible correlations with the intelligence measures (with the strange exception at grade 6), which accords with other studies. E shows slightly more than chance positive correlation with the scholastic achievement measures, but these vary unsystematically in magnitude from one grade to another. E is positively and significantly correlated with the SES measures, especially the index of parental education and occupational status. Most of the loadings of E on the first principal component are significant and average about .20, indicating that E significantly shares some common variance in this domain. The three ethnic groups do not differ overall in this respect ; the ethnic variations within grades are quite irregular.

N shows much less correlation with abilities, achievement, and environment than does E. The correlations for N are consistently small and negative in all groups. There is no systematic trend across grades. As found in other studies, the highest negative correlations are between N and L, since 'faking good' necessarily raises L and lowers N. As can be seen from the insignificant loadings on the first principal component, N shares very little common variance in this domain.

The L scale shows significant negative correlation with achievement, and these tend to be higher than the correlations with intelligence (note the grade 4 white group), which suggests the negative correlation of L with achievement is not entirely accountable in terms of intelligence or mental age. This, too, accords with other findings (Eysenck and Cookson, 1969).

Independent Contribution of the JEPI to the Prediction of Achievement.

Of greater interest perhaps than the zero order correlations of the JEPI scales with achievement is their independent contribution to the achievement variance over the variance accounted for in terms of the cognitive ability and home background measures. A multiple regression analysis was performed to answer this question. It provides the partial correlation of E, N and L with achievement when the effects of the ability and background variables are held constant (i.e., statistically partialled out). The correlations of E, N and L with achievement independent of the mental ability and home background variables are shown in Table 7. For the sake of clarity the table shows only correlations which are significant beyond the 5 per cent level. No systematic pattern over grades or ethnic groups can be discerned.

TABLE 4
CORRELATIONS OF EXTRAVERSION WITH OTHER VARIABLES IN WHITE, NEGRO AND MEXICAN GROUPS.

Grade	4			5			6			7			8			Average			
	W	N	M	W	N	M	W	N	M	W	N	M	W	N	M	W	N	M	
Intelligence:																			
Lorge-Thorndike Non-verbal I.Q.	02	13	01	-02	15	07	20	37†	27†	07	12	03	04	04	11	06	16†	10†	
Lorge-Thorndike Verbal IQ	08	16	08	08	15	11	27†	25†	30†	09	17*	16	06	08	18*	12†	16†	17†	
Raven's Progressive Matrices	03	15	-02	04	12	-10	09	22*	26†	01	08	-03	08	-03	06	05	11†	03	
Stanford Achievement Tests:																			
Reading Comprehension	09	02	05	05	06	10	22*	29†	19*	17*	05	09	10	04	09	13†	09*	10†	
Spelling	03	22*	-03	09	-05	05	22*	35†	16	14	17*	15	05	02	04	11†	14†	07	
Grammar	11	11	06	13	10	18	31†	25†	33†	24†	06	07	07	12	11	17†	13†	15†	
Mechanical Arithmetic	04	18	02	01	03	00	12	14	28†	19*	16	-03	-05	-07	06	06	09*	07	
Arithmetic Concepts	26*	13	05	24†	12	11	11	17	31†	08	08	12	-06	-11	16	13†	08*	15†	
Applied Arithmetic	10	04	21*	00	08	-05	12	18	28†	07	04	00	-10	09	19*	04	09*	13†	
Home Index (SES):																			
Parents' Education	28†	18*	11	27†	11	10	04	16	29†	04	23†	23	10	18*	06	15†	17†	16†	
Material Possessions	28†	23*	02	12	14	11	14	09	22*	03	14	-04	14	25†	22†	14†	17†	11†	
Social Activities	23*	01	-01	24†	19*	03	15	19*	16	17*	33†	10	08	12	05	17†	17†	07	
Cultural Advantages	01	05	-08	11	-01	07	07	05	10	07	13	04	-02	18*	03	05	06	03	
Sex (Female=1, Male=0)	-30†	-01	-01	-13	-06	-05	-04	-09	-13	07	-05	-04	-10	05	12	-10†	-03	-02	
JEP1: N Scale	-04	08	10	-21*	10	-10	-17	17	00	15	11	00	-09	-08	-08	-13†	11†	-02	
L Scale	-04	01	-08	-16	-17	-18*	-05	-17	-20*	-15	-06	-18*	-17*	-16	-31†	-14†	-09*	-19†	
Loading of E on First Principal Component	21*	24*	10	15	13	11	33†	37†	40†	21*	25†	15	10	09	24†	20†	22†	20†	

Decimals omitted. * P < .05 † P < .01

TABLE 5
CORRELATIONS OF NEUROTICISM WITH OTHER VARIABLES IN WHITE, NEGRO AND MEXICAN GROUPS.

Grade	4			5			6			7			8			Average			
	W	N	M	W	N	M	W	N	M	W	N	M	W	N	M	W	N	M	
Variable																			
Intelligence:																			
Lorge-Thorndike Non-verbal IQ	-03	-03	09	-11	22*	-06	-21*	-01	-03	-04	-09	-16	00	-05	01	08*	01	-03	
Lorge-Thorndike Verbal IQ	-00	04	-02	-10	11	-05	-24*	-09	-10	-02	-12	-05	01	-00	04	-07	-01	-04	
Raven's Progressive Matrices	-05	06	10	02	19*	07	-19*	-05	12	-15	-01	-02	-01	05	-17*	-08*	05	02	
Stanford Achievement Tests:																			
Reading Comprehension	-08	-18	02	05	08	-10	-34†	-07	-08	-10	11	-17*	-07	04	-07	-11†	-00	-08*	
Spelling	-02	02	00	01	-01	00	-26†	08	-05	-08	-03	-00	-01	08	-05	-07	03	-02	
Grammar	-01	-13	-04	-10	03	05	-15	02	-13	-11	-05	-03	10	-03	-11	-05	-03	-05	
Mechanical Arithmetic	11	-11	03	11	09	-14	-24†	14	-09	-12	15	-12	-08	-03	-10	-03*	05	-18*	
Arithmetic Concepts	00	-15	03	-01	00	-00	-26†	-11	-09	-10	-03	-11	-03	-04	-15	-08*	-07	-06	
Applied Arithmetic	07	-01	14	-04	-11	-18	-22*	-08	-08	-15	01	02	10	-21†	-09	-05	-08*	-04	
Home Index (SES)																			
Parents' Education	-06	06	06	-10	-05	-07	-22*	00	07	-04	01	-12	13	-09	-04	-06	-01	-02	
Material Possessions	-07	-14	-11	-05	03	-09	-19*	-08	-03	03	-07	-08	-02	-06	-15	-06	-06	-09*	
Social Activities	-02	01	-04	08	06	05	-17	13	04	03	17*	-04	17	-04	02	-00	07	-01	
Cultural Advantages	03	11	-00	-14	-09	-05	-05	08	-12	-04	-01	07	18*	02	-00	-00	02	-02	
Sex (Female=1, Male=0)	14	04	21*	24†	13	-04	19*	-07	04	09	07	16*	16*	05	13	16†	04	10†	
JEP1: E Scale	-04	08	10	-21*	10	-10	-17	17	00	-15	11	00	-09	-08	-08	-13†	08*	-02	
L Scale	-50†	-38†	-46†	-29†	-22*	-44†	-38†	-43†	-34†	-32†	-36†	-28†	-32†	-31†	-23†	-36†	-34†	-35†	
Loading of N on First Principal Component	01	-08	05	-10	14	-07	-38†	10	-08	-14	-02	-13	09	-03	-09	-10†	00	-06	

* P < .05 † P < .01

Decimals omitted.

TABLE 6
CORRELATIONS OF LIE SCALE WITH OTHER VARIABLES IN WHITE, NEGRO AND MEXICAN GROUPS.

Grade	4			5			6			7			8			Average			
	W	N	M	W	N	M	W	N	M	W	N	M	W	N	M	W	N	M	
Intelligence :																			
Large-Thordike Non-verbal IQ ..	-08	09	-15	03	-13	01	01	-29†	-29†	-09	-07	-20*	-28†	-13	-18*	-08*	-11*	-16*	
Large-Thordike Verbal IQ ..	-17	-06	00	01	-04	-05	-04	-13	-21*	-14	-16	-19*	-31†	-17*	-18*	-13†	-11†	-13†	
Raven's Progressive Matrices ..	-15	-01	-17	-13	-17	-10	-02	-10	-28†	-08	-08	-12	-26†	-14	-19	-13†	-10†	-19†	
Stanford Achievement Tests :																			
Reading Comprehension ..	-32†	09	-01	02	-04	08	-03	-17	-20*	-16	-18*	-17*	-27†	-18*	-21*	-15†	-10†	-10†	
Spelling ..	-18	-00	-06	-00	03	05	05	-13	-20*	-05	-05	-16	-19*	-16	-12	-07	-06	-07	
Grammar ..	-29†	06	06	-03	-03	-08	-07	-16	-18	-17*	-18*	-11	-22†	-24†	-15	-16†	-11†	-09*	
Mechanical Arithmetic ..	-17	07	-01	01	-03	15	-05	-12	-10	-01	02	01	-14	-21*	-06	-07	-05	-00	
Arithmetic Concepts ..	-29†	-02	-17	-08	-02	02	-10	-13	-24*	-15	-03	-04	-21*	-11	-06	17†	-06	-10†	
Applied Arithmetic ..	-36†	04	-21*	-02	00	08	-06	-22*	-22*	-10	-11	-05	-21†	-09	-01	-15†	-08*	-08*	
Home Index (SES) :																			
Parents' Education ..	-16	-01	01	-03	11	-06	15	13	02	-05	02	00	-23	04	-03	-06	06	-01	
Material Possessions ..	08	-09	17	07	06	-10	01	05	04	-07	01	02	-12	-11	-11	-01	-02	00	
Social Activities ..	-02	01	-08	-11	-01	-08	-02	-09	-02	-13	-03	-11	-11	04	-19*	-08*	-02	-10†	
Cultural Advantages ..	-03	-04	15	15	-05	11	-09	08	10	03	02	-11	-17*	-11	-20†	-02	-02	01	
Sex (Female=1, Male=0) ..	03	15	09	09	27†	33†	01	22* 10		08	03	-08	00	13	-05	04	16†	08*	
JEPI : E Scale ..	-04	01	-08	-16	-17*	-18*	-05	-18	-20*	-15	-06	-18*	-17*	-06	-31†	-11†	-09	-19†	
N Scale ..	-50†	-38	-46†	-29†	-22*	-44†	-38†	-43†	-34†	-32†	-36†	-28†	-32†	-31†	-23†	-36†	-34†	-35†	
Loading of L on First Principal Component ..	-32†	02	-09	-03	-08	-00	-01	-27†	-27†	-12	-13	-19*	-38†	-22†	-23†	-17†	-14†	-16†	

Decimals omitted. * P < .05 † P < .01

TABLE 7
 PARTIAL CORRELATIONS AND SIGNIFICANCE OF INDEPENDENT CONTRIBUTION OF JEPI SCALES TO PREDICTION OF SCHOLASTIC ACHIEVEMENT

Grade Predictor Scale	Criterion Variable	4			5			6			7			8		
		W	N	M	W	N	M	W	N	M	W	N	M	W	N	M
E	Reading Comprehension															
	Spelling															
	Grammar															
	Mechanical Arithmetic															
N	Arithmetic Concepts				21*											
	Applied Arithmetic															
	Reading Comprehension															
	Spelling															
L	Grammar															
	Mechanical Arithmetic															
	Arithmetic Concepts															
	Applied Arithmetic															
E	Reading Comprehension															
	Spelling															
	Grammar															
	Mechanical Arithmetic															
N	Arithmetic Concepts															
	Applied Arithmetic															
	Reading Comprehension															
	Spelling															
L	Grammar															
	Mechanical Arithmetic															
	Arithmetic Concepts															
	Applied Arithmetic															

Correlations not significantly different from zero at the 5 per cent level are omitted.

Decimals omitted. * P < .05 † P < .01

TABLE 8

PERCENT OF TOTAL VARIANCE IN ACHIEVEMENT SCORES (IN ITALICS) AND PERCENT OF PREDICTED VARIANCE (IN ROMAN TYPE) ACCOUNTED FOR BY E, N and L SCALES OF JEPI INDEPENDENTLY OF INTELLECTUAL AND SES PREDICTOR VARIABLES.

Grade	4			5			6			7			8			Averages		
	W	N	M	W	N	M	W	N	M	W	N	M	W	N	M	W	N	M
Achievement Tests	18.7	2.6	1.0	2.1	1.0	1.3	5.6	1.6	6.1	2.5	5.9	3.5	2.2	0.2	4.0	6.2	2.3	3.2
Reading Comprehension	31.7	8.0	3.0	5.1	3.1	3.2	9.0	2.5	9.5	3.8	14.3	9.6	4.0	0.4	7.6	10.7	5.7	6.6
Spelling	4.6	2.0	2.3	1.3	4.7	2.1	4.4	9.1	3.7	1.0	0.3	0.4	1.0	0.4	3.3	2.5	3.3	2.4
Grammar	8.2	5.5	5.2	2.9	13.7	4.3	10.0	15.5	6.9	2.3	0.9	1.0	1.9	0.9	7.3	5.1	7.3	4.9
	13.0	2.2	0.6	1.0	0.9	2.5	3.7	2.8	5.1	4.9	3.0	0.1	0.3	3.8	1.8	4.6	2.5	2.0
	19.3	7.7	1.3	1.6	2.1	5.7	5.7	4.3	8.2	10.6	7.3	0.3	0.6	7.7	5.9	7.6	5.8	4.3
Mechanical Arithmetic	0.8	3.2	0.1	4.4	0.3	2.1	5.3	6.5	2.1	1.9	5.1	1.2	4.4	4.9	1.4	3.4	4.0	1.4
	2.8	18.9	0.4	17.4	1.1	8.4	17.0	18.8	6.2	4.4	22.8	4.5	9.6	15.0	4.8	10.2	15.3	4.9
Arithmetic Concepts	5.7	3.4	2.9	6.7	1.6	2.4	6.3	1.2	3.9	1.6	0.2	0.8	6.7	2.8	1.9	5.4	1.8	2.4
	12.9	14.2	10.1	20.4	7.4	6.0	13.6	2.7	7.7	2.9	1.5	3.0	12.1	6.7	4.9	12.4	6.5	6.3
Applied Arithmetic	10.2	0.9	6.0	0.8	2.4	4.8	2.3	3.1	2.4	1.5	0.9	3.1	4.9	6.7	3.1	3.9	2.8	3.9
	20.0	3.5	12.8	1.8	8.6	11.3	5.0	6.6	5.0	3.6	3.2	10.9	12.5	20.1	9.3	8.6	8.4	9.9
Averages	8.8	2.5	2.2	2.7	1.8	2.5	4.6	4.1	3.9	2.2	2.6	1.5	3.3	3.1	2.6	4.3	2.8	2.5
	15.8	9.6	5.5	8.2	6.0	6.5	10.1	8.4	7.3	4.6	8.3	4.9	6.8	8.5	6.6	9.1	8.2	6.1

In terms of practical usefulness, readers will be concerned less with the statistical significance of the correlations than with the actual degree of the scales' independent contribution to the prediction of scholastic performance. Table 8, therefore, shows the percent of the variance in achievement scores that is predictable by the combined E, N and L scales in a multiple regression equation which includes also the intelligence and SES measures. Two estimates are given in Table 8, the first (in italics) is the percent of *total* achievement variance accounted for by the JEPI; the second (in Roman type) is the percent of the *predicted* (by all variables in the multiple regression equation) variance in achievement accounted for by the JEPI. (The overall multiple *R*s were mostly in the range from .5 to .7). These percentages can be evaluated only in terms of one's own theoretical or applied purpose with respect to the relationship between the JEPI and scholastic achievement. By far the most of the predictive power of the multiple regression equation is carried by the ability tests. But as can be seen in Table 8, the JEPI consistently contributes a small share to the predicted variance in achievement, independently of intelligence and SES.

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