ETHNICITY AND SCHOLASTIC ACHIEVEMENT

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Summary.—Scores on tests in 8 areas of scholastic achievement were "predicted" by multiple regression from 7 nonscholastic tests of ability, a personality inventory, and items of personal background data in some six thousand white, Negro, and Mexican-American California school children in Grades 1 to 8. Averaged over Grades, the multiple correlation (R) between the predictor variables and achievement scores ranged from .60 to .80 for various school subjects. Ethnicity made no significant contribution to the multiple R independently of the several predictor variables.

The present study examined the contribution of pupils' ethnic group membership to the prediction of scholastic achievement. Does the pupil's ethnicity *per se* make any independent contribution to the prediction of achievement over the predictive power obtained by the multiple correlation of a number of psychometric, personality, and background variables, none of which can be regarded merely as substitute code names for the ethnic variable?

To answer this question, an attempt was made to obtain the highest possible predictive validity for scholastic achievement by means of a battery of diverse psychological tests and background information in large samples of children of three ethnic groups in a California school district. The zero-order correlation of ethnicity with achievement was determined as well as the partial correlation when all the other predictive variables were controlled.

METHOD

*S*s were white, Negro, and Mexican-American pupils in Grades 1 to 8 in a California school district. They were representative samples of these ethnic groups in this school district. All the tests were administered in regular classrooms. Because of a high degree of residential segregation in this district, each of the schools in which testing was done had predominantly one ethnic group. Table 1 shows the sample sizes in each grade.

The battery of predictor tests was administered in the Fall, near the begin-

TABLE 1
SAMPLE SIZE

Grade	White	Negro	Mexican
1	285	218	258
2	229	162	250
3	281	207	241
4	237	189	239
5	242	198	211
6	219	169	218
7	388	262	305
8	356	289	303
Total	2,237	1,694	2,025

ning of the school year. The dependent variables, the Stanford Achievement Tests, were obtained in late Spring, near the end of the school year.

Independent variables are in Table 2, along with the grades in which they were used in the multiple prediction. Not all of the tests are appropriate or have sufficient variance at every grade level.

Ethnic group was treated as a dichotomous quantized variable, with the values 0 and 1 assigned so that Negro < Mexican-American < White. Correlations were obtained in combined samples of only two ethnic groups at a time.

Sex was quantized as male = 0, female = 1.

The Lorge-Thorndike IQ tests are standardized timed verbal and nonverbal intelligence tests (Buros, 1959, pp. 478-484). The Lorge-Thorndike Nonverbal test makes no demands on the pupil's reading ability, although it correlates almost as highly with the reading tests of the Stanford Achievement battery as the Lorge-Thorndike Verbal IQ.

Raven's Progressive Matrices is a nonverbal test of reasoning ability based upon figural materials (Buros, 1965, pp. 762-765). There are two forms of the test: the Colored Matrices, used in Grades 3 to 6, and the Standard Matrices, used in Grades 7 and 8. The two forms are essentially the same test; the Standard matrices simply extends the difficulty of the test to a level suitable for older children and adults.

The Figure Copying Test is a set of 10 geometric forms, one on each page of the test booklet, which S is simply required to copy (Ilg & Ames, 1964). The figures increase in difficulty and form a Guttman scale. Each of S's drawings is scored on a three-point scale for resemblance to the model. Interscorer reliability is above .90.

The Listening-Attention Test measures the child's ability to listen to directions paced at 2-sec. intervals given by means of a tape recorder.

S crosses out or encircles numbers on a special answer sheet as the numbers are named by the speaker. The test makes no demands on memory, reasoning,

TABLE 2

INDEPENDENT VARIABLES ENTERING MULTIPLE CORRELATION
WITH SCHOLASTIC ACHIEVEMENT

Variable	Grades
Ethnic Group	1 - 8
Sex	1 - 8
Age in Months	1 - 8
Lorge-Thorndike Nonverbal IQ	1 - 8
Lorge-Thorndike Verbal IQ	4 - 8
Raven's Progressive Matrices	3 - 8
Figure Copying Test	1 - 6
Listening-Attention	2 - 8
Memory for Numbers (3 scores)	2 - 8
Speed and Persistence (Making Xs) (2 scores)	1 - 8
Gough's Home Index (4 scores)	3 - 8
Eysenck Junior Personality Inventory (3 scores)	4 - 8

or problem-solving ability but only on *S*'s ability for listening, paying attention continuously, and responding appropriately to the spoken instructions he receives for marking his answer sheet.

The Memory for Numbers test measures digit span memory. Strings of from 4 to 9 digits are presented at a 1-sec. rate over a tape recorder; *S* listens to each string and then writes down as many of the digits as he can recall on a specially prepared answer sheet. There are three parts: immediate recall, delayed recall (there is a 10-sec. delay, the end of which is signalled by a bong, before *S* can write his answer), and recall after repeated presentation (each digit series is presented three times in succession before *S* recalls it). The score is the total number of digits recalled in the correct order.

The Speed and Persistence Test (or Making *X*s Test) is intended to measure motivation and effort in a test situation. The test makes minimal cognitive demands, yet reflects large and reliable individual differences. Making *X*s has two parts. On the first part (Neutral instructions) *S* is asked simply to make *X*s in a series of 150 squares for a period of 90 sec. The score is the number of *X*s *S* has made within the time limit. The second part (Motivating instructions), administered after 2 min. rest, instructs *S* to show how much better he can perform than he did on the first part, and urges him to work as rapidly as possible. Again 90 sec. are allowed to make *X*s on another page of 150 "boxes." Virtually all *S*s show some gain in score from the neutral to the motivating conditions.

The Home Index, devised by Gough (1949), is a 24-item questionnaire about the home environment. It provides a good index of the socioeconomic level of the child's family. There are four scales, each of which is used here; they measure (1) educational level of the parents, (2) material possessions in the home, (3) parental participation in social or civic activities, (4) formal exposure to music and other arts.

The Junior Eysenck Personality Inventory is the children's form of the Eysenck Personality Inventory for adults (Eysenck & Eysenck, 1965). It is a questionnaire devised to measure two main factors of personality, Extraversion and Neuroticism. 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 merely a validity detector consisting of a number of items which are very rarely answered in the keyed direction by the vast majority of *S*s. The main reasons for elevated L scores are "faking good" and naivete. Because of the reading level required by this inventory, it was not used below Grade 4.

The dependent variables are the various subtests of the Stanford Achievement Test battery, a widely used standardized set of scholastic achievement tests.

RESULTS AND DISCUSSION

The results are summarized in Tables 3, 4, and 5. *R* is the shrunken multiple

TABLE 3
SUMMARY STATISTICS OF WHITE-NEGRO SAMPLES

SAT Variable	Grade								M
	1	2	3	4	5	6	7	8	
Word Meaning									
R	.460	.449	.761	.846	.794	.784			.702
R^2	.212	.201	.580	.716	.630	.615			.492
r_o	.191A	.166A	.385A	.438A	.501A	.384A			.366
r_p	.001	−.033	.074	.115	.239	.082			.117
t	.03	−.644	1.20	1.73	3.94	1.26			1.25
p	.979	.520	.232	.084	.001	.209			.337
Paragraph Meaning									
R	.280	.583	.759	.758	.779	.869	.902	.889	.753
R^2	.079	.340	.576	.575	.607	.755	.813	.791	.567
r_o	.020	.348A	.424A	.469A	.484A	.439A	.573A	.521A	.440
r_p	−.116	.108	−.025	.173	.237	.103	−.009	.027	.109
t	−2.59	2.11	−.399	2.62	3.89	1.58	−.149	.492	.944
p	.010	.035	.691	.009	.001	.115	.881	.623	.295
Total Reading									
R	.438	.564	.762						.603
R^2	.192	.318	.581						.364
r_o	.123B	.303A	.428A						.311
r_p	−.081	.061	.025						−.027
t	−1.80	1.19	.397						−.071
p	.072	.235	.692						.333
Spelling									
R				.793	.708	.774	.749	.821	.769
R^2				.628	.501	.598	.561	.673	.592
r_o				.266A	−.361A	.345A	.397A	.279A	.243
r_p				−.173	.072	.011	−.065	−.220	−.124
t				−2.61	1.16	.166	−1.13	−4.14	−1.31
p				.009	.249	.869	.259	.001	.277
Word Study									
R				.797					.797
R^2				.635					.635
r_o				.412A					.412
r_p				−.003					−.003
t				−.042					−.042
p				.966					.966

Language									
R				.806	.825	.869	.795	.745	.809
R^2				.649	.680	.754	.632	.554	.654
r_o				.459A	.504A	.458A	.454A	.290A	.439
r_p				.159	.145	.132	−.150	−.223	−.041
t				2.39	2.34	2.04	−2.64	−4.20	−.014
p				.018	.020	.042	.009	.001	.018
Arithmetic Computation									
R				.479	.470	.584	.693	.746	.605
R^2				.230	.221	.341	.481	.556	.366
r_o				.310A	.207A	.314A	.455A	.412A	.351
r_p				.063	−.003	.091	−.011	.015	.050
t				.941	−.044	1.39	−.195	.273	.473
p				.348	.965	.165	.845	.785	.622
Arithmetic Concepts									
R				.693	.579	.721	.733	.826	.715
R^2				.480	.336	.520	.538	.682	.511
r_o				.470A	.392A	.392A	.437A	.417A	.423
r_p				.176	.095	.035	−.096	−.097	.067
t				2.66	1.52	.531	−1.67	−1.79	.250
p				.008	.130	.596	.095	.074	.181
Arithmetic Applications									
R				.693	.713	.771	.791	.614	.719
R^2				.480	.508	.594	.626	.377	.517
r_o				.398A	.394A	.485A	.496A	.268A	.416
r_p				.080	.043	.245	.003	−.067	.113
t				1.19	.691	3.87	.046	−1.23	.913
p				.235	.490	.000	.964	.218	.381
Mean									
R	.401	.535	.761	.741	.705	.772	.780	.778	.722
R^2	.161	.286	.579	.549	.497	.597	.609	.605	.522
r_o	.132	.283	.413	.409	.370	.406	.472	.376	.383
r_p	−.082	.069	.043	.100	.147	.122	−.078	−.136	.055
t	−1.45	.885	.399	1.11	1.93	1.55	−.956	−1.77	.266
p	.354	.263	.538	.210	.265	.285	.509	.283	.379

TABLE 4
SUMMARY STATISTICS OF WHITE-MEXICAN SAMPLES

SAT Variable	Grade								M
	1	2	3	4	5	6	7	8	
Word Meaning									
R	.371	.362	.738	.821	.783	.863			.689
R^2	.137	.131	.545	.674	.614	.744			.474
r_o	.205A	.134A	.255A	.444A	.467A	.429A			.347
r_p	.113	−.032	−.062	.147	.204	.192			.134
t	2.63	−.683	−1.05	2.29	3.35	3.00			1.59
p	.009	.495	.294	.023	.001	.003			.137
Paragraph Meaning									
R	.229	.519	.733	.798	.744	.912	.894	.946	.756
R^2	.052	.269	.537	.636	.554	.833	.799	.895	.572
r_o	.079	.245A	.267A	.407A	.380A	.401A	.525A	.450A	.369
r_p	.034	.016	−.123	.121	.092	.065	−.053	−.198	−.059
t	.798	.338	−2.09	1.88	1.48	1.00	−.932	−3.68	−.151
p	.425	.736	.038	.061	.139	.318	.352	.001	.259
Total Reading									
R	.361	.498	.768						.568
R^2	.130	.248	.589						.322
r_o	.178A	.222A	.335A						.254
r_p	.097	−.002	−.119						−.040
t	2.25	−.039	−2.02						.064
p	.025	.969	.044						.346
Spelling									
R				.789	.760	.830	.773	.883	.808
R^2				.623	.577	.689	.598	.779	.653
r_o				.204A	.291A	.367A	.318A	.222A	.287
r_p				−.120	.021	.085	−228	−.338	−.186
t				−1.87	.335	1.32	−4 12	−6.57	−2.18
p				.063	.738	.189	.001	.001	.198
Word Study									
R				.828					.828
R^2				.686					.686
r_o				.234A					.234
r_p				−.176					−.176
t				−2.76					−2.76
p				.006					.006

Language									
R				.812	.853	.918	.802	.687	.818
R^2				.659	.728	.842	.643	.472	.669
r_o				.406A	.396A	.383A	.431A	.332A	.391
r_p				.073	.143	.133	−.089	−.088	.075
t				1.13	2.32	2.05	−1.57	−1.62	.680
p				.260	.021	.041	.118	.106	.109
Arithmetic Computation									
R				.537	.410	.606	.730	.723	.613
R^2				.288	.168	.367	.533	.523	.376
r_o				.171A	.060	.092	.361A	.349A	.242
r_p				.005	.018	−.146	−.137	−.002	−.089
t				.076	.290	−2.26	−2.44	−.035	−.874
p				.939	.772	.025	.015	.972	.545
Arithmetic Concepts									
R				.690	.631	.771	.776	.888	.756
R^2				.476	.398	.594	.602	.789	.572
r_o				.321A	253A	.324A	.415A	.397A	.347
r_p				.043	085	.032	−.101	−.177	−.079
t				.661	1.38	.489	−1.78	−3.29	−.508
p				.509	.169	.625	.075	.001	.276
Arithmetic Applications									
R				.793	.705	.793	.716	.610	.727
R^2				.630	.497	.629	.512	.372	.528
r_o				.288A	.179A	.386A	.406A	.235A	.311
r_p				−.007	−.112	.175	−.060	−.128	−.020
t				−.115	−1.82	2.74	−1.07	−2.36	−.525
p				.909	.070	.007	.287	.019	.258
Mean									
R	.326	.465	.746	.764	.711	.819	.784	.799	.734
R^2	.106	.216	.557	.584	.505	.671	.615	.638	.539
r_o	.163	.206	.288	.324	.317	.356	.414	.341	.314
r_p	.088	−.016	−.105	−.016	.097	.104	−.126	−.187	−.083
t	1.89	−.358	−1.72	.161	1.05	1.19	−1.99	−2.93	−.518
p	.153	.856	.125	.346	.273	.173	.141	.183	.237

TABLE 5
SUMMARY STATISTICS OF MEXICAN-NEGRO SAMPLES

SAT Variable	Grade								M
	1	2	3	4	5	6	7	8	
Word Meaning									
R	.346	.290	.818	.581	.605	.782			.604
R^2	.120	.084	.669	.338	.366	.612			.365
r_o	.005	.054	.132B	.020	.021	−.077			.050
r_p	−.068	.040	.016	.043	.007	−.129			−.054
t	−1.48	.806	.256	.681	.108	−1.96			−.265
p	.140	.421	.798	.496	.914	.051			.470
Paragraph Meaning									
R	.344	.491	.711	.509	.639	.848	.654	.839	.650
R^2	.118	.241	.505	.259	.408	.720	.427	.703	.423
r_o	−.051	.169A	.170A	.102	.141B	.053	.114B	.099	.118
r_p	−.122	.129	.071	.068	.107	.020	.201	.031	.090
t	−2.65	2.61	1.12	1.09	1.69	.304	3.68	.567	1.05
p	.008	.009	.263	.276	.091	.761	.000	.571	.247
Total Reading									
R	.417	.464	.722						.551
R^2	.174	.215	.521						.303
r_o	−.031	.145A	.121						.107
r_p	−.117	.106	.006						−.028
t	−2.55	2.14	.103						−.102
p	.011	.033	.918						.321
Spelling									
R				.671	.661	.793	.637	.765	.708
R^2				.450	.437	.629	.406	.585	.501
r_o				.057	.095	−.002	.085	.062	.068
r_p				.024	.081	−.041	.127	−.018	.065
t				.388	1.27	−.628	2.29	−.330	.598
p				.698	.205	.531	.023	.741	.440
Word Study									
R				.754					.754
R^2				.569					.569
r_o				.198A					.198
r_p				.185					.185
t				2.99					2.99
p				.003					.003

Language									
R				.679	.694	.852	.666	.687	.719
R^2				.461	.481	.726	.444	.471	.517
r_0				.060	.135B	.088	.005	-.083	.067
r_p				.098	.060	.019	-.027	-.234	-.091
t				1.56	.939	.285	-.481	-4.43	-.425
p				.119	.349	.776	.631	.001	.375
Arithmetic Computation									
R				.443	.494	.573	.454	.575	.511
R^2				.196	.245	.329	.206	.331	.261
r_0				.126B	.142B	.221A	.116B	.097	.147
r_p				.089	.080	.110	.072	.007	.079
t				1.43	1.26	1.67	1.30	1.33	1.16
p				.155	.209	.096	.195	.894	.310
Arithmetic Concepts									
R				.479	.520	.709	.454	.725	.589
R^2				.229	.271	.502	.206	.526	.347
r_0				.192A	.144B	.089	-.003	.052	.116
r_p				.161	.071	.010	-.003	-.087	.069
t				2.60	1.12	.149	-.046	-1.61	.443
p				.010	.264	.882	.963	.108	.445
Arithmetic Applications									
R				.603	.623	.703	.586	.572	.619
R^2				.363	.388	.494	.343	.327	.383
r_0				.139B	.261A	.072	.126B	.039	.148
r_p				.048	.243	.052	.164	-.048	.133
t				.759	3.93	.793	2.97	-.889	1.51
p				.449	.000	.428	.003	.375	.251
Mean									
R	.371	.424	.752	.598	.609	.757	.582	.700	.638
R^2	.137	.180	.565	.358	.371	.573	.339	.491	.408
r_0	-.034	.132	.143	.127	.149	.097	.090	.058	.122
r_p	-.105	.099	.042	.104	.115	-.019	.121	-.103	.084
t	-2.23	1.85	.493	1.44	1.47	.087	1.62	-1.09	.773
p	.053	.154	.660	.276	.290	.503	.303	.448	.318

correlation of all the predictor variables listed in Table 2 with the criterion variable, i.e., one of the Stanford Achievement subtests. The square of the multiple correlation, R^2, indicates the proportion of variance in the achievement scores predicted by the independent variables. The zero-order correlation of ethnicity with the achievement variable is indicated by r_o. The partial correlation of ethnicity with achievement, independently of all the other predictor variables, is indicated by r_p. A t test of the value of r_p is shown, along with the significance level, in terms of the exact p value of the t. Generally, values of p greater than .05 are arbitrarily regarded as indicating correlations nonsignificantly different from zero. Values of r_o and r_p followed by the letters A and B are significant beyond the .01 and .05 levels, respectively.

The values of the shrunken R are generally very high, in many cases approaching the reliability of the tests, especially in the later grades. This shows that a combination of psychometric variables and background information can yield remarkably high validity for the prediction of scholastic achievement. By far the most of this predictive power derives from the ability tests, especially the Lorge-Thorndike IQ, but the other measures in combination add appreciably to the R.

The zero-order correlations (r_o) of ethnicity with achievement are substantial. These point biserial correlations, of course, simply reflect the mean differences between the ethnic groups, the mean scores of which are generally in the order, from highest to lowest, of white, Mexican-American, Negro.

But the partial correlations (r_p) of ethnicity with achievement are uniformly small and usually nonsignificant despite the substantial sample sizes. In brief, the contribution of pupils' ethnic group membership to the prediction of scholastic performance, independently of psychometric, personality, and status variables, is practically nil. This also means that there is no evidence in these data that any differentially discriminative forces in the school, if such exist, differentially affect the scholastic performance of children according to their ethnic membership independently of the characteristics measured by the independent variables in this study.

REFERENCES

BUROS, O. K. (Ed.) *Fifth mental measurements yearbook.* Highland Park, N. J.: Gryphon Press, 1959.

BUROS, O. K. (Ed.) *Sixth mental measurements yearbook.* Highland Park, N. J.: Gryphon Press, 1965.

EYSENCK, H. J., & EYSENCK, S. B. G. *Junior Eysenck Personality Inventory.* London: London Univer. Press, 1965.

GOUGH, H. G. A short social status inventory. *Journal of Educational Psychology,* 1949, 40, 52-56.

ILG, F. L., & AMES, L. B. *School readiness: behavior tests used at the Gesell Institute.* New York: Harper & Row, 1964.