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SOME EFFECTS OF SOCIAL CLASS AND RACE ON CHILDREN'S LANGUAGE AND INTELLECTUAL ABILITIES.

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Identifiers-*Deprivation Index, Lorge Thorndike Intelligence Test, Wechsler's Intelligence Scale For Children

A cross-sectional study of 292 first and fifth grade Negro and white children examined the relationship between environmental factors and performance test scores of verbal and cognitive ability. The socioeconomic status (SES) of each subject was determined and included in a deprivation index formed by obtaining a composite score for each subject across six background variables: housing dilapidation, parental educational aspirations, number of children under 18, dinner conversation, weekend cultural experiences, and attendance of child in kindergarten. The two dependent variables were a nonlanguage test of general intellectual ability, the Lorge-Thorndike Intelligence Test, and the vocabulary subtest of Wechsler's Intelligence Scale for Children. Data was treated by a three way analysis of variance. Results indicated that the deprivation index acted as a factor independent of SES and race in contributing to variation in test performance. Older children scored lower than younger ones, indicating that deficit is progressive. Environment, however, can offset deficits. Negro status and lower SES are associated , so the Negro child is twice disadvantaged. Preschool intervention may be able to prevent accumulation of deficits early in the child's life. (MS)

SOME EFFECTS OF SOCIAL CLASS AND RACE ON CHILDREN'S LANGUAGE AND INTELLECTUAL ABILITIES[1]

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Some Effects of Social Class and Race on Children's Language and Intellectual Abilities[1]

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There is a frequently replicated finding that socioeconomic status (SES) and racial group membership are important correlates of children's performance across a variety of measures of ability. Numerous investigations have demonstrated that on the average: (a) lower SES children tend to perform less well than upper SES children; (b) Negroes perform less well than whites; and (c) within SES groups there is a tendency for white children to score at higher mean levels than Negro children (Eells et al., 1951; Dreger & Miller, 1960; Klineberg, 1963). As Klineberg (1963) has noted, the outstanding, and as yet uncontrolled, factor in this research is the existence of considerable intra-class variance and inter-group overlap in the score distributions of measured abilities among these children. Perhaps the most prominent sources of this variability in performance are

important differences in environmental conditions which may be experienced by children within the same SES levels or racial groupings.

For purposes of empirical study, SES levels, as well as racial groups, have traditionally been treated as homogeneous entities. This has permitted classification of subjects into groups for comparative analysis, but almost inevitably yields sizeable error variance.

The assumption of relative homogeneity has been empirically useful; however, its latent function has been to limit investigators to demonstrating that differences in IQ or in other more specifically defined abilities exist between: (a) children coming from lower as opposed to middle class environments, or (b) Negro as compared to white children.

It is of significance that while the replication of these normative differences has been highly consistent, investigators have largely failed to pursue the matter further, and have, thereby, neglected to pose an important question. This question is concerned with the identification of specific features of the lower class environment which are associated with cognitive and verbal development. Beyond demonstrating that differences between groups exist, we must identify environmental factors which, when present or absent, can be related to performance on measures of these abilities. It is also important to determine whether deficiences in environmental stimulation, or more appropriately, environmental "deprivations," have any greater affect on younger as opposed to older children in terms of their developing cognitive and

verbal abilities. Presumably, the longer a child has experienced deprivation, the more pronounced should be its effects on the development of these abilities. Related to this question is the problem of the kinds of abilities being studied. Though by no means definitive, there is a body of evidence suggesting that language measures are particularly responsive to the effects of social disadvantage (Bernstein, 1961; Milner, 1951). It would be important, therefore, to compare the environmental correlates of measures varying in the language component.

The purposes of the present study are:

1. To explore whether relations between specific environmental factors and performance on tests of cognitive and verbal abilities are independent of SES and race.

2. To investigate differences between younger and older children in cognitive and verbal abilities in an effort to determine whether the adverse effects of a socially deprived background become more pronounced with the passage of time.

3. To explore whether some specific environmental factors reflecting social disadvantage interact jointly with SES and race to affect children's performance on some cognitive and verbal tasks.

4. To investigate whether the deprivational aspects associated with lower socioeconomic status, Negro status, or some specific environmental factors have greater effect upon more verbal as compared to less verbal tests.

Let us examine the concept of "deprivation" and its use here. Environmental factors can be viewed as socially depriving when at least two conditions are met: (a) when they are predominantly found within certain social groupings such

as those defined by SES or race, and (b) when they are associated with impaired performance, e.g., lowered academic achievement.

An environmental condition may be associated with a particular psychological deficit, but it would not be considered socially depriving if the condition were not socially patterned. Thus, a particular mode of child rearing may be associated with cognitive deficits, but we would not consider this as a social deprivation unless the mode of child rearing were more prevalent in one specific segment of the culture than in another. Nor would it be considered as a deprivation unless it also entailed a functional or behavioral deficit.

Social deprivation implies further that the association between social grouping and specific environmental factor is not strictly causal, e.g., not genetically determined, but mediated by more basic societal conditions such as unemployment, poverty, and inequality of opportunity in various areas. With the removal of such conditions, the association between social grouping and the socially depriving factor may vanish. Social deprivation also implies that the association between environmental condition and performance decrement <u>is</u> causal, at least in so far as the deprivational factor hampers the learning of the performance in question. From this discussion, it can also be seen that "social deprivation" is a relative term. It is relative in two senses. First, a given environmental factor may be deprivational relative to one social group, e.g., low SES, but not deprivational relative to another social group, e.g., Negro. Second, the

environmental factor may be deprivational with respect to one ability or performance, but neutral or even advantageous with respect to other behaviors or functions.

From the above, it follows that the investigation of social deprivations involves both conceptual and empirical steps. The conceptual step implies the delineation of environmental conditions which on an a priori basis might qualify as social deprivations. In our study we have selected 15 of these conditions from a broader array of over 30 background variables. These 15 factors include motivational variables, e.g., parental schooling desired for child; factors related to the family, e.g., whether or not there is a father in the home; and variables related to parental interaction, activities with adults, and school experiences.

The empirical step stems directly from our conception of social deprivation. Each of these 15 variables is studied from two vantage points: (a) whether it is related to an important psychological function such as reading, and (b) whether it is related to an important social grouping such as SES. The environmental conditions which meet these dual criteria might then be viewed as social deprivations. They comprise six variables which have been combined into a composite score, a Deprivation Index. The particular items and the mode of combination will be discussed below.

At this point, it would be well to summarize some of the functions which such an index can serve. The Deprivation Index can play the role of specifier, i.e., it contains specific environmental features meeting criteria of social deprivation

that we have set down above. It can play the role of mediator, i.e., it can help account, at least partially, for the relation between SES and scores on ability tests. It can also play the role of independent contributor, i.e., as a set of environmental conditions which accounts for aspects of performance not accounted for by SES or race. Finally, it can serve as an interactive variable. Thus, it may, in combination with other background factors, serve to account for performance over and beyond the contribution of the background variables taken singly.

Method

Sample

A sample of 292 first- and fifth-grade Negro and white children was obtained from 12 elementary schools located in three boroughs of New York City. The schools were selected to maximize the possibility of obtaining samples of Negro and white children with comparable SES distributions. The first- and fifth-grades were sampled to obtain approximately equal number of white and Negro subjects coming from both lower and middle SES backgrounds. The sample was also stratified by sex. Non-English speaking children were eliminated from this group. This is, of course, a cross-sectional study of first- and fifth-grade children, rather than a longitudinal study in which the same children were followed from the first- through fifth-grade.

Indices

An objective estimate of socioeconomic status (SES) was obtained for each S by ratings of the occupational prestige

and educational attainment of the main support in each S's family.[3] This index was used to distinguish three SES levels within our sample: SES I, lower; SES II, lower middle; and SES III, middle.

The Deprivation Index was formed by obtaining a composite score for each S across six background variables. Each variable included in the Index was dichotomized to yield a score of one or two. The summed score was operationally defined as an Index of Deprivation. These variables, and the manner in which they were dichotomized, are identified in Table 1.

With the exception of housing information, data on each of these items were obtained either from parents or from S's themselves. An estimate of housing condition was made for the dwelling unit of each S by obtaining data from the U. S. Census of Housing, by block, for New York City.[4]

The correlations between each of the six environmental variables given above and fifth grade reading grade level score ranged between .20 and .32, all relatively small correlations, but each exceeding chance expectation for a sample of this size ($N=167$). The multiple correlation between the six environmental variables and reading grade level scores was .49. In addition, the multiple correlation between these six variables and SES was .48. This overall correlation is significant ($p < .01$), but since it accounts for not more than 25% of the total variance within the sample on these variables, we may conclude that it is not sufficiently redundant with the SES measure to render it useless.

Table 1

Description of Variables in Deprivation Index

Variable	Dichotomized
1. Housing Delapidation index for block on which S resides, and assigned to him, computed from census data.	1 = Anything less than sound with complete plumbing (either dilapidated or deteriorating). 2 = Sound with complete plumbing
2. The educational aspirational level of the parent for the child.	1 = College or less 2 = Graduate or professional training
3. The number of children under 18 in the home.	1 = 3 or more 2 = 2 or less
4. Dinner conversation.	1 = Did not engage in conversation because: Not allowed to Others participated but child did not No conversation, no indication why Ate alone 2 = Engaged in conversation
5. Total number of cultural experiences anticipated by child for coming weekend--i.e., visiting relatives, family, museums, library, zoo, travel outside NYC, school or lesson work	1 = None 2 = One or more experiences (1 - 4)
6. Attendance of child in kindergarten	1 = No attendance at kindergarten 2 = Attendance at kindergarten

Each of the six variables may be viewed as an indicator of a specific type of socio-cultural deprivation which may occur in variable degree within any SES level, although we would generally suppose high deprivation to be more severe and more frequent within lower as opposed to middle or upper SES groups.

A more "deprived" score on the Index was obtained by those children with a cumulation of the following conditions, each of which is significantly associated with lower SES and with lowered reading achievement at the fifth grade level. These children tend to have missed kindergarten; their families are larger, more crowded, and located in the more dilapidated neighborhoods; the parents have lower educational aspirations for the children; and the latter report relatively limited conversation at dinner and limited "cultural activities" (as defined in Table 1) with parents or relatives. The decision to use a composite index reflects the belief that cumulations of these variables are more significant (and more reliable) than each variable taken singly. The multiple correlations reported above attest to the enhanced effect of the joint action of these variables. The use of the children's expectations in the derivation of the "cultural activities" and of the parents' judgments in appraising parental aspiration for the educational achievement of the child pose some methodological problems. Thus, an increase in the expected number of cultural activities might be attributable to the child's verbal responsiveness in the test situation rather than to environmental realities. Mitigating against this interpretation, however, is the lack of significant correla-

tion between "cultural activities" and independent measures of the child's total verbal output and verbal fluency in the test situation. Also, the sheer number of activities with parents as contrasted with the number of cultural activities does not correlate with reading achievement, contrary to the verbal fluency hypothesis. The parental educational aspiration might be considered spurious in so far as it is reflective of the child's reading level rather than contributive to it as an antecedent or concurrent environmental influence. However, a check upon this interpretation fails to support it. The correlation between the parents' educational aspiration and the parents' estimate of the child's reading ability at the fifth grade is not significant ($r=.11$). This finding suggests that there was little influence of perceived reading performance of the child on parents' educational aspiration.

Our dependent variables are two: (a) a non-language test of general intellectual ability, the Lorge-Thorndike Intelligence Test, and (b) a standardized test of vocabulary strength, the vocabulary subtest of Wechsler's Intelligence Scale for Children. Since our sample consisted of two different age groups, e.g., first- and fifth-graders, different forms of the Lorge-Thorndike test appropriate for each age level were used. Both forms, as reported by the authors, are designed to measure non-verbal aspects of intelligence. The first grade battery uses pictorial items only to measure abstract thinking, pictorial classification, and picture pairing abilities. The items found in the fifth grade battery typically involve picture classification, pictorial analogies, and items requiring distinctions between numerical relationships. Both forms are designed to be group administered.

Statistical Treatment

Analysis of variance was used to determine the extent to which systematic variation in performance on the two tests occurs as a function of SES, Race, Age, and Deprivation Index. Since the cell Ns within this analysis are unequal, and in some cases disproportionate, analyses of variance using harmonic mean approximations were carried out on the data. For a full discussion of this procedure, the reader is referred to Winer (1962).

Since simultaneous classification of Ss by four independent variables would have resulted in cell Ns of zero, we have done three analyses in which SES, Race, and Deprivation Index were varied, two at a time, together with grade level which was used in each analysis.

Results and Discussion

Analysis of Lorge-Thorndike test (non-verbal form).

Table 2 reveals that there were no significant differences between the two age groups on IQ scores. This was to be expected since the IQ, by definition, is adjusted for age. There were, however, significant differences between SES groups and between Negro and white Ss; and a significant interaction between grade and race.

These differences were in the expected directions with the means for lower SES Ss being smaller than the means for the higher SES groups. In addition to the significant differences between SES groups, the Negro Ss scored significantly lower than did the white Ss.

Table 2

Results of Three-Way Analysis of Variance on Lorge-Thorndike IQ Scores by Grade, SES, and Race (N=292)

Source	df	MS	F	p
Grade (A)	1	< 1.000	0.00	ns
SES (B)	2	4362.31	21.61	< .01
Race (C)	1	4856.56	24.06	< .01
A x B	2	3.24	< 1.00	ns
A x C	1	883.32	4.38	< .05
B x C	2	299.88	1.48	ns
A x B x C	2	130.77	< 1.00	ns
Error	280	201.82		
Total	291			

Table 3

Means for SES Groups and for Race Groups on Lorge-Thorndike IQ Scores

Group	Mean	SD	N
SES I	94.31	14.89	110
SES II	102.67	14.83	99
SES III	109.16	14.69	83
Negro	97.01	14.30	152
White	105.08	16.36	140

Table 4 reveals that the significant interaction between grade and race was attributable to the stronger Negro-white differences at the fifth-grade level than at the first-grade level. Whereas the Negro children averaged five IQ points less than the white children at the first-grade level, this difference increased to 12 points at the fifth-grade level. (The difference between Negro and white Ss reached statistical significance at the fifth-grade level but not at the first-grade level, as determined by a test of simple effects.)[5]

Table 4

Means on Lorge-Thorndike IQ Scores for Negro as Compared to White Ss within Each Grade Level

Group	Mean	SD	N
Grade 1			
Negro Ss	99.01	13.87	68
White Ss	103.86	14.72	59
Grade 5			
Negro Ss	95.39	14.52	84
White Ss	107.70	17.37	81

Table 5 reveals that there were significant differences between Ss coming from more, as opposed to less, deprived background conditions. Lower SES ratings and scores denoting greater disadvantage on the Deprivation Index were independently associated with IQ scores. In addition, this table indicates that there was a significant interaction effect of grade by deprivation on IQ scores.

Table 5

Results of Three-Way Analysis of Variance on Lorge-Thorndike IQ Scores by Grade, SES and Deprivation

Source	df	MS	f	p
Grade (A)	1	0.00	0.00	ns
SES (B)	2	2120.95	10.06	<.01
Deprivation (C)	1	2191.07	10.40	<.01
A x B	2	45.68	< 1.00	ns
A x C	1	1492.79	7.08	<.01
B x C	2	.44	0.00	ns
A x B x C	2	29.15	< 1.00	ns
Error	277	210.77		
Total	291			

Table 6 reveals that regardless of grade, Ss coming from the more deprived conditions obtained significantly lower IQ scores than did Ss coming from the less deprived background conditions. Also, the effects of deprivation on IQ scores were more pronounced among older Ss (fifth graders) than among the younger Ss (first graders).

Table 6

Means for Overall Deprivation Levels and For Deprivation Levels within Grade on Lorge-Thorndike IQ Scores

Group	Mean	SD	N
More Deprivation	97.34	15.08	175
Less Deprivation	107.79	15.30	114
Grade 1			
More Deprivation	100.13	15.01	91
Less Deprivation	104.14	12.54	36
Grade 5			
More Deprivation	94.31	14.64	84
Less Deprivation	109.47	16.21	78

The interesting findings which emerge from Table 7 are: (a) the vanishing of the significant interaction between grade and race noted in Table 2, and (b) the maintainance of the significant grade by Deprivation Index interaction reported in Table 5. It appears that once disadvantage, as assessed by the Deprivation Index, is controlled, the age decrement, as assessed by the Lorge-Thorndike test, among the Negro children tends to be ameliorated. However, the converse is not true within racial groups. The age decrement associated with the Deprivation Index is still significant.

Table 7

Results of Three-Way Analysis of Variance on Lorge-Thorndike IQ Scores by Grade, Race and Deprivation

Source	df	MS	f	p
Grade (A)	1	43.07	< 1.00	ns
Race (B)	1	3131.15	14.71	$< .01$
Deprivation (C)	1	4534.89	21.30	$< .01$
A x B	1	183.24	< 1.00	ns
A x C	1	1068.79	5.02	$< .05$
B x C	1	159.12	< 1.00	ns
A x B x C	1	38.29	< 1.00	ns
Error	284	212.86		
Total	291			

Analysis of the Wechsler Vocabulary Subtest

Table 8 reveals that there were highly significant differences between the grades, between SES groups, and between Negro and white Ss. In addition, there were significant interaction effects of grade by SES and grade by race. The SES and race differences paralleled those found on the Lorge-Thorndike test. However, in the case of the Lorge-Thorndike results, there was only a significant grade by race interaction, but not a significant grade by SES interaction.

Table 8

Results of Three-Way Analysis of Variance on WISC Vocabulary Subtest Score by Grade, SES, and Race

(N = 289)

Source	df	MS	F	p
Grade (A)	1	24112.06	435.29	.0001
SES (B)	2	1044.82	18.86	<.01
Race (C)	1	52.88	9.40	<.01
A x B	2	262.75	4.74	<.05
A x C	1	463.93	8.38	<.01
B x C	2	24.11	1.00	ns
A x B x C	2	12.27	1.00	ns
Error	277	55.39		
Total	288			

One notes from examination of Table 8 that the difference between the two grade levels was a large one. Since the vocabulary subtest score is a raw score which contains no adjustment for age, it is not surprising that the differences in vocabulary, between six- as opposed to eleven-year-old children, are so large. The Negro children generally performed more poorly than did the white children, and the lower SES children performed more poorly than did higher SES children.

In Tables 9 and 10 the means for the significant effects are presented. These tables indicate that differences between Negro and white Ss, as well as differences between lower and middle SES children, were in the expected direction and were sharper at the fifth-grade level than at the first-grade level. (These differences, as tested by the simple effects method, reached statistical significance within the fifth grade, but not within the first grade.)

Table 9

Means for Grade Levels, SES Groups and Race Groups on WISC Vocabulary Subtest Scores

Group	Mean	SD	N
Grade 1	14.05	5.82	125
Grade 5	32.41	9.85	164
SES I	21.28	11.08	110
SES II	24.55	11.53	97
SES III	28.66	13.72	82
Negro	22.74	10.67	147
White	26.31	13.73	140

Table 10

Means for SES Groups and Race Groups within Grade Levels on WISC Vocabulary Subtest Scores

Group	Mean	SD	N
Grade 1			
SES I	12.17	5.40	46
SES II	14.72	5.81	43
SES III	15.64	5.84	36
Grade 5			
SES I	27.83	9.36	64
SES II	32.37	8.57	54
SES III	38.85	8.40	46
Grade 1			
Negro	13.97	6.19	68
White	14.14	5.49	57
Grade 5			
Negro	30.11	7.67	81
White	34.66	11.20	83

Table 11 explores the possibility of interaction between SES and the Deprivation Index. A significant interaction did not result. Interesting, however, is the loss of two significant interactions which had emerged previously in connection with the WISC vocabulary scale. These are the grade by Deprivation Index interaction (see Table 7) and the grade by SES

interaction (see Table 8). The difference appears to be that the analysis reported in Table 11 is a simultaneous study of SES and the Deprivation Index. The analyses in Tables 7 and 8 had studied the Deprivation Index or SES simultaneously with race, but not with each other. Table 11 reveals that once there is some homogeneity in level of disadvantage, as measured by the Deprivation Index, a lowered SES loses its cumulative effect. However, SES retains its cumulative effect on the vocabulary measure despite the control on race, i.e., even within the Negro and white groups. The means corresponding to the main effect of the Deprivation Index are shown in Table 12. The results correspond to those obtained with the Lorge-Thorndike IQ measure--the more the deprivation, the lower the vocabulary score.

Table 11

Results of Three-Way Analysis of Variance on WISC Vocabulary Subtest Scores by Grade, SES and Deprivation

(N = 286)

Source	df	MS	f	p
Grade (A)	1	17508.48	304.11	.0001
SES (B)	2	474.56	8.24	$<.01$
Deprivation (C)	1	356.45	6.19	$<.05$
A x B	2	165.09	2.87	ns
A x C	1	99.27	1.72	ns
B x C	2	53.59	1.00	ns
A x B x C	2	20.75	1.00	ns
Error	274	57.57		
Total	285			

Table 12

Means for More and Less Deprived Groups on WISC Vocabulary Subtest Scores

Group	Mean	SD	N
More deprivation	20.94	10.98	172
Less deprivation	29.53	12.60	114

Table 13 reveals that, in addition to the significant main effects which emerged in earlier analyses, there were significant and independent interaction effects of grade by race and grade by deprivation.

The decline in vocabulary performance in the case of the Negro children is relatively independent of the decline attributable to disadvantage, as reflected by the Deprivation Index. This independence of the Deprivation Index, in the case of the Negro children's decrement on the vocabulary scale, contrasts with what was found in the analysis of the Lorge-Thorndike test. With the latter measure, the grade by race interaction was not significant once deprivation level was controlled (see Table 7). There was no significant Negro decline among homogeneous deprivation groups. In the case of the vocabulary measure however, the scores of the Negro children decline significantly despite control over deprivation level. In short, the measure which more heavily reflects language (vocabulary) is more responsive to cumulating deficits among Negroes than is the measure which draws less heavily on linguistic knowledge (Lorge-Thorndike Non-Verbal Test). Table

14 presents the means indicating that among older as compared to younger children there are stronger differences on vocabulary score associated with variation on the Deprivation Index.[6]

Table 13

Results of Three-Way Analysis of Variance on WISC Vocabulary Subtest Scores by Grade, Race and Deprivation

(N = 286)

Source	df	MS	f	p
Grade (A)	1	19136.91	318.93	.0001
Race (B)	1	322.23	5.37	.05
Deprivation (C)	1	865.34	14.42	.01
A x B	1	398.83	6.65	.05
A x C	1	283.67	4.73	.05
B x C	1	14.88	1.00	ns
A x B x C	1	168.86	2.81	ns
Error	278	60.00		
Total	285			

Table 14

Means for More and Less Deprived Groups within Grade Levels on WISC Vocabulary Subtest Scores

Group	Mean	SD	N
Grade 1			
More deprivation	13.54	6.27	89
Less deprivation	15.30	4.35	36
Grade 5			
More deprivation	28.88	9.25	83
Less deprivation	36.09	9.28	78

Conclusions and Implications

The findings will now be discussed in connection with the four problems posed in the introductory section.

1. The results indicate that the Deprivation Index tends to act as a factor independent of SES and race in contributing to variation in test performance. Thus significant main effects on both tests were related to the Deprivation Index even in groups homogeneous with respect to race or socioeconomic status. This suggests that cumulations of specific environmental factors

(e.g., low parental motivation, absence of a kindergarten experience) can have a disadvantaging effect despite relatively high socioeconomic status, and that the diminution of such features may have an advantageous effect despite relatively low socioeconomic status. This latter point provides support for enrichment programs aimed at alleviating the effects of social disadvantage on children of lower socioeconomic status. In a similar vein, the cumulative deficit found among Negro children on the Lorge-Thorndike test tends to be ameliorated once level of disadvantage (as assessed by the Deprivation Index) is controlled. Thus, we see that decrements in test performance associated either with Negro or lower-class status tend to be offset or mitigated in the context of cumulations of specific, advantaging environmental factors.

2. Test decrements in the more disadvantaged group (i.e., the group as determined by the Deprivation Index) were more pronounced among the older children. Thus, in the case of the Lorge-Thorndike, the older children scoring in the more disadvantaged range of the Deprivation Index tended to score relatively lower than the younger children. This progressive deficit obtained even within groups homogeneous with respect to race or socioeconomic status. On the vocabulary scale, as age increases, the disadvantaged children, whether white or Negro, tended to score relatively lower than the more advantaged children.

The findings also indicate that cumulative deficits emerge in connection with each of the three background measures studied. Not only do we find cumulative deficits emerging with respect to the Deprivation Index, but also in connection with Negro status and lower socioeconomic standing. However, socioeconomic status shows some departure from the two other background variables. Lower SES is the only one of the three variables associated with Lorge-Thorndike deficits among younger children which are as pronounced as those among older children. If we compare the role of race and SES with respect to the Lorge-Thorndike, a differentiated picture emerges--the deficit associated with lower SES begins earlier but the deficit associaced with race accelerates faster. We have attempted to separate race and SES effects both by the sample design and by the statistical analysis. By these methods we have been able to study the effect of race independently of SES. In the general population, however, race and SES are by no means independent, for Negro status and lower SES are definitely associated. This implies that typically the Negro child is doubly hit. Early deficit may be occasioned by disadvantaging factors associated with lower socioeconomic status; in addition, later deficit may be produced by environmental factors associated with his being Negro. As the analysis has indicated some of these later factors are related to the environmental features tapped by the Deprivation Index.

3. There was little evidence of interaction among the three main types of background variable--SES, Race, and Deprivation Index. Thus, with the test measures, performance was not significantly altered within the more complex groupings formed by any particular combination of background factors, e.g., the group which is low SES, Negro, and in the disadvantaged range on the Deprivation Index. This does not imply that the effect of such multiple groupings is not summative, as we have indicated above in discussing the Negro child who is more often than not of lower socioeconomic status. Indeed, the lowest scores were found among groups defined in terms of combinations of disadvantaging background factors. However, unusual decrements, not predictable from simple summations of the three main background factors, were not obtained. The suggestion here is that deprivational factors cumulating <u>over</u> time may be more important in effecting decrement than the cumulation of conditions <u>within</u> a particular time. This point, coupled with the early deprivational effect of low SES pointed out above, indicates the importance of enrichment programs which are instituted early in the child's life, i.e., before deficit sets in and before it has a chance to cumulate.

4. Our findings indicate that the effects of the background factors are a function of the kind of ability under consideration. Thus, race and SES play different roles depending upon the degree to which language is involved in test performance. In the case of the non-verbal form of the Lorge-Thorndike,

there was no cumulative deficit manifest when the data were analyzed by SES groups, but the same SES analysis did show a cumulative deficit in connection with the vocabulary scale. Analysis by race did yield a cumulative deficit finding with respect to the Lorge-Thorndike. This deficit tends to vanish when some controls on level of disadvantage (as assessed by the Deprivation Index) are introduced. However, in the case of the more verbal measure, the vocabulary scale, cumulative deficits associated with race obtain even in the presence of controls on SES and Deprivation Index. The implication here is that the more linguistic measures show greater responsiveness to the cumulative effects of certain disadvantaging conditions than the measures tapping non-verbal abilities. The fact that the cumulative vocabulary deficit among the Negro children is independent of both the SES and Deprivation Index, points to the importance of a close investigation of the Negro child's environment to uncover those conditions which affect his linguistic development. Such factors may include adult stimulation of the child's speech, adult reward for linguistic modes of expression, the opportunity to hear new words in meaningful context, and the opportunity to discover the utility of a developing vocabulary as instrumental in satisfying one's needs and influencing the social environment.

This paper has attempted to present a differentiated picture of the environmental, temporal, and measurement conditions leading to impaired performance on psychological tests. This

picture stresses the importance of specific environmental features in addition to the more global factors of race and SES; it stresses the importance of time as interacting with environmental background in producing a cumulative deficit; and finally it stresses the differential patterning of deficit produced by the nature of the psychological function being measured. These results, again, point to the need for comparative longitudinal studies of linguistic and cognitive growth for groups differing in social and cultural backgrounds.

Footnotes

[1]An earlier version of this paper was read at the Biennial Meeting of the Society for Research in Child Development, Minneapolis, Minnesota, March, 1965.

[2]Consultant, Institute for Developmental Studies, New York Medical College.

[3]Institute Index of Socioeconomic Status, mimeographed, 1964, Institute for Developmental Studies, New York Medical College, New York, New York.

[4]U.S. Bureau of the Census, U.S. Census of Housing, 1960, 3, City Blocks, Series H. C., Nos. 274-276.

[5]For a complete discussion of this procedure see Winer, Statistical principles in experimental design, p. 174, 232, 237.

[6]A possible confounding factor is the increased heterogeneity of variance of the vocabulary measure for the fifth-graders as compared to the first-graders. Such heterogeneity might contribute to the increased association between background factors and vocabulary among the older children, without the necessity of invoking cumulative deficit as an explanatory factor. In order to control for this differential heterogeneity of variance, the fifth-grade correlations of SES, Deprivation Index, and race with vocabulary were each calculated. These Pearson product-moment coefficients were then adjusted through statistical reduction of the vocabulary variance of the fifth grade to that of the first grade, using the formula presented by Gulliksen for predicting correlations when there are changes in the variance of a variable (Gulliksen, 1950; p. 133). Despite these adjustments, there were no changes in the levels of significance for the various correlations between the three background variables and the vocabulary test.

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