MENTAL RETARDATION AND PERFORMANCE ON THE PORTEUS MAZE TEST: A REAPPRAISAL OF SOME PREVIOUS FINDINGS

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ABSTRACT

MENTAL RETARDATION AND PERFORMANCE
ON THE PORTEUS MAZE TEST:
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In a previous study using both the Porteus Maze Test and a Rating Scale of Personal Effectiveness there resulted a near perfect prediction of who later did or did not get hired from among a group of adolescents participating in a special work-training program. Although the adolescents were considered to be "mentally retarded," their scores on the Porteus test were not consistent with this labeling. They scored too high. The present research attempted to determine the basis for this inordinately high performance.

The Porteus Maze Test (PMT) was administered to 154 randomly selected normal Ss in regular school programs. They attended the same high schools, and were fairly comparable to the "mentally retarded" Ss previously studied, in age, sex, and grade level distribution. In so far as possible, socioeconomic information and intelligence test data were also obtained.

The results show that a fairly large number of the retarded Ss are inappropriately labeled. While in comparison to the normal Ss they do show a significantly inferior intellectual performance on the PMT, they are apparently brighter than the "average person in the general population." Also, in comparison

to a presumably representative High School population, the normal Ss are significantly brighter. Analysis of intelligence test data shows that 67% of the retarded Ss, on whom scores were available, are misclassified in terms of the usual statistical dividing line for "mental retardation." Similarly, on the basis of IQ scores alone, a number of the normal Ss should be classified as "retarded" but are not.

At the same time, however, the retarded Ss are significantly poorer in scored qualitative performance on the PMT. Additional analyses indicate that the retarded Ss more frequently have father's in lower level occupations and more frequently live in homes of low monetary value.

The inefficient academic performance displayed by these youngsters is probably the result of unfavorable environmental conditions. It is proposed that rather than having been originally selected on the basis of "insufficient intelligence," selection is likely to have occurred more on the basis of S's unacceptable personal-social characteristics. It is suggested than many of the Ss are better "labeled" as "academically poor performers." This more neutral term appears to be more correct in fact and has the advantage of obviating the stereotyped thinking on the part of psychologists and educators which almost automatically attaches to the label "mentally retarded." Turning to the Porteus Maze Test, it is noted that more difficult mazes need to be added at the adult level if discrimination among brighter or older Ss is desired. In addition, serious

reservations are noted and discussed regarding the "representativeness" of what little normative or standardization information is available.

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PROBLEM

Gambaro (1963), using the Porteus Maze Test and a Rating Scale of Personal Effectiveness, found that he was able to predict almost perfectly which "mentally retarded" adolescents -- in the special Type A work-training program conducted by the Lansing, Michigan Special Education Department -- would or would not be hired upon their completion of the program. However, in reviewing the Porteus Maze Test data it was noted that a large percentage of the retardates scored at or above the mean Test Age score reported by Porteus (1959) in the standardization of the test.

If, as Porteus states, "planning capacity" (as measured by the Test Age score of the PMT) is an essential component of intelligence, one is forced to ponder the apparent inconsistency between the high test performance and the label accorded these adolescents. If these Ss are retarded, how can one account for the fact that such a large percentage of them scored so high on the PMT? Does it have something to do with only part of Gambaro's sample or with the Porteus Maze Test norms? Or, are the so-called retarded Ss misclassified?

In more specific terms, questions regarding sampling, Porteus test norms, and misclassification are as follows. First, since Gambaro's Ss came from three schools, are his results attributable to the possibility that either the higher or lower performers come from just one of the schools? Second, do his

retarded Ss score lower as a group than normal Ss? Third, even if the retarded Ss do score lower than the normal Ss, how do both the normal and retarded samples compare to the standardization sample of Porteus? In particular, do the normal age- and school-mates of the retarded adolescents score higher or lower than the standardization group? Fourth, if the retarded Ss score lower and yet this is not due to a particular school or inadequate comparison groups, then in what sense are the retarded Ss to be so classified, if any? In the sense, for example, that they do, in fact, score in the "mentally deficient" range on a standard intelligence test? Or, that they come from lower socio-economic class backgrounds and they show in their school behavior the effects of cultural impoverishment?

In so far as possible, the present study was designed to answer such questions. The PMT was given to normal Ss and additional descriptive and test information was obtained on them as well as on the retarded Ss originally studied by Gambaro.

METHOD

Subjects

Retarded: The Ss were 71 adolescents -- 25 girls and 46 boys -- ranging in age from 16 to 19 years. All of the Ss attended one of the three Lansing Public High Schools; 11 attended Sexton, 20 attended Everett, and 40 attended Eastern. These 71 Ss originally studied by Gambaro, comprised all of those from the Lansing, Michigan Special Education Department population of 84 for whom complete test (PMT) information was available.

Normal: The 154 normal adolescent Ss -- 77 girls and 77 boys -- also ranged in age from 16 to 19 years. They were all full-time students in the regular school program at the same three high schools. In each of the three schools all regular students have one period a day devoted to a study hall, and it was from these classes that Ss were selected. All were juniors or seniors, corresponding to the class status used by Gambaro, and were randomly selected from the study hall class lists. It was possible to select and test 46 Ss attending Sexton, 56 attending Everett, and 52 attending Eastern.

Measures

Porteus Maze Test (PMT): For each subject a quantitative (TA) and a qualitative (Q) score was derived in accordance with Porteus' (1959) scoring systems. TA is based on the total number

of mazes successfully completed taking into consideration the number of trials required. Q is based on such things as frequency or extent of cutting corners, crossing lines, taking a wrong direction, and lifting the pencil from the paper.

Both TA and Q scores were used in all analyses involving the PMT data. Both measures are related but also supposedly tap different aspects of behavior (Porteus, 1942). Presumably, TA is more a measure of what a S can do while Q is more a measure of how, or the way, S does it. TA is then, supposedly, more a measure of ability as such, Q being more a measure of the way this ability is expressed. The latter ostensibly gets at features of temperament such as impulsivity and is felt by Porteus to relate to a Ss general and social adjustment.

Socioeconomic: In order to have at least some crude assessment of socio-economic level on most Ss, the following three measures were used.[1]

The dwelling unit of each S was assigned a monetary value based on Census data for the City of Lansing, Michigan (1960). Assignment consisted of first locating each S's address on a base map of the city and then assigning to that dwelling unit the average value of all units on that particular block. House value was not determined where a S lived outside the city limits or on blocks with fewer than six dwelling units, nor where a recent address was unattainable.

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[1]Occupation of mother and grade completed in school of mother and father were also considered for inclusion. Neither was feasible, however, since almost all mothers were housewives and most Ss did not know either the father's or mother's educational level.

For those Ss whose father's occupation was specifically determinable, an occupational classification was assigned. Five categories of classification were used, ranging from Professional to Unskilled, in accordance with the Dictionary of Occupational Titles (1955).

As an afterthought, a record was also kept of the latest report on the number of siblings each S reported as having. At least as a possibility, it seemed that less well-off families might have more children, yet not differ from more well-off families in house value or occupational level of father.

"Intelligence" Test Scores: Language and Non-Language scores on the California Test of Mental Maturity were obtained, as far as possible, for the normal Ss. As is customary, the CMMT had been administered in groups on a school-wide basis. For most Ss the test had been taken within the last one or two years. Full Scale WISC and WAIS IQ scores were obtained for as many of the retarded Ss as possible. They do not ordinarily take the CMMT, but instead are usually given an individual WISC, WAIS, or Stanford-Binet as one of the requirements for admission to the Special Education program.

Procedure

Gambaro tested his Ss individually and as a part of their activities in the special work-study training program. The normal Ss, randomly selected, but volunteers, took part in the present study on the basis that they were participating in research being conducted by the "University." They were told that the research was being carried out in several schools in

the city, that it involved a simple task, and did not take long. There were no refusals. Since individual testing was not feasible, Ss were tested two at a time.[2] The two Ss were separated by a 30" X 30" X 1/4" pressed board divider which prevented them from seeing each other, but permitted E to maintain close vigilance on both Ss throughout testing. Communication between Ss was not allowed, and testing required about 10-15 minutes per pair, a period of time similar to that reported by Gambaro.

In scoring the PMT, all identifying information was removed so as to avoid scorer bias. This is especially important in the qualitative (Q) scoring of the mazes since many subjective decisions are made. As a further check on possible effects of bias, another judge was trained in Q-scoring. A sample of forty randomly selected sets of mazes were then scored by the investigator and independently by the trained judge (an undergraduate psychology major). A Pearson's correlation coefficient of .93 (df = 28) was obtained on the scoring of individual mazes and a .95 (df = 38) rank order correlation was obtained on the scoring of the 40 sets of mazes.

Data for the determination of house value and father's occupation, counts of number of siblings, and intelligence test score were obtained from either the school's files or from an information sheet filled out by S. Normal Ss filled out the information sheet shown in Appendix A prior to the administration of the PMT. A somewhat similar sheet had been completed by Gambaro for each of the retarded Ss. Information regarding home

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[2] A pilot study was conducted and revealed no significant differences between individual and dual testing.

address, father's occupation and number of siblings was then checked against S's school record folder. In cases of doubt or discrepancy, the information sheet was used, particularly since the school folders were often incomplete or lacking information. "Intelligence" test scores were obtainable solely from the school record folder.

RESULTS

In all comparisons between normal and retarded samples on PMT data, Mann-Whitney U tests and two-tailed rejection regions were used, unless otherwise stated.

Did higher or lower performing retarded Ss come from just one of the three schools?

Mean TA and Q values on the PMT are presented for the retarded Ss of each school in Table 1. There are no significant differences among the three groups of retarded Ss on either measure. The possible explanation is therefore ruled out that Gambaro's findings were due to just one of his school samples.

TABLE 1

Mann-Whitney U Tests for Differences Between Normal and Retarded Samples on PMT

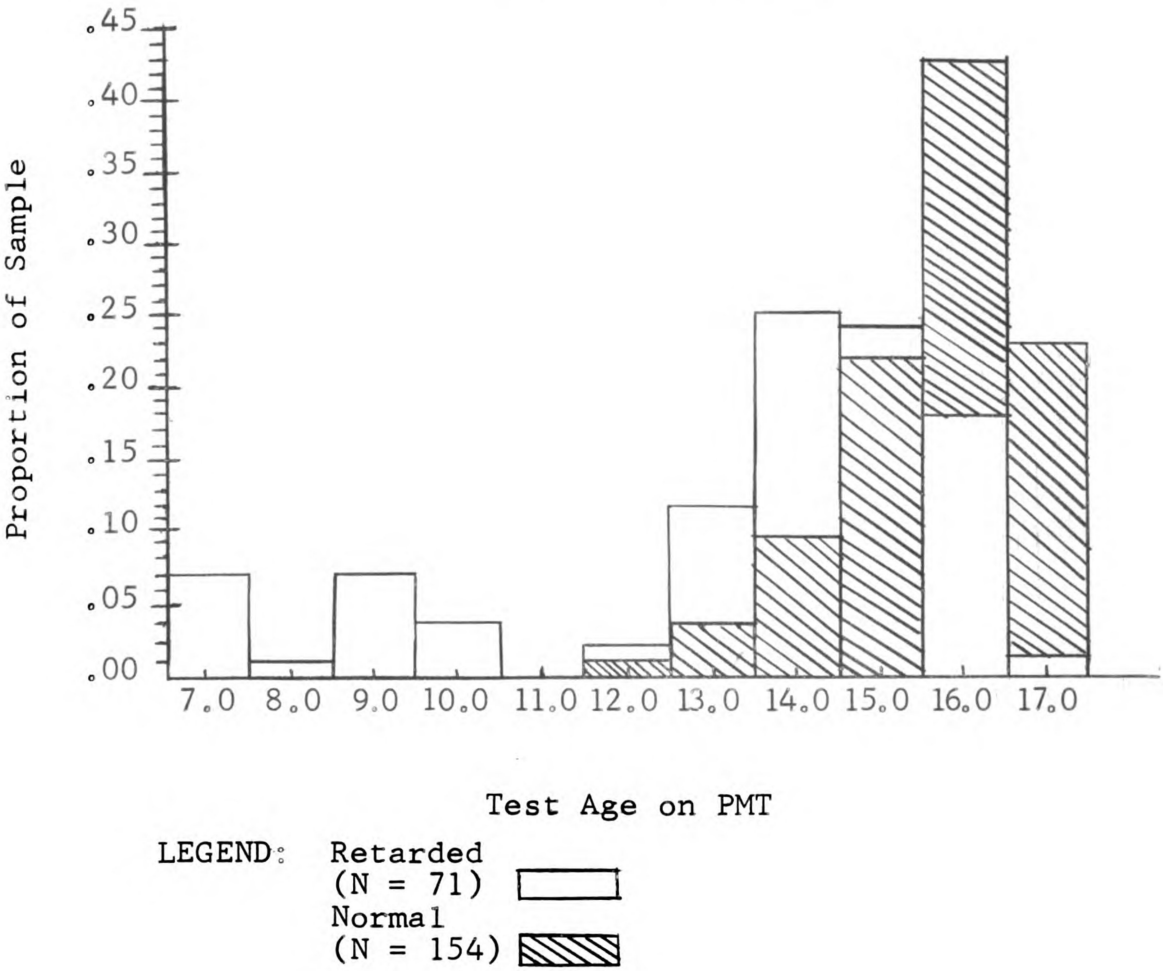
PMT Score	School	Sample Means		U	p
		Normal	Retarded		
TA	Sexton	16.0	14.4	77.5	$<.001$
	Everett	15.9	13.3	315.0	$<.001$
	Eastern	15.9	14.1	823.5	$<.001$
Q	Sexton	25.5	49.5	94.0	$<.001$
	Everett	25.3	43.3	487.0	$<.001$
	Eastern	23.7	35.8	316.5	$<.01$

Is there a difference in performance between the retarded and normal groups on the PMT?

The relevant data are presented in Table 1. In each school the retarded group scores significantly lower than the normal group on TA. At the same time there is a great deal of overlap in the TA score distributions of both groups. Examination of Figure 1 shows that both distributions are negatively skewed, and the distribution of the normal Ss also reflects the low ceiling of the scale.

FIGURE 1

Distribution of Test Age Scores for Normal and Retarded Ss



In terms of Q score, retarded Ss should score significantly higher than normal Ss. As shown by the summary data in Table 1, this is the case.[3] In each school the retarded group scores significantly higher than the normal group. The distribution of Q scores for the normal Ss shows some positive skewness but it is more markedly so for the retarded Ss (see Figure 2). As in the case of the TA distributions there is also a fair amount of overlap of the two distributions on this measure. In this instance, it is instructive to apply a cutting score to the Q measure distributions which in several studies has been found to discriminate between dependable and undependable individuals (Docter & Winder, 1954; Fooks & Thomas, 1957; Porteus, 1959; Wright, 1944). Using cut scores of 29 for males and 32 for females, 75 per cent of the retarded Ss and 36 per cent of the normal Ss score above these values. These figures fit fairly well those previously found; in general 20-30 per cent of dependable individuals and 80-70 per cent of undependable individuals score above these values. In spite of this gross discrimination, however, it is clear that in using such a cut score many errors would occur in predicting for the individual case.

How do both the normal and retarded groups score as compared to Porteus' standardization group?

Surprising as it is, truly adequate normative information is not to be found either in the general literature or in

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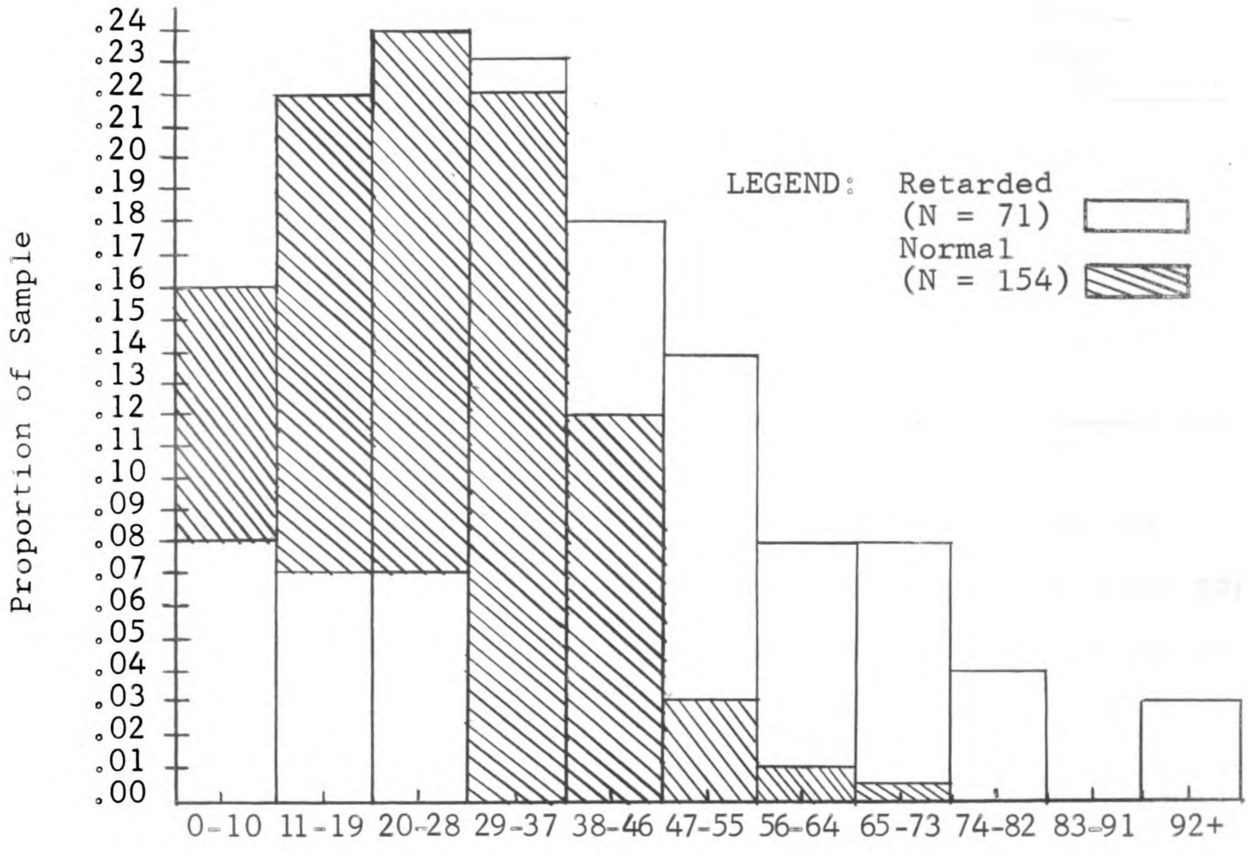
[3] In previous research, correlations from -.22 to -.44 have been reported between TA and Q on the PMT. In the present study the correlation for the combined samples is -.40 ($N = 225$, $p < .001$).

FIGURE 2

Distribution of Q Scores for
Normal and Retarded Ss



Porteus' extensive writings. The closest thing to adequate data on a possibly representative normal sample of high school students is reported by Porteus (1959). As far as can be determined, the sample seemingly varies in age from 14 to 17 years, is of like sex distribution as that of the normal Ss included in the present study, and has the mean and standard deviation values on TA and Q presented in Table 2. Comparison between this sample and the normal one under study shows that they differ significantly on TA ($t = 2.63$, $df = 452$, $p < .01$ two tailed), but not on Q ($t = 1.68$, $df = 452$).

TABLE 2

PMT Data for Normal and Retarded Samples

Sample	PMT Score			
	TA		Q	
	Mean	S.D.	Mean	S.D.
Porteus Normal (N = 300)	15.43	1.63	22	13
Present Study Normal (N = 154)	15.94	1.09	25	13
Retarded (N = 71)	13.69	2.68	42	21

According to Porteus a 14 year TA "can probably" be taken as representative of the average person in the general population. As compared to the "general average of the population" then, both high school groups are relatively bright, although the one under study is significantly brighter. On the basis of their TA the normal Lansing students have an average TQ of 128.

As noted by Gambaro, his so-called retarded Ss scored quite high on TA. Converting their TA scores into TQ data; their average TQ of 112 places them well within a "normal" range. On the other hand, in terms of the Q measure, the "retarded" group's performance appears to be more in keeping with its label. The apparent paradox, however, between the two findings seems resolvable on the basis of previous research. In studies where mean TA is about average or higher and mean Q is in the range of 29-50, the Ss are likely to be called such things as "undependable," "lazy," "slow," "illiterate," "confused," or "sloppy" (Porteus, 1959). More likely than not they will also be found

by their teachers to have unsatisfactory behavior in school as shown by "indifferent effort and undependable work in completing assignments" (Porteus, 1959). Essentially their difficulties are not a function of "subnormal intelligence" but are a function of motivation or other personal characteristics. Taken together these pieces of evidence give rise to a composite picture which suggests that a number of the "retarded" Ss under study are probably better classified as "academically poor performers" due to lack of learning or motivation, rather than as individuals of subnormal intelligence.

In what sense are the "retarded" Ss appropriately so classified, if any?

Do the retarded Ss score in the "mentally deficient" range on a standard intelligence test? It was possible to obtain an IQ score of some vintage on 45 of the 71 retarded Ss. It can only be presumed that the data for the 45 Ss are representative of that for the total 71. The number of Ss scoring above and below the conventional dividing value of an IQ score of 70 on the WAIS or WISC is shown in Table 3. Over 67 per cent of the retarded Ss are inappropriately classified on this basis. If the dividing score is increased to the IQ value of 79, used by the Lansing Special Education System, 22 per cent are still misclassified. Even the mean IQ score of 77 for the group fails to be representative of what is to be expected for a mentally retarded sample. The mean CMMT non-language IQ of 109 for the normal group (N = 154) is at least more consistent. Here too, however, six per cent of the Ss have an IQ score below 75.

TABLE 3

Number of "Retarded" Ss Having WAIS or WISC IQ Score Above or Below 70

IQ Score	
Below 70	Above 70
15	30

which is a fair approximation to a cut score of 70 on the WAIS or WISC.[4] If the cut point is raised to 85, in approximation of a 79 on the WAIS or WISC, 10 per cent of the normal Ss score below this value. For the CMMT language IQ scores the mean is 107; four per cent of the normal Ss score below 75 and 15 per cent score below a cut point of 85.

Analysis of the socioeconomic measures raised additional questions about the appropriateness of the label or the bases on which the "retarded" Ss may have been originally classified. It was possible to determine father's occupation for all normal and 54 of the retarded Ss, house value for 119 of the normal and 33 of the retarded Ss, and number of siblings for 153 of the normal and 61 of the retarded Ss. Analysis of the paternal occupation data in Table 4, gives a X^2 value of 20.96, df = 4, p .001.[5]

[4]There are low positive significant correlations between intelligence test score and TA of the PMT for both the normal and retarded samples (see Appendix E). And there is a low negative significant association between Q score on the PMT and nonlanguage IQ score on the CMMT for the normal group. These findings appear to agree with previous reports summarized by Porteus (1959).

[5]It was not one of the purposes of the present study to determine how close either the normal or retarded samples are to representative U.S. Census data. However, what amounts to percentage approximations of paternal occupation data are presented for illustrative purposes in Table 4. The distribution is based

TABLE 4

Distribution of Normal and Retarded Ss by Father's Occupational Level

Occupational Level	Normal		Retarded		U.S. Population
	N	%	N	%	%
Professional, Technical, Managerial & Self-Employed	50	32	3	6	23
Clerical and Sales	20	13	5	9	21
Skilled	40	26	16	30	23
Semi-Skilled	24	16	19	35	11
Unskilled & Service	20	13	11	20	15

A similar analysis on the house value data of Table 5 gives a value of 16.8, df = 4, $p < .01$. For the siblings data of

TABLE 5

Distribution of Normal and Retarded Ss by House Value

House Value	Sample	
	Normal	Retarded
$15,000 +	22	3
13,000 - 14,999	24	3
11,000 - 12,999	24	2
9,000 - 10,999	40	13
5,000 - 8,999	13	12

on U.S. Census data for 1960 (Report PHC 1-73). The U.S. per cents are crude estimates at best, since the coding systems of the census report and the present study hardly duplicate one another. It was impossible to find any suitably coded U.S. Census data for either house value or number of siblings.

Table 6, $X^2 = 5.27$, df = 5, p .50-.30.[6] It is clear that the "retarded" Ss have more fathers in lower occupations and fewer in higher occupations than do the normal Ss, and that they more frequently live in homes of lower monetary value.[7]

TABLE 6

Distribution of Normal and Retarded Ss by Number of Siblings

Number of Siblings	Sample	
	Normal	Retarded
0	7	4
1	39	9
2	40	13
3	30	13
4	18	9
5+	19	13

A somewhat different way of visualizing the relationships that occur within and between each sample, with respect to

[6] It was considered possible that number of siblings would not reflect a difference between the retarded and normal Ss unless they were equated for paternal occupation and home value. This was crudely checked by noting the distribution of number of siblings for those Ss whose father's occupation and home value measures were both above the respective median and for those Ss where both measures were below both the medians. This was done separately for retarded and normal Ss. None of the U test comparisons between distributions were significant.

[7] Father's occupation and house value correlate .28 (df = 150, $p < .01$); father's occupation and number of siblings .03 (df = 202); and house value with number of siblings .12 (df = 149).

test and socioeconomic measures, is obtained by inspection of Table 7. The data in this table are based on those cases where complete information was obtained on each S. Looking at the data for normal Ss first, it can be seen that while there is a tendency for the highest occupational categories to differ from the lowest with respect to house value, there are no significant differences with respect to number of siblings or TA. In the case of "retarded" Ss, the data suggest a somewhat greater degree of association among the several measures. In particular this is so in comparing the Professional and Clerical category with any one of the three lower categories on each measure; as one goes from Professional and Clerical to a lower category there is a drop in house value, number of siblings goes up, and TA goes down. Turning next to comparisons between normal and retarded Ss, there is no significant difference on either of the socioeconomic measures at the Professional-Clerical levels. For all three of the lower occupational categories, normal Ss show a significantly higher TA and, except in the case of the lowest category, a significantly higher house value than do "retarded" Ss.

By a rather dubious process of backward reasoning, it seems quite possible to conclude that for at least a fairly large fraction of the "retarded" Ss, a sociocultural difference may have been operative in their original selection. That is, a large number of them, if not all, may have been showing in their school behavior the effects of some kind of -- for want of a better term -- cultural impoverishment. In turn, their

TABLE 7

Median House Value, Number of Siblings, and PMT Test Age For Normal and Retarded Ss Classified by Father's Occupational Level

Father's Occupational Level	House Value		Siblings		Test Age		Number of	
	Normal	Retarded	Normal	Retarded	Normal	Retarded	Normal	& Retarded
Professional, etc.	$11.8^{a,c}$	$12.5^{a,c}$	2.3	$1.5^{a,b}$	$^{x}16.2$	$^{x}15.5^{a,b,c}$	38	7
Clerical & Sales	12.5^{b}		2.6		$^{x}16.5$		16	
Skilled	$^{x}11.1$	$^{x}9.3^{c}$	3.1	2.6	$^{x}16.3$	$^{x}13.5^{c}$	29	8
Semi-Skilled	$^{x}10.2^{a,b}$	$^{x}9.4^{a}$	2.7	2.9^{a}	$^{x}16.4$	$^{x}13.8^{a}$	21	11
Unskilled & Service	10.8^{c}	8.0	3.4	4.3^{b}	$^{x}16.8$	$^{x}13.0^{b}$	15	6

Note: The Professional and Clerical categories for the retarded Ss were combined since N was so small in each case. House value is in thousands of dollars; TA is in years.

^{a,b}Vertical entries with superscripts a or b to the right are significantly different; $p < .05$, one-tailed U test.

^{c}Vertical entries with superscript c to the right have $p < .10$; one-tailed U test.

^{x}Horizontally adjacent entries with superscript x to the left are significantly different; $p < .05$, one-tailed U test.

relatively poor everyday school performance may have been reacted to and judged to be due to intellectual insufficiency *per se*; thus justifying the label "mental retardation," but in a most circular way. Whatever the case, the evidence seems sufficient to warrant the conclusion that some number of the "retarded" *S*s, if not all, are inappropriately classified.

DISCUSSION

If the Ss in the Lansing "Special" program are retarded and representative of the population of all mentally retarded individuals, they should have scored in the "mentally deficient" range on the tests used and come somewhat proportionately from all socioeconomic levels. If, on the other hand, they are retarded and representative of the "Cultural or Garden Variety" retarded population, instead of all mentally retarded Ss, they still should have scored in the appropriate range on the tests, but come disproportionately from the lower socioeconomic classes. The results show that neither set of conditions are sufficiently well met. While a disproportionate number of the so-called retarded Ss do tend to come from the lower socioeconomic classes, practically every S scores above the "mentally retarded" range on at least one of the tests.

As an alternative, it is suggested that most of the "retarded" Ss are probably more appropriately classified as "academically poor performers." This more neutral term has the advantage of obviating the stereotyped thinking on the part of psychologists and educators which almost automatically attaches to the label "mentally retarded." Equally or more important, however, the term appears to be more descriptively correct. The relatively high TA performance on the PMT, in conjunction with the relatively poor performance on Q, the often at least borderline IQ score performance, and the generally lower socioeconomic

level are all consistent with what previous investigators have found to be the case for samples with characteristics like the so-called retarded one under study (Havinghurst & Janke, 1944; Masland, Sarason, & Glandwin, 1958; McCandless, 1964; Porteus, 1959; Sarason, 1959). Such Ss are characterized as tending to have values, interests, and habits that often make them misfits in the regular school classroom. They are likely to be indifferent, frustrated, or bored by school studies and activities. From kindergarten on, they may have been unduly inattentive or distractible in the classroom. Frequently they started off in school failing, and continued to experience failure in their school studies. Often, unless they are shunted into some kind of "special" program, they will end up being "dropouts" or are simply given "social passes" from grade to grade. While the extent to which the Ss under study actually match such descriptions in some quantitative sense is unknown, they at least probably come closer to being representative of such individuals than they are of the mentally retarded. Accordingly, the behavior they show, on the basis of which they have been selected for special attention by the school, is presumed to be more a function of features of their personal and social adjustment or their intellectual efficiency, than a function of their intellectual ability or capacity as such.

This way of viewing the results is also applicable, of course, in the case of those Ss in the normal group who had a relatively low or high TA performance on the PMT, possibly in conjunction with a relatively poor Q performance, a borderline

or lower IQ score, and who come from lower socioeconomic classes; yet are not in the Lansing Special Education program. The appropriate answer would seem to be; they are less likely to be in the program because for some reason their personal-social characteristics in the school situation are acceptable. Clearly, however, this is merely guessing, and a more respectable answer will require further research.

Turning to Gambaro's results, they are apparently better understood, then, as reflecting the relationship between how a S performs on the PMT and his personal-social characteristics; as opposed to how he performs on the PMT and his intelligence. Those individuals who are likely to be hired are not necessarily likely to be more intelligent, but more likely to be more cooperative, more responsible, and careful in their work, and in general more trustworthy. That this interpretation is correct, is suggested by the fact that applying a cut score on the Q distribution of these Ss works as well or better than does the TA cut score used by Gambaro. Further, this way of viewing the results is supported by the rather high correlation found by Gambaro between PMT performance and ratings of personal effectiveness.

Some final comments are called for regarding the Porteus Maze Test. First, as with Gambaro's Ss, the scores of the normal Ss in the present research bunch towards the top of the scale. If for some reason someone wishes to discriminate among brighter and/or older Ss, more difficult mazes need to be added at the adult level. Second, Porteus' normative data are most unlikely

to be representative of U.S. male or female children, adolescents, or adults. Almost all standardization data was obtained more than a quarter of a century ago, and on Chinese, Japanese, Filipino, Korean and mixed racial-ethic subjects. It is hard to believe, without evidence to the contrary, that such data will hold for mainland American Caucasian or Negro subjects. In addition, it is particularly difficult to imagine that even what little normative data is to be found for mentally retarded subjects in Hawaii, is representative of the case in the mainland U.S.

SUMMARY

A previous investigation found that a group of "mentally retarded" adolescents scored higher on the Porteus Maze Test than should be expected. The present research attempts to determine the basis for the inordinately high performance of these Ss.

The Porteus Maze Test was given to 154 normal Ss, and additional descriptive and test information was obtained on them as well as on the 71 "mentally retarded" Ss previously studied. Both groups of Ss came from the same schools and were of fairly comparable age, sex, and grade level distribution.

The results show that in comparison to the normal Ss the retarded Ss are significantly inferior in PMT performance, across all school situations. In comparison to a presumably representative high school sample, the normal Ss are significantly brighter. The "retarded" Ss in turn are apparently brighter than the "average person in the general population." At the same time, however, they are significantly poorer in scored qualitative performance on the PMT. Analysis of intelligence test data shows that 67% of the retarded Ss, on whom scores were available, are misclassified in terms of the usual statistical dividing line for "mental retardation." Also, on the basis of an IQ score alone, a number of the normal Ss should be classified as "retarded" but are not. Additional analyses indicate that the retarded Ss differ significantly from the normal

Ss in socioeconomic level. The retarded Ss more frequently have father's in lower level occupations and more frequently live in homes of low monetary value.

Considering the results as a whole, it is concluded that a fairly large number of the "retarded" Ss are inappropriately labeled. Rather than having been originally selected on the basis of "insufficient intelligence," it is proposed that selection is likely to have occurred more on the basis of S's unacceptable personal-social characteristics. Supporting evidence is cited for this proposal and it is suggested that many of the Ss are better "labeled" as "academically poor performers." This more neutral term appears to be more correct in fact and has the advantage of obviating the stereotyped thinking on the part of psychologists and educators which almost automatically attaches to the label "mentally retarded." Turning to the Porteus Maze Test, it is noted that more difficult mazes need to be added at the adult level if discrimination among brighter or older Ss is desired. In addition, serious reservations are noted and discussed regarding the "representativeness" of what little normative or standardization information is available.

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APPENDICES

APPENDIX A

Student Information Sheet

SEX _____ YOUR BIRTHDATE: _____/_____/____
mo. day year

YOUR PRESENT ADDRESS: _____

PLEASE CHECK THE ONE WHICH APPLIES TO YOU:

I LIVE IN THE FOLLOWING TYPE OF DWELLING UNIT

APARTMENT PRIVATE HOUSE OTHER _____
explain

HOW MANY BROTHERS AND SISTERS DO YOU HAVE?

BROTHERS _____ SISTERS _____

WHAT IS YOUR FATHER'S OCCUPATION? _____

PLEASE CHECK THE BOX WHICH APPLIES TO YOUR PRESENT CLASS STATUS:

FRESHMAN ___ SOPHOMORE ___ JUNIOR ___ SENIOR ___

APPENDIX B

Means and Standard Deviations of PMT TA and Q Scores for Normal and Retarded Ss

PMT Score	School	Normal			Retarded		
		$\bar{x}$	s.d.	N	$\bar{x}$	s.d.	N
TA	Sexton	16.0	.93	46	14.4	1.27	11
	Everett	15.9	1.32	56	14.1	2.92	20
	Eastern	15.9	.99	52	13.3	2.80	40
Q	Sexton	25.4	12.9	46	49.6	22.5	11
	Everett	23.7	11.8	56	35.8	18.8	20
	Eastern	25.3	15.5	52	43.3	20.6	40

APPENDIX C

Mean Age and PMT Values for Normal and Retarded Ss

Sample	N	Chronological Age	PMT Score TA Mean	TA Range	TQ Mean	TQ Range
Normal	154	17.3	15.94	12.0 - 17.0	128.11	98 - 135
Retarded	71	18.4	13.70	7.0 - 17.0	112.28	58 - 135
Combined	115	17.3	15.23	7.0 - 17.0	122.80	58 - 135

APPENDIX D

Mean Number of Siblings and Mean TA Score on PMT for Normal and Retarded Ss: Grouped by Parental Occupation and House Value

	Normal			Retarded		
	N	Sibling Mean	TA Score Mean	N	Sibling Mean	TA Score Mean
Above Median on H.V. & Occup.	37	2.5	16.0	4	1.3	15.5
Below Median on H.V. & Occup.	20	2.5	16.1	13	3.0	13.1
Above Median on H.V. -at or Below Median on Occup.	30	2.8	15.8	4	3.8	12.4
Below Median on H.V. -at or Above Median on Occup.	32	3.4	15.8	11	2.3	13.4

Note: Medians are based on Retarded and Normal samples (N = 151). Median House Value is $10,800; Median parental occupational classification is Skilled.

APPENDIX E

Pearson Correlations Between PMT and Intelligence Test Scores

Sample	Test Score	PMT Score TA	PMT Score Q
Normal (N = 145)	CMMT		
	NL	.23**	-.25**
	L	.22**	.11
Retarded (N = 45)	WAIS or WISC Full Scale Score	.34*	.08

*p < .05
**p < .01

APPENDIX F

Pearson Correlations Between PMT and Socioeconomic Measures for Normal and Retarded Samples Combined

Socioeconomic Measure	PMT Score TA	PMT Score Q
Father's Occupation (N = 208)	.17*	.08
House Value (N = 152)	.22**	.02
Number of Siblings (N = 217)	.13	.12

*p < .05
**p < .01

APPENDIX G

RAW DATA - (NORMALS)

Subject # By School	Sex	Age (in Years)	# of Siblings	PMT T.A.	PMT T.Q.	PMT Q	Father's Occupational Level	Average House Value (in 1,000's of dollars)	I.Q. CMMT L	I.Q. CMMT NL
Eastern - 28	F	16	5	16.5	132	10	3	8.5	108	132
29	M	16	3	15.5	126	28	5	17.0	106	102
16	F	16	5	15.5	126	20	5	8.0	96	123
31	M	17	2	13.5	110	49	3	13.5	121	118
5	M	18	4	16.5	132	2	4	12.5	116	134
33	M	17	3	15.5	126	19	5	NI	99	96
4	M	16	5	15.0	122	58	5	11.0	95	110
30	F	19	9	14.5	118	58	3	8.0	104	90
2	M	17	1	17.0	135	13	5	NI	137	127
17	M	17	9	17.0	135	9	5	11.5	84	83
1	F	16	4	16.5	132	12	1	14.5	116	86
34	F	17	0	16.0	129	9	5	12.0	135	125
6	F	17	5	13.5	110	26	2	8.5	82	80
26	M	17	3	16.0	129	18	1	NI	98	117
49	M	18	1	15.5	126	35	5	9.5	118	136
14	F	17	3	16.0	129	15	1	9.5	97	92
11	F	17	2	17.0	135	23	1	13.5	112	115
27	M	17	2	15.5	126	38	5	9.0	86	105
3	F	17	3	15.0	122	6	5	11.5	124	129
50	F	17	6	15.0	122	38	5	10.0	106	110
12	M	17	2	17.0	135	11	3	NI	104	122
13	M	16	1	17.0	135	44	5	12.0	128	128
10	M	18	6	17.0	135	34	1	5.0	93	100
40	F	17	1	14.5	118	7	2	9.0	79	112
25	F	16	1	17.0	135	4	5	16.0	120	138
9	F	17	2	15.0	122	12	5	8.5	121	110
47	F	17	1	17.0	135	48	5	NI	110	102
24	M	16	1	17.0	135	38	5	NI	78	103
48	M	16	3	17.0	135	28	1	10.5	79	81
21	F	18	3	14.5	118	30	5	9.5	110	65
42	M	18	1	17.0	135	41	2	10.5	104	118
39	M	18	2	16.5	129	34	3	17.5	114	141

APPENDIX G Con't.

RAW DATA - (NORMALS)

Subject # By School	Sex	Age (in Years)	# of Siblings	T.A.	PMT T.Q.	Q	Father's Occupational Level	Average House Value (in 1,000's of dollars)	I.Q. CMMT L	I.Q. CMMT NL
35	M	17	2	17.0	135	46	2	12.5	127	115
23	F	17	2	16.0	129	67	1	NI	95	99
46	M	17	1	17.0	135	19	3	NI	86	113
22	M	16	3	16.5	132	36	4	10.5	NI	
15	F	18	6	15.5	126	18	3	9.0	77	89
8	M	17	3	17.0	135	16	3	9.0	66	74
36	F	17	1	16.5	132	17	3	8.5	90	99
41	M	17	0	16.5	132	29	3	NI	122	117
7	F	18	3	15.0	122	27	3	NI	81	102
44	F	17	1	16.0	129	17	5	14.5	118	115
45	F	18	3	15.5	126	12	5	8.5	101	104
52	F	17	1	13.5	110	33	2	8.0	82	113
51	M	18	1	15.0	122	22	2	9.0	117	104
19	F	17	2	16.5	132	4	5	9.5	121	114
18	F	17	1	15.5	126	11	5	NI	94	117
43	F	17	1	16.0	129	46	4	9.5	76	69
38	M	17	6	16.0	129	20	2	NI	116	124
32	F	17	4	16.5	132	12	2	9.0	126	133
37	F	17	4	16.0	129	26	5	NI	88	102
20	M	17	4	16.5	132	18	3	10.0	126	127
Sexton - 18	F	18	2	17.0	135	21	1	17.5	69	65
13	F	17	4	17.0	135	20	3	20.0	127	123
45	M	18	2	16.5	132	27	3	NI	121	145
31	M	17	3	15.5	126	37	3	12.5	106	115
40	F	17	3	15.0	122	26	5	21.0	124	93
37	M	18	1	16.5	132	14	1	9.5	117	131
28	F	18	2	17.0	135	11	2	NI	125	123
3	M	18	2	17.0	135	15	3	18.5	123	145
47	M	19	10	16.5	132	10	2	11.0	85	102
17	M	18	3	14.0	114	25	2	18.5	58	46
8	M	18	2	16.5	132	31	2	10.5	101	99
15	M	17	2	15.0	122	54	3	11.5	113	102

APPENDIX G Con't.

RAW DATA - (NORMALS)

Subject # By School	Sex	Age (in Years)	# of Siblings	T.A.	PMT T.Q.	Q	Father's Occupational Level	Average House Value (in 1,000's of dollars)	I.Q. CMMT L	I.Q. CMMT NL
16	M	18	2	14.5	118	36	4	14.5	112	111
41	M	17	5	16.5	132	38	4	9.5	115	122
43	F	17	1	14.0	114	28	3	8.0	79	84
23	F	18	1	16.0	129	23	4	NI	99	103
7	M	18	1	16.0	129	33	1	NI	133	111
10	F	17	4	15.0	122	33	3	10.5	112	97
19	F	18	0	16.5	132	32	5	16.5	108	122
4	F	17	2	16.5	132	19	5	NI	123	115
36	F	18	2	16.5	132	0	2	9.5	113	101
38	F	17	4	16.0	129	37	1	NI	109	115
12	M	18	1	16.0	129	54	4	11.5	66	62
46	F	18	0	16.5	132	25	5	NI	107	111
48	F	18	0	16.5	132	32	5	21.0	115	111
14	F	18	1	17.0	135	6	5	11.0	116	127
20	M	17	4	17.0	135	18	2	16.5	111	97
39	M	18	2	16.5	132	32	5	NI	NI	
34	F	17	2	15.5	126	31	5	NI	110	88
25	F	18	4	16.0	129	14	1	17.0	118	130
27	M	18	1	16.5	132	32	5	NI	123	126
26	M	18	4	15.5	126	11	4	14.5	121	130
9	F	17	3	15.5	126	40	2	9.0	101	122
1	F	17	4	14.5	118	45	5	14.5	124	93
5	F	18	3	17.0	135	6	3	NI	122	112
42	F	17	1	16.0	129	17	3	NI	126	127
11	F	18	3	16.5	132	8	5	NI	107	118
2	M	17	2	14.0	114	29	5	18.5	124	109
24	M	19	11	17.0	135	8	3	9.5	102	102
29	F	16	2	16.5	132	24	5	NI	124	98
30	M	17	5	16.0	129	43	4	13.5	124	123
22	F	17	6	15.0	122	46	1	NI	87	104
6	M	19	3	14.0	114	20	2	11.5	67	69
21	M	18	2	17.0	135	28	2	8.5	99	121

APPENDIX G Con't.

RAW DATA - (NORMALS)

Subject # By School	Sex	Age (in Years)	# of Siblings	T.A.	PMT T.Q.	Q	Father's Occupational Level	Average House Value (in 1,000's of dollars)	I.Q. CMMT L	I.Q. CMMT NL
35	M	18	3	16.5	132	20	1	10.0	126	137
33	M	18	4	17.0	135	10	1	11.0	83	114
Everett - 27	F	17	1	16.0	129	25	5	10.0	93	109
26	M	17	6	17.0	135	21	3	11.5	NI	
25	F	17	2	16.5	132	30	3	14.5	NI	
24	M	17	1	16.5	132	26	2	8.5	NI	
14	M	17	4	16.0	129	22	5	9.0	94	94
2	F	16	1	17.0	135	12	1	9.0	127	107
3	F	18	4	16.0	129	26	5	14.0	NI	
4	M	18	2	17.0	135	14	4	16.0	108	94
5	M	17	2	16.5	132	25	4	13.5	82	100
6	F	17	3	14.5	118	18	1	14.0	102	91
7	M	18	3	16.5	132	19	5	NI	113	134
8	M	17	3	16.5	132	34	5	15.5	124	95
9	M	16	4	15.5	126	29	5	11.0	NI	
10	F	18	7	12.0	98	29	3	NI	72	98
11	F	18	0	17.0	135	12	2	10.0	97	92
12	F	17	4	15.0	122	16	3	9.0	113	114
13	M	18	10	14.5	118	44	3	10.5	116	100
1	M	18	1	16.0	129	29	3	14.5	119	117
15	M	18	1	17.0	135	14	5	10.5	122	117
16	M	17	2	16.5	132	44	5	22.0	108	95
17	F	17	3	12.5	102	39	2	NI	NI	
18	F	17	3	16.0	129	23	3	11.0	108	106
19	F	18	2	16.5	132	10	2	11.5	116	119
20	F	17	1	16.5	132	22	5	10.0	106	99
21	M	18	2	15.5	126	36	1	16.5	89	99
22	F	17	6	15.5	126	42	5	19.5	118	118
23	F	17	1	16.5	132	0	3	14.5	118	134
35	F	17	1	17.0	135	22	3	NI	104	111
42	F	17	1	15.5	126	20	5	12.5	128	128
28	M	19	1	16.0	129	31	1	8.5	69	67

APPENDIX G Con't.

RAW DATA - (NORMALS)

Subject # By School	Sex	Age (in Years)	# of Siblings	T.A.	PMT T.Q.	Q	Father's Occupational Level	Average House Value (in 1,000's of dollars)	I.Q. CMMT L	I.Q. CMMT NL
35	M	18	3	16.5	132	20	1	10.0	126	137
33	M	18	4	17.0	135	10	1	11.0	83	114
Everett - 27	F	17	1	16.0	129	25	5	10.0	93	109
26	M	17	6	17.0	135	21	3	11.5	NI	
25	F	17	2	16.5	132	30	3	14.5	NI	
24	M	17	1	16.5	132	26	2	8.5	NI	
14	M	17	4	16.0	129	22	5	9.0	94	94
2	F	16	1	17.0	135	12	1	9.0	127	107
3	F	18	4	16.0	129	26	5	14.0	NI	
4	M	18	2	17.0	135	14	4	16.0	108	94
5	M	17	2	16.5	132	25	4	13.5	82	100
6	F	17	3	14.5	118	18	1	14.0	102	91
7	M	18	3	16.5	132	19	5	NI	113	134
8	M	17	3	16.5	132	34	5	15.5	124	95
9	M	16	4	15.5	126	29	5	11.0	NI	
10	F	18	7	12.0	98	29	3	NI	72	98
11	F	18	0	17.0	135	12	2	10.0	97	92
12	F	17	4	15.0	122	16	3	9.0	113	114
13	M	18	10	14.5	118	44	3	10.5	116	100
1	M	18	1	16.0	129	29	3	14.5	119	117
15	M	18	1	17.0	135	14	5	10.5	122	117
16	M	17	2	16.5	132	44	5	22.0	108	95
17	F	17	3	12.5	102	39	2	NI	NI	
18	F	17	3	16.0	129	23	3	11.0	108	106
19	F	18	2	16.5	132	10	2	11.5	116	119
20	F	17	1	16.5	132	22	5	10.0	106	99
21	M	18	2	15.5	126	36	1	16.5	89	99
22	F	17	6	15.5	126	42	5	19.5	118	118
23	F	17	1	16.5	132	0	3	14.5	118	134
35	F	17	1	17.0	135	22	3	NI	104	111
42	F	17	1	15.5	126	20	5	12.5	128	128
28	M	19	1	16.0	129	31	1	8.5	69	67

APPENDIX G Con't.

RAW DATA - (NORMALS)

Subject # By School	Sex	Age (in Years)	# of Siblings	PMT T.A.	PMT T.Q.	PMT Q	Father's Occupational Level	Average House Value (in 1,000's of dollars)	I.Q. CMMT L	I.Q. CMMT NL
29	M	18	4	16.5	132	19	1	9.0	117	112
30	F	18	3	16.5	132	27	3	9.0	92	71
31	F	17	1	16.5	132	34	3	14.0	92	85
32	M	17	3	17.0	135	9	2	9.5	108	98
33	F	16	1	14.5	118	44	2	12.5	107	106
34	M	17	2	15.0	122	36	5	19.0	111	101
36	M	17	2	17.0	135	28	5	14.5	120	108
37	M	18	0	16.0	129	33	5	9.0	92	117
38	M	17	2	16.5	132	0	3	9.5q	114	114
39	F	17	2	15.5	126	9	4	12.5	102	117
40	F	17	2	17.0	135	0	4	11.5	107	127
41	F	18	3	15.0	122	31	3	NI	105	106
43	M	18	1	17.0	135	32	4	20.0	131	124
44	M	17	2	15.5	126	37	5	9.0	119	96
45	M	17	3	16.5	132	40	5	16.5	110	107
46	F	17	3	16.0	129	8	2	11.5	95	110
47	F	17	7	10.0	82	20	3	13.5	NI	
48	M	18	1	16.5	132	26	3	10.0	114	136
49	F	18	2	16.0	129	26	4	16.5	NI	
50	M	17	2	17.0	135	32	4	14.0	92	116
51	M	17	3	16.5	132	2	5	11.5	113	116
52	F	17	2	15.0	122	16	4	10.5	104	112
53	M	17	2	16.0	129	26	4	NI	110	118
54	F	17	1	16.5	132	8	3	NI	89	111
55	F	18	1	14.5	118	33	3	13.5	79	89
56	M	17	2	16.5	132	18	3	14.5	129	102

APPENDIX G Con't.

RAW DATA - (RETARDATES)

Subject # By School	Sex	Age (in Years)	# of Siblings	T.A.	PMT T.Q.	Q	Father's Occupational Level	Average House Value (in 1,000's of dollars)	I.Q. WAIS or WISC
Sexton - 27r	M	16	5	15.0	122	66	NI	NI	76
30r	M	19	2	16.0	129	49	2	9.5	NI
17r	M	17	3	14.0	114	78	2	9.0	NI
18r	M	17	1	15.5	126	52	NI	NI	85
31r	M	18	5	14.0	114	39	NI	NI	NI
9cs	M	19	1	14.5	118	35	4	12.0	68
33cs	F	18	10	16.0	129	7	NI	NI	57
16cs	F	18	NI	14.5	118	70	3	NI	75
15cs	M	19	NI	14.5	118	21	NI	NI	NI
5cs	M	18	4	12.5	102	54	2	14.0	70
6cs	F	18	NI	12.0	98	74	NI	NI	NI
Everett-13r	M	18	4	16.0	129	33	1	9.5	71
29r	M	17	3	16.5	132	33	2	NI	85
8r	M	17	1	7.5	62	46	2	11.5	NI
20r	M	19	2	14.5	118	31	2	8.5	75
12r	F	18	1	15.5	126	50	1	NI	75
10r	F	17	0	13.0	106	50	2	9.0	55
2r	M	NI	NI	9.5	78	53	NI	NI	85
22r	M	18	NI	9.0	74	36	2	9.5	75
1cs	M	18	3	9.0	74	28	3	NI	NI
24cs	M	17	1	15.5	126	46	3	NI	68
22cs	M	17	0	16.0	129	6	3	9.0	78
3cs	M	18	4	13.5	110	40	3	10.0	65
25cs	M	19	6	16.0	129	9	1	15.5	NI
29cs	M	18	1	14.5	118	37	4	13.5	NI
28cs	M	19	2	16.5	132	17	5	27.0	NI
27cs	M	19	NI	15.5	126	66	NI	NI	NI
18cs	M	19	2	14.0	114	53	NI	NI	NI
35cs	M	18	2	16.0	129	14	3	7.0	NI
34cs	M	19	8	16.5	132	8	3	NI	71
2cs	M	18	1	16.5	132	59	4	14.5	NI

APPENDIX C Con't.

RAW DATA - (RETARDATES)

Subject # By School	Sex	Age (in Years)	# of Siblings	T.A.	PMT T.Q.	Q	Father's Occupational Level	Average House Value (in 1,000's (of dollars)	I.Q. WAIS or WISC
Eastern- 1r	M	17	6	10.5	86	41	NI	NI	80
4r	F	17	5	16.5	132	5	1	NI	79
11r	F	16	2	13.0	106	68	3	9.0	73
21r	M	18	4	15.5	126	35	2	NI	NI
15r	F	16	2	7.0	58	40	3	8.5	59
2r	F	16	6	14.5	118	55	1	NI	70
14r	M	16	3	8.5	70	59	NI	NI	58
3r	F	16	9	7.0	58	42	1	NI	57
25r	M	17	2	14.0	114	21	3	9.5	NI
5r	M	18	4	15.0	122	18	3	NI	NI
19r	M	18	4	14.0	114	59	2	9.5	64
16r	M	16	3	14.0	114	26	2	NI	NI
7r	M	18	6	15.5	126	37	5	6.5	61
9r	F	16	3	7.5	62	31	3	8.5	NI
24r	F	17	2	10.5	86	74	2	10.0	NI
6r	M	16	2	13.5	110	44	2	8.0	77
26r	F	16	1	14.0	114	50	NI	NI	NI
23r	M	17	4	13.5	110	65	1	17.5	83
28r	F	16	1	15.0	122	34	3	NI	79
21cs	M	18	7	16.0	129	6	2	7.0	78
40cs	M	18	0	14.5	118	70	4	9.5	NI
30cs	F	17	2	15.5	126	32	4	8.5	78
10cs	F	17	NI	14.5	118	44	2	NI	77
32cs	F	18	3	15.5	126	12	NI	NI	NI
23cs	M	17	10	17.0	135	35	NI	NI	66
19cs	F	18	4	7.5	62	19	1	6.5	56
26cs	M	18	9	16.0	129	36	1	NI	68
14cs	M	18	2	15.0	122	35	2	NI	83
12cs	M	18	6	9.5	78	62	NI	NI	60
7cs	M	19	0	15.0	122	33	2	NI	75
17cs	M	17	2	14.5	118	25	3	9.0	71
37cs	M	19	5	15.5	126	64	NI	NI	90

APPENDIX C Con't.

RAW DATA - (RETARDATES)

Subject # By School	Sex	Age (in Years)	# of Siblings	T.A.	PMT T.Q.	Q	Father's Occupational Level	Average House Value (in 1,000's of dollars)	I.Q. WAIS or WISC
4cs	F	19	3	14.0	114	42	2	NI	67
20cs	F	18	4	13.5	110	92	5	NI	NI
13cs	M	19	3	9.0	74	39	2	8.5	81
31cs	M	18	NI	15.5	126	58	3	NI	74
36cs	M	16	3	15.0	122	51	1	8.0	73
8cs	F	19	3	13.0	106	94	1	6.5	NI
11cs	F	16	3	13.0	106	31	3	NI	75
39cs	M	19	3	15.0	122	46	NI	NI	NI