

# A Follow-up Study of Dyslexic Boys

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*Over 500 men who attended the Gow School, an independent school for boys with developmental dyslexia, were given a follow-up questionnaire from 1 to 38 years after they left the school. More than half had graduated from college; business was the most frequently chosen major in college; most were employed in managerial or related business positions; and their adult reading habits and attitudes did not compare well with those of other men of similar socioeconomic backgrounds. Socioeconomic status and IQ were not predictive of adult outcome among these men in contrast to their effect in the general population. An important result was that severity of the reading problem upon entrance to Gow and the academic and remedial progress of the men while at the school were highly predictive of adult educational, occupational, and attitudinal status.*

## Introduction

With the increased attention to the identification and remediation of developmental dyslexia and other learning disabilities in the last few decades, there has been a consequent interest in the adult outcomes of children with these conditions. This interest is reflected in the review of Herjanic and Penick (1972) and in several more recent reviews (Spreeen 1982; Schonhaut and Satz 1983; Horn, O'Donnell, and Vitulano 1983; and Finucci 1985). In all of these, the point was made that few follow-up studies included a large sample size, used clearly stated diagnostic criteria, or followed subjects well into adulthood. The study

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This work was supported by funds from NIH grant HD00486, the Gow School, and the John F. Kennedy Institute. We thank the following people for their assistance: Redmond C.S. Finney, David Gow, Sarah D. Isaacs, Ann E. Pulver, and Catherine C. Whitehouse.

of Gow School alumni reported here takes each of these factors as well as the severity of dyslexia among subjects into consideration.

The Gow School, founded in 1926, is an independent boarding school for boys with developmental dyslexia located in South Wales, New York. It includes grades seven through twelve and offers a college preparatory curriculum. All students at the school take a course in Reconstructive Language each year. This course, which meets daily, provides instruction and practice in reading and language skills and is strongly based in phonics, word roots and derivations, and language structure.

The motivation for conducting the study arose from the school's own realization that their records and large alumni group constituted a valuable resource for research purposes and from their interest in fostering research at the school. At the same time, our reading research group at Johns Hopkins had an interest in the natural history of reading disability particularly as it might illustrate an influence of one's biological makeup on educational and vocational outcomes and lifestyle in general. Our purposes were to: 1) characterize the students upon entry to the school; 2) characterize their achievement while at the school; 3) describe a number of adult outcomes; 4) determine the relationship, if any, between outcomes and earlier status; and 5) compare the outcomes of Gow alumni to those of alumni of an independent school whose students are not known to be dyslexic.

## Methods

### Subjects

The focus of this study was on the 965 men who had left the Gow School between the years 1940 and 1977. Although students had been at the school earlier than that, their records were insufficient to make them suitable for study. We were able to locate by mail or phone 672 (69.6 percent) of these alumni and of those contacted, 579 (86.1 percent) responded to the questionnaire described below.

In addition to the Gow alumni, a sample of 753 alumni of the Gilman School, an independent school, in Baltimore were sent a similar but slightly expanded questionnaire. The Gilman School draws from approximately the same middle to high socioeconomic classes and the students are not known to be dyslexic. The alumni contacted were proportionately matched with the Gow alumni for the year of leaving their respective schools. Six hundred and twelve (81.3 percent) of the Gilman alumni responded. Their data were used to make some specific comparisons.

## Procedures

Two types of data were gathered: information from school records and followup information obtained through a questionnaire.

*School record data.* For the Gow School men, information in the school records included intelligence and achievement test scores and laterality scores obtained at the time of application to the school and achievement test scores and grades in both academic and Reconstructive Language courses while the men were at the school. Stanford-Binet IQ scores (Terman and Merrill 1937) were available for most of the men and Wechsler-Bellevue IQ test scores (Wechsler 1944) were available for most of the men in attendance after 1949. The achievement test scores discussed in this report are those from the Gray Oral Reading Paragraphs Test (Gray 1955), the Morrison-McCall Spelling Scale (Morrison and McCall 1923), and a silent reading comprehension test, The Paragraph Meaning subtest of the Stanford Achievement Test (Kelley et al. 1922, 1966). For the Gilman men, information ascertained from records included English grades, rank in class, and for most, SAT scores.

*Questionnaire data.* The questionnaire sent to the Gow alumni included questions about their educational and occupational outcomes, about their families, and about their current reading habits and attitudes. With respect to educational outcomes, we asked questions relating to when and where degrees were earned, about the number of years spent in college and graduate school, and the field of study. Questions about occupation asked for job descriptions so that jobs could be classified according to U.S. census occupational classification codes (U.S. Bureau of the Census 1971). Questions relating to the family concerned the subject's own marital status, education of the respondent's mother, father, and wife, his father's occupation, and whether reading disability was present in the respondent's sibs or offspring. There were also questions about the amount and type of his reading, his attitude toward reading for pleasure, and a self-assessment of spelling ability.

Most of the questions required the subject to select one of several options as a response. The remainder required a written response of about two or three words. The questionnaire sent to the Gilman alumni included all of the items on the Gow questionnaire, a few additional questions about their reading habits and attitudes, and a rating scale about abilities and traits that they thought were important in their jobs.

The questionnaires were mailed to subjects and nonresponding alumni were sent follow-up copies and encouraged to reply. Finally, those who had not returned them within several weeks' time were called and administered the questionnaire over the telephone. Of the

Table I  
Distributions and Means for Grade of Entry and Length of Stay at The Gow School (1940–1977)

a) Grade of Entry			b) Length of Stay		
Grade	<i>n</i>	%	Length	<i>n</i>	%
≤ 8th	323	33.5	< 2 yrs.	270	28.0
9th or 10th	466	48.3	2 – 3.9 yrs.	498	51.6
11th or 12th	176	18.2	≥ 4 yrs.	197	20.4
Total	965	100.0	Total	965	100.0

579 Gow respondents, 163 (28.2 percent) responded by telephone; 59 (9.6 percent) of the 612 Gilman replies were by telephone.

## Results

### The Men while at The Gow School

In this section we will say something about the alumni while they were at The Gow School. First of all, Table I shows the distributions for both the grade of entry and length of stay for the 965 men who left the school between 1940 and 1977. The most frequent grades of entry were grades 9 and 10. On average the Gow men were about one year older than students in general at any particular grade of entry. It can also be seen that more than 70 percent of the boys were at the school for at least two years, enough time for the school to have had some influence on them.

*IQ scores.* The mean Stanford-Binet IQ (S-B IQ) was 117.9 for the 551 of the 579 respondents who were given the test at the time of admission testing and over 96 percent of this group had S-B IQs over 100. The mean S-B IQ for all alumni showed a steady significant increase from about 104 in the 1940s to about 119 in the 1970s, but within any decade the means did not differ among respondents, nonrespondents, and subjects who could not be located. The mean Wechsler-Bellevue IQ (W-B IQ) obtained for 487 respondents was 111.4. There was no difference on this test among respondents, nonrespondents and subjects not located. Neither S-B IQs nor W-B IQs differed between mail and telephone respondents.

*Achievement test scores.* In order to take IQ and age into account in expressing subjects' reading and spelling achievement scores, achievement quotients were calculated for each subject using the test scores from the Gray Oral Reading, Morrison-McCall Spelling, and the Stanford Paragraph Meaning Tests. The quotient was derived using the procedure illustrated in Finucci et al. (1982) which is similar to that used by Myklebust (1971). In essence it is the ratio of the achievement age obtained on a test (converted from a grade equivalent score) to an expected achievement age which is the simple average of chronological

Table II  
 Percentage Distributions, Means and Standard Deviations for Three Achievement Quotients for Gow Men Obtained at Admissions Testing

Test*	Value of Quotient					n	$\bar{x}$	s.d.
	$\leq .60$	.61 – .70	.71 – .80	.81 – .90	$> .90$			
GOR	14.0	27.8	28.6	18.3	11.4	493	.74	.13
MMS	12.6	31.8	35.4	15.9	4.3	491	.72	.11
SPM	3.5	14.9	20.6	24.7	36.3	490	.85	.14

\*GOR = Gray Oral Reading; MMS = Morrison-McCall Spelling; SPM = Stanford Paragraph Meaning

age, mental age determined from the Stanford-Binet IQ, and the average age of students at a subject's grade placement. A subject whose performance is in line with expectation would have a quotient of 1.00. Finucci et al. (1982) reported that this was the average value of quotients for a large sample of comparison students and that quotients derived in this way correlated well with responses to several types of self-report items concerning school achievement. We consider quotients below .80 to be indicative of fairly severe disability and quotients in the range of .81 to .90 to be indicative of borderline disability.

The distribution, means, and standard deviations of achievement quotients for the Gow respondents are shown in Table II. Not all respondents have a value for these variables, because either the Stanford-Binet IQ test or the particular achievement test was not administered. For the most part, the men were rather severely disabled in oral reading and in spelling with a small number whose quotients on one or both of the tests were above .90. In fact, only 5.5 percent of the 488 respondents with test scores had an average of the oral reading and spelling quotients greater than .90. Yet over one third of the respondents had quotients that high on the Stanford Paragraph Meaning test, pointing to the fact that even when oral reading and spelling skills are depressed, many individuals can perform almost normally in silent reading comprehension. The mean values of the quotients did not differ for any of the three tests among the respondents, non-respondents, and not located subjects, nor did they differ between the mail and telephone respondents.

*Changes in achievement test scores.* Figure 1 illustrates the changes in Gray Oral and Morrison-McCall quotients over the time that the men were at the school. The data shown are only for those respondents who entered the school in the fall of a year with admissions testing done the previous spring or summer and who were not missing data for either admissions testing or any of the followup testing times. The data are shown for the men grouped according to their length of stay at the school because that variable differentiates them at least on Gray

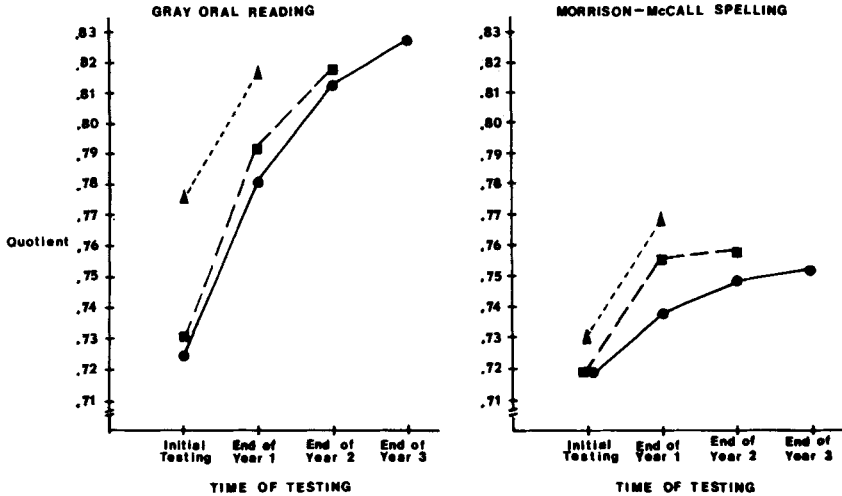


Figure 1. Mean Gray Oral Reading quotient and mean Morrison-McCall Spelling quotient over time for three sets of Gow alumni grouped by length of stay at the school. Key:  $\blacktriangle$ ----- $\blacktriangle$  = length of stay  $\geq 1$  but  $< 2$  years ( $n = 87$ );  $\blacksquare$ — $\blacksquare$  = length of stay  $\geq 2$  but  $< 3$  years ( $n = 125$ );  $\bullet$ — $\bullet$  = length of stay  $\geq 3$  years ( $n = 178$ ).

Oral quotients. The graph shows that for those alumni who were at the school less than two years, the Gray Oral quotient increased from .775 initially to .817 a year later. We will illustrate that amount of growth in terms of grade equivalent scores for a hypothetical student whose age at the time of admissions testing is 13.5 years, whose grade placement is 7.9, and whose Stanford-Binet IQ is 110. Such a student would have an expected achievement age of 13.76 years and a year later would have an expected achievement age of 14.79 years. Thus, for initial and follow-up quotients of .775 and .817, his observed achievement age would have changed from about 10.7 to about 12.1 and his grade equivalent scores from about 5.6 to about 7.0, about 1.4 years growth in a one-year period.

Examining the data for the alumni who were at the school for at least three years, we see that over a three-year period their achievement quotients for the Gray Oral improved, on average, from .727 to .830 and that there was a more modest improvement on the Morrison-McCall from .719 to .751. Again, for illustrative purposes, for a student who was 12.5 years of age, in grade 6.9 and with an IQ of 110 at the time of admissions testing, these gains in quotients over a three year period represent approximately 3.8 years growth in oral reading and 2.6 years growth in spelling. The alumni also showed gains in Paragraph Meaning quotients, but they were not as dramatic since the initial values were already above .80. For instance, for subjects at the school less

Table III

## Handedness Data for Gow School Alumni

## a) Percentage distributions across handedness categories

Year of Leaving Gow	Hand							
	Decidedly Right		Ambidextrous Right		Ambidextrous Left		Decidedly Left	
	n	(%)	n	(%)	n	(%)	n	(%)
1940-1959	104	(69.3)	25	(16.7)	14	(9.3)	7	(4.7)
1960-1969	296	(75.3)	29	(7.3)	35	(8.9)	33	(8.4)
1970-1977	215	(74.1)	23	(7.9)	27	(9.3)	25	(8.6)
Total	615	(73.8)	77	(9.2)	76	(9.1)	65	(7.8)

## b) Intelligence and achievement scores by handedness

Variable	Decidedly Right						Ambidextrous Right						Ambidextrous Left						Decidedly Left						Test of Differences
	n		x̄		sd		n		x̄		sd		n		x̄		sd		n		x̄		sd		
	n	x̄	sd	n	x̄	sd	n	x̄	sd	n	x̄	sd	n	x̄	sd	n	x̄	sd	n	x̄	sd	n	x̄	sd	
S-B IQ	603	118.9	9.0	72	118.5	11.5	72	117.9	10.8	65	118.6	9.3	65	117.9	10.8	65	118.6	9.3	65	118.6	9.3	65	118.6	9.3	ns
W-B VIQ	555	108.6	10.2	64	107.6	12.7	66	108.4	11.4	50	107.6	7.7	50	108.4	11.4	50	107.6	7.7	50	107.6	7.7	50	107.6	7.7	ns
W-B PIQ	555	111.2	9.9	64	110.3	9.9	66	109.3	11.4	50	111.1	10.2	50	109.3	11.4	50	111.1	10.2	50	111.1	10.2	50	111.1	10.2	ns
GOR Quot.	547	.73	.12	65	.74	.10	63	.72	.11	56	.72	.12	56	.72	.11	56	.72	.12	56	.72	.12	56	.72	.12	ns
MMS Quot.	542	.71	.11	65	.73	.10	62	.72	.10	56	.73	.10	56	.72	.10	56	.73	.10	56	.73	.10	56	.73	.10	ns
SPM Quot.	538	.84	.14	64	.85	.13	62	.85	.15	56	.85	.14	56	.85	.15	56	.85	.14	56	.85	.14	56	.85	.14	ns

than two years, the Paragraph Meaning quotient improved from .86 to .88 over a one-year period and for those at the school more than two years but less than three, Paragraph Meaning quotients improved from .86 to .89 over a two year period.

*Laterality scores.* Handedness data were available for 833 of the Gow alumni, including nonrespondents. Subjects were designated as decidedly right, ambidextrous right, ambidextrous left, or decidedly left. The major designation, right or left, was determined by the subject's writing hand and if a subject performed six or more of approximately thirty tasks about which he was queried with the opposite hand, he was designated as ambidextrous. Table III shows the distribution across the four handedness categories for alumni grouped according to the year in which they left the school as well as the overall distribution. In addition, the mean scores in each of the handedness categories are given for the Stanford-Binet IQ, the Wechsler-Bellevue Verbal and Performance IQs, and Gray Oral Reading, Morrison-McCall Spelling, and Stanford Paragraph Meaning quotients.

Overall, 141 (16.9 percent) of the subjects wrote with their left hand. This figure is at the high end of the range generally reported for the incidence of left-handedness (Hardyck and Petrinovich 1977), but the techniques for the measurement of handedness vary considerably. Briggs and Nebes (1975) had 1599 college students indicate their preferred hand for twelve different tasks. From their data, it can be estimated that about 11 percent wrote with their left hand. Spiegler and Yeni-Komshian (1983) reported that 15.2 percent of 810 male college students were left-handed writers. Annett (1981) found 10.5 percent of 79 12-year-olds to be left-handed writers and Batheja and McManus (1985) found 12.8 percent of 47 male and female students between the ages of 7 and 12 to be left-handed writers. In our own family study, we found the incidence of left-handed writing among 241 comparison subjects between the ages of 8 and 17 to be 16.2 percent and the 24 among them who were poor readers had a lower incidence of left-handedness than did the good readers. For 78 dyslexic subjects in the same study the percentage of left-handers was 15.4 percent (Finucci and Childs 1985).

There has been interest in whether there is an increased incidence of left-handers among dyslexics since the observations of Orton (1937). With the recent studies of Geschwind and Behan (1982) showing an increased incidence of learning disorders and immune disorders in left-handers and their relatives there has been renewed interest in the topic. Satz et al. (1985) suggest that among manifest left handers with *known* brain injury where the incidence of left-handedness may be as high as 17-20 percent, approximately half may be pathological left-handers and that one of several characteristics of the syndrome may be impaired visuospatial function. However, in a study of 322 learning-



disabled subjects, half of whom were left-handed and half of whom were right-handed, DeIDotto and Rourke (1985) found that the two groups exhibited similar ability profiles and that handedness was not an important consideration in defining subtypes of learning disabilities. Similarly, as shown in Table III, there was no difference between the left-handed and right-handed Gow alumni either in the severity of their reading and spelling impairment, in the level of their intelligence, or in visuospatial function as measured by Verbal/Performance IQ differences.

### **Educational Outcomes**

For most of the results described in this section, the analyses were confined to 472 Gow respondents who at the time of the survey were not students. Many of their outcomes were examined in light of other characteristics, including their initial reading and spelling quotients, IQ scores, grades while at the school, and father's education.

For some variables, the Gow alumni were compared with a selected group of 386 Gilman alumni. These Gilman men were selected from the total sample of Gilman alumni on the basis of a variable which is an estimate of the amount of training or schooling required for the job in which their fathers were employed. This general educational development (GED) score was developed by the U.S. Employment Service from ratings of reasoning, mathematical, and language development needed in various occupations (Cain 1980). It is measured on a scale of 1 to 6, where 6 represents the highest level of development. Matching the two alumni groups on this variable gives us two groups of approximately equivalent socioeconomic status. We believe it provides a better match than would parental education; since many cases of developmental dyslexia are familial (DeFries et al. 1978; Finucci et al. 1976) some of the parents of Gow alumni may be dyslexic, and therefore, less likely to have pursued higher education. However, they may have pursued high level occupations through the use of other talents. The two resulting samples, 472 Gow respondents and 386 Gilman respondents who were not students at the time of the survey, were stratified so that there were equal proportions from each decade of leaving their respective schools and equal proportions from each school with fathers whose occupations are in each of four categories of GED, with the lowest three levels merged into one category.

*Educational attainment.* Table IV shows the distribution of educational attainment for these Gow and Gilman samples. The table shows that 50.4 percent of the Gow sample obtained a bachelor's degree compared with 94.8 percent of the Gilman sample. However, if we examine the educational attainment of the alumni who left Gow before 1970, the percentage with bachelor's degrees is 58.3. This fact is consistent with two other observations: a) that 33 percent of Gow men as opposed to 11 percent of Gilman men who graduated from college

Table IV  
Educational Attainment for Gow and Gilman Respondents not now Students

	Gow		Gilman	
	n	%	n	%
GED or less*	26	5.6	0	0.0
High School Graduate	26	5.6	0	0.0
High School and Some College	144	30.8	17	4.4
Technical or Associate's Degree	36	7.7	3	0.8
Bachelor's Degree	200	42.7	172	44.8
Master's Degree	25	5.3	95	24.7
Law Degree	5	1.1	46	12.0
Doctoral Degree	6	1.3	51	13.3
Total	468	100.0	384	100.0
(Missing)	(4)		(2)	

$$\chi^2_{df} = 272.93; p .001$$

\*GED refers to General Education Diploma frequently earned through State Departments of Education or branches of the Armed Service. Of the 26 Ss in this category, 13 earned the GED and 13 did not.

took five or more years to earn their degrees and b) that 29 percent of Gow men as opposed to 17 percent of Gilman men who graduated from college had a discontinuous course of schooling, delaying entry to college to one or more years after high school graduation or dropping out of college from time to time before their degree attainment. This suggests that we might expect more of the men who left Gow in the 1970s to eventually earn a bachelor's degree.

Of particular interest to us were the variables that are predictive of educational attainment. We examined the proportion of subjects who earned a bachelor's degree for several levels of each of the seven variables listed in Table V. As shown in the table, the spelling and reading comprehension quotients and both the average grade in all subjects and average grade in Reconstructive Language were predictive of earning a bachelor's degree. Although in the general population, a subject's IQ and his father's educational attainment are predictive of his own educational attainment (Guilford 1967; Sewell and Hauser 1975), this was not the case for the Gow sample, apparently because the subjects' dyslexia had an overriding effect. Also, the initial Gray Oral quotient was not a good predictor of attaining a bachelor's degree, probably because as discussed earlier, subjects made considerable gains on the Gray Oral while at the school.

To determine which variables might have the greatest influence on attainment of a bachelor's degree and to determine how well a combination of such variables distinguish between those who did and

Table V  
Proportion of Gow Respondents Receiving a Bachelor's Degree Grouped by Levels of Predictor Variables

Variable	Level	Proportion	%	X <sup>2</sup>	df	p
Gray Oral Reading Quotient	≤.60	22/49	44.9	.801	3	.849
	.61 – .70	51/105	48.6			
	.71 – .80	62/121	51.2			
	≥.81	62/120	51.7			
	Total	197/395	49.9			
Morrison-McCall Spelling Quotient	≤.60	14/44	31.8	8.809	3	.044
	.61 – .70	54/115	47.0			
	.71 – .80	79/150	52.7			
	≥.81	47/83	56.6			
	Total	194/392	49.5			
Stanford Paragraph Meaning Quotient (comprehension)	≤.70	22/65	33.8	23.330	3	.000
	.71 – .80	27/79	34.2			
	.81 – .90	63/101	62.4			
	≥.91	83/147	56.5			
	Total	195/392	49.7			
Stanford-Binet IQ	≤110	44/85	51.8	2.473	2	.290
	111–120	93/201	46.3			
	≥121	85/156	54.5			
	Total	222/442	50.2			
Reconstructive Language Grade	<70	9/47	19.1	38.001	2	.000
	70–79	122/259	47.1			
	≥80	102/150	68.0			
	Total	233/456	51.1			
Average Grade at Gow	<70	75/199	37.7	32.305	2	.000
	70–79	130/232	56.0			
	≥80	31/37	83.8			
	Total	236/468	50.4			
Father's Educational Attainment	<Bachelor's	64/127	50.3	.046	2	.977
	Bachelor's only	89/175	50.8			
	>Bachelor's	78/151	51.6			
	Total	231/453	51.0			

did not earn a degree, the data were examined in a stepwise linear discriminant analysis (Nie et al. 1975). The groups to be discriminated were the subjects with a bachelor's degree and those without. Ten variables were used as potential discriminators: continuous forms of the seven variables listed in Table V plus the mother's educational

attainment, the age of the subject at the time of response (a function of the period the subject was at Gow) and the general educational development score of the father's occupation.

One hundred and sixty-five subjects with less than a bachelor's degree and 176 subjects with a bachelor's degree had sufficient data to be used in the analysis. The two groups differed significantly ( $p < .01$ ) in spelling quotient, Reconstructive Language grades, average grade in other courses, age at the time of response, and educational equivalent of the father's job.

An F ratio of at least 1.00 was required as a test of whether a variable added a significant amount of separation between the two groups and eight variables were allowed to enter the discriminant function. But it was found that the first three variables to enter the function classified correctly only 1 percent fewer subjects than the eight variable function. Shown below is the most parsimonious equation. The variables are listed in the order in which they entered the function, and the coefficients are given in standardized form. Thus, the magnitude of the coefficients reflects the relative importance of the variables in discriminating between the two groups. The function is:

$$DF = .624 AVGR + .424 RL + .360 PMQ$$

where AVGR = average grade in courses other than Reconstructive Language, RL = Reconstructive Language grade, and PMQ = Stanford Paragraph Meaning quotient. The three variables which in isola-

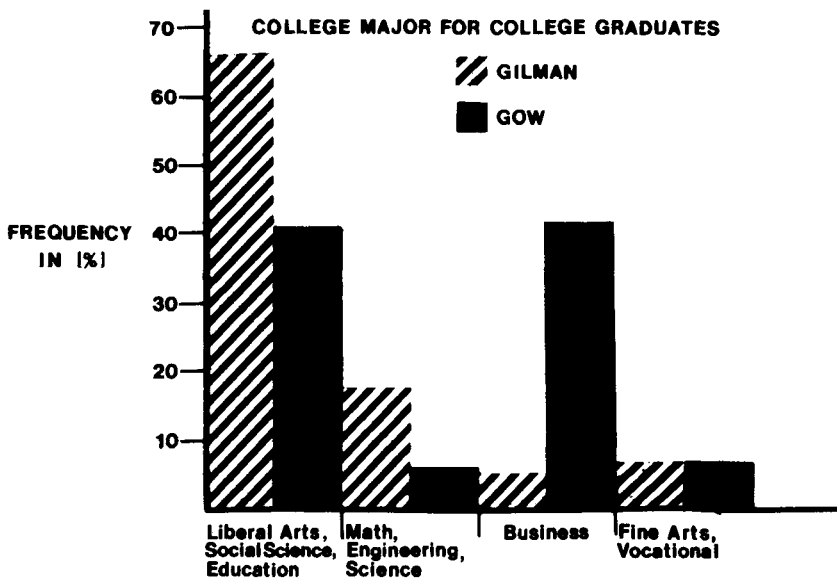


Figure 2. Distribution of college major for alumni of Gow and Gilman schools who graduated from college. Gow,  $n = 230$ , 6Ss with missing data; Gilman,  $n = 359$ , 5 Ss with missing data.

tion showed the most significant relationship to degree attainment were also the most important when several variables were considered together. This discriminant function correctly classified 68 percent of the subjects with less than a bachelor's degree and 66 percent of those who earned a bachelor's degree.

*Major field of study.* Figure 2 shows the distribution of the field of study in which the college graduates among the Gow and Gilman samples received their degrees. The distributions differ significantly ( $\chi^2_{3df} = 126.0, p < .001$ ). The most notable difference between the two schools is the greater propensity for Gow men to choose business as a field of study. This large difference is accounted for by an overrepresentation of Gow men and an underrepresentation of Gilman men in this field when compared to figures, shown in Table VI, of men, mostly white, drawn from the general population.

The choice of college major for the Gow men who had at least one

Table VI  
Percentage Distributions of College Majors in Four Different Samples of Males

Major	<sup>a</sup> Late '50s	<sup>b</sup> Early '70s	<sup>c</sup> 70-71	<sup>d</sup> 78-79
Liberal Arts, Social Sciences, Education	29.1	27.2	47.2	39.6
Math, Engineering, Sciences	31.5	35.4	28.1	31.9
Business	23.2	24.5	22.1	25.3
Fine Arts, Vocational	3.7	3.5	2.7	3.4
Other or not Classifiable	12.7	9.3	—	—

<sup>a</sup>Data of Eckland reported in Polachek (1978)—major fields of 410 college graduates, men, predominantly white, who were high school seniors in 1955.

<sup>b</sup>Data of Research Triangle Institute-National Longitudinal Study Survey reported in Polachek (1978)—intended major of 999 males who were college freshmen in academic year 1972-73.

<sup>c</sup>Data reported by Roemer (1983) from Earned Degrees Conferred 1970-71, U.S. Department of HEW, Office of Education (White males, earned Bachelor's degrees 1970-71).

<sup>d</sup>Data reported by Roemer (1983) from Earned Degrees Conferred 1978-79, U.S. Department of HEW, Office of Education, (White males, earned Bachelor's degrees 1978-79).

year of college was significantly related to both the initial spelling quotient ( $\chi^2_{df} = 22.08, p < .01$ ) and grades in Reconstructive Language while at Gow ( $\chi^2_{df} = 23.38, p < .001$ ). Those with high grades in Reconstructive Language and high initial spelling quotients were more likely to enroll in liberal arts, social sciences, education, mathematics or science than in business, fine arts, or vocational programs.

### Occupational Outcomes

Analyses of the adult occupations of Gow and Gilman alumni are reported by Gottfredson, Finucci, and Childs (1983). The distributions of occupations for 339 Gow alumni and 387 Gilman alumni, all at least twenty-six years of age at the time of the survey, for their fathers, and for the U.S. white male population in general are shown in Table VII.

Most of the Gow men were engaged in managerial work and were about as likely to be in that category as were their fathers. However they were less likely than the Gilman alumni and their fathers or even their own fathers to be in professional occupations. It is clear from the table, however, that their occupational distribution differs from that of white men in general who are well represented in craftsman, operative, and laboring categories. This outcome is in accord with the prediction by Gottfredson et al. (1983) that the Gow men would have relatively high level jobs because their IQ and SES were high relative to the general population. The Gow men in professions or technical occupations were much more likely to be secondary or elementary school teachers, computer specialists, designers, or clergy and less likely to be lawyers or physicians than Gilman men or their fathers. Fewer than 2 percent of the Gow alumni were in law or medicine in contrast to 17 percent to 27 percent of the Gilman men or the fathers of both alumni groups. A path analysis carried out to examine the

Table VII  
Percentage Distributions of Men in Broad Occupational Categories, Gow and Gilman Alumni, Their Fathers, and White Men in General

	Gow Alumni	Gilman Alumni	Gow Fathers	Gilman Fathers	White Men in General
Professional/					
Technical	17.7	53.0	31.2	48.4	15.0
Managerial	49.6	32.6	53.0	39.6	11.9
Sales	15.3	9.8	11.5	9.6	7.3
Farmer	3.2	0.8	1.5	0.8	3.0
Other	14.2	3.9	2.7	1.6	62.8
N	339	387	330	376	*

\*Calculated from data on white men age 16 and over in the 1970 experienced civilian labor force. N is approximately 2,118,250.

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influence on occupational attainment among Gow men suggests that the reading difficulties of Gow men placed limitations on their degree attainment which in turn placed limitations on occupational attainment. The Gow men were underrepresented in those reading-intensive professions that might also have required reading-intensive training programs.

Of special interest were the analyses of the questionnaire responses of Gilman men concerning characteristics and traits that they considered critical to good performance in their respective jobs (Gottfredson, Finucci, and Childs 1984). They found that, whether Gilman men were in professional, managerial, or sales occupations, the job-related abilities or traits rated as critical by large proportions of the men were to "get information by talking with people," "give information by talking with people," and "have integrity." For men engaged in professions the fourth most highly rated trait was to "get information by reading." For men in managerial positions, however, to "handle several tasks at one time," "take initiative and responsibility," and "spot and tackle problems quickly" were high on the list of critical skills while to "get information by reading" was low on the list. Thus, it appears that most of the Gow men found career success in positions which have high prestige with respect to salary and responsibility but which were less reading-intensive and allowed the men to use their other competencies to succeed.

### Family Information

Our research group has a special concern with family and genetic studies of developmental dyslexia. Thus, we asked alumni of both schools to report on whether or not their sibs and offspring who were at least of school age had "a reading disability." Reading disability was not defined for the respondents, but if they answered affirmatively they were asked to give details such as whether their sibs or children had tutoring or special schooling.

Table VIII  
Reports of Reading Disability in Families

Relative	Gow			Gilman		
	Number of Respondents	Reporting Rdg. Dis.*	%	Number of Respondents	Reporting Rdg. Dis.*	%
Sibs	407	79	19.4	527	39	7.4
Children	115	41	35.6	192	28	14.5

\*Number of respondents reporting reading disability in at least one sib (first row) or in at least one child (second row).

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The tally of their responses is reported in Table VIII for all of the Gow and Gilman respondents who had either sibs or children. It shows that the proportion of Gow alumni who reported that at least one child was a disabled reader is about twice as large as the proportion reporting that at least one sib was a disabled reader. Furthermore, each of these figures is about 2½ times as great as the corresponding values for the proportion of Gilman alumni giving positive responses to the same two questions. Thus, these results give additional evidence for the familial nature of dyslexia. We do acknowledge, however, that arguments might be made that Gow men could over-report the presence of reading disability because of heightened awareness of the condition or that Gilman men could over-report because any school problem that exists in their families might be highlighted in families otherwise comprised of school achievers. These possibilities only suggest however that self-reports might have a wider margin of error but it is unlikely that error would account for differences as large as those observed here.

The responses can also be used to tell us something about the sex ratio of reading disability. The 407 Gow men with sibs had 450 brothers of whom 63 (13.1 percent) were reported disabled and had 542 sisters of whom 36 (6.6 percent) were reported disabled. The ratio of the proportions of affected males to females among sibs is 2.0:1. The 115 Gow men with children had 148 sons of whom 44 (29.7 percent) were reported disabled and 141 daughters of whom 25 (17.1 percent) were reported disabled. The ratio of the proportions of affected males to females among their offspring then is 1.7:1. If we examine the ratios of proportions of affected males to females among sibs and children using only the data from those families in which at least one sib or at least one child is affected then the ratios decrease to 1.6:1 and 1.2:1 respectively. These data suggest that the sex ratio is not as high as the commonly reported figure of 4.0:1 (see Finucci and Childs 1981 for a review).

### **Reading Habits and Attitudes as Adults**

One final purpose of our study was to determine how the alumni felt about and used their reading and other language skills as adults. Two of the questions asked were about the amount of leisure time devoted to reading compared to the amount of time devoted to reading by their wives or friends. Table IX shows a comparison of the responses to both questions for all of the Gow and Gilman men who were married at the time of the survey. A higher percentage of Gilman men than Gow men claimed to read at least as much as their friends or their wives. However, the proportions of men from both schools who said they read as much as their friends, presumably male, are much larger than the proportions who reported they read as much as their wives. These figures are in accord with results of a survey conducted by the



Table IX  
Self-report of Amount of Reading Compared to Amount Done by Wife or Friends

	Compared to Wife		Compared to Friends	
	Gow	Gilman	Gow	Gilman
More or Same	31.8%	54.6%	48.5%	74.4%
Less or much less	68.2%	45.4%	51.5%	25.6%
	N = 311	N = 355	N = 309	N = 348

Book Industry Study Group (1978) in which women were found both to read and to buy more books than men. Many of the Gow men may actually rely on their wives to compensate for some of their reading deficits.

Subjects were also asked to rate how they feel about reading for pleasure and to rate their spelling in comparison to that of others of their age and education. Three hundred and eighty four Gow alumni who were not students at the time of the survey responded to the first question and 60 percent said they found reading pleasurable, were enthusiastic about it or that it was among their favorite pastimes while 40 percent rated it as OK, a chore, or difficult. The higher a respondent's average quotient in reading and spelling at the time of initial testing the more likely that he gave a favorable response. Positive responses were given by 71 percent of those with quotients greater than .80, by 59 percent of those with quotients between .61 and .80, and by only 49 percent of those with quotients below .61. A similar but more dramatic trend was observed with the responses to the spelling ratings. Among the same respondents, 53 percent rated their spelling as average or above but those ratings were given by 86 percent of subjects with initial quotients greater than .80, by 49 percent of those with initial quotients between .61 and .80, and by only 14 percent of those with quotients below .61.

Sixty-seven percent of the respondents read daily newspapers at least five days per week and 65 percent said they read the Sunday newspaper more than half the Sundays in a year. Seventy-five percent of the Gow alumni spent at least fifteen minutes with the daily newspaper compared to 85 percent of the Gilman alumni and 85 percent of the Gow alumni spent that much time with the Sunday newspaper compared with 95 percent of the Gilman alumni. Twenty-six percent of the Gow alumni claimed to read no more than one book per year compared to 8 percent of the Gilman men, but alumni from both schools were just as likely to subscribe to and read at least two magazines regularly, about 75 percent of each group. The probability

of a Gow alumnus to read newspapers, magazines, and books varied with the value of the average initial quotient as one might expect since their attitude toward reading varied with that variable.

### Summary and Discussion

This study examined a number of adult outcomes for boys who had been diagnosed as dyslexic in childhood. All but a few scored at or above average on intelligence tests at the time of entry to the school. Their achievement test performance at entry was poorest for spelling and oral reading and better, but below average, in reading comprehension.

For those respondents who were not students at the time of the survey, about 50 percent had earned a bachelor's degree. This compared with 95 percent for the alumni of another college preparatory, independent school, the Gilman School, whose fathers were in jobs that required similar educational preparation. The Gow men tended to interrupt their schooling more often than did the Gilman men; three times as many Gow men as Gilman men took at least five years to earn a bachelor's degree. If we look only at the data for men who left Gow before 1970, we find that 58 percent earned a bachelor's degree. Variables that were highly predictive of graduating from college were average grade in all subjects, grades in Reconstructive Language, and reading comprehension scores.

About 50 percent of the Gow men were engaged in managerial work at the time of the survey as might have been predicted by the fact that about 40 percent of the college graduates had majored in business. About 18 percent were in professional or technical positions. Thus, for the most part, they were employed in high level positions although not in the most demanding with respect to reading requirements either for preparation or for carrying out the work of the position.

Several measures of their adult reading habits and attitudes compared poorly to those of the Gilman men. However, 60 percent reported that they enjoyed leisure reading, but fewer reported average or better adult spelling, and only 14 percent of those with initial quotients below .60 reported spelling that was that good.

Considering only the socioeconomic status of their families and their own intelligence, the men did not do as well as might be predicted with respect to educational and occupational attainment. However, considering that they were underachieving in school before coming to Gow, their accomplishments, on average, seem rather good. These men had benefited from having been placed in a school environment that provided systematic instruction and encouraged accomplishment. They undoubtedly also benefited from family support and

encouragement. It appears that a good number of the men were able to improve their reading skills and that some were able to take advantage of other skills to complete their education and find appropriate occupations. One very important result of this study that we want to stress is that outcomes were very clearly a function of both the severity of dyslexia at entry to the school and the achievement of the men while at the school. Those who were most severely affected and who did not profit from the Reconstructive Language course were much less likely to earn a bachelor's degree, to be employed in a reading-intensive job, or to give favorable responses to the questions about adult reading habits and attitudes.

Because these men had special educational opportunities we cannot conclude that their outcomes may be generalized to other groups of dyslexics. It is unlikely that educational and occupational satisfaction and accomplishment will be achieved by all dyslexics unless care is taken to provide for them the opportunities that allow each child to make full use of his talents.

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