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ABSTRACT

This study considered whether occupational groups can be discriminated by unique patterns of antecedent characteristics of an academic and non-academic nature. Statistical materials about family background, educational status at matriculation, and in-college data were assembled and coded on quantitative scales for 3 groups of Yale graduates: (1) the Classes of 1931 and 1932, (2) the Classes of 1935 and 1937, and (3) the Class of 1959. The most recent occupational information available about each graduate was coded according to an occupational code. Of the 25 occupational categories large enough for analysis in terms of the antecedent data, 5 had statistically unique patterns of matriculation and in-college characteristics. These were: (1) chemists and physicists, (2) engineers, (3) college teachers, (4) lawyers, and (5) salesmen. Nine discriminant variables were identified. These included: (1) age, (2) father's occupation, (3) mother's occupation, (4) score on SAT, (5) senior year average grade, (6) scholastic honors received at Yale, (7) involvement in fraternities, (8) academic, sports and social clubs, and (9) dramatics, publications and musical organizations. There was too much overlap, however, to predict later membership in a vocational group. (AF)

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Final Report

THIRTY YEAR FOLLOW-UP OF MALE COLLEGE STUDENTS

Project No. 5-0816
Contract No. OE-3-10-014

Paul S. Burnham
Benjamin A. Hewitt

May 1967

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YALE UNIVERSITY

New Haven, Connecticut

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The research design for this study called for collection of data from existing sources. No interviews were held with subjects and no questionnaires were sent out. Questionnaires frequently provide data easier to work with, and interviews may be structured to concentrate on what seem to be the central concerns of an investigation.

In the present study, however, we had a wealth of recorded data in the form of college records and of published material in the form of biographical sketches. The task of coding, punching and checking this sizeable mass of data was the responsibility of fifteen staff members and eighteen students. A few worked full time, others on a part-time basis and some were temporary workers.

Among the staff members, Mrs. Grace Rose Rees took special responsibility for supervising and coordinating much of the data gathering, coding, and checking. Mr. Elwood C. Travis, 1927, Yale College, took major responsibility for occupational coding and classification. Mrs. Margaret B. Michaelson handled all the secretarial work including preparation of the final manuscript. All staff workers provided valuable services. Their names are listed alphabetically:

Autry, Susie R.
Burne, Viola M.
Constantino, Joy
David, Cora Lynne
Fasano, Dora E.
Four, Margaret L.
Keyes, Irene J.
Murdoch, Marie
Pope, Jo Anne
Senf, Janet Hilger
Shimmel, Olive B.
Sofia, Tara L.
Stone, Angela F.
Trinkaus, Sylvia D.
Yeager, Joan I.

We also had the benefit of a considerable amount of student assistance. Among those who contributed most importantly in the coding of extracurricular activities were Charles Hamlin, 1961, Yale College, and Gerald Senf, 1964, Yale College. It is to John Strauch, 1965, Yale College, that the greatest recognition is owed, for he carried by far the major responsibility for data processing. As with so many other studies carried on in the last decade, electronic data processing has made possible the handling of large masses of data and their analyses with relatively sophisticated statistical techniques. In many instances it would not have been feasible to undertake such studies a decade earlier. John Strauch's contribution was a major one.

The names of the student workers are listed alphabetically along with their respective Yale College classes:

Aisenbrey, Stuart K.,'64
Bolles, Robert C.,'67
Bowers, James W.,'64
Campbell, Woodrow W.,'66
Dubin, Michael,'66
Hix, Norman L.,'64
Hodes, Douglas M.,'68
Holahan, Thomas R.,'63
Inmon, William H.,'67
Kroener, William F.,'67
Lewis, John A.,'67 (deceased)
Muñoz, Richard D.,'67
Randall, Robert G.,'61
Rehberger, Edward H.,'65
Schumacher, Barry D.,'66
Thomas, James B.,'65
Webster, Joseph B.,'64
Williams, Donald E.,'63

It is easy enough to express our appreciation for those directly concerned with the project. But to the many others in the various University offices who supplied supporting services and to those who over the years contributed most importantly to the compilation of University records we can only express general acknowledgement. But one exception stands out in the person of Albert Beecher Crawford, 1913,Yale College, Director Emeritus of the Office of Counseling, Placement and Research. Dr. Crawford's foresight and imagination, exercised in the organization and establishment of the cumulative record files in the former Department of Personnel Study at Yale University, provided the basic records on which the present research effort was based. Without these cumulative records, beginning with the class matriculating in 1927, the Thirty Year Follow-up of Male College Students would not have been feasible.

Paul S. Burnham
Benjamin A. Hewitt

March 31, 1967

CHAPTER 1

INTRODUCTION

In 1961 Burnham became interested in the substantial amount of background and in-college information that Yale had accumulated on its undergraduates starting in 1927, when a cumulative record-keeping system was inaugurated. In addition, the College Entrance Examination Board's Scholastic Aptitude Test, required of Yale matriculants, had been administered for the first time in the previous year. On most matriculants College Board scores were available, along with diverse background data of both an educational and a personal nature; in-college information included cumulative data of an academic and extracurricular nature. Postgraduation records of most Yale classes were also available by which to follow careers of former students; and Alumni Directories had been published periodically. Unique data appeared to be available for analyses of the results of a well known psychological measure and also of other measures of educational status.

A small pilot study of the academically highest 3 percent (n = 25) and lowest 3 percent (n = 25) of matriculants in a Yale class of the early 1930's was carried out relating college data to subsequent careers. Because the two extreme groups were so markedly unlike in academic promise, it would have been surprising if no differences in career patterns had emerged. The results of this pilot study led to the formulation of the hypothesis that after a substantial period of time following graduation from college, some occupational groups are characterized by sufficiently unique patterns of antecedent measures (both academic and nonacademic) to permit their identification from data available at graduation. In this context we mean identification of membership in an occupational group and not prediction of degree of success. Degree of success might be implied, however, in the assumption that a person engaged in an occupation three decades after graduation from college must have been achieving a sufficient amount of success to have survived in it that long.

With this hypothesis in mind, we reviewed the literature and became more fully aware that of all the studies involving college students, college graduates, and occupational groups, relatively few long-range studies involved the analysis of so-called "hard" data; only in the present century have any sizeable amounts of "hard" data involving reliable educational and psychological measurements been accumulated. The annotated bibliography in APPENDIX A, which we present instead of the more conventional but in this case less appropriate review of the literature, reveals how few studies have been concerned with data gathered over a span of several decades, have involved the statistical analysis of "hard" data, and, most strikingly, have replicated the analyses.

We examined our data pool to identify the antecedent measurement data that were available and to explore the possibility of replicating an

analysis on additional populations. Follow-up data were found to vary from class to class because no uniform pattern had been followed in the published class histories; some classes provided better records than others. But with uniform in-college data, it was possible to replicate by selecting classes with fairly uniform bodies of post-graduation material so that this study would not be restricted to the customary short-range academic criteria. We concluded that the amount of overlap between our plan for this study and others which have been reported is very slight.

CHAPTER 2

METHOD

Statistical materials regarding family background, educational status at matriculation, and in-college data were assembled and coded on quantitative scales for three groups of Yale graduates which totalled 3577: (a) the Classes of 1931 and 1932; (b) the Classes of 1935 and 1937; and (c) the Class of 1959. These data will be referred to as predictor variables, of which there were twenty-six for the two earlier groups and twenty-nine for the Class of 1959.

From published materials, the most recent occupational information available about each graduate was found and coded according to a specially designed occupational code.

To identify occupational groups which were characterized by unique patterns of predictor variables, Fisher's discriminant function analysis was applied to the data. Each occupational group was analyzed in relation to two standard samples of its parent population. Statistically significant results were checked against total class populations from which the vocational group data were eliminated.

Predictor variables that contributed most to discrimination were identified.

Correlational and two group discriminant function analyses were used to determine the extent to which the occupational groups so identified differed from each other. Characteristics of each discriminant occupational group were graphed according to its deviations from the total class means of each of the predictor variables.

Discriminant function techniques were applied to determine to what extent membership in an occupational group could be determined from the predictor variables.

CHAPTER 3

RESULTS

The early characteristics of five occupational groups formed sufficiently unique patterns to result in their identification by Fisher's discriminant function analysis: (a) chemists and physicists, (b) engineers, (c) college teachers, (d) lawyers, and (e) salesmen. For each of these five categories, significant F values were found in at least one of the parent groups and were replicated with some consistency in either one or both of the remaining class groups. To these may be added a sixth: a nonvocational group of men employed at the highest occupational level (i.e., top-policy makers).

The five occupational groups were also found through correlational analysis to have had statistically significant earlier characteristics which differentiated them in most instances from each other; the extent to which each differed from the others varied markedly however.

On the basis of relative contribution which each of the twenty-six predictor variables made to differentiation between occupational groups and standard samples, nine were found to contribute most within each class population and most consistently across the three class populations: (a) age, (b) father's occupational level, and (c) mother's educational level, all at the time of the student's matriculation at Yale; (d) the student's score on the Scholastic Aptitude Test taken before matriculation at Yale; (e) his senior year average grade and (f) the scholastic honors he received at Yale; and his involvement (g) in fraternities and societies, (h) in academic, sports, and social clubs, and (i) in dramatics, publications, and musical organizations. With the exception of the three academic measures, a high degree of independence and stability and considerable consistency over the three populations were found among the nine variables.

Despite significant differences in predictor variables between the five occupational groups and their parent populations, the degree of overlap in the two distributions would lead one to make a serious error if he relied solely on these antecedent data to predict membership in a particular occupational group.

CHAPTER 4

DISCUSSION

Examination of the cumulative records of Yale classes that had matriculated since 1927 revealed large bodies of information about family background and educational status at matriculation and in-college data regarding academic achievement, scholastic honors, and participation in extracurricular activities. With the hope that we might locate clusters of antecedent measurement variables which might be analyzed so as to reveal important relationships with career status, we sought to identify classes with common kinds of data. It was found feasible to assemble statistical material on three sizeable groups of undergraduate matriculants:

1. The combined Classes of 1931 and 1932, which had matriculated in 1927 and 1928.

2. The combined Classes of 1935 and 1937 which had matriculated in 1931 and 1933.

3. The Class of 1959, which had matriculated in 1955. This class represented a relatively recent postwar group with 1964 follow-up information available on the occupations reported by members of that class.

The matriculating populations in these three groups were large. The percentages subsequently earning their Bachelor's degree varied from 77 percent to 90 percent. For purposes of having a uniform body of data with which to work, the actual study groups were limited to degree recipients, hereafter referred to as degree groups. TABLE 1 summarizes the basic population statistics.

Prematriculation and in-college data were coded on quantitative scales where possible and twenty-six predictor measurement variables were found to be available on the earlier classes and twenty-nine possible predictors on the most recent class. TABLE 2 lists these prospective predictor variables along with pertinent information about the maximum and minimum values of the coding scale used with each. Also shown are the number of cases in each category for which no data were available.

One bit of information not revealed in TABLE 2 concerns the Class of 1959. The records for these matriculants did not contain anything about the item, "number of siblings." This particular class, however, in contrast to the earlier ones, lived for three years under the residential college system with its full complement of college-associated extracurricular activities. It was possible, therefore, to develop four additional scales reflecting amount of involvement in residential college activities. These four scales, when added to the 25 others also available

TABLE 1

POPULATIONS

	Combined Classes of 1931 & 1932	Combined Classes of 1935 & 1937	Class of 1959	Total
Year of Matriculation	1927 ; 1928	1931 ; 1933	1955	
Matriculants	1720	1664	1000	4384
Non-Graduates 1/	327	379	101	807
Degree Recipients ("Degree Group")	1393 = 81%	1285 = 77%	899 = 90%	3577 = 82%
Standard Sample #1 2/	278	254	179	
Standard Sample #2 2/	281	261	181	

1/ Includes a few cases about whom the records reveal no information.

2/ A 20% sample drawn systematically to comprise those degree recipients with identification numbers ending in 0 or 5, (i.e. xx0; xx5). Similarly for Standard Sample #2 (xx1; xx6).

on the two earlier groups, totalled 29 variables used in the Class of 1959 analyses. Since none of these four additional scales (residential college activities) made a significant contribution to later differentiation between the career groups, they have been omitted from TABLE 2.

Next we secured as recent information as possible about each of the 3577 degree recipients who comprised 82 percent of the 4384 matriculants in the three groups chosen for the study. The major source for such information was the published biographical sketches which the former students themselves had supplied for class histories published at various intervals following graduation, but in 10 to 15 percent of the cases information was secured from telephone, street and professional directories. The intent was to establish the individual's most recently reported occupational involvement.*

On the basis of information so gathered, an occupational classification and coding scale was developed (see APPENDIX B) and each graduate was classified according to his most recently reported occupational status. In the total context of all occupations in which people in this country are engaged, those represented by Yale alumni tend to be relatively concentrated in the higher-level business and professional categories. For this reason, many occupational codes including that of the U. S. Employment Service were found not suitable and therefore, a three-digit code was developed specifically for the present research. This coding scheme provided for 1200 different categories, some of which were later combined to form a two-digit code reflecting the related occupational groupings in which the majority of the graduates could be classified.

TABLE 3 lists some 25 of these occupational categories and the populations found in each. In addition, there is the category of "no occupation" indicating that no information could be found about these individuals or that they may have died within perhaps a decade following graduation. Another substantial group (Code 98), listed as "not coded otherwise in Column 63-4" indicates that many graduates were engaged in a variety of occupations but with so few being represented in each that it was impossible to secure meaningful categories for purposes of analysis.

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* Recency of career information in approximate number of years since graduation:

	Class Groups		
	1931 & 1932	1935 & 1937	1959
	%	%	%
10 Years (five years for 1959)	2.1	2.1	87.8
20 Years	12.0	5.4	
30 Years	83.1	84.0	
1962 Alumni Directory	2.8	8.2	8.1
No Information	0.0	0.3	4.1
	100.0	100.0	100.0

TABLE 2

DATA ON PREDICTOR MEASUREMENT VARIABLES

Variable	Col.	Code			Number of Degree Recipients Coded "No Information"		
		No Info.	Low (Min.)	High (Max.)	1931 & 1932	1935 & 1937	1950
1. Matriculation Age	07	0	6	1	0	0	0
2. Father's Educational Level	12	-	0	4	-	-	-
3. Father's Occupational Level	13	0	1	5	185	192	48
4. Mother's Educational Level	14	-	0	4	-	-	-
5. Number of Siblings	19	0*	1	5	200	155	**
6. Number of Yale Relatives	20	0*	1	4	548	505	510
7. Secondary School Grade Average, Adjusted	23	0	1	7	45	25	5
8. Mean, CEEB Achievement Scores	24	0	1	7	98	25	6
9. SAT-V Score	25	0	1	8	39	25	2
10. Prediction, Freshman Year at Yale	26	0	1	7	43	25	7
11. Freshman Year Average at Yale	27	0	1	7	10	11	5
12. Senior Year Average at Yale	28	0	1	7	22	29	77
13. Yale Scholastic Honors	29	0	5	1	0	1	0
14. Financial Aid (Maximum Year)	31	0*	5	1	8	6	0
15. Socio-Economic-Educational Status	32	0*	1	5	185	192	48
16. Athletic Contact Points	35	-	0	4	-	-	-
17. Athletic Non-Contact Points	36	-	0	4	-	-	-
18. Debating, Dramatics, Radio/TV Points	37	-	0	4	-	-	-
19. Music (Singing and Instrumental) Points	38	-	0	4	-	-	-
20. Publications, Political, Religious, and Service Points	39	-	0	4	-	-	-
21. Fraternities and Societies Points	40	-	0	4	-	-	-
22. Academic, Sport and Social Club Points	41	-	0	4	-	-	-
23. Sum of Athletic Points	42	-	0	4	-	-	-
24. Sum of Debating, Dramatics, Radio/TV Music, Publications, Polit., Relig., and Service Points	43	-	0	4	-	-	-
25. Sum of Fraternity, Society, and Club Points	44	-	0	4	-	-	-
26. Sum of All Activities	45	-	0	5	-	-	-

* None or No Information; Insufficient Information; No Entry

** Not Available

"-" When "0" indicated both "none" and "no information"

TABLE 3

OCCUPATIONAL GROUPS YIELDING LESS THAN TWO SIGNIFICANT F VALUES

Code	Occupational Group (Col. 63-4)	Class of 1931 & 1932		Class of 1935 & 1937		Class of 1959	
		n	p	n	p	n	p
01	Professional Writer, Editor, Publisher	34	.05	20	-	16	-
02, 03	Professional Advertising Agencies & Professional Public Relations Firms	19	*	20	*		
09	Teacher, Secondary School	25	-	17	.05	21	-
10	Clergy	7	*	7	*		*
11	Dentists	3	*	2	*		*
12	Physicians & Surgeons	109	-	90	.05	94	-
20	Accounting: CPA's, Accountants, Auditors	23	-	16	-		
22	Professional Business Consultants	14	*	10	*		
32	Farmers	19	*	16	*		
44	Professional Architects	9	*	18	*		
50	Chief Executives, Corporation A	15	*	11	*		
51	Chief Executives, Corporation B & C	42	-	64	.01	0	-
52	Sales, V. Pres. & Sales Mgrs. Corp. A	32	.05	23	-		*
53	Sales, V. Pres. & Sales Mgrs. Corp. B & C	22		8		3	*
54	Administrators, Corporation A	75	-	102	.05	27	-
55	Administrators, Corporation B & C	54	-	62	-		
56	Bank Presidents & Board Chairmen	8	-	1	-		
57	Bank Officers, Lesser	29	-	38	.05	24	-
58	Investment Bankers, Officers & Professional Staff	21	-	21	-		
59	Insurance Companies, Officers & Professional Staff	25	-	20	-		
61	Brokers, Officers & Professional Staff	30	-	17	-		
62	Insurance Agents	23	-	16	-		
63	Real Estate Agents	13	.05	17	-		
64	Retail Stores, Managers & Owners	32	.01	26	-	4	
65	Wholesale Businesses, Mgrs. & Owners	44	.05	34	-	4	
71	Skilled Tradesmen	6	*	3	*		*
81	Commissioned Officers	6	*	11	*	12	*
82	Gov't. Execs. & Professional Specialists	24	-	16	-		
	Sub-Total	763		706			
99	No Occupation	55	-	45	.05	69	-
98	Not Coded Otherwise in Cols. 63-4	230	-	258	-	128	-
	Five occupational groups shown in TABLE 4	345		276		275	
	Degree Recipients	1393		1285			

- indicates F > .05

* indicates F not calculated since n was small

The Twenty-Six Variable Discriminant Function Analyses

Fisher's discriminant function was chosen as the statistical technique which seemed to be most appropriate for use in this study. The focus was on the identification of graduates in common occupational groups who might have had sufficiently unique patterns of matriculation and in-college characteristics so that from a statistical point of view they might be considered to be distinct groups and, hence, their membership capable of description from antecedent data at the time of their graduation from Yale.

Because the parent populations were so large, it was decided to analyze each occupational group with reference to a sample of the parent population. For reasons of economy and control, two structured samples,* rather than random samples, of each parent population were identified. These structured samples, designated as "Standard Samples No. 1 and No. 2" are indicated along with the other basic population data in TABLE 1. Each standard sample represented approximately 20% of the parent population. When each occupational group was analyzed in relation to one of these standard samples an approximately 20% overlap might be expected. The fact of this 20% overlap or common element implied that any significant F value found in the two-group comparison would be biased in a conservative manner. That is to say, its true F value, without the overlap, could be expected to be larger than the F actually found, and hence, its probability level lower (i.e., more significant).

The five occupational groups whose earlier characteristics formed sufficiently unique patterns to result in their identification by Fisher's discriminant function analysis are listed in detail in TABLE 4 and as a composite in the lower part of TABLE 3. The latter also shows the probability (p) that any particular discriminant function calculated on the basis of all 26 variables (29 in the case of the Class of 1959) might be "statistically significant." A glance at TABLE 3 quickly reveals the disappointingly large number of categories in which the F value was not significant or could not be calculated because of the small number of cases involved. It also reveals in those instances of a significant F value (probability indices of either .05 or .01) in how few instances the significant value found for one occupational category proved also to be replicated in the other two class groups.

TABLE 4 details the five occupational categories in which significant F values were found in at least one of the parent groups and replicated with some consistency in either one or both of the remaining class groups. The analyses in TABLE 4 (and in TABLE 3 as well) were based on all 26 variables (29 in the Class of 1959). The extent to

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* See TABLE 1, footnote 2 for a description of composition of these two samples.

which there was consistency in findings in relation to standard samples 1 and 2 is also indicated. Unfortunately, the group classified as "Professional Chemists and Physicists" numbered only 1 in the Class of 1959.*

An additional category, not previously discussed, consisted of those who could be classified as of the highest occupational level. Examples are: newspaper publisher, university president, hospital superintendent, president of large corporation, and bank president. The fact that none of the four F values found for this group was significant at less than the 5 percent level is in itself perhaps indicative of a certain heterogeneity among the qualities represented by men in this classification.

The Nine Variable Discriminant Function Analyses

On the basis of the relative contributions (expressed in terms of "t" scores and their probability values) which each of the 26 variables made to differentiation between occupational groups and standard samples, the nine most important variables were identified. These nine contributed most to discrimination within each class population and also most consistently across the three class populations. The nine variables (listed in TABLE 5) can be grouped in the following three categories:

1. Non-cognitive matriculation data consisting of (a) the matriculant's age at entrance; (b) the father's occupational level when the son matriculated and (c) the mother's educational level at the time of the son's matriculation.

* This is interesting, for it may reflect the changing status of these two scientific professions over the intervening years. Members of the earlier classes earning a Bachelor's degree in one of the Sciences could probably qualify as a chemist or physicist while in today's world an advanced degree is required. In the Class of 1959, 128 graduates reported in 1964 that they were either graduate or professional school students at that time, but it was not possible to estimate which ones and how many might later become chemists or physicists in the professional sense. Hence, it was impossible to replicate the analysis involving chemists and physicists in the Class of 1959.

TABLE 4

OCCUPATIONAL GROUPS IDENTIFIED IN A 26 VARIABLE ANALYSIS AS YIELDING AT LEAST TWO SIGNIFICANT F VALUES [1/]

Occupational Groups	Classes of 1931 & 1932			Classes of 1935 & 1937			Class of 1959		
	n	F	p	n	F	p	n	F	p
Chemists & Physicists (Prof.)	21			17			1		
vs. Standard Sample #1		2.18	.01		1.75	.05			
" " " #2		2.23	.01		1.54	.05			
Engineers (Prof.)	54			45			48		
vs. Standard Sample #1		1.58	.05		1.63	.05		2.28	.01
" " " #2		1.18	-		1.40	-		2.75	.001
College Teachers	62			49			25		
vs. Standard Sample #1		3.94	.01		2.34	.01		1.45	-
" " " #2		4.39	.001		2.29	.001		1.16	-
Lawyers	162			130			160		
vs. Standard Sample #1		1.92	.01		1.97	.01		1.60	.05
" " " #2		2.25	.001		2.55	.001		1.42	-
Salesmen	46			35			41		
vs. Standard Sample #1		1.09	-		2.19	.01		1.59	.05
" " " #2		1.53	.05		2.09	.01		1.13	-
Totals	345			276			275		
High Occupational Level	136			141			9		
vs. Standard Sample #1		1.58	.05		1.51	.05			
" " " #2		1.75	.05		1.41	-			

1/ F is the discriminant function found between each occupational group and the 20% standard sample derived from each of the three populations.

2. Academic achievement factors, namely: (a) the student's score on the Scholastic Aptitude Test taken before matriculation;* (b) the student's average grade achieved during his senior year at Yale; (c) the scholastic honors which he had received during his college career.

3. Non-athletic extracurricular activities, namely: (a) membership in fraternities and societies; (b) involvement in clubs of an academic, sports or social nature and (c) involvement in dramatics, publications, musical organizations, etc.

One might expect a fairly high degree of independence among these nine variables and this indeed proves to be the case with the exception of the three academic measures. TABLE 5 details the correlation coefficients which support this statement. Owing to the large size of the populations represented in each coefficient (population 1393, 1285 and 899 respectively), one can regard these coefficients as highly stable. The replication data, over the three populations, shows a relatively high degree of consistency.

The purpose in identifying the nine variables was the obvious one of searching for a more economical way to differentiate between occupational groups on the basis of a minimum number of antecedent measures. An equally important and related purpose was to gain insight into the nature of those variables which were most discriminating and conversely to identify those which contributed little to differentiation.

The nine most significant variables having been identified, discriminant function analyses were then carried out between each of the five occupational groups and each of the standard samples. The relevant data are summarized in TABLE 6, where it is clearly apparent that on an overall basis about as much evidence of discrimination resulted from the nine variable analyses as from the more complex twenty-six variable analyses. Furthermore, in the nine variable analyses the consistency of probability values across the three separate class groups is quite noticeable.

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* A brief note about the content of the SAT may be in order at this point. First administered in 1926, the 1927 and 1929 forms provided only a single score. In 1927 (Class of 1931) the score was derived from seven Verbal and two Mathematical sub-tests; in 1928 from seven Verbal sub-tests. The 1931, 1933 and 1954 versions, each provided a Verbal score based on three Verbal sub-tests; and also a separate Mathematical score. The scores used in the present study were based entirely on Verbal material with the exception of the two-ninths Mathematical content of the 1927 Test. Those interested in the genetic history of the SAT are referred to the Annual Reports of the College Entrance Examination Board; and to: Loret, Peter G. (1960). A History of the Content of the Scholastic Aptitude Test. College Entrance Examination Board Research and Development Reports. TDM 60-1. Educational Testing Servi e.

TABLE 5

CORRELATIONS BETWEEN THE NINE MOST DISCRIMINATING VARIABLES

Column No. and Variable	Col. 13	Col. 14	Col. 25	Col. 28	Col. 29 *	Col. 40	Col. 41	Col. 43	Degree Groups
(7) Matriculation Age*	-.02	.04	.27	.20	-.22	-.27	-.03	-.01	'31&'32
	.02	.06	.20	.23	-.28	-.26	-.07	-.01	'35&'37
	-.02	.04	.18	.13	-.17	-.10	.05	.14	1959
(13) Father's Occupational Level		.10	.06	.00	.05	.15	.01	.12	
		.06	.03	.01	.01	.09	.02	.04	
		.15	-.02	.04	.01	.12	-.05	-.03	
(14) Mother's Educational Level			.07	.03	-.05	.02	-.00	.13	
			.11	.01	-.03	-.01	.02	.04	
			.03	.09	-.10	.01	.03	.05	
(25) SAT-V Score				.26	-.32	-.12	.03	.08	
				.29	-.35	-.09	.02	.11	
				.18	-.26	-.17	.05	.13	
(28) Senior Year Average					-.60	-.14	-.02	.03	
					-.61	-.16	-.01	.01	
					-.40	-.04	-.04	.13	
(29) Scholastic Honors*						.17	-.09	-.04	
						.18	.01	-.07	
						.09	-.08	-.13	
(40) Involvement in Fraternities & Societies							.16	.22	
							.21	.20	
							-.15	-.03	
(41) Involvement in Ac., Sport & Social Clubs								.10	
								.16	
								.03	
(43) Involvement in Dramatics, Publications, etc.									

Notes: Correlations were based on degree group populations of 1393, 1285 and 899 respectively. These populations are all so large that in a statistical sampling sense, each coefficient of .08 or larger is "significant" at the .01 level.

* The scale reversal on Column 29 has resulted in several negative correlations; that on Column 7 has resulted in several positive correlations.

TABLE 6

SUMMARY OF DISCRIMINANT FUNCTION VALUES OF FIVE OCCUPATIONAL GROUPS IN NINE VARIABLE ANALYSES WITH BOTH STANDARD SAMPLES AND ALSO WITH THE TOTAL POPULATION ADJUSTED

Occupational Groups	Classes of 1931 & 1932			Classes of 1935 & 1937			Class of 1959		
	n	F	p	n	F	p	n	F	p
Chemists & Physicists (Prof.)	21			17			1		
vs. Standard Sample #1		2.98	.01		3.64	.001			
" " " #2		3.02	.01		2.98	.01			
" TPA		*			*			*	
Engineers (Prof.)	54			45			48		
vs. Standard Sample #1		2.63	.01		2.31	.05		4.85	.001
" " " #2		1.16	-		2.08	.05		6.59	.001
" TPA		1.74	-		2.31	.05		9.03	.001
College Teachers	62			49			25		
vs. Standard Sample #1		9.07	.001		3.89	.001		3.20	.001
" " " #2		10.58	.001		4.09	.001		2.50	.01
" TPA		12.61	.001		5.20	.001		3.54	.001
Lawyers	162			130			160		
vs. Standard Sample #1		2.86	.01		4.78	.001		3.25	.001
" " " #2		5.59	.001		4.98	.001		2.85	.01
" TPA		5.50	.001		8.35	.001		5.22	.001
Salesmen	46			35			41		
vs. Standard Sample #1		1.61	-		3.22	.001		2.26	.05
" " " #2		1.49	-		2.86	.01		1.61	-
" TPA		1.57	-		3.19	.001		2.63	.01
Totals	345			276			275		

- indicates F > .05
* indicates F not calculated

TPA: Total Population Adjusted by removal of that occupational group.

The next step in further analysis of the five occupational groups is also summarized in TABLE 6 wherein F and p values are shown for the discrimination between each occupational group and the balance of the total population from which that group was derived. This balance is referred to as TPA, or total population adjusted by removal of the particular occupational group under examination. For example, in the case of the 48 engineers in the Class of 1959, this phase of the analysis involves a comparison of the nine variable data for these 48 cases; and the same nine variable data for the 851 remaining degree recipients in that class. Such a procedure eliminates the approximately 20 percent overlap mentioned previously in the discussion of the standard samples. Quite impressive confirmation of the discriminant function values previously found (versus the standard samples) was also found versus the total population adjusted (TPA). The number of instances in which discrimination at the .001 level appeared is also quite noteworthy.

Having identified these five occupational groups as having had earlier characteristics which differentiated them from the standard samples and also from the balance of their respective class populations it now became of interest to determine to what extent these five groups really differed from each other in terms of their antecedent measures. One approach to this question was through the correlational analyses shown in TABLE 5 and previously discussed in connection with the data in that table. Later, when the data for the five occupational groups were analyzed in pairs (two group discriminant function analysis) that is, one group against every other occupational group, F values and their corresponding probability levels were found as summarized in TABLE 7.

It is unfortunate that the data for the chemists and physicists is limited to the two earlier class groups and to such small populations in each instance. Therefore, one has to regard the intergroup function data (TABLE 7) involving chemists and physicists with more reservations than may be the case with the other four groups. College teachers and salesmen appear to be the most unique pair since the probability values in all three class groups are at the .001 level of significance. Lawyers and salesmen, however, and also lawyers and engineers, as well as college teachers and engineers, also show significant F values.

The Prediction of Membership in an Occupational Group

If one were to rest here he might be quite content at having found such a high degree of discrimination among five occupational groups. He might then go on to explore the means of the nine differentiating variables and set up descriptions or graphic profiles of the nine characteristics which during the college period seem to describe those who will later be found in the career groups indicated. This we have actually done in the graphs shown in FIGURE 1, which reflect the extent to which each occupational group has a characteristic profile. Each point in the graphs is based on average deviations from the total class mean, represented by the horizontal line. The basic data for the graphs

TABLE 7

DISCRIMINANT FUNCTION VALUES BETWEEN PAIRS OF OCCUPATIONAL GROUPS IN CORRESPONDING YEARS [1/]

Occupational Groups	n	Engineers F	Engineers p	Coll. Teachers F	Coll. Teachers p	Lawyers F	Lawyers p	Salesmen F	Salesmen p
Chemists & Physicists									
1931 & 1932	21	2.20	.05	3.94	.001	2.64	.01	4.58	.001
1935 & 1937	17	3.56	.01	1.69	-	3.08	-	6.59	.001
1959	1	*	*	*	*	*	*	*	*
Engineers									
1931 & 1932	54			5.19	.001	2.22	.05	1.42	-
1935 & 1937	45			2.93	.01	4.59	.001	3.26	.01
1959	48			2.42	.05	12.10	.001	5.15	.001
College Teachers									
1931 & 1932	62					4.27	.001	9.17	.001
1935 & 1937	49					1.34	-	5.52	.001
1959	25					2.87	.01	4.28	.001
Lawyers									
1931 & 1932	162							3.72	.001
1935 & 1937	130							3.57	.001
1959	160							3.10	.01

1/ These F values were calculated on the basis of the nine most discriminating variables (TABLE 5).

- indicates $F > .01$

* indicates F not calculated

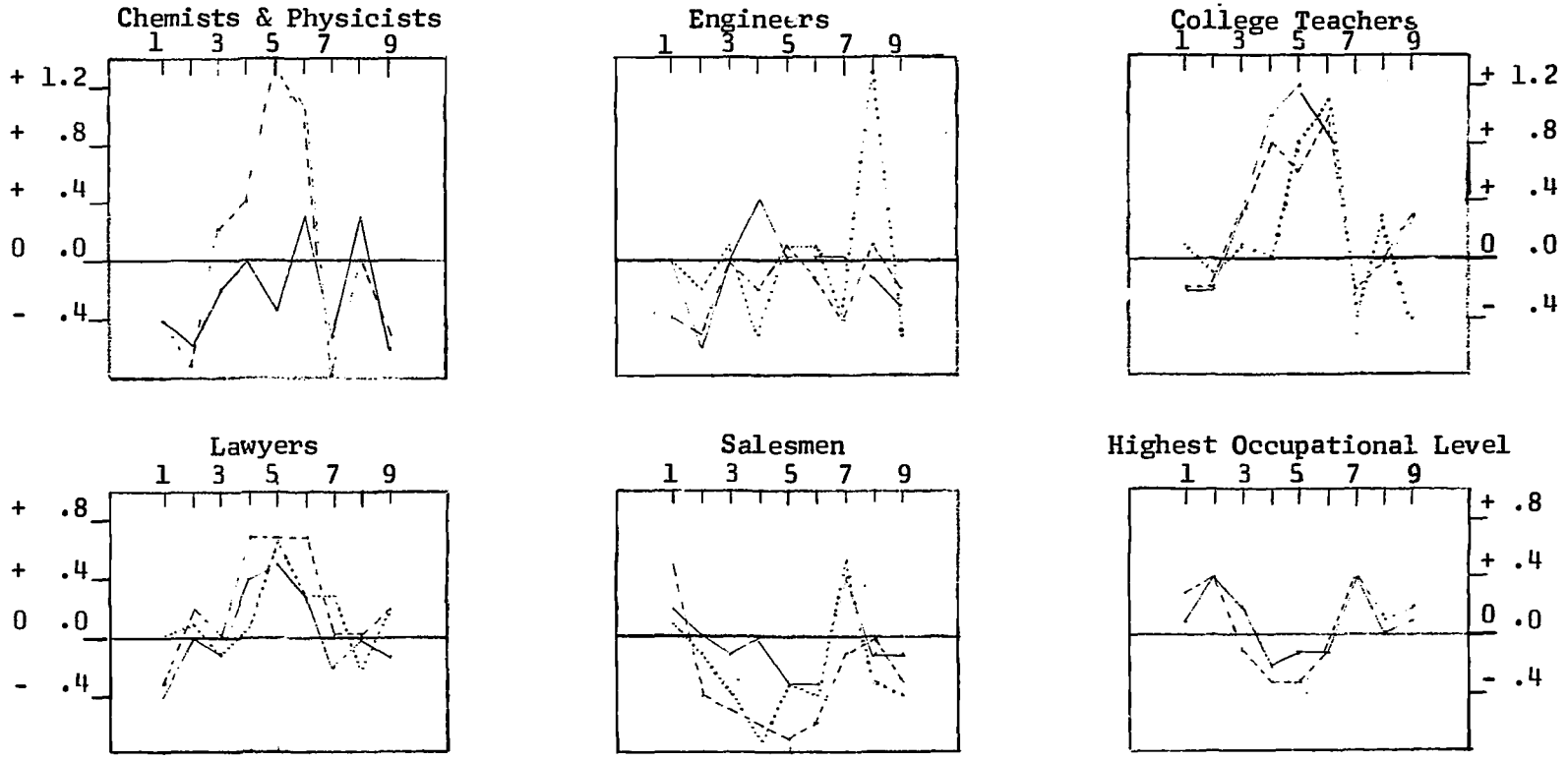
are shown in the tables comprising APPENDIX C. Omitted from FIGURE 1 are the data for the high occupational level group in the Class of 1959 because the number of graduates represented was only nine. The small number of cases (21 and 17) in the chemists and physicists group may account for some of the irregularity observable in their profile.

The lawyers and college teachers have profiles quite different from those of the salesmen, and the engineers tend to be different from the other three. These average differences cannot be disregarded, for they describe the typical pattern for each group; nevertheless, they suggest an oversimplification because they do not take into account the extent of overlap with the total population data shown in APPENDIX C, nor with each of the other discriminant occupational group distributions also shown in APPENDIX C.

A ready acceptance of a discriminant function value with a level of significance as marked as .01 or .001, however, overlooks the possibility that a high level of significance might still permit so much overlapping of distributions on the original variables as to create a real problem in any attempt to use the original data prognostically. To be sure, the intercorrelations among the nine variables (TABLE 5) show in many instances a high degree of independence of pairs of antecedent measures. This, however, does not in itself establish the possibility of dependable prediction of group membership by an appropriate combination of variables. The fact that there is considerable overlapping between the distributions of the occupational groups is shown in the tables which comprise APPENDIX C. It is a well known fact, for example, that a conventional "t" test of the significance of differences between means of independent samples may be found at a high level of confidence even when there may be a very large amount of overlapping between the two sample distributions.

Fortunately, the discriminant function technique provides a method by which, for any two-group-analysis, the original variables may be combined in a manner which is optimally weighted to produce a discriminant index or function. In a sense, this procedure is somewhat analogous to the use of a multiple regression equation, except that the discriminant function is concerned with identification of probability of membership in a group, while multiple regression is concerned with placement on a quantitative scale. In order to explore this matter further, functions were actually calculated to see to what extent membership in these various occupational groups could be estimated or determined from the original data. If a group were really unique, then one might expect no overlapping between the distribution of function index values for all cases in the occupational group when compared with similar function indices calculated on all other cases in the total population from which the specific subgroup was derived. Such indices were calculated (with the omission of chemists and physicists for the reasons previously cited, i.e., small populations and lack of representation in the Class of 1959), and these comparative data are shown in TABLE 8.

PROFILE GRAPHS OF DEVIATIONS OF DISCRIMINANT OCCUPATIONAL GROUP MEANS FROM TOTAL CLASS GROUP MEANS



F I G U R E 1

Key:

1 Age at Matriculation
2 Father's Occupational Level
3 Mother's Educational Level
4 SAT Score
5 Senior Year Average
6 Scholastic Honors
7 Fraternities and Societies
8 Academic, Sport and Social Clubs
9 Dramatics, Publications, Music, etc.

——— 1931, 1932
---- 1935, 1937
..... 1959

TABLE 8

EVIDENCE OF OVERLAPPING OF DISTRIBUTIONS OF THE FUNCTION DISCRIMINATING BETWEEN EACH OF FOUR OCCUPATIONAL GROUPS AND THE TPA

		1931 & 1932		1935 & 1937		1959	
		og [1]	TPA	og [1]	TPA	og [1]	TPA
Engineers							
n		54	1339	45	1240	48	851
Max [2]		02	05	32	35	42	44
Mean [2]		-06	-08	22	18	08	-13
Min [2]		-15	-21	12	00	-29	-47
SD		04	04	05	06	19	15
	F	1.74		2.31		9.03	
	p	-		.05		.001	
College Teachers							
n		62	1331	49	1236	25	874
Max		09	11	-05	03	-35	-31
Mean		-14	-28	-23	-31	-65	-80
Min		-41	-56	-40	-42	-101	-112
SD		12	10	10	08	18	13
	F	12.61		5.20		3.54	
	p	.001		.001		.001	
Lawyers							
n		162	1231	130	1155	160	739
Max		21	17	19	22	31	31
Mean		07	05	06	01	16	11
Min		-04	-09	-06	-14	-05	-11
SD		04	04	06	06	06	07
	F	5.50		8.35		5.22	
	p	.001		.001		.001	
Salesmen							
n		46	1347	35	1250	41	858
Max		23	25	04	02	10	12
Mean		18	15	-10	-17	-04	-11
Min		13	00	-24	-54	-22	-39
SD		03	04	06	07	07	09
	F	1.57		3.19		2.63	
	p	-		.001		.001	

1/ o g Occupational Group
2/ Decimals have been omitted for all Max, Mean and Min values which are relative rather than absolute values.

If we look at the data for the 48 engineers in the Class of 1959 we see that function indices for this group range from a low of -29 to a high of 42 with a mean at 08. The corresponding indices for the balance of the class (TPA) range from -47 to a maximum of 44 with a mean at -13. Hence, instead of being identified as different from the parent population, the distribution of indices for the 48 engineers is contained within the range of indices for the TPA with the major difference lying in the means of 08 and -13 respectively. Hence, even though F is significant at the .001 level, with this degree of overlap in the two distributions, one would be seriously in error if he relied solely on this index for identification during the college period of those who would subsequently be members of this occupational group. Very extensive overlap occurs in all of the groups shown in TABLE 8. Among the 12 analyses represented, there is a 100 percent overlap in nine instances.

For those who hope that such antecedent data may be useful in predicting occupational group membership, these findings are disappointing. Yet nine of the twelve F values shown in TABLE 8 have probability levels of .001. Also observable in these data is the suggestion of a trend in probability values, from two which are highly significant for the earliest of the three populations, to four for the latest. The data do not reveal whether this seeming trend is a function of time or whether it is a reflection of differences in the basic populations or in the specific occupational groups. The situation exemplifies the kind of difficulty one faces when his research design involves replication on different populations, in contrast to the more comfortable single population design. The latter is less likely to give rise to inconsistencies which the researchers might like to be able to "explain."

The last phase of the analysis was the application of the multiple discriminant function technique to the four occupations: engineers, college teachers, lawyers and salesmen. This is a procedure by which one establishes whether the four groups are really quite separate and independent samples (in terms of the nine antecedent variables) or conversely, whether they are so interdependent that they cannot be distinguished from each other. When the first function had been calculated it proved to account for some 70 to 80 percent of the total variance between the four groups and the second function accounted for a substantial part of the residual variance. These two functions were expressed in the form of an index value (or prediction) for each case in the population. Maximum, minimum and mean values are shown in TABLE 9. Again, if these four occupational groups were really unique, one might expect little or no overlapping between the distributions of the function indices. That this proves not to be the finding is shown by a comparison of maximum, minimum and mean values across the four columns representing occupational groups. Marked differences in means can readily be identified but again the overlapping in the distributions is great. This extensive overlapping suggests no encouraging probability that by any combination of these particular antecedent measures alone, could one predict with assurance during the college period, later membership in one of these four discriminant groups.

TABLE 9

EVIDENCE OF OVERLAPPING OF DISTRIBUTIONS OF FIRST AND SECOND FUNCTIONS DERIVED FROM MULTIPLE DISCRIMINANT ANALYSIS OF FOUR OCCUPATIONAL GROUPS

		Engineers	Coll. Teachers	Lawyers	Salesmen
First Function					
Classes					
1931 & 1932	Max 1/	5.7	9.1	8.9	2.7
	Mean 1/	-1.58	2.51	-0.12	-2.67
	Min 1/	-6.4	-5.6	-8.3	-6.9
	SD	3.05	3.35	2.99	2.33
1935 & 1937	Max	9.8	17.0	14.8	5.8
	Mean	1.10	5.22	4.74	-1.86
	Min	-5.3	-5.7	-3.7	-8.6
	SD	3.94	5.53	4.22	3.23
1959	Max	11.1	10.9	12.7	14.2
	Mean	-0.03	3.73	6.77	6.09
	Min	-9.0	-5.3	-7.1	-6.9
	SD	5.24	4.33	3.42	3.79
Second Function					
1931 & 1932	Max	-6.6	-17.1	-18.2	-18.2
	Mean	-36.37	-37.13	-41.38	-38.26
	Min	-53.5	-55.3	-61.0	-53.8
	SD	10.93	9.55	9.57	8.80
1935 & 1937	Max	-9.8	0.7	-1.0	-2.0
	Mean	-19.25	-16.38	-14.77	-13.14
	Min	-40.8	-37.1	-36.0	-28.0
	SD	6.45	8.15	5.90	5.56
1959	Max	34.9	28.3	38.6	9.7
	Mean	-1.76	7.49	0.81	-10.15
	Min	-26.2	-18.8	-25.4	-28.8
	SD	13.31	14.62	13.99	10.33

1/ Decimals have been omitted for all Max, Mean and Min values which are relative rather than absolute values.

CHAPTER 5

CONCLUSIONS AND IMPLICATIONS

In retrospect, perhaps it is surprising that we should have found as many as five discriminant occupational groups. This statement is made in consideration of the nature of the data. Students entering Yale three decades ago were highly selected, not broadly representative of the total age group, but on the other hand probably representative of a fairly large body of young men entering several of the better known institutions of higher education which also exercised selective admissions' policies at that time. Because of this factor of selectivity, a certain degree of homogeneity was characteristic of the group. Furthermore, although the 26 measurement variables with which we were concerned in this study embraced a number of important characteristics, yet there were many other characteristics of probable importance which were not subject to a quantitative scaling procedure. Ethnic background, religious affiliation, geographic location of the parental home and the kind of occupation engaged in by the father are but a few examples of those which could be mentioned.

At the other end of the spectrum is the occupational classification of these students, some three decades after their matriculation in college. Occupations in our society are such broadly defined types of categories that it is difficult to describe them, much less classify them with the same degree of precision that may be represented in such a measure as chronological age at matriculation, or an estimate of intellectual capacity as represented by a reliable psychological examination, such as the Scholastic Aptitude Test. Furthermore, the range of ability and personality characteristics that one observes in any vocation reinforces the feeling that occupational groups represent very heterogeneous categories with several occupations sharing many common elements.

In addition to the above observations about the end points of the time continuum in this study, there is the very real question of the extent to which the characteristics of people manifested at an earlier age, have necessarily a high relationship to characteristics which we observe in the same people as adults, after a time span of several decades. Furthermore, in our society there is great freedom of choice for the individual who really wants to make a choice and follow that choice. By and large, people in our study group were probably free to stay within the occupation chosen initially, or to transfer to another. To be sure, transfer is more feasible in some directions than in others. Those occupations which presuppose a high degree of professional or preprofessional training are more difficult to transfer into, but there are still many occupational categories which are less restrictive in terms of earlier training requirements.

In the broad sense, the members of the study group had great freedom of choice, particularly at college-entrance level. The data, however, do not tell us anything about the reasons for the choices which they made, nor about their basic motivations and the drives operating over the years. The choices which they made were probably in many instances influenced by contingency factors which also are not revealed in the data.

Hence, we repeat, that because of the nature of the data, it may be surprising that five occupational groups were identified by the discriminant function analysis of antecedent measures.

The extensive overlapping suggests little probability that one could combine the particular antecedent measures so as to predict with assurance during the college period later membership in one of the four occupational groups discriminated. Yet one might hypothesize that many men with similar characteristics who did not enter that occupation did select another that was very similar. For example, what occupation did the non-engineers who had the same characteristics as our engineers choose? While contingency factors might have caused them to select a vocation quite different, did some of them become management consultants, industrial designers, physicists, architects, production managers or mathematicians? Perhaps by asking our engineers how satisfying they found their occupations and by asking non-engineers with similar characteristics what occupation they wish they had selected one could develop some hypotheses about the contingency factors that may have swung these graduates of the depression years away from the occupations they might have preferred.

The methods we used in arriving at our final occupational groups may have precluded our findings from being as significant as we had hoped. After all the occupations were initially coded, we found that our basic populations of men in most vocations were small, and so we decided to consolidate those in the same vocational field into single vocational groups, thus disregarding their functions and their levels of responsibility. We felt justified in doing this because with very small populations there is likely to be doubt about the representativeness and significance of the sample. We found that this kind of consolidation left us with 25 vocational groups to analyze. Of these, only the lawyers, engineers, chemists and physicists, college teachers, and salesmen, and to a lesser extent, the non-vocational group at the top occupational level, were differentiated by antecedent measures.

A backward look at what we had done in our consolidations and the recollection of Thorndike's observation (1962) regarding the outcomes of his 1959 study that "the occupational groups were so heterogeneous that no differentiation or prediction was possible" led us to conclude that we might have combined in at least ten instances, groups that were basically very different. For example, of the secondary school teachers, some might have been in private, some in public schools and in a variety of subject matter fields, some with advanced degrees some without. All of

our farmers were not alike, either in the size of their operations or in their specializations. The four groups of officers and administrators of banks, insurance companies, and of large and of medium-size corporations were undoubtedly performing numerous functions and at various levels of responsibility. To this heterogeneous group we could add the chief executives of small and of medium-size corporations, managers and owners of retail stores and of wholesale businesses, since all types of each were grouped together; and the government service executives and specialists.

Again from hindsight we also agree with Thorndike's observation (1962) that "long range success depends so heavily upon contingency factors that one can never hope to predict it from what can be known about the individual in advance." He describes contingency factors as "the whole gamut of things that can happen to a person and that are not known or knowable from any information about him .... his college fraternity brother might be able to get him started in the family business or might introduce him to the boss' daughter .... the jobs that happened to be open the day he started looking for work, the ad he happened to see .... the foreman who happened to take over his training as a green hand, the vacancy that happened to be available at the point when he was a candidate for promotion. All of these and many more interact to shape his occupational career." With this admonition, perhaps we could not expect to find differences between our basic populations and men in advertising and public relations, business consulting, investment banking, and writing and chief executives of companies, and sales vice presidents.

If this had been a forward instead of a backward look, we might have expected to find significant differences between our study populations and the engineers, the chemists and physicists, and the lawyers, where this proved to be the case; and also the physicians and surgeons, the accountants, the brokers, the insurance agents, and the real estate agents, where this was not the case. We might have been somewhat surprised to find that the college teachers and salesmen differed significantly from the basic groups. The former taught in a wide range of fields; the latter handled many kinds of sales activities and products.

The significant differences we could have anticipated in analyzing the engineers, the chemists and physicists, and the lawyers seem attributable, then, to their relative homogeneity at the time they selected their careers and possibly to the lesser importance of contingency factors in their choice of an occupation. In each instance, during the college years these groups had to make very significant choices. The engineers and the chemists and physicists had to concentrate early. The lawyers had to decide to attend law school following graduation from college. Except in possibly determining their eligibility to enter their professions, contingency factors have not deprived these men of their occupational titles, nor in most instances could they help or hinder their holding them. While it is difficult for us to hypothesize why the physicians and surgeons and, to some extent, the accountants, were not found to be significantly

different also, we should probably not be surprised after all that the college teachers were. They too had to make an early decision to pursue postgraduate training.

Like the college teachers who are involved in a variety of fields, the salesmen in the study are engaged in a wide range of activities and with diverse products. So far as we can tell, this group is not comprised of sales-administrators or -executives. They are involved primarily in customer-contact activities. Perhaps we do not yet know enough about the personalities of long-term salesmen to hypothesize why these men differ significantly from our study group nor why the stockbrokers, insurance agents, and real estate agents do not.

Men employed at the top occupational level in a variety of vocational fields proved to be different (but at a somewhat lower level of statistical significance) from our study populations. These men, it should be remembered, were the chief executives or top decision-makers of corporations, banks, businesses, or professional groups where, at the time of formulating the occupational code, we believed policy setting and some abstract planning would be demanded. It is possible only to hypothesize that these men, too, made an early decision to attain such a position; perhaps if we had data such as their in-college scores on Strong's Occupational Level scale or on Allport-Vernon's Political value we might have some specific measure of their drive to attain this kind of status. Our antecedent measures may be revealing but not defining precisely the factors that accounted for their success.

It is within this last group that we might expect contingency factors to operate particularly in the selection of men moving toward the top of the pyramid. It is probably not surprising that their in-college characteristics can be identified less well than those of the five occupational groups and that we cannot predict which among them will attain his high aspirational goal.

The findings of this study imply that given enough appropriate data at the time of college graduation and earlier, we might be better able to predict the probability of possessing the qualifications for membership in certain occupational groups during the adult years. The probability of being able to do this might well vary with the occupation and depend among other things on the specificity versus the generality of characteristics which define and describe people who are successfully engaged in that occupation.

A host of contingency factors operates to influence the determination of which specific individuals may several years later actually be found in some of these occupational classifications. Freedom of personal choice will make it possible for some to continue in the field earlier chosen or move to another one which may seem to have more attractive features.

Additionally there is the implication that we need to study the contribution of the many non-measurement factors associated with the development of people. We need also to broaden the range of measurement factors among the antecedent variables, and to explore their contribution to career determination.

The influence of contingency factors needs to be examined and ways found to treat these as influences making a positive contribution to prediction. In other words, from a measurement point of view, we need to find ways of better identifying and describing these contingency factors, so that we may reduce their chance or contingency characteristics and increase the non-chance or prediction related possibilities.

To attempt any of these explorations is a formidable undertaking, but the challenge is great.

CHAPTER 6

SUMMARY

It was hypothesized that after a substantial period of time following graduation from college, some occupational groups are characterized by sufficiently unique patterns of antecedent measures (both academic and non-academic) to permit their identification from data available at the time of their graduation. To test this hypothesis three groups of Yale graduates about whom matriculation, in-college, and subsequent career information was generally consistent were selected as the study population:

(a) The Classes of 1931 and 1932, combined (n = 1393);

(b) The Classes of 1935 and 1937, combined (n = 1285);

(c) The Class of 1959 (n = 899).

Prematriculation and in-college data were coded whenever possible on quantitative scales. Twenty-six predictor measurement variables were found to be available on the earlier classes and twenty-nine on the most recent class; these included personal and family data, scores on College Entrance Examination Board Aptitude Tests, academic averages, scholastic honors received, and extent of participation in various kinds of extracurricular activities.

As recent occupational information as possible was secured about each graduate, mainly from class histories but also from telephone, street, and professional directories. This was coded according to a specially designed three-digit occupational code. This coding system was later adapted to a two-digit code that reflected combinations of men in related occupations within the same fields; through this procedure, a majority of the graduates were classified. Twenty-five occupational categories with seemingly large enough populations to analyze were thus developed.

With these three groups of graduates to study, it was possible to replicate analyses so as to test the consistency of findings. Two sets of standard samples, each representing about 20 percent of the parent group, were selected from each of the three class groups; the characteristics of each occupational group were compared with those of these standard samples.

Through Fisher's discriminant function, five occupational groups were found to have statistically unique patterns of matriculation and in-college characteristics: (a) chemists and physicists, (b) engineers, (c) college teachers, (d) lawyers, and (e) salesmen. For each of these five occupational categories, a significant F value was found in one class group and was replicated with some

consistency in either one or both of the remaining class groups. To these five was added a sixth -- a non-vocational group of men employed at the highest occupational level (i.e., top policy makers). It should be noted that a disappointingly large number of occupational categories could not be calculated because of the small number of cases involved in one or more of the three groups of graduates; in many instances significant F values found in one occupational category were not replicated in the other two class groups.

On the basis of relative contributions which each of the 26 variables made to differentiation between occupational groups and standard samples, the nine most important variables were identified. These nine contributed most to discrimination within each class population and also most consistently across the three class populations. These were: (a) age, (b), father's occupational level, and (c) mother's educational level, all at the time of the student's matriculation at Yale; (d) the student's score on the Scholastic Aptitude Test taken before his matriculation at Yale; (e) his senior-year average grade and (f) the scholastic honors he received at Yale; his involvement (g) in fraternities and societies, (h) in academic, sports, and social clubs, and (i) in dramatics, publications, and musical organizations.

Through correlational techniques a high degree of independence was found among these nine variables except in the case of the three academic measures. The large size of the populations and the replication over the three populations indicated that this independence is stable and consistent.

Discriminant function analysis using these nine variables was performed between each of the five occupational groups and each of the standard samples. As much evidence of discrimination resulted from the nine variable analyses as from the more complex twenty-six variable analyses. The same analytic technique was applied to determine the degree of differentiation between each vocational group and the balance of the class (or the total class population after a vocational group had been eliminated). This yielded impressive confirmation of the discriminant function values previously found between the vocational groups and the standard samples. Correlational and two group discriminant function analyses revealed that these vocational groups tend to differ from each other in terms of their antecedent measures. College teachers and salesmen appeared to be the most unique pair; their probability values were at the .001 level of significance in all three class groups.

Comparisons of profiles of the nine antecedent characteristics of each of the five occupational groups reveal differences which cannot be disregarded; they suggest, though, an oversimplification of the findings unless one is also mindful of the extent of overlap between the characteristics of each vocational group and its parent population.

It should be noted that a discriminant function value with a level of significance as marked as .01 or .001 still permits so much overlapping of distributions as to impair the prognostic use of the antecedent variables.

The discriminant function technique was applied to optimally weight the original variables of each occupational group so as to yield a discriminant index. Functions were calculated to determine the extent to which membership in each occupational group could be estimated from the original data. If a group were really unique, no overlapping would exist between the distribution of function index values for all cases in the occupational group when these are compared with similar function indices calculated on all other cases in the total population from which the specific subgroup was derived. Because such extensive overlap occurred in all of the groups, antecedent data such as we used do not prove to be discriminantly predictive of membership in specific occupational groups.

Similarly, when this technique was applied to determine the degree of overlap between the vocational groups, overlapping of these distributions was so great as to preclude assured prediction during the college period of later membership in one of these groups.

A retrospective look at the nature of the study population and of the antecedent variables we used leads us to feel little surprise that our findings do not offer stronger support of our hypothesis. But the study population had been highly selected as a result of Yale's admissions policy; hence, our populations were comprised of notably homogeneous groups. All of the predictor variables we used were quantifiable; excluded were non-quantifiable characteristics, some of which are probably important in the selection of occupations (i.e., the father's occupation, the family's religion and ethnic background, the marital status of parents, etc.). Contingency factors, too, may have prevented our finding more than five discriminant groups; during the depression years, particularly, many graduates may have entered an occupation because an opportunity for employment existed, not because it seemed most desirable or appropriate. We do not know the extent to which uncontrollable circumstances or things that happened to these men affected the composition of our vocational groups.

We cannot be sure, either, that our occupational groups were sufficiently homogeneous to permit discrimination. Because occupations are so broadly defined in our society, it is difficult to categorize them precisely and to be certain that men in the same occupational classification are performing the same kind of work. Our occupational categories are not "pure" for this reason and also because we had consolidated men in the same field regardless of their specific function so as to have sufficiently large occupational groups to study.

We believe that the discrimination found with the engineers, the chemists and physicists, and the lawyers resulted from the homogeneity of these occupations and the fact that these men made presumably early choices to enter these fields, that they had common specialized training for these occupations, and that contingency factors did not appreciably affect their occupational stability after they had completed their training. These reasons may apply, too, to college teachers, except that their "common" training was in a broad spectrum of subject-matter fields. We are unable to explain why the salesmen are significantly different nor why we did not find differences in some of the other vocational groups, such as physicians and accountants, who also made early choices, had common training, and were probably affected negligibly by post-training contingency factors.

We conclude that given enough appropriate data at the time of college graduation and earlier, later researchers will find it possible to predict the probability that individuals possess the qualifications for later membership in certain occupational groups. Additionally, the contribution of nonmeasurement factors must be investigated and the range of antecedent variables broadened and related to the determination of a career. Finally, the effect of contingency factors must be identified and treated in studies of this kind as influences making a positive contribution to prediction; we must find better ways to identify the latter so as to reduce their chance effects.

APPENDIX A

REFERENCES

There exists a considerable body of research related to various aspects of student change and development and also with respect to occupational choice. Relatively few longitudinal studies are available, however; and when the area is narrowed down to longitudinal studies of male college students over the last three decades in institutions of higher education which have been traditionally selective, there is no substantial overlap with the present study. There are many related studies, however, and among them the following are noteworthy:

1. Altus, William D. (1966). Birth Order and its Sequelae. Science, Vol. 151, pp. 44-49. A very interesting review of several studies beginning with Galton's English Men of Science, (1874). All were foccussed on the relationship of ordinal position among siblings to potential eminence and educational attainment.

2. Burnham, Paul S. (1961). Academic Success and Career Choice. College Board Review, No. 45, pp. 22-23. A small pilot study contrasting the careers three decades after graduation of two small groups of Yale matriculants. One group comprised the top three percent of the class in academic standing at matriculation; the other comprised the bottom three percent.

3. Campbell, David P. (1965). The Results of Counseling: Twenty-Five Years Later. W. B. Saunders. "Two groups of students enrolled at the University of Minnesota 25 years ago (in the period 1933 to 1940) were studied. Each contained about 400 students. One group had sought and received counseling as college freshmen; the other had not."

4. Chauncey, Henry and Hilton, Thomas L. (1965). Are Aptitude Tests Valid for the Highly Able? Science, Vol. 148, pp. 1297-1304. A review of research evidence gathered from several sources and focussed on the earlier aptitude scores of several samples of those who subsequently achieved distinction as graduate students, Ph.D. recipients, Rhodes Scholars, etc.

5. Cooley, William W. (1963). Career Development of Scientists, an Overlapping Longitudinal Study. Cooperative Research Project, No. 436. Graduate School of Education, Harvard University. A recent study employing the discriminant function technique in an effort to identify factors related to becoming a scientist. The concern was not with what makes a good scientist or an eminent or a creative scientist. Study was based on a population of 500 fifth, eighth, and eleventh grade boys in nine different school systems, and some 200 college students at six different colleges.

6. Cooley, William W. and Lohnes, Paul R. (1962). Multivariate Procedures for the Behavioral Sciences. Wylie. Contains a good chapter on multiple discriminant analysis.

7. Crawford, Albert B. (1962 ff.). Men of Yale Series. Yale University. Yale Football Y Men: Vol. I, 1872-1919; Vol. II, 1920-1939; Vol. III, 1940-1965. A series of biographical records and summary data on the later careers of former Yale students grouped initially by categories of student achievement. Other volumes have been planned for Phi Beta Kappa members, letter-men in additional team sports; leaders in non-athletic activities, etc.

8. Freedman, Marvin B. (1960). Impact of College. New Dimensions in Higher Education, No. 4, U. S. Department of Health, Education, and Welfare. Concerned with the description of relevant social scientific research carried out in recent years on college populations, with emphasis on identifying components by which degree of change in student personality, character and values might be ascertained. This pamphlet provides a splendid introduction to recent studies in closely related fields.

9. Galton, Sir Francis (1869). Hereditary Genius; An Inquiry into its Laws and Consequences. American Edition, Appleton, 1870. Galton studied the families of men who had achieved eminence as statesmen, commanders, judges, literary men, scientific men, etc. "Non-cognitive" classifications were represented by "oarsmen" and "wrestlers of the North Country." Galton's analyses concentrated on family relationships, with little attention to environmental factors and none (for obvious reasons) to educational measurements, such as psychological test scores, college grades, etc.

10. Ginzberg, Eli and Herma, John L., et al. (1964). Talent and Performance. Columbia University Press. Questionnaires were sent to men who had been awarded a fellowship for graduate or professional study at Columbia University during the period 1944-1951. The focus of the research was on determining how personal and social factors interacted to shape the subsequent careers of the 80 percent who responded out of the total group of 433 reached.

11. Hawes, Gene R. (1963). The Colleges of America's Upper Class. Saturday Review of Literature, November 16, 1963. pp. 68-71. Interesting data on the choice of college by sons and daughters of America's upper class.

12. Haveman, Ernest and West, Patricia Salter. (1952). They Went to College. Harcourt, Brace and Co. In 1947, Time Magazine used a questionnaire to survey 9064 college graduates who had taken their degrees in the period 1900-1947 in 1037 colleges. Analyses related to such things as earnings, occupations, type of college attended and attitude toward the college experience.

13. Holland, John L. and Richards, James M., Jr. (1966). Academic and Non-academic Accomplishment in a Representative Sample Taken from a Population of 612,000. ACT Research Reports, No. 12. American College Testing Program. A study of students' scores on the ACT battery and their scores for non-academic achievement in a sample of 18,378 college applicants. Correlations between measures of academic and non-academic accomplishment were generally negligible, suggesting that academic and non-academic accomplishment are relatively independent dimensions of talent.

14. Hoyt, Donald T. (1965). The Relationship Between College Grades and Adult Achievement, a Review of the Literature. ACT Research Report, No. 7. American College Testing Program. A review of 46 studies grouped into eight categories - business, teaching, engineering, medicine, etc. "Although this area of research is plagued by many theoretical, experimental measurement and statistical difficulties, present evidence strongly suggests that college grades bear little or no relationship to any measures of adult accomplishment."

15. Hutchins, Edwin B. (1964). The AAMC Longitudinal Study: Implications for Medical Education. The Journal of Medical Education, Vol. 39, No. 3. pp. 265-277. A longitudinal study of the development of students entering 28 representative medical schools in the Fall of 1956. Illustrates the AAMC's continuing concern with student characteristics and their relation to subsequent careers.

16. Lins, Joseph L. (1963). The Role of Institutional Research in Planning. The Office of Institutional Studies, University of Wisconsin. Critical comments on some of the problems of student follow-up studies appear in two chapters: Mayhew, Lewis B. Student Follow-up Studies, A Research Design; and Davis, Junius A. Comments on Student Follow-up Studies. pp. 126-140.

17. National Merit Scholarship Corporation (1964). Summary of Research Completed During the Period July 1, 1963 through June 30, 1964. Technical Report No. 8. A concise summary of several studies using the high level NMSC population data. Projects were classified in one of five categories: (1) Identification of Talent; (2) College Environment; (3) College Influence; (4) Genetic Studies; (5) Miscellaneous Studies.

18. Roe, Anne (1956). The Psychology of Occupations. Wylie. "A book intended for upperclass college students in programs in vocational guidance, counseling and clinical Psychology. It structures the broad field of relations between occupation and other aspects of life in a search for a general pattern of basic principles." Contains a wealth of valuable information.

19. Sanford, Nevitt (1962). The American College. Wiley. Chapter 25, Studies of College Alumni, by Mervin B. Freedman, reviews the findings of several research efforts.

20. Thorndike, Edward L. (1934). Prediction of Vocational Success. The Commonwealth Fund. One of the follow-up classics is E. L. Thorndike's study of 2285 eighth grade pupils tested in New York City in 1921-1922. The test battery used was somewhat limited, consisting of arithmetic and reading tests, a test of "clerical intelligence" and one of "clerical speed and accuracy" and a mechanical assembly test. Thorndike did not attempt to study specific occupations but rather evaluated success in general terms over the whole range of occupations. The correlations of test scores with appraisals of later success were in general quite low.

21. Thorndike, Robert L. and Hagen, Elizabeth (1959). Ten Thousand Careers. Wylie. In 1955-1956 Thorndike secured questionnaire information from over 10,000 of some 17,000 cadets who had been given a battery of Air Force Aptitude Tests in 1943. Material had been gathered about the educational and vocational history of each cadet. That certain occupational groups differed with respect to personal background variables as well as with respect to aptitude test scores was one of the outcomes of this study. The major differentiating predictor variables, however, were the scores made on the Air Force Aptitude Tests.

22. Thorndike, R. L. (1962). The Prediction of Vocational Success. The Vocational Guidance Quarterly, Vol. 11, pp. 179-187. A critique of 10,000 Careers which seeks to answer the questions: "Why were differences between occupational groups no sharper than they were" and "Why did we fail to predict our indicators of occupational success." An excellent review of the many limiting factors which affected Thorndike's research published under the title: 10,000 Careers.

23. Terman, Lewis M. and Oden, Melita H. (1959). The Gifted Group at Mid-Life. (Vol. 5 in the Genetic Studies of Genius). Stanford University Press. An insightful report on the 1950-1955 follow-up of a research program begun in 1921 when approximately 1500 intellectually superior children were selected for study. Chapter VII, The Matter of Career, is of particular interest in the context of the present research. This chapter is largely descriptive with little attempt to relate membership in different occupational groups to characteristics identified thirty-five years earlier.

24. Warner, W. Lloyd; Van Riper, Paul P.; Martin, Norman H. and Collins, Orvis F. (1963). The American Federal Executive. Yale University Press. "Research reported in this volume is one of a series begun in 1932 when Taussig and Joslyn published their American Business Leaders. .....(Warner, et al.).... have designed their study to secure knowledge about movement into the federal elites of American government comparable to that obtained for business leaders in 1952." The study was based on a 69 percent return from questionnaires mailed in 1959 to 15,701 civilian executives and 2919 military executives in the federal government. "The study projects the composite image of the elites of the civil, foreign, and military services - their socio-economic and regional backgrounds, their education, marriages and careers."

A P P E N D I X B

THE OCCUPATIONAL CODE

Tailored initially to the occupations of Yale graduates of the 1930's and to those of their parents, the Occupational Code is heavily weighted with professional, executive, and administrative job titles. It was easily expanded to meet the somewhat different requirements of the Class of 1959.

A three-digit, 1200-cell code, it utilizes numbers 0 through 9 in all three positions and the letters y and x in the third position. The digits in the first and third positions have special significance. In the first, 0 designates occupations in the fine and applied arts; 1, personal-service occupations requiring professional or specialized training; 2, other service occupations in such areas as law, accounting, and consulting; 3, mathematical and scientific occupations; 4, engineering and applied science; 5, business, banking, and industrial positions requiring administrative skills; 6, owners and employees of smaller businesses; 7, skilled and semi-skilled jobs of a clerical, mechanical, and manipulative nature; 8, government service; 9, uncodable or not fully codable occupational information.

The second digit of the code is significant only in combination with the first; together the first two digits specify the occupational field of employment.

The third digit or letter defines the degree of decision-making responsibility and/or the function of the individual within the occupational field. Third digit 0 indicates that only the individual's occupational field is known; 1 designates top responsibility within the organization; 2, secondary managerial responsibility; 3, staff functions, usually demanding higher-level skills; 4, sub-professional, skilled jobs; and 5, semi- and unskilled occupations. Third digits 6 through 9 and the letters y and x designate functions from which level of responsibility can often be inferred; 6 and 7 are used for teachers at the college and secondary levels, respectively, and 8 for salespeople, each within the field indicated by the first two digits; 9 is reserved for special occupations germane primarily to that field. Final digit y designates deans and other high-level college administrators and x, sales managers, both in the field designated by the first two digits.

Occupational fields incorporated in the code can be ascertained from the following list of values which have been assigned.

00y - 009 Visual Art

01y - 019 Verbal Communication

02y - 029 Drama, Performing

03y - 039 Drama, Producing

04y - 049 Music

05y - 059 Museum

06y - 069 Advertising

07y - 079 Public Relations

08y - 089 Foreign Languages

10y - 109 Church

11y - 119 Education

12y - 129 Dentistry

13y - 139 Medicine

14y - 149 Medical Related

15y - 159 Nursing

16y - 169 Psychology and Social Work

17y - 179 Library

18y - 189 Welfare

20y - 209 Accounting

21y - 219 Law

22y - 229 Management Consulting

23y - 239 Marketing Consulting

24y - 249 Personnel Consulting and Placement

25y - 259 Economics

26y - 269 Trade Associations

30y - 309 Physical Sciences

31y - 319 Biological Sciences

32y - 329 Space Sciences

33y - 339 Mathematics

34y - 349 Geology

35y - 359 Forestry

36y - 369 Landscape Architecture

37y - 379 Farming, Horticulture

38y - 389 Oil and Mining

40y - 409 Engineering, Chemical

41y - 419 Engineering, Civil

42y - 429 Engineering, Electrical

43y - 439 Engineering, Mechanical

44y - 449 Engineering, Other

45y - 459 Engineering, Unspecified

46y - 469 Metallurgy

47y - 479 Architecture

50y - 509 "A" Corporations (Large)

51y - 519 "B" Corporations (Medium)

52y - 529 "C" Corporations (Small)

53y - 539 Corporations n.e.c.

54y - 549 Banking

55y - 559 Investment Banking

56y - 569 Insurance Companies

57y - 579 Brokerages

59y - 599 Utilities

60y - 609 Insurance Agencies

61y - 619 Real Estate Agencies

62y - 629 Real Estate-Insurance-Securities Agencies

63y - 639 Retail Businesses

64y - 649 Wholesale Businesses

65y - 659 Automobile Dealerships

66y - 669 Contracting and Construction

67y - 679 Hotels, Theatres, and Restaurants

68y - 689 Shopkeepers Offering Services

69y - 699 Mortgage-Loan Companies

70y - 709 Clerical

71y - 719 Computational

72y - 729 Electrical-Mechanical-Manipulative

73y - 739 Sports

74y - 749 Domestic and Sanitary

75y - 759 Transportation, Road

76y - 769 Transportation, Rail

77y - 779 Transportation, Air

78y - 789 Transportation, Water

79y - 799 Fishing, Hunting, Trapping

80y - 809 Armed Forces

81y - 819 Executive Branch, City and State

82y - 829 Executive Appointees and Civil Service

83y - 839 Legislative Branch

84y - 849 Judges

85y - 859 Judicial Branch, Attorneys

86y - 869 Diplomatic Service

87y - 879 Postal Service

88y - 889 Police Service

89y - 899 Fire Service

97y - 979 Companies of Undetermined Classification

98y - 989 Occupation Unknown but Title Known

99y - 999 Reason for Not Coding Occupation including deceased, ambiguous or no information, etc.

A P P E N D I X C

COMPARATIVE DISTRIBUTIONS OF PERCENTAGE FREQUENCIES OF THE NINE MOST DISCRIMINATING ANTECEDENT MEASURES

TABLE 10A

COMPARATIVE DISTRIBUTIONS OF PERCENTAGE FREQUENCIES ON THE NINE MOST DISCRIMINATING ANTECEDENT MEASURES

ANTECEDENT MEASURE:		Classes of 1931 and 1932							Classes of 1935 and 1937							Class of 1959						
Age at Matriculation		Total Degree Group	Chemists and Physicists	Engineers	College Teachers	Lawyers	Salesmen	Top Occupational Level	Total Degree Group	Chemists and Physicists	Engineers	College Teachers	Lawyers	Salesmen	Top Occupational Level	Total Degree Group	Chemists and Physicists	Engineers	College Teachers	Lawyers	Salesmen	Top Occupational Level
>20	1	3	5	4	2	1	2	3	2	0	0	4	1	6	3	1	-	2	0	1	0	0
20	2	8	5	7	5	3	11	12	7	6	2	4	3	11	11	0	-	0	0	1	0	0
19	3	27	19	32	24	23	40	29	28	12	27	16	15	34	33	8	-	6	12	5	15	22
18	4	41	29	32	42	41	30	41	41	58	31	39	50	43	39	75	-	71	76	73	70	67
17	5	18	32	19	24	25	17	13	19	6	29	33	27	6	13	15	-	19	12	19	15	11
<17	6	3	10	6	3	7	0	2	3	18	11	4	4	0	1	1	-	2	0	1	0	0
No Info.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0
Total		100	100	101	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
N		1393	21*	54	62	162	46	136	1385	17*	45	49	130	35	141	899	1*	48	25	160	41	9*
Mean		3.7	4.1	3.7	3.9	4.1	3.5	3.6	3.8	4.2	4.2	4.0	4.1	3.3	3.5	4.1	-	4.1	4.0	4.1	4.0	3.9

* < 25 cases

TABLE 10B

COMPARATIVE DISTRIBUTIONS OF PERCENTAGE FREQUENCIES
ON THE NINE MOST DISCRIMINATING ANTECEDENT MEASURES

ANTECEDENT MEASURE: Father's Occupational Level		Classes of 1931 and 1932							Classes of 1935 and 1937							Class of 1959						
		Total Degree Group	Chemists and Physicists	Engineers	College Teachers	Lawyers	Salesmen	Top Occupational Level	Total Degree Group	Chemists and Physicists	Engineers	College Teachers	Lawyers	Salesmen	Top Occupational Level	Total Degree Group	Chemists and Physicists	Engineers	College Teachers	Lawyers	Salesmen	Top Occupational Level
Highest	5	16	5	7	10	11	15	32	16	12	7	10	11	9	35	9	-	13	4	6	12	11
	4	41	19	34	37	49	49	40	41	18	24	37	58	47	32	41	-	25	24	47	39	56
	3	18	33	17	24	14	15	10	19	22	33	25	15	9	16	36	-	42	64	34	27	22
	2	10	19	20	13	13	4	4	7	18	18	12	6	6	4	7	-	10	4	6	10	0
	1	2	19	2	5	1	2	0	2	18	2	8	1	3	1	2	-	4	0	3	7	11
No Info.	0	13	5	20	11	12	15	14	15	12	16	8	9	26	12	5	-	6	4	4	5	0
Total		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
N		1393	21*	54	62	162	46	136	1285	17*	45	49	130	35	141	899	1*	48	25	160	41	9*
Mean		3.2	2.6	2.6	3.0	3.2	3.2	3.6	3.2	2.5	2.7	3.0	3.4	2.8	3.6	3.3	-	3.1	3.2	3.4	3.2	3.6

* < 25 cases

ERIC

TABLE 10C

COMPARATIVE DISTRIBUTIONS OF PERCENTAGE FREQUENCIES ON THE NINE MOST DISCRIMINATING ANTECEDENT MEASURES

ANTECEDENT MEASURE: Mother's Educational Level		Classes of 1931 and 1932							Classes of 1935 and 1937							Class of 1959						
		Total Degree Group	Chemists and Physicists	Engineers	College Teachers	Lawyers	Salesmen	Top Occupational Level	Total Degree Group	Chemists and Physicists	Engineers	College Teachers	Lawyers	Salesmen	Top Occupational Level	Total Degree Group	Chemists and Physicists	Engineers	College Teachers	Lawyers	Salesmen	Top Occupational Level
No College	0	81	90	83	69	83	85	75	75	65	74	64	73	94	77	47	-	39	36	50	66	22
Att. "	1	2	0	0	3	2	2	3	3	0	2	6	3	0	1	4	-	6	8	3	5	11
	2	12	5	13	23	12	9	13	14	29	20	12	19	3	16	35	-	38	44	33	20	34
	3	5	5	4	2	3	4	8	8	6	2	14	5	3	6	12	-	15	12	11	7	11
Highest	4	0	0	0	3	0	0	1	0	0	2	4	0	0	0	2	-	2	0	3	2	22
Total		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
N		1393	21*	54	62	162	46	136	1285	17*	45	49	130	35	141	899	1*	48	25	160	41	9*
Mean		0.4	0.2	0.4	0.7	0.3	0.3	0.6	0.6	0.8	0.6	0.9	0.6	0.1	0.5	1.2	-	1.3	1.3	1.1	0.8	2.0

* < 25 cases

ERIC

TABLE 10D

COMPARATIVE DISTRIBUTIONS OF PERCENTAGE FREQUENCIES ON THE NINE MOST DISCRIMINATING ANTECEDENT MEASURES

ANTECEDENT MEASURE: CEEB SAT Score		Classes of 1931 and 1932							Classes of 1935 and 1937							Class of 1959						
		Total Degree Group	Chemists and Physicists	Engineers	College Teachers	Lawyers	Salesmen	Top Occupational Level	Total Degree Group	Chemists and Physicists	Engineers	College Teachers	Lawyers	Salesmen	Top Occupational Level	Total Degree Group	Chemists and Physicists	Engineers	College Teachers	Lawyers	Salesmen	Top Occupational Level
700-800	8	3	5	2	8	4	0	3	2	6	0	6	4	0	3	7	-	0	12	8	0	11
650-699	7	7	14	11	15	9	9	6	7	6	4	18	8	3	5	23	-	17	28	24	20	33
600-649	6	13	5	9	22	17	13	12	13	18	11	22	24	9	9	26	-	26	16	31	23	45
550-599	5	17	10	27	23	21	13	19	18	28	27	18	24	9	14	22	-	23	24	18	15	11
500-549	4	21	28	28	16	20	37	18	21	12	16	10	19	23	22	13	-	21	8	11	22	0
450-499	3	19	14	11	2	15	11	20	17	0	13	8	10	25	18	7	-	13	8	7	15	0
400-449	2	10	19	6	7	6	11	7	12	18	18	8	6	25	20	2	-	0	0	1	0	0
< 400	1	7	0	4	5	6	4	10	8	12	9	8	3	6	8	0	-	0	0	0	5	0
	0	3	5	2	2	2	2	5	2	0	2	2	2	0	1	0	-	0	4	0	0	0
Total		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
N		1393	21*	54	62	162	46	136	1285	17*	45	49	130	35	141	899	1*	48	25	160	41	9*
Mean		4.1	4.1	4.5	5.1	4.5	4.1	3.9	4.0	4.4	3.8	4.8	4.7	3.4	3.7	5.6	-	5.1	5.6	5.7	4.9	6.4

* < 25 cases

ERIC

TABLE 10E

COMPARATIVE DISTRIBUTIONS OF PERCENTAGE FREQUENCIES ON THE NINE MOST DISCRIMINATING ANTECEDENT MEASURES

ANTECEDENT MEASURE: Senior Year Average at Yale		Classes of 1931 and 1932							Classes of 1935 and 1937							Class of 1959						
		Total Degree Group	Chemists and Physicists	Engineers	College Teachers	Lawyers	Salesmen	Top Occupational Level	Total Degree Group	Chemists and Physicists	Engineers	College Teachers	Lawyers	Salesmen	Top Occupational Level	Total Degree Group	Chemists and Physicists	Engineers	College Teachers	Lawyers	Salesmen	Top Occupational Level
90 & Higher	7	4	5	4	24	5	2	2	5	35	7	16	9	0	1	6	-	6	32	11	2	0
85 - 89	6	15	19	26	33	22	9	13	14	29	13	34	28	3	12	18	-	17	24	26	5	22
80 - 84	5	20	0	6	21	35	11	22	24	18	29	8	29	20	23	33	-	27	24	35	24	45
75 - 79	4	36	37	38	15	29	48	41	32	6	27	22	21	29	30	25	-	31	4	18	45	11
70 - 74	3	18	29	13	3	7	30	16	20	12	20	14	11	36	27	8	-	15	4	8	22	22
65 - 69	2	4	10	11	2	1	0	2	3	0	2	2	0	6	5	1	-	0	0	1	0	0
< 65	1	1	0	0	0	0	0	0	0	0	0	0	0	3	0	0	-	0	0	0	0	0
No Info.	0	2	0	2	2	1	0	4	2	0	2	4	2	3	2	9	-	4	12	1	2	0
Total		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
N		1393	21*	54	62	162	46	136	1285	17*	45	49	130	35	141	899	1*	48	25	160	41	9*
Mean		4.3	4.0	4.3	5.5	4.8	4.0	4.2	4.3	5.7	4.4	4.9	5.0	3.6	4.0	4.4	-	4.5	5.2	5.1	4.1	4.7

* < 25 cases

TABLE 10F

COMPARATIVE DISTRIBUTIONS OF PERCENTAGE FREQUENCIES
ON THE NINE MOST DISCRIMINATING ANTECEDENT MEASURES

ANTECEDENT MEASURE: Yale Scholastic Honors		Classes of 1931 and 1932							Classes of 1935 and 1937							Class of 1959						
		Total Degree Group	Chemists and Physicists	Engineers	College Teachers	Lawyers	Salesmen	Top Occupational Level	Total Degree Group	Chemists and Physicists	Engineers	College Teachers	Lawyers	Salesmen	Top Occupational Level	Total Degree Group	Chemists and Physicists	Engineers	College Teachers	Lawyers	Salesmen	Top Occupational Level
Summa, etc.	1	1	0	4	7	3	0	1	2	18	2	14	2	0	1	3	-	6	20	5	2	0
	2	4	10	0	18	6	2	4	9	12	4	20	22	0	6	12	-	8	24	19	0	11
	3	9	14	15	21	14	2	7	15	24	7	22	28	3	12	3	-	4	4	2	0	11
	4	33	38	28	43	43	26	32	17	34	36	12	14	11	18	0	-	0	0	0	0	0
None	5	53	38	53	11	34	70	56	57	12	51	32	33	86	63	82	-	82	52	74	98	78
No Info.	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	-	0	0	0	0	0
Total		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
N		1393	21*	54	62	162	46	136	1285	17*	45	49	130	35	141	899	1*	48	25	160	41	9*
Mean		4.3	4.0	4.3	3.4	4.0	4.6	4.4	4.2	3.1	4.3	3.2	3.5	4.8	4.3	4.5	-	4.4	3.4	4.2	4.9	4.4

* ≤ 25 cases

ERIC

TABLE 10G

COMPARATIVE DISTRIBUTIONS OF PERCENTAGE FREQUENCIES ON THE NINE MOST DISCRIMINATING ANTECEDENT MEASURES

ANTECEDENT MEASURE: Involvement in Fraternities and Societies		Classes of 1931 and 1932							Classes of 1935 and 1937							Class of 1959						
		Total Degree Group	Chemists and Physicists	Engineers	College Teachers	Lawyers	Salesmen	Top Occupational Level	Total Degree Group	Chemists and Physicists	Engineers	College Teachers	Lawyers	Salesmen	Top Occupational Level	Total Degree Group	Chemists and Physicists	Engineers	College Teachers	Lawyers	Salesmen	Top Occupational Level
High	4	1	0	0	0	1	0	4	1	0	0	2	1	0	1	6	-	4	8	9	12	11
	3	12	5	6	5	10	13	22	15	0	0	10	19	11	23	9	-	2	4	9	15	22
	2	45	33	55	27	36	65	45	35	18	40	29	27	37	41	22	-	15	0	25	24	22
	1	2	0	2	10	1	2	2	3	0	2	4	6	3	3	11	-	4	12	11	10	22
None	0	40	62	37	58	52	20	27	46	82	58	55	47	49	32	52	-	75	76	46	39	23
Total		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
N		1393	21*	54	62	162	46	136	1285	17*	45	49	130	35	141	899	1*	48	25	160	41	9*
Mean		1.3	0.8	1.3	0.8	1.1	1.7	1.7	1.2	0.4	0.	1.0	1.2	1.1	1.6	1.0	-	0.6	0.6	1.3	1.5	1.8

* < 25 cases

ERIC

TABLE 10H

COMPARATIVE DISTRIBUTIONS OF PERCENTAGE FREQUENCIES ON THE NINE MOST DISCRIMINATING ANTECEDENT MEASURES

ANTECEDENT MEASURE: Involvement in Clubs - Academic, Sport and Social		Classes of 1931 and 1932							Classes of 1935 and 1937							Class of 1959						
		Total Degree Group	Chemists and Physicists	Engineers	College Teachers	Lawyers	Salesmen	Top Occupational Level	Total Degree Group	Chemists and Physicists	Engineers	College Teachers	Lawyers	Salesmen	Top Occupational Level	Total Degree Group	Chemists and Physicists	Engineers	College Teachers	Lawyers	Salesmen	Top Occupational Level
High	4	0.1	0	0	0	0.6	0	0	0.1	0	0	0	0	0	0	7	-	25	16	3	2	11
	3	0.5	0	0	0	0	0	0	0.6	0	2	2	0	0	1	5	-	10	4	3	0	0
	2	5	24	2	8	5	2	7	3	6	2	2	2	0	6	6	-	17	8	5	5	0
	1	5	0	2	3	4	4	6	5	0	4	4	6	6	9	17	-	33	8	16	17	33
None	0	89.4	76	96	89	90.4	94	87	91.3	94	92	92	92	94	84	65	-	15	64	73	76	56
Total		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
N		1393	21*	54	62	162	46	136	1285	17*	45	49	130	35	141	899	1*	48	25	160	41	9*
Mean		0.2	0.5	0.1	0.2	0.2	0.1	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.2	0.7	-	2.0	1.0	0.5	0.4	0.8

* < 25 cases

TABLE 10I

COMPARATIVE DISTRIBUTIONS OF PERCENTAGE FREQUENCIES ON THE NINE MOST DISCRIMINATING ANTECEDENT MEASURES

ANTECEDENT MEASURE: Involvement in Dramatics, Musical Activities and Publications		Classes of 1931 and 1932							Classes of 1935 and 1937							Class of 1959						
		Total Degree Group	Chemists and Physicists	Engineers	College Teachers	Lawyers	Salesmen	Top Occupational Level	Total Degree Group	Chemists and Physicists	Engineers	College Teachers	Lawyers	Salesmen	Top Occupational Level	Total Degree Group	Chemists and Physicists	Engineers	College Teachers	Lawyers	Salesmen	Top Occupational Level
High	4	5	0	4	11	6	2	8	4	0	2	4	5	3	6	12	-	6	8	15	2	0
	3	7	0	6	15	6	7	9	7	0	2	8	12	0	8	10	-	4	4	12	7	33
	2	11	10	7	10	7	11	9	10	0	9	20	9	6	10	23	-	21	24	21	29	11
	1	13	5	6	3	17	17	15	9	6	11	10	9	6	12	15	-	6	12	19	12	11
None	0	64	85	77	61	64	63	59	70	94	76	58	65	85	64	40	-	63	52	33	50	45
Total		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
N		1393	21*	54	62	162	46	136	1285	17*	45	49	130	35	141	899	1*	48	25	160	41	9*
Mean		0.8	0.2	0.5	1.1	0.7	0.7	0.9	0.6	0.1	0.4	0.9	0.8	0.3	0.8	1.4	-	0.9	1.0	1.6	1.0	1.3

* < 25 cases