PERFORMANCE ON PROFESSIONAL-LEVEL SELECTION TESTS BY SOCIALLY-SENSITIVE DEMOGRAPHIC GROUPINGS

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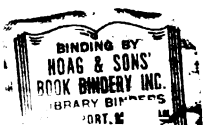
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ABSTRACT

PERFORMANCE ON PROFESSIONAL-LEVEL SELECTION TESTS
BY SOCIALLY-SENSITIVE DEMOGRAPHIC GROUPINGS

By

Obdulia C. Becerril

A state civil service commission put together a battery of tests which was then administered to 112 applicants for the sensitive and important position of civil rights representative, a position calling for at least the bachelor's degree. The commission had to rely on its judgment in choosing tests for the battery, since the job was completly new and no criterion data could possibly be available. This study is concerned with the analysis of the data collected from the administration of this test battery.

Factor analysis of the battery revealed three factors: general verbal facility or "G", civil rights knowledge (a kind of achievement often useful in selection testing), and ability to write reports in good English.

From the point of view of fairness, an especially critical matter in the selection of persons themselves to be involved with implementing fairness, it was possible to obtain information on four sensitive demographic characteristics of the 112 applicants: race, present civil service status

(those already on civil service status could conceivably do better on traditional civil service tests because of superior test wiseness), education and sex.

No statistically significant relationships emerged from an analysis of the cross-relationships among these demographic variables for the sample of applicants.

Analysis of the relationships between test scores and the demographic variables showed that significant differences in performance on the tests was associated only with race and not with any of the other demographic variables. Whites did significantly better on the "G" type tasks, while non-whites outperformed whites on the civil rights knowledge tasks. Fortunately scores on these two types of tests roughly counterbalanced each other so that the battery as a whole probably was relatively free from any racial differentiation. None of the other test performances showed any significant relationships with race.

With respect to the "G" type tests, analysis showed that the better performance of whites occurred through all educational levels represented in the sample, including graduate level. These results with the "G" type tests should be added to the accumulating literature on relationships between such tests and demographic characteristics.

Approved: Frederic R. Wickert
Advisor

Date: June 11, 1971

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By

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CHAPTER I

INTRODUCTION

Problem

The Civil Service Commission of a midwestern state with significant numbers of concerned and active minority group members found itself, in 1966 for the first time, confronted with putting together a civil service battery of tests to select fairly not from among the usual, less skilled level applicants but applicants to fill a professional level job. This professional level job carried the title Civil Rights Representative. The applicants for such a job, would, it could be expected, be especially concerned that they be selected without bias and that the tests used for their selection be a model of fairness. To further complicate matters, the law authorizing the hiring of these representatives had only recently been passed and the job description was, necessarily, far from complete. In other words, no present employees were functioning as civil rights representatives so job analysis and job description in the customary way could not be carried out.

The Civil Service Commission did the best it could with the limited information about the job and the time at its

disposal. It put together a battery of four multiple-choice group paper and pencil tests, and an essay test. To those who came above the cutting score on the weighted total score for all five written tests, the usual board oral examination was administered at a later date.

The population taking the battery on its first administration was made up as shown in Table 1-1.

Table 1-1. Number of Subjects by the Four Demographic Variables Who Took the Written and Oral Tests

Category	Took the five written tests	Took the Oral test
Race		
Whites	35	6
Non-whites	48	17
Non-responders	29	8
Civil Service Status		
State employees	38	11
Non-state employees	39	11
Non-responders	35	9
Education		
Undergraduate work only up to and including college graduation	54	15
Beyond college graduation	57	16
Non-responders	1	--
Sex		
Males	81	21
Females	31	10
Total in each category	112	31

It will be observed that there was sufficient variance on the four socially-sensitive demographic variables, race, civil service status, education, and sex, to make it possible to compare performance on the tests among the sub-groupings of people delineated by the four demographic variables. It will further be observed that substantial numbers of subjects did not report their race or current civil service status, such substantial numbers, in fact, that non-responders may, in the analysis of the data, have to be regarded as a separate group.

The availability of data on still another dimension, namely, the types of tests included in the battery, makes possible an analysis of special value to the psychology of test construction. One of the tests in the battery was one that the Civil Service Commission had used many times with other groups of about the same educational level as the applicants for the civil rights representative positions. Predictably this test was largely measuring general verbal facility or verbal intelligence. In view of continuing questioning now going on in American society concerning the fairness of using such tests with minorities, it should be illuminating to see how well highly educated minorities as compared with a group of about equally highly educated majorities perform.

Another type of test that the Civil Service Commission evidently considered had some promise of validating was

designed to measure knowledge of people associated with the civil rights movement. It is a well-established practice in employment testing to assume that a relevant knowledge on achievement test might predict job success.

A third type of test was, again, knowledge or achievement, but this time the concern was with social science principles applied to minorities including some techniques of social investigation and conciliation. A fourth type of test also measured knowledge of investigation techniques but in the case of this test, the focus was more on interviewing and doing research.

The essay test asked each applicant to write an essay to assess his ability to write in English, a skill required for the considerable amount of report writing the civil rights representatives would probably have to do.

To summarize about the battery of tests used, it is clear that the Civil Service Commission was ingenious in developing a battery of promising tests among the kinds of tests customarily used in civil service testing. As is usual in civil service testing, however, there was some danger that all the tests would be saturated with general verbal facility, a kind of facility that in other selection testing has been sometimes shown to discriminate against minorities. The achievement and knowledge tests, provided the general verbal facility component was not too great, could be tapping other abilities or aptitudes associated with civil rights work.

Review of the Literature

Few studies in the recent literature address themselves to internal analyses of test batteries used in the selection of socially sensitive groupings of people. This lack of attention to internal analysis is somewhat surprising in view of the expense and difficulty involved in validating such batteries. Advance internal analysis could reveal situations that call for additional test battery development work before validation itself is attempted. For example, one might check to assure himself that one has a factorially heterogeneous battery rather than too homogenous a one.

The prevailing view tends to be that expressed by Bartlett and O'Leary (1) who state, "The problem of discrimination against minority groups is then not only a question of differences between mean test performance for two races, but also a question concerning the nature of the relationship between test and criterion performance," in other words, validity. Cronbach (2, p. 298) says "The real issue is relevance." Kirkpatrick et al. (3, p. 6) and Schmidt (9), each in their own way, differentiate between differential validity and test bias, both of which concepts again involve validity. The generally accepted approach to minority group discrimination is testing as described above could not be followed here in the absence of criterion data.

An approach that involves both group differences and validity is that of groups matched by standing on the

criterion. Wollowick et al. (11) reports means and standard deviations on three tests (verbal ability, non-verbal reasoning, and arithmetic reasoning), two demographic variables (age and education), and two criterion measurements (supervisory rank achieved and salary) for Caucasian and Negro administrative personnel in branch offices of a large electronics organization. Average education for both Caucasians and Negroes was a little less than a year and a half of college; the groups are somewhat less well educated than those in the present study. Two Caucasian groups, one matched for salary and the other for supervisory rank (separate analyses for each criterion) in this situation had significantly higher mean scores on all three tests in the battery, including the verbal ability test. These higher mean scores suggest that the kind of tests used could be discriminating against Negroes.

Moore et al. (7) also reports a matching study, but in this case the matching was limited to demographic variables and no criterion variables. Subjects were Negro and White applicants for refinery work who were matched on age and education. Average education was not reported, but education was reasonably comparable with that of the Ss used by Wollowick et al., but a little lower than the group used in the present study since the following educational data are reported in one of two groups (Southwest United States): 43 were high school graduates only, 32 had less than 2 years

of college, while 16 had more than two years of college; in the second group (Northeast United States) 29 were high school graduates only, 20 had less than 2 years of college, and 6 had more than 2 years of college. The battery of five tests included a spiral omnibus test consisting of block counting, vocabulary, and arithmetic tasks, a test of spatial reasoning utilizing geometric symbols, a test of chemistry comprehension, the Bennett test of mechanical comprehension (Form BB), and the mathematics section of the advanced California Achievement Tests (Form W). The authors believed that the battery roughly measured two factors: spatial and verbal. As in the Wollowick et al. study, whites did significantly better on the tests except for the verbal tests in the Northeast sample, but actual differences were small.

At this point, the suggestion is that the Civil Service Commission in the present study could have been on not especially safe ground in using the battery that they did.

Another set of results reported in the Moore et al. article concerns the intercorrelations among the tests in the battery. The correlations are remarkably uniform: only 10 of the 60 coefficients were .70 or larger or .29 or smaller. No clear internal structure was evident.

One by-product of the Moore et al. study was that mean scores on tests of the kind used in this study were substantially higher for Negroes who had some college over those who were no more than high school graduates. Such a finding

supports the Civil Service Commission's action in the present study to go ahead and use a range of paper and pencil tests for their relatively well educated applicants for civil rights representatives without much fear of racial differentiation.

Ruda and Albright (8), reported in their analysis of Wonderlic scores among applicants for office jobs, that Negro-White differences remained in favor of the Whites at high school graduate, some college, and college graduate levels of education.

On the general matter of Negro-White differences in performance on general mental ability tests, usually but not necessarily, tests with a substantial verbal facility component, Krug (6) states, "By usual psychometric standards, we can say that we 'knew' that mean scores for Negroes are lower than the mean scores for whites on most tests of general ability, intelligence, academic aptitude, or whatever you choose to call these measures of 'G'.

Kirkpatrick et al. (3) were successful in compiling a series of five investigations on testing and fair employment. Two of these studies demonstrate a situation in which applicants performed in a comparable manner in the selection situation.

In a study involving female clerical employees in an insurance company, 34 black and 102 white clerks were given one of the Short Employment Tests. Results showed that the

white and non-white groups were approximately equal in terms of mean test performance. Since no differences were also present in the mean criterion scores, the investigators concluded that the predictors did not discriminate unfairly in this situation.

Comparable results were found in a second study involving a new sample of female clerical workers. After a battery of vocabulary, checking, and numerical tests plus two non-verbal tests were administered, the authors found no significant differences between minority and non-minority group members in terms of mean test performance.

Few studies comparing Negroes and Whites on general ability or achievement at higher educational levels seem to have appeared in the literature beyond the two cited earlier here. A check of the Dreger and Miller reviews (4,5) of Negro-White differences revealed no comparable studies. Two additional such studies were located. In the first of these two studies, Kirkpatrick (3), in his study 4 on nursing students did not have very comparable groups since the white S's attended nursing schools for their race and the Negro S's schools for theirs. Science research associates (10) describe a study comparing test performance (FIT Ingenuity and Arithmetic) for non-whites and whites but gives only an expectancy table and a multiple correlation for their group of presumably fairly well educated claims auditors.

The review of the literature, then, reports little on (1) Negro-white differences in performance on general ability type tests of the sort used by civil service commissions, and (2) the internal structure of test batteries designed for personnel selection where both Black and White applicants are involved and, in fact, where differences could prove to be a sensitive matter.

CHAPTER II

METHODS

Components of the Study

Subjects and demographic groupings

The subjects and demographic groupings are those given in Table 1-1. As that table indicates, race, civil service status, education, and sex information were generally available on all 112 subjects.

Biographical data: Information regarding the subjects' race and civil service status came from a special civil service application form (Appendix A). The information was requested as part of a program designed to assure equal employment opportunity and was collected jointly by the Civil Service Commission and the Civil Rights Department. The form was administered before the applicants took the examination. As part of the instructions, the examiner stated that one need not answer the questions that reflected demographic information. However, after the purpose of asking for the information was made clear, the cooperation of the applicants was strongly urged. Also, the applicants were advised that the information they supplied would not affect their examination score in any way. As was noted in Chapter I, many did

not answer the questions on race and civil service status.

Rather than the special form used to obtain race and civil service status, the other two demographic variables, education and sex, were obtained from the standard civil service application form. Answering these two questions was mandatory if one wanted to take the tests. As Table 1-1 shows, there was almost complete information on education and sex. Although sex would appear to be irrelevant to the job, educational requirements were listed in the civil service announcement. As that announcement shows, a bachelor's degree with additional credit for a master's degree was a prerequisite, although experience could be substituted for college education year for year up to two years (see Appendix B).

Tests

The tests were those briefly described in Chapter I. A more complete description of each of these tests follows. It should be noted that civil service regulations prohibit any more detailed description of the tests than that shown in the following paragraphs.

The Civil Service Test (CST) is a typical civil service test, a test of general mental ability, designed to evaluate the fitness of applicants and their capacity to develop so as to merit advancement. It has 50 multiple choice items, each one having 4 choices. The score is the number of correct answers.

Knowledge of people associated with the Civil Rights Movement (KPACRM) is a matching test made up of 25 items. The score is the number of correct responses. The purpose of this test is to evaluate the applicant's knowledge of the recent developments in the field of civil rights and the persons associated with these developments. The applicant must know the resources which can be employed to assist minority groups and the recent developments in state, federal and local statutes, court orders, rulings, and programs affecting the civil rights movement.

The Civil Rights and Human Relations test (CRANDHR) has 56 items and the Interviewing and Investigation test (I and I) has 32 items. Both are multiple choice tests with 4 choices for each item. The score is the number of correct answers. The purpose of this test pertains to the knowledge each applicant must have of the techniques used to ease intergroup tension and conflicts, knowledge of the sociological and economic forces which affect the welfare of minority groups, and knowledge of the principles of sociology, psychology, and human relations. The test judges the applicant's ability to maintain an impartial attitude, his tact and similar traits while investigating and conciliating civil rights problems.

I and I emphasizes the techniques of effective investigation and knowledge of social investigation. The test is designed to measure an applicant's ability to perform research studies concerning minority groups.

The Essay is the last section of the written part. The applicant writes an evaluation of equal employment opportunities in the building trades. The aim is to measure the applicant's interpretation of the purpose of a research study on this topic and then to make a detailed yet comprehensive report. His ability to use correct English and to write effectively and accurately is assessed.

Grading for this examination is based on the quality of the writing mechanics and content. With respect to mechanics, the length of the review, punctuation, spelling, grammar, and orderliness and neatness are evaluated. With respect to content, the applicant must state the purpose of the study, note not only the racial patterns in the construction labor force, but also problems that limit the upgrading of Negroes in the construction industry and the role of unions, companies, and union leaders in relation to these problems. The total possible raw score is 100 points, 50 points for contents and 50 for mechanics.

This raw score is developed into a weighted score. The two examiners, a civil service examiner and a college professor, give two completely independent evaluations.[1] The score given by the professor is multiplied by two while the score given by the examiner is given a weight of one. The maximum weighted score is 300.

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[1]Data were not available to calculate an estimated reliability coefficient for this Essay test.

The last part of these examinations is an oral appraisal. The resulting rating is supposed to be limited to an evaluation of the applicant's (1) personality and appearance, (2) experience and education, and (3) ability to deal with people and speak correctly and effectively. The examiners are part of the CSC oral board. Its members come from private industry, the professions, other agencies of government, and civil service staff members.

The total oral score in this case of this test ranged from 29 to 40 points. The Civil Service Commission, to keep the expense and time of appraisal at a minimum, substantially reduced the number of applicants invited to appear for the orals by a screening process which considered education, experience, and/or performance on the written test.

For purposes of overall evaluation, the written and oral examination scores were both considered. The written part was weighted 60% and the oral 40%. The passing score was 70%, as is set by law.

A summary of experience with the total battery indicates that 163 applied, 112 actually took the written tests, 53 passed the written test and were invited to take the oral, 31 took the oral, and 29 passed the complete examination. Table 2-1 shows the racial composition of those failing and passing the total examining process.

Table 2-1. Racial Composition of Subjects Who Passed and Failed the Total Test Battery*

	Failed		Passed		Total	
	N	%	N	%	N	%
Whites	29	83	6	17	35	100
Non-whites	32	67	16	33	48	100
Non-responders	22	76	7	24	29	100
Total	83		29		112	

*Of the 31 applicants who appeared for the oral, a total of 29 passed. Of the two who failed, 1 was non-white and 1 was a non-responder. Percentages of each race who passed or failed were not greatly affected.

Statistical Methods

Intercorrelations among the tests, all continuous variable measures, were Pearson product-moment correlations. As checks on each other both quartimax and varimax rotations were performed to analyze out the factors present in the matrix of test intercorrelations.

Interrelationships among the non-continuous demographic variables were computed by means of chi-square.

Interrelationships among the continuous variable test scores and the non-continuous demographic variables were analyzed by one-way analyses of variance. Means and standard deviations of each of the tests by each of the four demographic variables are presented in Appendix C.

All computations were carried out by computer.

CHAPTER III

RESULTS

Introduction

The results presented in this chapter can be classified according to the three issues which this study is designed to answer. The first section is concerned with the interrelationships among the predictors, or, in other words, the tests the Civil Service Commission used putting together the battery to select civil rights representatives. Questions to be answered revolve around what factors were present in the battery. Were the tests all general verbal ability, was one or more types of achievement being tested, or what other factors were operating in this situation?

The second section concerns the interrelationships among the demographic variables: race, civil service status, education and sex. The purpose of the analysis in this second section is to answer such questions as the following: Were those with current civil service status of one or both races or high or low education or one or both sexes? Were those with high education from one race or both races, with or without current civil service status, or of predominantly one sex or both? Were the men or the women generally those of

one race or both races, of higher or lower education, or present civil servants or not?

The third section is the pay-off section. It lays out the relationships among test performance and the demographic variables. It describes the extent to which race performed better on each of the tests, whether those already with civil service status or those from outside the system did better or less well on the tests, and the extent to which education and sex affected test performance.

Interrelationships Among the Predictors

Seven of the fifteen possible intercorrelations among the predictors as shown in Table 3-1 were significant at the .05 level or better. In other words, there was a fair amount of intercorrelation running through the tests in the test battery.

CST, the test of general verbal facility, had significant correlations with both CRANDHR and I and I but not KPACRM. Also CST did not enter into the essay or oral tests.

KPACRM had its most substantial relationship with CRANDHR. Both tests, it will be recalled are tests of a similar type of achievement. KPACRM seemed very free from general verbal facility as measured by CST although KPACRM did enter into whatever the Oral was measuring.

CRANDHR was related to all the other tests in the battery. Its highest relationship, however, was with KPACRM,

Table 3-1. Intercorrelations Among the Tests in the Battery Used for the Selection of Civil Rights Representatives**

	KPACRM	CRANDHR	I AND I	ESSAY	ORAL
CST	.125	.449*	.416*	.129	.217
KPACRM		.635*	.124	.122	.411*
CRANDHR			.364*	.206*	.502*
I AND I				.170	.262
ESSAY					.332

*Significant at the .05 level or better

**Note: N=112 on all tests except the Oral. On the Oral N=31. (Significant levels shown have been adjusted for the changes in N.)

a closely related achievement test. CRANDHR unlike KPACRM, however, was significantly correlated with CST; evidently CRANDHR has more general verbal facility in it than KPACRM. CRANDHR entered substantially into the Oral but had less overlap with I and I and the Essay.

I and I had some CST in it as well as some CRANDHR. Otherwise it was a rather separate test.

The Essay was not related to any of the other tests except slightly with CRANDHR. The Essay may have been measuring something quite different from them but its relative independence may be a function of the low reliability often characteristic of essay tests.

The Oral and medium correlations with the more achievement type tests, KPACRM and CRANDHR, but with little else, except for the slight relationship with the Essay. Evidently the examiners in the Oral especially focussed on race relations.

In view of the patterns of intercorrelation among the tests in the predictor battery, factor analyses (both quartimax and varimax rotations to serve as checks on each other) were performed. Table 3-2 shows that three factors emerged. Factor loadings are also shown.

Table 3-2. Factor Loadings on a Factor Analysis of the Intercorrelations Among the Tests Used in the Selection of Civil Rights Representatives

	I	II	III
Quartimax Rotation Analysis			
CST	.83	.13	-.01
KPACRM	-.00	.94	.03
CRANDHR	.44	.80	.08
I and I	.81	.05	.11
Essay	.11	.09	.98
Varimax Rotation Analysis			
CST	.83	.15	-.00
KPACRM	-.02	.94	.04
CRANDHR	.42	.80	.10
I and I	.81	.07	.12
Essay	.09	.08	.98

Factor I seems to be made up of general verbal facility. Its main loadings were on CST and I and I. I and I turned

out to be a typical general verbal civil service test rather than any measure of specific interviewing and investigative ability.

Factor II has its main loadings on the two civil rights knowledge or achievement tests, KPACRM and CRANDHR. The third factor is mostly whatever is special about the Essay test, presumably mastery of written English. It will be observed that the Oral, in view of the much smaller number of cases who took the test, was omitted from the factor analysis. Of the two civil rights knowledge tests, CRANDHR has a substantial element of general verbal facility in it while KPACRM does not.

On the whole, the factor structure came out startlingly clear. The whole battery was not measuring only the all too often encountered general verbal facility. Rather, other factors were being measured as well, quite independently of general verbal facility.

Interrelationships Among the Four Demographic Variables

The analysis of these interrelationships is presented in the chi square results shown in Table 3-3. In general, no significant chi squares occurred. The only significant chi square occurred in the race vs. civil service status analysis. Further study shows that race and civil service status were the two demographic items that substantial numbers of subjects refused to report. In other words, the one significant

Table 3-3. Chi Square Contingency Table for the Four Demographic Variables

	N	Chi-square	df	Significance level	Coeff. of contingency
Race					
Civil service status (W-NW-NR)	112	79.79	4	.05*	.645
Civil service status (W-NW)	76	1.36	1	n.s.	.127
Education		19.71	12	n.s.	.386
Sex		3.37	2	n.s.	.171
Civil Service Status					
Education		17.32	12	n.s.	.366
Sex		1.84	2	n.s.	.127
Education					
Sex		7.27	6	n.s.	.246

chi square seems traceable to the non-answering behavior that occurred on these two variables. Table 3-4 shows the calculation of chi square for the race and civil service status relationships with and without the non-answering respondents. It is quite clear from this table that the chi square with non-responding behavior eliminated, is not significant, just as were the chi squares for the relationships among all the other demographic variables. The numbers on which the chi squares in Table 3-4 are based may be found in Appendix C.

Table 3-4. Number of Subjects in Each Race and Civil Service Status Category

Including non-responders

X^2 = 79.79 with 4 degrees of freedom; significant at 5% level

	RACE			
	Total	Whites	Non-whites	No response
Civil Service Status				
State employees	38	13	25	0
Non-state employees	39	18	20	1
No response	35	4	3	28
Total	112	35	48	29

With non-responders omitted

X^2 = 1.36 with 1 degree of freedom; not significant

	RACE		
	Total	Whites	Non-whites
Civil Service Status			
State employees	38	13	25
Non-state employees	38	18	20
Total	76	31	45

It may be noted in passing that Appendix C shows that among the non-whites the proportion of females was higher than that among whites and non-responders to the question identifying race. This chi square, however, was not quite

significant at the 5% level. Similarly, non-white female applicants tended to have less education than males, but again the chi square was not significant at the 5% level.

Interrelationships Between the Test Scores and the Four Demographic Variables

This third and last set of results is concerned with showing performance on each of the tests by each of the four demographic groupings of race, civil service status, education, and sex. Taken into account in the discussion of these results will be the factor structure of the test battery on one hand, and the rather although not perfectly even distribution, of demographic characteristics in relation to each other on the other hand.

More specifically, the results for each test are in the form of a one-way analysis of variance. Tables 3-5, 3-6, 3-7, 3-8, and 3-9 present the analyses of variance for CST, KPACRM, CRANDHR, I and I, and the Essay tests respectively, the five tests, the interrelationships among which were factor analyzed as shown in Tables 3-1 and 3-2. Table 3-10 and 3-11 respectively show the results for the Total Weighted Score and the Oral.

The means and standard deviation on which the analyses of variance are based are given in Appendix D.

Inspection of Tables 3-5 to 3-9 inclusive shows that the only demographic variable with a significant F is race.

Table 3-5. Summary of Analysis of Variance for CST Against Each of the Four Demographic Variables

Source	SS	df	MS	F
Race	580.84	2	290.42	7.45*
Error	4244.01	109	38.93	
Civil service status	32.60	2	16.30	0.37
Error	4792.25	109	43.96	
Education	146.87	6	24.47	0.54
Error	4677.97	105	44.55	
Sex	64.89	1	64.89	1.49
Error	4759.96	110	43.27	
Total	4824.85	111		

*Significant at the .05 level or better.

Table 3-6. Summary of Analysis of Variance for KPACRM Against Each of the Four Demographic Variables

Source	SS	df	MS	F
Race	334.19	2	167.09	6.03*
Error	3016.91	109	27.67	
Civil service status	1.38	2	.69	0.02
Error	3349.72	109	30.73	
Education	242.36	6	40.39	1.36
Error	3108.74	105	29.60	
Sex	27.28	1	27.28	.902
Error	3323.82	110	30.21	
Total	3351.10	111		

*Significant at the .05 level or better.

Table 3-7. Summary of Analysis of Variance for CRANDHR Against Each of the Four Demographic Variables

Source	SS	df	MS	F
Race	341.32	2	170.66	2.90
Error	6411.59	109	58.82	
Civil service status	144.92	2	72.46	1.19
Error	6607.99	109	60.62	
Education	358.11	6	59.68	0.98
Error	6394.80	105	60.90	
Sex	40.59	1	40.59	0.66
Error	6712.32	110	61.02	
Total	6752.91	111		

*Significant at the .05 level or better.

Table 3-8. Summary of Analysis of Variance for I and I Against Each of the Four Demographic Variables

Source	SS	df	MS	F
Race	49.95	2	24.97	0.60
Error	4472.03	109	41.02	
Civil service status	117.25	2	58.62	1.45
Error	4404.73	109	40.41	
Education	264.43	6	44.07	1.08
Error	4257.55	105	40.54	
Sex	.50	1	.50	0.01
Error	4521.49	110	41.10	
Total	4521.99	111		

*Significant at the .05 level or better.

Table 3-9. Summary of Analysis of Variance for the Essay Against Each of the Four Demographic Variables

Source	SS	df	MS	F
Race	27.11	2	13.55	.73
Error	2020.16	109	18.53	
Civil service status	74.82	2	37.41	2.06
Error	1972.45	109	18.09	
Education	158.14	6	26.35	1.46
Error	1889.13	105	17.99	
Sex	19.92	1	19.92	1.08
Error	2027.35	110	18.43	
Total	2047.27	111		

*Significant at the .05 level or better.

Table 3-10. Summary of Analysis of Variance for the Total Weighted Score Against Each of the Four Demographic Variables

Source	SS	df	MS	F
Race	460.94	2	230.47	1.34
Error	18664.54	109	171.23	
Civil service status	458.75	2	229.37	1.33
Error	18666.73	109	171.25	
Education	748.15	6	124.69	0.71
Error	18377.33	105	175.02	
Sex	35.03	1	35.03	0.20
Error	19090.45	110	173.54	
Total	19125.49	111		

*Significant at the .05 level or better.

Table 3-11. Summary of Analysis of Variance for the Oral Against Each of the Four Demographic Variables

Source	SS	df	MS	F
Race	638.70	2	319.35	1.39
Error	24951.26	109	228.91	
Civil service status	42.99	2	21.49	0.09
Error	25546.96	109	234.37	
Education	867.09	6	144.51	.61
Error	24722.87	105	235.45	
Sex	143.37	1	143.37	.61
Error	25446.58	110	231.33	
Total	25589.96	111		

*Significant at the .05 level or better.

Race accounts for a significant proportion of the variance in the case of CST and KPACRM and approaches significance (at the .059 level and not shown on Table 3-7) for CRANDHR. It will be recalled that these are the three tests that in Table 3-2 showed substantial loadings in Factors I and II, respectively the general verbal facility factor and the achievement or knowledge of civil rights information. The Essay test, with its exclusive and heavy loading in Factor III, however, showed no significant F's with any of the demographic variables.

Reference to the mean scores in Appendix D reveals that of those tests having a significant or nearly significant

proportion of variance accounted for by race, whites had the higher mean scores on CST, the general verbal facility factor. Non-whites scored lowest with non-responders in between. On KPACRM, however, the test with the highest loading in Factor II, the civil rights information test, the non-whites achieved the highest mean scores with the whites scoring lowest and, again, the non-responders in between. On CRANDHR, with its moderate loadings in both Factors I and II, the non-responders scored highest with the whites and non-whites scoring at about the same level.

Significances of the differences between white and non-white mean test scores were calculated for CST, KPACRM, and CRANDHR, and are shown in Table 3-12.

Table 3-12. Significance of Mean Test Score Differences of Whites and Non-whites on the CST, KPACRM, CRANDHR and Oral Subtests

	$\bar{X}$	s^2	t	N
CST				
Whites	30.2	49.00	3.5*	35
Non-whites	25.1	39.69		48
KPACRM				
Whites	14.2	40.96	3.4*	35
Non-whites	18.3	18.49		48
CRANDHR				
Whites	24.2	86.49	0.8	35
Non-whites	25.7	44.89		48
ORAL				
Whites	6.0	182.25	0.7	6
Non-whites	11.6	256		17

*Significant at the .05 level or better.

The CST and KPACRM differences are significant while the CRANDHR difference is not. The meaning is clear. Whites performed better on the general verbal facility factor while non-whites performed better on civil rights information.

Further inspection of Appendix D shows that the non-whites far outperformed the whites on the Oral test. The mean of the non-whites was 11.6 but that of the whites only 6. The N was too small for the large difference of 5.6 between the means to be significant. Nevertheless, it could be suspected that the Oral largely duplicated KPACRM and possibly CRANDHR. Further evidence on this point is available in Table 3-1 which shows significant correlations between the Oral on the one hand and both KPACRM and CRANDHR on the other.

Summary of Results

Factor analysis of the intercorrelations among the tests used in the selection battery revealed three factors: a general verbal facility factor, a civil rights knowledge factor, and an-ability-to-write-English factor.

The four demographic variables of race, civil service status, education, and sex tend not to be highly interrelated.

In relating test performance to demographic variables, the only demographic variable among the four that accounted for a significant proportion of the variance on any of the

tests was race. Testing the significance of white vs. non-white mean test scores showed that whites performed better on the general verbal facility test, non-whites performed better on the civil rights knowledge test, while there was no performance difference on the ability to write English test. Non-whites far outperformed the whites on the Oral test, but the N was too small to produce a significant difference.

CHAPTER IV

CONCLUSIONS AND INTERPRETATIONS

The purpose of this research was to explore the internal structure of a selection test battery the first time the test battery was given and before criterion and therefore validity data were available. Such a preliminary exploration could provide quidance with respect to the construction of test batteries to be administered for the next waves of applicants, possibly before stable criterion data were available. Also, this preliminary exploration could provide some notion with respect to possible discrimination among sensitive demographic groupings and among the selection devices used; after all, selection had to be based on some sort of predictors even though criterion data could not possibly be available. Another rather unique factor in this situation was that selection was to take place not among lower level personnel but at rather high professional levels.

Fortunately for the study a variety of tests were tried out. The types of tests evaluated were those measuring (1) general verbal facility or "G", so often found in civil service selection testing; (2) knowledge of civil rights; (3) knowledge of interviewing and investigating techniques

common to much government work; (4) ability to write the kind of English used in preparing reports of investigations and the like; and (5) the board oral. Demographic characteristics available for analysis were such sensitive ones as race, civil service status (those on civil service could be more test wise and "know the ropes" better), education, and sex.

Previous research on white, non-white test performance differences were conflicting. At least one study reported no white, non-white differences among those with some college or better, while others reported that differences persist among the better educated of both races. Previous studies compared up to and including college graduates. This present study was able to extend the ceiling since substantial numbers of subjects had taken graduate work.

Findings revealed that the tests used in this battery designed to select from among high level professionals could be fairly well accounted for by three factors; (1) general mental ability or verbal facility or "G"; (2) knowledge or achievement with respect to civil rights; and (3) ability to handle written English. Because of the much smaller number of applicants who took the Oral, the Oral had to be omitted from the factor analysis but was included in the table of intercorrelations among the several tests.

The analysis of the interrelationships of the four demographic variables turned up no significant patterns although

some such patterns might well emerge more clearly with a larger number of cases.

Analysis of the great number of interrelationships among the tests by demographic variables revealed only one demographic variable, race, that accounted for a significant proportion of variance on any of the tests. When mean test score differences were tested for significance, conclusions were that whites outperformed non-whites on "G" type tests but that non-whites outperformed whites on civil rights information. No racial differences were evident on the third factor, ability to handle written English. Performance on the Oral turned out to be highly related to civil rights knowledge.

From a practical viewpoint, the results showed that the Civil Service Commission was fortunate and wise in the choice of tests used for their first selection testing with no criterion and of course validity data available. All of the types of test tried out showed no "preliminary bias" against any demographic grouping except race. For the total battery, civil service test wiseness was not a factor, nor was sex or education. It turned out that the one test of "G" favored whites while another test, civil rights knowledge, favored non-whites so that the two tests roughly counterbalanced each other. Results also showed that it was possible to develop a verbal selector test (KPACRM) not loaded with "G" yet also to develop one loaded with both "G" and with a separate knowledge or achievement component (CRANDHR).

The Oral presents a problem for possible correction. The examining board might try to avoid duplicating variance accounted for by other tests in the written battery, in this case knowledge of civil rights (KPACRM and CRANDHR). Another, they could concentrate on assessing for example ability to handle oneself in interpersonal situations, an ability presumably needed by civil rights representatives.

Psychologically, the findings of this study have to be aligned with those that indicate that whites perform better than non-whites on "G" type tests, no matter how much education both racial groups have. The superior performance of whites continues even among those applicants who have gone as far in their education as graduate work. This may be the first study done in an industrial (governmental) selection situation to show that "G" differences among whites and non-whites persist even at the highest level of formal education.

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APPENDICES

APPENDIX A

CIVIL SERVICE APPLICATION

The information on this part of the application is collected jointly by the Civil Service Commission and the Civil Rights Commission as part of a program designed to assure equal employment opportunity. The information you supply on this sheet will not affect your examination score.

Social Security Number _____ _____ _____

Race: White ☐ Non-white ☐

Are you now employed in the state classified service?

Yes ☐ No ☐

From what source did you first learn of this examination? Please Check One.

1. A state employee you know ☐
2. Civil Service examination announcement ☐
3. Department of Civil Service office ☐
4. State Employment Security office ☐
5. State employer recruitment ☐
6. School referral ☐
7. Newspaper advertisement ☐
8. Newspaper story ☐
9. Radio announcement ☐
10. Television ☐
11. Private organization (civic, fraternal, etc.) ☐
12. Other (please specify) ☐

_____

APPENDIX B

ANNOUNCEMENT: CIVIL RIGHTS REPRESENTATIVE

GENERAL DESCRIPTION

An employee in this class, in the central or branch office of the Civil Rights Department, participates in programs for assuring equal opportunity for citizens of the state; and performs related work.

EXAMPLES OF WORK

Serves as an experienced civil rights representative; assumes responsibility for the more complex or sensitive cases; assists in the training of new representatives.

Makes investigations of problems affecting minority groups or of cases of alleged discrimination and prepares reports on findings.

Attempts to concillate differences between participants involving claims of discrimination.

Investigates incidents involving intergroup tension, and recommends and carries out procedures for handling tense situations.

Assists in the training of local officials to handle intergroup tension and conflicts.

Serves as speaker or panel participant in meetings to promote desegregation.

Meets with public and private officials to educate and persuade them to take affirmative actions to achieve desegregation in the area of housing, employment, public accommodations and education.

Gathers information for research studies concerning minority groups.

Keeps informed of developments in the field.

Participates in professional meetings and conferences.

EXPERIENCE AND EDUCATION REQUIREMENTS

Education

*Possession of a bachelor's degree in the social sciences from an accredited college.

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*Minimum requirements--degree, experience.

Additional credit will be given for possession of a master's degree in the social sciences.

Note: One additional year of the experience described below (see 2) may be substituted for one year of college up to a maximum of two years.

Experience

1. *Two years of experience as a Civil Rights Representative

2. or, *Three years of experience in community organization, social work, counseling and guidance, education, investigations dealing with people, or other work dealing in human relations, preferably in civil rights programs.

Note: Performance of duties should have included conference planning and participation and/or depth investigation, mediation and negotiation, as well as the preparation of detailed and comprehensive reports, case histories or briefs.

OTHER REQUIREMENTS

Physical condition adequate for performance of the work.

Tact and similar qualities necessary in meeting and dealing effectively with others.

Willingness to participate in inservice training programs.

Personal commitment to the fundamental objectives of the Civil Rights Department programs.

Impartial attitude and ability to maintain it in the investigation and conciliation of civil rights problems.

Knowledge of the principles of psychology, sociology and human relations.

Knowledge of individual or group counseling.

Knowledge of social investigation.

Knowledge of state, federal and local statutes, orders, court rulings and programs affecting the civil rights field.

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*Minimum requirements--degree, experience.

Knowledge of the sociological and economic forces which affect the welfare of minority groups.

Knowledge of the resources which can be employed to assist in meeting problems relating to minority groups.

Knowledge of the practices used in the sale, rental and financing of homes.

Knowledge of labor and management employment practices and policies.

Knowledge of the techniques of effective investigation and conciliation of cases involving alleged discrimination.

Knowledge of the techniques used in easing intergroup tension and conflicts.

Ability to use good English and to write and speak effectively.

Ability to interpret policies and regulations uniformly.

Ability to work well with individuals, committees, and organizations.

Ability to speak before groups, conduct meetings and negotiate settlements on civil rights complaints.

APPENDIX C

CROSS-RELATIONS AMONG NUMBERS OF SUBJECTS IN EACH OF THE FOUR DEMOGRAPHIC VARIABLES

	RACE			CIVIL SERVICE STATUS			SEX	
	Whites	Non-whites	Non-responders	State employees	Non-state employees	Non-responders	Males	Females
CIVIL SERVICE STATUS								
State employees	13	25						
Non-state employees	18	20	1					
Non-responders	4	3	28					
EDUCATION								
19 yrs. school			1			1	1	
18	3	6	4	3	5	5	10	3
17	16	16	11	8	20	15	35	8
16	14	9	6	14	9	6	20	9
15	2	11	3	9	3	4	9	7
14		6	3	4	2	3	6	3
Non-responders			1			1		1
SEX								
Males	29	31	21	25	28	28		
Females	6	17	8	13	11	7		

APPENDIX D

MEAN SCORES AND STANDARD DEVIATIONS

	$\bar{X}$	s	N
For CST			
Race			
Whites	30.2	7.0	35
Non-whites	25.1	6.3	48
Non-responders	28.9	5.1	29
Total	27.7	6.6	112
Civil Service Status			
State employees	27.4	6.2	38
Non-state employees	27.3	7.5	39
Non-responders	28.5	6.0	35
Total	27.7	6.6	112
Education			
14	25.2	7.7	9
15	28.4	5.2	16
16	27.8	5.8	29
17	27.2	7.2	43
18	29.5	7.5	13
19	33.0	0.0	1
No response	28.0	0.0	1
Total	27.7	6.6	112
Sex			
Males	28.2	7.0	81
Females	26.5	5.2	31
Total	27.7	6.6	112
For KPACRM			
Race			
Whites	14.2	6.4	35
Non-whites	18.3	4.3	48
Non-responders	16.6	5.2	29
Total	16.6	5.5	112
Civil Service Status			
State employees	16.6	5.4	38
Non-state employees	16.7	6.0	39
Non-responders	16.4	5.2	35
Total	16.6	5.5	112

continued

	$\bar{X}$	s	N
Education			
14	13.6	4.7	9
15	17.5	4.5	16
16	15.5	5.9	29
17	16.8	6.0	43
18	19.3	3.1	13
19	19.0	0.0	1
No response	14.0	0.0	1
Total	16.6	5.5	112
Sex			
Males	16.3	5.8	81
Females	17.4	4.6	31
Total	16.6	5.5	112
For CRANDHR			
Race			
Whites	24.2	9.3	35
Non-whites	25.7	6.7	48
Non-responders	28.8	6.9	29
Total	26.0	7.8	112
Civil Service Status			
State employees	25.5	7.5	38
Non-state employees	25.0	7.9	39
Non-responders	27.7	7.9	35
Total	26.0	7.8	112
Education			
14	25.0	5.5	9
15	26.4	8.3	16
16	24.0	7.8	29
17	26.5	8.2	43
18	29.8	7.0	13
19	20.0	0.0	1
No response	26.0	0.0	1
Total	26.0	7.8	112
Sex			
Males	25.7	7.9	81
Females	27.0	7.7	31
Total	26.0	7.8	112

continued

	$\bar{X}$	s	N
For I and I			
Race			
Whites	22.3	6.3	35
Non-whites	20.7	7.0	48
Non-responders	21.4	5.4	29
Total	21.4	6.4	112
Civil Service Status			
State employees	22.7	5.8	38
Non-state employees	20.2	7.3	39
Non-responders	21.2	5.7	35
Total	21.4	6.4	112
Education			
14	21.6	5.6	9
15	22.6	7.2	16
16	22.3	6.4	29
17	19.6	6.8	43
18	23.7	3.3	13
19	20.0	0.0	1
No response	21.0	0.0	1
Total	21.4	6.4	112
Sex			
Males	21.4	6.2	81
Females	21.3	7.0	31
Total	21.4	6.4	112
For the Essay			
Race			
Whites	19.3	5.2	35
Non-whites	18.8	3.8	48
Non-responders	20.0	3.8	29
Total	19.3	4.3	112
Civil Service Status			
State employees	19.7	4.7	38
Non-state employees	18.2	4.4	39
Non-responders	20.1	3.5	35
Total	19.3	4.3	112

continued

	$\bar{X}$	s	N
Education			
14	17.9	4.9	9
15	18.0	6.2	16
16	19.5	2.8	29
17	19.5	3.5	43
18	19.8	5.6	13
19	28.0	0.0	1
No response	25.0	0.0	1
Total	19.3	4.3	112
Sex			
Males	19.6	3.8	81
Females	18.6	5.4	31
Total	19.3	4.3	112
For the Total Weighted Score			
Race			
Whites	33.5	15.2	35
Non-whites	33.6	12.7	48
Non-responders	38.2	10.7	29
Total	34.7	13.1	112
Civil Service Status			
State employees	35.4	13.7	38
Non-state employees	32.1	13.8	39
Non-responders	36.9	11.5	35
Total	34.7	13.1	112
Education			
14	31.1	8.5	9
15	35.6	14.0	16
16	32.7	14.0	29
17	34.7	13.0	43
18	39.4	13.8	13
19	45.0	0.0	1
No response	45.0	0.0	1
Total	34.7	13.1	112
Sex			
Males	34.4	13.1	81
Females	35.6	13.4	31
Total	34.7	13.1	112

continued

	$\bar{X}$	s	N
For the Oral			
Race			
Whites	6.0	13.5	6
Non-whites	11.6	16.0	17
Non-responders	9.2	15.4	8
Total	9.3	15.2	31
Civil Service Status			
State employees	9.8	15.8	11
Non-state employees	9.5	15.4	11
Non-responders	8.4	14.6	9
Total	9.3	15.2	31
Education			
14	3.4	10.3	1
15	10.1	15.6	5
16	10.8	16.4	9
17	8.8	15.4	11
18	9.6	15.0	4
19	29.0	0.0	1
No response	--	--	--
Total	9.3	15.2	31
Sex			
Males	8.6	14.7	21
Females	11.1	16.5	10
Total	9.3	15.2	31