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Difference between prisoners and the general population in psychometric *g*

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Summary—White and black prison inmates differ psychometrically from the general population mainly on the *g* factor of the Wechsler Adult Intelligence Scale-Revised. The average white–black difference is also predominantly a difference in *g*, although the groups also differ in spatial ability independently of *g*. The higher Performance than Verbal subtest scores typically found in criminal offenders is a relatively weak effect when *g* is removed.

INTRODUCTION

A classic review of the evidence on the intelligence of delinquents and criminal offenders has made a strong case that IQ has an effect on criminal behavior independent of social class and race (Hirschi and Hindelang, 1977). However, the mean deviation of criminal offenders from the population norms on various mental tests is much more variable than can be accounted for by sampling error alone. Systematic differences have long been noted, such as the relatively lower Verbal IQ than Performance IQ of the Wechsler scales (Matarazzo, 1972, pp. 433–439). An obvious hypothesis is that the size of criminals' average deviation on various tests is related to the ability factors composition of the tests. Most of the standard intelligence tests, such as the Wechsler scales, yield IQ scores that represent a composite of abilities, always comprising predominantly a large general ability factor, or Spearman's *g*, and including group factors such as verbal and spatial abilities. Gordon (1987) has argued that " . . . all of the classic subtest profile differences that have been found to differentiate criminals from noncriminals on Wechsler tests . . . can be shown to be simply a reflection of differences in subtest *g* loadings" (p. 40). In brief, Gordon claims that criminal offenders differ psychometrically from the noncriminal population mainly in *g*, rather than in other more specialized abilities independent of *g*. [The construct validity and social importance of the *g* factor are detailed elsewhere (Gottfredson, 1986).]

The present study examines Gordon's empirical generalization in samples of white and black criminal offenders in the southern United States.

METHOD

Subjects

A total of 275 prisoners was randomly selected from three penal institutions in the southern United States. There were 187 blacks and 88 whites; 85% of both racial groups were males. Mean age of the whites was 27.6 years, SD = 7.2; of blacks, 28.3 yr, SD = 7.2. Further descriptive statistics on these samples are provided by Faulstich, McAnulty, Carey and Gresham (1987).

Test

The Wechsler Adult Intelligence Scale-Revised (WAIS-R) was individually administered according to standard procedures. The WAIS-R Manual (Wechsler, 1981) provides age-standardized scores based on a national probability sample that closely matches the demographic features of the United States population in the 1980 Census. Each of the 11 subtests is scaled to a mean of 10, SD = 3, in the national standardization sample (N = 1880).

RESULTS

A principal factor analysis was performed on the intercorrelations of the WAIS-R subtests separately in the white (W) and black (B) samples and on the standardization (S) sample. The general factor, *g*, is represented by the first unrotated principal factor, which accounts for 41.46%, 38.18% and 51.08% of the total variance of the WAIS-R subtests in the W, B, and S samples, respectively. Only one other interpretable factor with an eigenvalue greater than 1 emerged, accounting for 8.0%, 10.1% and 4.7% of the variance in the W, B and S samples; it is a bipolar factor contrasting verbal and spatial abilities uncorrelated with *g*.

Table 1 shows the means and SDs of the various subtest scale scores, and the subtests' *g* loadings in each sample. The subtest means and SDs all fall below the national norms (mean = 10, SD = 3), in both the W and B samples, but there is considerable variability among the subtests in this respect. The *g* factor is highly similar in the W, B, and S samples; the coefficient of congruence between each pair of samples is at least 0.99, whereas a congruence coefficient of 0.95 is the general criterion for identity of factors. The profile of subtest *g* loadings is much more invariant across the W and B samples than the profile of subtest means. Using the Pearson *r* as an index of profile similarity, the W and B profiles of subtest scores show $r = 0.47$, while the W and B profiles of *g* loadings show $r = 0.82$. The *g* profile of group S shows $r = 0.95$ and 0.83 with the W and B *g* profiles, respectively.

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Table 1. Mean scaled scores (and standard deviations) of WAIS-R on white (W) and black (B) prisoners and the subscale's *g* loadings derived from the W and B groups and the national standardization sample (S)[a]

	White scaled score		Black scaled score		*g* Loading[b]		
WAIS-R subscale	Mean	SD	Mean	SD	W	B	S
Vocabulary	7.22	2.69	5.53	2.17	87	76	85
Information	7.02	2.80	5.92	1.69	83	58	81
Similarities	7.74	2.57	6.20	2.40	78	73	79
Comprehension	7.56	2.82	5.87	2.15	77	74	78
Arithmetic	7.93	2.50	6.31	1.63	69	65	75
Picture Completion	8.50	2.29	7.05	2.53	56	54	69
Picture Arrangement	8.91	2.83	7.04	2.35	53	60	63
Digit Span	8.57	2.86	7.33	2.59	51	51	60
Block Design	9.18	2.19	6.59	1.92	50	59	71
Object Assembly	9.21	2.59	6.96	2.59	46	52	60
Digit Symbol	8.19	2.06	6.87	2.41	35	50	59
Verbal IQ	86.48	11.85	78.40	8.05			
Performance IQ	91.74	11.29	81.01	10.04			
Full Scale IQ	87.66	11.15	78.47	8.24			

[a]Sample sizes: W = 88, B = 187, S = 1880. [b]Decimal omitted.

Evidence that the variation in the deviations of the prisioners' subtest means, below the standardization mean of 10 for each subtest, is not a random phenomenon and is shown in Table 2 in the consistently significant correlations between the profile of subscale means and subscale *g* loadings. Because the *g* loadings are not independent, the Pearson *r* cannot be accurately tested for significance. Since this restriction does not pertain to Spearman's rank-order correlation, ρ, which is a purely nonparametric permutation test, ρ was also calculated on these data, and all are found to be significant beyond the 0.01 level by a one-tailed test. The profile of subtest means is highly correlated with the profile of *g* loadings, in both same-sample and cross-sample comparisons and for both prisoner samples with the standardization samples.

Jensen (1985) has shown that in unselected white and black samples that are representative of their respective general populations, the size of the average W–B difference (in standard score units) on various tests is directly related to the tests' *g* loadings. This empirical generalization, which has not been contradicted in any of the many representative samples of whites and blacks examined so far, does not hold for the blacks and whites in this prisoner population. The correlation between the mean W–B differences in subtest scores and their *g* loadings, whether based on the W, B, or S *g* factor, is nonsignificant and negligibly different from zero. The reason appears to lie in the fact that the W and B groups differ more markedly on spatial ability than is found in the white and black general populations. The effect is attributable to the higher spatial ability (independent of *g*) in the white prisoners as compared with whites in the general population. From the S data, orthogonalized Verbal and Spatial factors were extracted, with the *g* variance completely removed. The Pearson *r* between the standard scores on the six Verbal scales and their loadings on the Verbal factor is −0.88 for W and −0.81 for B; that is, the higher the Verbal factor loading of a subtest, the lower is the mean score of both prisoner groups. The same kind of analysis was done for the Spatial factor, for which the *r* (between mean scores on the five nonverbal or performance subtests and their loadings on the Spatial factor) is 0.80 for W and −0.49 for B; that is, the W prisoners are relatively high on spatial ability, independent of *g*, as compared with the black prisoners, who are lower in spatial ability. Figure 1 shows the regression of the subtest means on the subtests' *g* loadings derived from the standardization data. The strong linear trend of the subtest scores as a function of their *g* loadings is clear in both the W and B groups, emphasizing the fact that these groups of prisoners differ from the general population mainly in the *g* factor of this diverse battery of psychometric tests. In Fig. 2 the WAIS-R subtest profiles of the W and B samples are compared after the *g* factor has been regressed out to reveal the W–B subtest differences independently of the W–B differences in *g*.

DISCUSSION

Both the white and black prisoners in the present study show higher Performance IQ than Verbal IQ, the pattern typically found in delinquents and sociopaths (Matarazzo, 1972, pp. 433–439). However, it is clear in the present data that this high Performance–low Verbal pattern is not primarily attributable to a difference between verbal and performance (or spatial) factors, but is largely a result of the fact that the verbal subtests of the WAIS-R are more highly *g* loaded than are the

Table 2. Correlations (Pearson *r* and Spearman rank-order ρ) between WAIS-R subscale means and subscale *g* loadings in prison samples and national standardization sample

Scaled scores (x) sample	*g* Factor (y) sample	Correlation	
		r_{xy}	ρ_{xy}
White	White	−0.83	−0.84*
White	Black	−0.87	−0.71*
Black	White	−0.60	−0.52*
Black	Black	−0.83	−0.75*
White	Standardization	−0.78	−0.77*
Black	Standardization	−0.93	−0.83*

*$P < 0.01$ (one-tailed test).

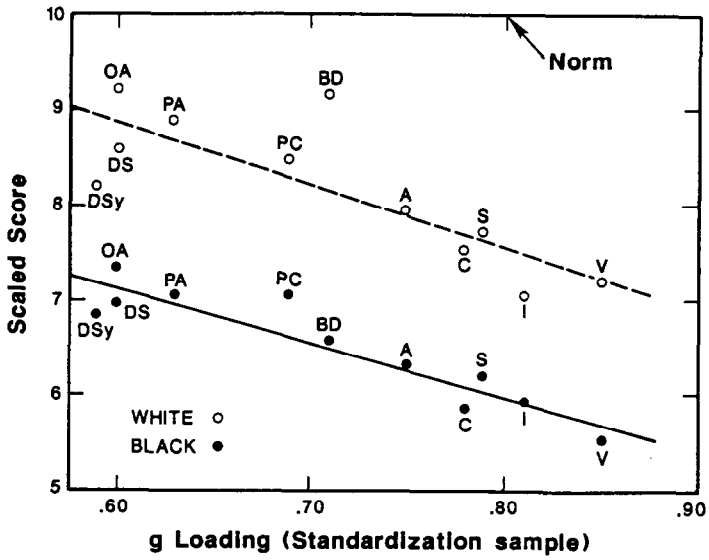

Fig. 1

performance subtests, and criminal offenders are generally lower in g than the noncriminal population. About three-fourths of the variance in subtest means is attributable to differences in the g loadings of the subtests. The psychometric difference between the prisoner groups and the general population is mainly a difference in g, and the difference between the white and black prisoner groups is also mainly a difference in g. This is seen graphically in Fig. 1, in the nearly parallel regression lines of whites and blacks. The Digit Symbol subtest is rather anomalous in this respect, in that both the white and black groups perform quite poorly on Digit Symbol despite the fact that it has the lowest g loading.

Even with the g variance removed (Fig. 2), however, the prisoner groups, especially the white group, still show relative inferiority on the verbal tests and relative superiority on the performance tests, attributable to their higher loadings on a spatial ability factor. With g removed, the difference between the mean verbal and mean performance scaled scores is 0.361 for whites and 0.016 for blacks. But these are small effects as compared to the differences attributable to g. In the white group and the black group, respectively, g accounts for about 1.7 and 6.2 times more variance among subtest means than the variance among subtests after the g variance is removed.

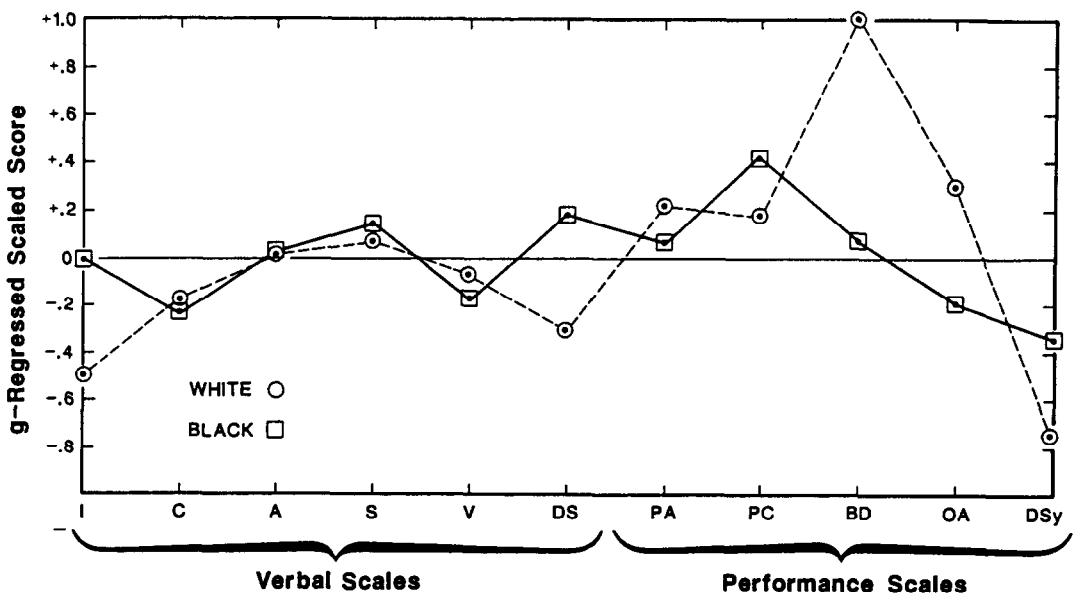

Fig. 2

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