Measured IQ Related to Teacher-Estimated Intelligence:

An Exploration in Bias*

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ABSTRACT

By comparing the teacher-estimated intelligence to the measured IQs of high school students, this study finds that teachers tend to overestimate the IQ of working class boys, and to underestimate the IQ of girls, regardless of their socio-economic status.

INTRODUCTION

It has often been observed that intelligence tests discriminate against children of lower socio-economic status (SES). Charters relates that intensive efforts have been made in attempts to produce culture-fair intelligence tests, but with only little success so far. However, "the work . . . helped to remove the bias, if not from tests, at least from the test-users in the education profession."[1] One assumption that may possibly be inherent in this statement is that although tests are culture-biased, teachers, being culture-fair, can make better, less biased estimates of intelligence. Such an assumption is open to question. Perhaps teachers are *also* culturally biased

but their biases may be different from those of intelligence tests. To the writer's knowledge, this problem has not yet been investigated.

It has been argued that school work is better suited to the interests and abilities of girls than of boys. For example, Hall and McFarlane have concluded from some of their Canadian research that most school practices and programmes are arranged in favour of girls, and to the detriment of the educational and occupational careers of boys.[2] In this sense, sex is a cultural dimension, and appears to be subject to bias just as SES is.

Why is cultural bias in the measurement or estimation of intelligence important? Several reasons come to mind. For one thing, streaming and grouping practices often take into consideration the intelligence of the children involved, and if there is any positive value in streaming or grouping, then there must be negative value in being placed in the inappropriate stream or group through biased, and therefore inaccurate, measures or estimates of intelligence. But in the writer's opinion, a far more important issue is that the self-concept of the child is at stake. Brookover *et al.* have demonstrated that, even holding IQ constant in the analysis, where students have a high academic self-concept, their actual school performance as measured by grades is higher than that of students who have low self-concept.[3] Pedersen has shown that, holding IQ constant, students with high academic self-concept have more ambitious plans for future education than students with low self-concept.[4] Both investigators have presented evidence that the teacher has a significant impact on the level of academic self-concept of the student, and can depress or elevate the self-concept, probably through combinations of certain actions, gestures, verbal comments, or other cues through which the student perceives the teacher's opinion of his (the student's) ability to do school work. The impact of the teacher on the self-concept of the student is important because of the subsequent effect of the self-concept on levels of academic performance and of educational aspiration.

THE PROBLEM INVESTIGATED

The problem investigated in this paper is as follows: In making estimates of IQ, to what extent are teachers biased in favour of, or against, pupils of different SES, of different sex, and of different combinations of SES and sex?

PROCEDURE

In the spring of 1965, 6465 pupils and their teachers in the eighth and tenth grades of thirty-seven high schools in rural, suburban, and urban areas of the Province of Quebec answered questionnaires related in part to a study concerning social factors associated with the level of educational aspiration. Use was made of this opportunity to collect data relevant to other research problems as well, one of which is the subject of this paper.

The variables used in this paper — IQ (both measured and estimated), the sex of the student, the SES of the student — were all obtained from teacher-responses to the questionnaire.

The questions and response categories were as follows:

    Sex   The sex of this student is
              A. male
              B. female

   IQ   The IQ of the student. In answering this question, it is understood that where the actually measured IQ scores are missing, estimating scores will be hazardous at best. But since these scores or estimates will be used for group analysis only — no judgments about individuals will be made — they will still be very useful for the purposes of this research. So please, even if your estimate runs the risk of being very wild, please make your best guess. If a measured score is at hand, use it; if more than one is available, use the most recent. And if no score is convenient, use the adjective checklist below to help you to estimate.

        A.   72 or lower   very dull
        B.   73 – 80   dull
        C.   81 – 88   below average
        D.   89 – 96   slightly below average
        E.   97 – 104   average
        F. 105 – 112   slightly above average
        G. 113 – 120   above average
        H. 121 – 128   well above average
        I. 129 – 136   much above average
        J. 137 or higher   gifted

        Give the source of your IQ score for this student.
        A. measured individual test

   B. measured group test
   C. measured nature of test not known
   D. estimated

  SES Where would you rank this student's family in terms
      of social class level?

    A. upper class, or upper middle class
    B. middle class
    C. working class.

Of the entire sample, estimated IQs were obtained for 3159 students, and measured IQs for 3304 students. However, since preliminary analyses indicated that there were systematic differences in other pupil characteristics associated with whether measured IQs were available (they generally were for urban schools, but not for rural ones), this paper makes use of data only from the ten schools in which approximately half the IQs reported were estimated, and the other half measured, thus limiting variation in the two main subsamples with respect to other social variables that might be related to levels of intelligence. In addition, those few students for whom any data used in this analysis were missing were simply dropped from consideration in this paper. As a result, the sample in this paper includes 657 students for whom we have estimated IQs, and 681 students from the same schools for whom the teachers supplied measured IQs.

FINDINGS

Measured IQ compared to estimated IQ. Table I shows that, while by measurement, some 15 per cent of the students have IQs of 121 or higher, only about 4 per cent are estimated by the teachers to be in this IQ range. On the whole, it appears that teachers tend to underestimate the intelligence of their students. This difference between estimated and measured IQ is significant at the .001 level of confidence, using the standard contingency chi square test of significance.

  The data in Table I also suggest that teachers tend to avoid extreme categories when estimating student intelligence, especially at the high end of the IQ range, and other tables in this paper bear this tendency out. On the whole, teachers seem to take a pessimistic view of student intelligence, at least by comparison of their estimates to measured IQ.

TABLE I

MEASURED IQ COMPARED TO ESTIMATED IQ

Source of IQ	IQ					
	96 and lower	97-104	105-112	113-120	121 and higher	Total
Measured IQ	19.2%	26.7%	24.1%	14.8%	15.1%	681
Estimated IQ	17.7%	33.2%	28.9%	16.1%	4.1%	657
			$X^2 = 50.7$; df $= 4$; p $< .001$			

SES. Since we are concerned with bias in the estimation of intelligence, we now turn to the SES of the students. The measure of SES is the teacher-estimate, and although it may be inaccurate, if SES introduces bias in teacher-estimates of intelligence, then it is the SES that the teacher perceives that influences him, whether it is accurate or not. But because the measured IQ (as shown in Table II) is related to SES in the way usually reported in the literature, that is, discriminating against low SES students, the teacher-estimates of SES are probably reasonably accurate.

Table II presents the comparison of estimated to measured IQ for children at two SES levels — middle and upper class, and working class. At both high and low SES levels, the distributions of measured and estimated IQs are significantly different from each other; but their patterns are quite dissimilar. For middle and upper class students, the teacher seems to have a tendency to underestimate IQs whereas this is not the case with the students at the working class level, where the tendency appears to be to concentrate students near the mean IQ rather than at either the high or low end of the IQ spectrum.

There is another way to look at the data presented in Table II, and that is to compare *measured* IQ of middle and upper class students to *measured* IQ of working class students. When this is done, one finds that 61.4 per cent of middle and upper class students have IQs of 105 or over, as compared to only 50.0 per cent of working class children. Although this difference is statistically signif-

icant ($X^2 = 16.4$; df $= 4$; p $< .01$), its interpretation is somewhat problematical. Either the working class children are significantly lower in intelligence than the middle and upper class children, or the tests discriminate against them; on the other hand, a combination of both these factors is at work. However, if one compares *estimated* IQ of middle and upper class students to *estimated* IQ of working class children, one finds that 46.8 per cent of middle and upper class students have IQs of 105 and higher, as compared to 50.9 per cent of working class children. While this difference is not significant statistically ($X^2 = 3.6$; df $= 4$; p $< .50$), it is certain that the teachers in our sample do not estimate the intelligence of working class children to be lower than that of middle and upper class children. In view of the known higher dropout rate among working class children as compared to middle and upper class children, it is just possible that the teacher-estimates are more accurate than the measured IQs; however, this is merely conjecture, and the answer awaits further research of considerable sophistication. In the meantime, it is clear that if tests discriminate against working class children, then teachers do not do so, or at least not as much so; and if tests do not discriminate against working class children, but give accurate measures of their intelligence, then teachers discriminate in their favour.

TABLE II

MEASURED IQ COMPARED TO ESTIMATED IQ
BY SOCIO-ECONOMIC STATUS LEVEL

SES Level	IQ					
Source of IQ	96 and lower	97-104	105-112	113-120	121 and higher	Total
MIDDLE AND UPPER CLASS						
Measured IQ	11.3%	27.3%	29.0%	16.0%	16.4%	238
Estimated IQ	18.0%	35.2%	27.1%	16.9%	2.8%	284
			$X^2 = 34.5$; df $= 4$; p $< .001$			
WORKING CLASS						
Measured IQ	23.5%	26.4%	21.4%	14.2%	14.4%	443
Estimated IQ	17.4%	31.6%	30.3%	15.5%	5.1%	373
			$X^2 = 27.9$; df $= 4$; p < 0.01			

Sex. A basis of discrimination other than that of SES is sex. It seems that girls do better at school, at least in the early years, and we have already referred to the argument of Hall and McFarlane that the world of the school is really a girl's world. Be that as it may, if IQ tests require compliant, willing attention to paper-and-pencil tasks, then it is likely that in our society, girls will be more ready to offer it than boys, and hence achieve higher results on IQ tests.

TABLE III

MEASURED IQ COMPARED TO ESTIMATED IQ BY SEX

SEX	IQ					
Source of IQ	96 and lower	97-104	105-112	113-120	121 and higher	Total
BOYS						
Measured IQ	23.0%	31.8%	23.3%	12.3%	9.7%	318
Estimated IQ	11.0%	33.6%	34.0%	17.2%	4.1%	435
			$X^2 = 31.5$; df = 4; p < .001			
GIRLS						
Measured IQ	16.0%	22.3%	24.8%	17.1%	19.8%	363
Estimated IQ	30.6%	32.4%	18.9%	14.0%	4.1%	222
			$X^2 = 47.1$; df = 4; p < .001			

The data presented in Table III show that although the measured IQ is significantly different from the estimated IQ for *both* boys and and girls, the *direction* of the discrepancy is different for each case. Apparently, teachers have a tendency to over-estimate the IQ of high school boys, but to under-estimate the IQ of high school girls. Or conversely, it could be argued that the teachers are realistic, and that it is the IQ tests which discriminate in favour of girls and against boys.

Again, if one makes the alternate comparison, it is clear that by *measurement,* girls have significantly higher IQs than boys ($X^2 = 24.1$; df = 4; p <.001); but by *teacher-estimate,* boys have

significantly higher IQs than girls ($X^2 = 43.9$; df $= 4$; p $< .001$).
Since teachers have been shown to have an impact on the academic
self-concept of students, and because academic self-concept is re-
lated to the level of educational aspiration, this might account to
some extent for the fact that more boys continue with higher educa-
tion than do girls of equal measured intelligence.

SES and Sex. To this point, it has been shown that although
the teacher does not discriminate against the lower-class student,
his estimate of the intelligence of middle and upper class students
is significantly lower than the measured intelligence of these
students. Also, we have presented evidence to support the view that
high school teachers tend to discriminate against girls, but in favour
of boys in the estimation of their intelligence. We now move to the
examination of the combination of these two factors, SES and sex.
The relevant data are presented in Table IV.

Although it appears from the comparative per cents in the
first section of Table IV that teachers have a slight tendency to
overestimate the IQ of middle and upper class boys, the differences
between measured and estimated IQs are not statistically signif-
icant. However, where working class boys are concerned, the ap-
parent tendency to overestimate is quite marked; for example, where
IQs are measured, a total of 44.3 per cent of working class boys have
IQs of 105 or higher, but where teachers estimate the intelligence,
56.8 per cent of working class boys have IQs or 105 or higher.

If the comparison for boys is made between the estimated per
cents in the various IQ brackets at different SES levels, it will be
noted that in estimating intelligence the teachers do not make very
much distinction between middle and upper class boys on one hand,
and working class boys on the other. The main difference seems to
occur in the 97-104 IQ category, where teachers place 38.6 per cent
of middle and upper class boys as opposed to only 30.9 per cent of
working class boys. This difference, however, is partly made up for
by the fact that the per cent of working class boys estimated to be
in the 96 and lower IQ category exceeds that of middle and upper
class boys. But these differences are not statistically significant
($X^2 = 2.2$; df $= 4$; p $< .70$). In fact, in no part of our analysis can
it be shown that teachers discriminate between students at different
SES levels, unless one accepts as a fact that working class boys (the
working class boys in our sample, to be precise) are truly not as in-

telligent as middle class boys, as is suggested by the comparison of *measured* IQs for boys at the different SES levels ($X^2 = 9.5$; df = 4; $p < .05$); if one accepts this position, then it can be said that teachers discriminate in *favour* of lower class boys, but that they discriminate neither in favour of, nor against, middle class boys.

TABLE   IV

MEASURED IQ COMPARED TO ESTIMATED IQ BY SES AND SEX

SES AND SEX	IQ					
Source of IQ	96 and lower	97-104	105-112	113-120	121 and higher	Total
MIDDLE AND UPPPER CLASS BOYS						
Measured IQ	11.8%	40.0%	28.2%	10.6%	9.4%	85
Estimated IQ	8.5%	38.6%	32.7%	17.0%	3.3%	153
	$X^2 = 5.9$; df = 4; p < .30					
WORKING CLASS BOYS						
Measured IQ	27.0%	28.8%	21.5%	12.9%	9.9%	233
Estimated IQ	12.4%	30.9%	34.8%	17.4%	4.6%	282
	$X^2 = 28.8$; df = 4; p < .001					
MIDDLE AND UPPER CLASS GIRLS						
Measured IQ	11.1%	20.3%	29.4%	19.0%	20.3%	153
Estimated IQ	29.0%	31.3%	20.6%	16.8%	2.3%	131
	$X^2 - 38.2$; df = 4; p < .001					
WORKING CLASS GIRLS						
Measured IQ	19.5%	23.8%	21.4%	15.7%	19.5%	210
Estimated IQ	33.0%	34.1%	16.5%	9.9%	6.6%	91
	$X^2 = 17.4$; df = 4; p < .01					

The lower half of Table IV presents comparisons between estimated and measured IQs for girls at the two SES levels. Here, the pattern is the same in both groups; regardless of SES, the teacher-estimates of IQ are significantly lower than the measured IQs.

Using the alternate comparison with these data, it appears that teachers tend to acknowledge that middle and upper class girls are more intelligent than working class girls, especially by reference to the per cents in the 105-112 and 113-120 IQ categories; however, the difference between the estimated IQs for girls at the two SES levels is not statistically significant ($X^2 = 4.3$; df $= 4$; $p < .50$). In fact, it can not even be demonstrated that measured IQs differ for the two groups ($X^2 = 6.7$; df $= 4$; $p < .20$). The only conclusion that can be drawn here is that, if one accepts measured IQ as the correct standard, teachers consistently underestimate the IQ of girls, regardless of their SES level.

CONCLUSIONS

If to this point our reasoning has occasionally seemed to be circular, it is because of a basic epistemological problem underlying the drawing of any conclusions from these data. The problem is this: To what extent is there any possibility of knowing whether or not teachers or tests underestimate or overestimate the intelligence of any of the groups of students? There is no satisfactory answer to this question, and it is doubtful whether there can ever be one. The only conclusion that we can state with any certainty is that *teachers and tests differ in the IQ they attach to students*. To draw any other conclusions than this, we must arbitrarily select IQ from one source and use it as the standard to which we will then compare IQ from the other source.

Summary. If we use measured IQ as a standard against which to compare the IQ of high school students as estimated by their teachers, our data lead us to the following conclusions:

1. High school teachers tend to underestimate the IQ of students as a group.
2. High school teachers tend to underestimate the IQ of middle and upper class students as a group.
3. High school teachers tend to estimate the IQ of working class students closer to average levels than they really are.
4. High school teachers tend to overestimate the IQ of working class boys.
5. High school teachers neither overestimate nor underestimate the IQ of middle and upper class boys.
6. High school teachers tend to underestimate the IQ of high school girls, regardless of their SES level.

Implications. IQ tests have been demonstrated to be culturally biased. It is possible that teachers, too, are biased in estimating the

intelligence of high school students, and if this is so, their biases are almost exactly opposite to those of the tests. Whereas IQ tests probably overestimate the intelligence of girls, teachers probably underestimate their IQs; and whereas IQ tests tend to underestimate the intelligence of boys — especially of working class boys — the teachers tend to overestimate it. Perhaps this is evidence of the removal "of bias . . . from the test-users in the education profession" as Charters has put it. It may be that teachers are compensating from their knowledge that tests tend to give inaccurate results. They may even be overcompensating, but we have no way of knowing this from these data.

Compensation is probably good, especially if it can be demonstrated that teachers do not merely select some different group to victimize by undermining their academic self-concept. Despite the assertion of Hall and McFarlane that school is a girl's world, this becomes less and less evident in the later stages of formal education. Boys catch up in performance, and attend college and university in larger numbers than girls. There are undoubtedly many social factors that contribute to this phenomenon of sexual differentiation in college-attendance rates, but the tendency of teachers to underestimate the intelligence of girls may find expression in their behavior, and thence into the girls' evaluation of their own abilities. This possibility should be explored by further research.

It is somewhat more difficult to suggest the implications of the teachers' tendency to overestimate the IQ of working class boys, especially in view of the known greater incidence of low self-concept among working class boys as compared to boys at higher SES levels. Perhaps without the teachers' overestimate, the academic self-concept of working class boys would be even lower, resulting in poorer school performance as well as a lower level of educational aspiration. But this, too, awaits investigation.

Suggestions for further study. The major methodological weakness of this study is that we have measured IQs for *one* group of students, and estimated IQs for *another* group. While we have taken every precaution to exclude data where there might be contaminating factors, it is possible that the two groups of students have certain differences in social characteristics other than intelligence that make their comparison to each other spurious. An improvement in method would be to obtain measured IQs for a group of

students, to withhold them from teachers and, after several months of teacher-student interaction, obtain teacher estimates of student intelligence. Then comparisons would be made on the same students, rather than on hopefully comparable groups of students from the same schools.

The fact that the subjects of this paper are Quebec students, and largely from rural areas, may limit the applicability of the findings. It is a distinct possibility that, at the time these data were collected (1965), the dropout rate of working class students, especially boys, was very much higher than that of middle and upper class students. If this is the case, then our findings may result largely from this fact, rather than from any widespread tendency of teachers in general to overestimate the intelligence of working class boys. This remains to be explored. In the meantime, this study should be replicated in different areas of the country to see if these are indeed universal trends, or merely local phenomena.

We would like to know how (or if) the sex of the teacher influences his tendency to overestimate or to underestimate the intelligence of girls and boys at different SES levels. It would also be useful to collect data from several grade levels to observe if there are any trends in tendencies to overestimate or to underestimate intelligence associated with increasing ages and grade levels of students. Religious differences, ethnic differences, rural differences, and regional differences should also be taken into account in future analyses of estimated intelligence.

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