NEGRO IQ DEFICIT: FAILURE OF A "MALICIOUS COINCIDENCE" MODEL WARRANTS NEW RESEARCH PROPOSALS

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A seemingly persuasive case that existing statistical data on Negro IQ deficits can be explained on a purely environmental basis, without recourse to any genetic differences, has been presented by Light and Smith (1969). Specifically, these investigators employed computer calculations using values for the contributions to variance of IQ consistent with Jensen's Harvard Educational Review article "How Much Can We Boost IQ and Scholastic Achievement?" (1969). Light and Smith initially used values of $f_G = 0.75$ and $f_E = 0.25$ for the genetic (G) and environmental (E) contributions to the white population variance. Using these values in conjunction with U.S. Census data on socioeconomic (SES) distribution, they explained a deficit ΔIQ for Negroes of -8.74, i.e., an average IQ of 91.26 compared to 100 for whites.

Light and Smith placed emphasis on an analysis in which a fraction (f_I) of the variance was attributed to an "interaction" (I) between environment and heredity. (See Table 2, Equation 5, and Figure 3 for examples of interaction as distinct from simple additivity.) In their 1% interaction case ($f_I = 0.01$, $f_E = 0.24$, $f_G = 0.75$), Light and Smith were able to account for an IQ deficit for Negroes (as compared to whites) of -13.19. For their 10% interaction case ($f_I = 0.10$, $f_E = 0.15$, $f_G = 0.75$), they computed a larger deficit of -17.41, i.e., an average Negro IQ of 82.59. Identical genetic distributions for Negroes and whites were assumed in both cases.

It is the thesis of this article that, contrary to its first impression, the Light-Smith contribution is evidence for genetic effects.

Malicious Allocation and Malicious Coincidence

Light and Smith's computations involved distributing the population over 120 cells defined by 10 genetic categories and 12 environmental or SES

Editor's Note. — Light and Smith's response to this article will appear in the October issue of the *Review*.

categories. Each cell corresponded to a narrowly defined mean IQ, within-cell variance of IQ being negligible. In these calculations they adhered only to the first three of the following four constraints.

Constraint 1. The G distribution for Negroes should be identical with that of whites. (Each G column of Tables 1 and 2 contains 10% of the population. G's IQ contribution was normally distributed to give $f_G = 0.75$.)

Constraint 2. The E distributions for both Negroes and whites should conform to Census Bureau Statistics and the E contribution to IQ should be the same for Negroes and whites. (The E variable was approximated by socioeconomic status (SES) and was considered constant for all children of the same SES category (Light & Smith, 1969, p. 490). No correlation between G and E distribution was introduced for whites or for Negroes. Since this last feature is not essential to the discussion here, the reader is referred to Jensen (1969) for a discussion. The method of obtaining the functional relationship for the 0% interaction case is discussed below.)

Constraint 3. The I contribution to IQ should depend on environment and genetics in exactly the same way for Negroes as for whites; for whites, it should not disturb the mean IQ or its variance from their nominal values of 100 IQ and $V_w \equiv \sigma_w^2 = 225$. (See Light & Smith, 1969, pp. 489, 496, Tables A, 1A.)

Constraint 4. The IQ variance for Negroes should be consistent with the experimentally established value that is smaller than that for whites. (The best value (Jensen, 1969; Kennedy, Van De Riet, & White, 1963) for Negroes is $12.4^2 = 156$ compared to $16.4^2 = 270$ for whites. For both Negroes and whites, Light and Smith (1969) postulated $15^2 = 225$ but, as discussed below, failed to note discrepancies from this value for their computed Negro populations.) Other features of the IQ distributions should also fit established data.

A "starting assumption" for all three cases treated by Light and Smith involved determining the dependence of IQ upon E for the 0% interaction case by assigning $f_E = 0.25$ to the white population and then assuming a normal environmental distribution. Each SES category was thereby given an average IQ corresponding to its percentile range for the population as a whole. (As stated in Constraint 2, no correlation between E and G was considered.) This process determined an average IQ for each environmental category for hypothetical population distributions in which each of the 10 G cells of an SES category contained the same percentage of the population. The lower SES distribution for Negroes then produced the $\triangle$IQ of -8.74 for the 0% interaction case initially considered. However, as discussed below for Figure 2, the resulting dependence of average Negro IQ upon SES is in marked disagreement with actual data, so that even the 0% interaction case does not satisfy Constraint 4.

The contribution of E to IQ was taken as proportional to $f_I^{1/2}$ to obtain the 1% interaction and 10% interaction cases.

The essential flexibility that Light and Smith allowed themselves, in order to maximize the effects of interaction for the 1% and 10% interaction cases, was to reallocate the Negro population among the 120 cells of the 10 by 12 array, subject to Constraints 1 and 2. A computer was used to determine the allocation patterns. These patterns were central both to their argument and to its shortcomings, as will be illustrated for their allocation for $f_I = 0.01$ that is shown in Table 1. Each of their 10 genetic categories contained 10% of the population, in keeping with Constraint 1. In keeping with Constraint 2, each row summed to the Census Bureau's tabulated SES percentages. The hypothetical situation of Table 1 exhibits a central feature of Light and Smith's analysis: the larger percentages tend to fall along a line which is somewhat above the main diagonal so that, for example, Negroes of the two central genetic categories are assigned to the lower third of the environmental categories. Light and Smith described this situation as "malicious allocation": "Thus, examining the black allocation table, we find that our social allocation of blacks has been 'malicious,' in that the standing of any black in his genetic category is likely to be higher than his standing on environment [1969, p. 497]."

This malicious allocation feature (which is shown below to be irrelevant to the quantitive results obtained by Light and Smith) has been accepted as one of the significant contributions of their analysis by many readers. For example, Silcock (1970) described malicious allocation as significant in explaining lower Negro IQ:

> There are an infinite number of ways of doing this, but with reasonable justification, they chose one where the blacks suffered the larger number of downward shifts—on the grounds that a black man's standing on environment is likely to be lower than his genetic standing. Applying the new IQ's to the black and white population distributions gives this time a white IQ still at 100, and a black IQ now reduced to 86.81, or virtually the whole fifteen points shortfall [Silcock, 1970].

The malicious allocation of Table 1 was matched by a computer program to an interaction, shown in Table 2; the interaction values were computed so as to satisfy Constraint 2. The computations arranged this interaction so as to cause the most negative interaction values (from Table 2) to fall precisely in those cells of Table 1 to which Negroes are maliciously allocated. This coincidence of the maliciously allocated cells with the cells having maximum negative interaction may be called a "malicious coincidence" in the sense that it is this coincidence that lowers the average Negro IQ from the 0% interaction value of 91.26 to the 1% interaction value of

Table 1

The "Malicious Allocation" of the Hypothetical Negro Population Used by Light and Smith (1969)

SES (*E*) rows	Genetic (*G*) Columns										Row %
	1	2	3	4	5	6	7	8	9	10	
1	8.60	4.72	.18	.18	.18	.18	.18	.18	.18	1.12	15.8
2	.18	4.00	8.57	5.64	.18	.18	.18	.18	.18	.88	20.2
3	.17	.17	.17	3.13	5.16	.17	.17	.17	.17	.54	10.0
4	.17	.17	.17	.17	3.50	5.15	.17	.17	.17	.27	10.1
5	.18	.18	.18	.18	.18	3.66	8.61	2.86	.18	.68	16.9
6	.17	.17	.17	.17	.17	.17	.17	5.87	4.45	.47	12.0
7	.16	.16	.16	.16	.16	.16	.16	.16	4.08	1.96	7.3
8	.13	.13	.13	.13	.13	.13	.13	.13	.13	2.80	4.0
9	.08	.08	.08	.08	.08	.08	.08	.08	.08	.59	1.3
10	.06	.06	.06	.06	.06	.06	.06	.06	.06	.34	.9
11	.07	.07	.07	.07	.07	.07	.07	.07	.07	.46	1.1
12	.04	.04	.04	.04	.04	.04	.04	.04	.04	.14	.5
Column %	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	100.0

Table 2

The Maliciously Coincident Interaction (I) between Environment (E) and Genetics (G) Used by Light and Smith (1969) for their 1% Interaction Case

SES (E) rows	Genetic (G) Columns 1	2	3	4	5	6	7	8	9	10	Row sum
1	—7.34	—4.24	1.97	1.51	1.30	1.45	2.18	1.45	.99	.72	0.0
2	2.26	—1.64	—9.43	—2.89	1.90	2.05	2.78	2.05	1.59	1.32	0.0
3	.59	.61	.65	—1.64	—2.01	.22	.70	.22	.26	.40	0.0
4	.59	.61	.65	.36	—2.01	—1.78	.70	.22	.26	.40	0.0
5	2.36	2.46	2.67	2.21	2.00	—1.85	—11.12	—1.85	1.69	1.42	0.0
6	.59	.61	.65	.36	—.01	.22	.70	—1.78	—1.74	.40	0.0
7	.16	.26	.47	.01	—.20	—.05	.68	—.05	—.51	—.78	0.0
8	.16	.26	.47	.01	—.20	—.05	.68	—.05	—.51	—.78	0.0
9	.16	.26	.47	.01	—.20	—.05	.68	—.05	—.51	—.78	0.0
10	.16	.26	.47	.01	—.20	—.05	.68	—.05	—.51	—.78	0.0
11	.16	.26	.47	.01	—.20	—.05	.68	—.05	—.51	—.78	0.0
12	.16	.26	.47	.01	—.20	—.05	.68	—.05	—.51	—.78	0.0
Column sum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

86.81. The malicious coincidence thus contributes a $\triangle IQ_{MC}$ (*MC* for malicious coincidence) of nearly five additional points to the 0% interaction case.

In describing the data in Table 2, Light and Smith emphasized their conformance with Constraints 1, 2, and 3 by writing: "There are an infinite number of interaction effect tables which would satisfy the variance constraints. We note, however, that our particular table satisfies Jensen's parameter estimates, which was our primary concern [1969, p. 496]." Light and Smith's emphasis on these Constraints did not call attention to the fact that malicious coincidence between Tables 1 and 2 is essential to their results. A similar interaction (not reproduced here) for $f_I = 0.10$, one that is also coincident to the same malicious allocation table, leads to a larger $\triangle IQ_{MC}$ and to an average IQ of 82.59.

Obviously, if the arbitrarily selected *I* values were simply reversed in sign, the "malicious" allocations would become "beneficient" and (as can be concluded from Table 3 below) the average Negro IQ would be 95.99 for $f_I = 0.01$ and 103.81 for $f_I = 0.10$. Light and Smith's computer program successfully accomplished malicious coincidence between Tables 1 and 2 so as to produce a nearly maximum depression of average IQ. (This conclusion is based on the discussion of Table 3 below.) It did not do so for the 10% interaction case and, as discussed under the heading *Simple Analytic Model* below, values of 79 and 107 could easily have been obtained. Light and Smith summarized their study of *I* as follows: "We may therefore conclude that with an interaction component of variance somewhere between 0.01 and 0.10, the black mean IQ may be expected to be approximately 85, even though blacks are distributed identically with whites over the genetic categories [1969, p. 498]." The preceding reasoning indicates that this sentence would be more accurate if the phrase "approximately 85" were replaced by "between 79 and 107." It was, of course, appropriate for Light and Smith to choose the interaction sign that would yield 85, in order to illustrate the possibility that the Negro IQ deficit can be nongenetic. However, it is not valid to conclude that an interaction of between 0.01 and 0.10 would be per se more likely to produce a $\triangle IQ_{MC}$ of -15 points rather than $+12$ points.

Reductio-Ad-Absurdum Evidence for Genetic Differences

What conclusion should be reached from Light and Smith's attempt to demonstrate, while staying within established constraints, that the observed 15 point deficit for average Negro IQ can be explained without assuming a Negro genetic deficit for intelligence? The critical analysis presented below suggests that the Light-Smith article (1969) is actually evidence for a conclusion precisely opposite to what they propose. The following analysis is based on serious shortcomings, amounting practically to absurdities, in their calculations and on discrepancies between their results and known facts reported in the Jensen article (1969). Thus their attempt to construct an environmental explanation constitutes in fact a reductio-ad-absurdum basis for rejecting their premises. Of the five shortcomings to be treated, the first three are initially introduced briefly and discussed in detail later.

Shortcoming 1. The agreement of the observed deficit of 15 IQ points with $\triangle IQ_{MC}$ calculated from the malicious coincidence of interaction effects combined with the malicious allocation is actually a numerical artifact. Specifically, the malicious feature of a higher-genetic-than-environmental-allocation is quantitatively irrelevant. Conversely, the selection of a 10×12 array of cells is essential; a 1000×1200 array would have produced, for $f_I = 0.01$, a $\triangle IQ_{MC}$ of -46 points rather than -4.6 points. This very serious shortcoming is shown below to be an analytic consequence of Light and Smith's methodology.)

Shortcoming 2. The IQ distribution for Negroes resulting from Tables 1 and 2 above (which are based on Light and Smith's Tables 2C and 2A) is in violent disagreement with actual data both as to shape and as to variance; this disagreement is even greater for the $f_I = 0.10$ distribution of their Tables 3A and 3C (1969). (These discrepancies are discussed below in connection with Figure 1.)

Shortcoming 3. The basic statistics that assume comparable environmental effects on Negroes and whites are in disagreement with current data as cited by Jensen (1969). (The details are discussed below in connection with Figure 2.)

Shortcoming 4. The logical consequences of the Light-Smith IQ distribution based on Tables 1 and 2 are strikingly in disagreement with fact. Specifically, it is obvious that these tables predict that individuals from a given social class have most peculiar IQ distributions. For example, 86% of the population in Environment Category 4 falls in the two cells of Genetic Categories 5 and 6 for which the mean IQ scores are 87.32 and 90.84 according to Light and Smith's Table 2B (1969). The small difference of 3.52 points between the mean IQ's of these two cells suggests that, since siblings belong in the same environmental categories, the within-family variance may be so small that the correlation coefficients for Negro siblings predicted by the Light-Smith model would be unreasonably high, thus implying much higher heritability of intelligence values for Negroes than for whites.

Shortcoming 5. Even if it is assumed that the Negro and white populations are genetically equal in a given generation, the Light and Smith model, combined with other well established facts, leads to the dysgenic prediction that one generation later the genetic distribution for Negroes will be lower than that for whites. This conclusion is based on the striking feature, seen in Table 1, that almost 90% of the Negroes in the two lowest genetic classes also fall into the two lowest environmental classes. Furthermore, there is a well established fact overlooked by Light and Smith: birth rates are significantly higher for Negroes of the lower SES categories compared to the upper categories. This fact was stressed by Jensen (1969). Expressing concern about dysgenic possibilities, Jensen cited Moynihan's report (1965) that "in 1960 non-white women (married once, husband present) age thirty-five to forty-five had 4.7 children as against 3.8 for white women in the same situation [p. 148]." For women in the same age bracket, married at age 22 or over to professionals or technical workers with one or more years in college, the numbers are 1.9 children for Negroes and 2.4 for whites. If, as Light and Smith proposed for their model, more than 85% of each of their three lowest genetic categories are found in the two lowest SES categories, a significant drop in genetic IQ would be expected to occur even in one generation. Thus, Light and Smith's theory is internally inconsistent in that it predicts what it presumably proves need not exist. It should be noted that much smaller dysgenic effects are expected for whites because their reproductive patterns are less unfavorable. (Osborne (1970) reviewed the standard treatments that reject all evidence for dysgenic trends. He presented new findings and came to the conclusion that prior studies were based on populations too narrowly selected and that dysgenic trends cannot be soundly rejected.)

Shortcomings 2 and 3 may be appreciated by comparing the Light-Smith model with the actually observed IQ distributions cited by Jensen, particularly those of Kennedy, Van DeRiet, and White (1963). The discrepancies constitute a serious failure to satisfy Constraint 4.

The distributions of Negro IQ computed by Light and Smith for $f_I = 0.01$ and 0.1 have striking peculiarities. Figure 1 exhibits the quantitative disagreement between the actual data of Kennedy et al. (1963) and the distribution obtained from the malicious allocation population ($f_I = 0.01$) based on Tables 1 and 2. The actual data (presented as cumulative percentage below each five point IQ value) appears as a concave upward curve, in keeping with the fact that the IQ distribution extends further from the median toward high IQ's than toward low ones. In contrast, the Light-Smith distribution (as obtained from their Tables 2B and 3B) has the opposite tendency. (Disagreement in median or in average IQ is not a serious shortcoming. The national average Negro IQ is probably about four points above the 80.7 of Kennedy et al. (1963) for Southeastern school children.) A serious shortcoming involves variance. The variance for the actual data is $12.4^2 = 154$. The excessive variance of the Light-Smith distribution may be estimated by inspection of Figure 1. The 16% and 84% points are about 65 and 103, corresponding to $\sigma = 38/2 = 19$ so that $\sigma^2 \doteq 360$. A calculation using the values for all 120 cells gives a variance of 340. The value of 340 was independently obtained by this author, by one of this author's students, and by Light and Smith after the author called the shortcoming to their attention in November 1969. The student, Mr. Paul Johnston, also obtained a variance of 617 for the population based on an interaction of $f_I = 0.10$.

Thus, the Light-Smith population for 1% interaction exceeds by more than 50% the target of $15^2 = 225$ stated by them (1969) for the total variance that is to be partitioned into fractions f_G, f_E, and f_I. This large discrepancy is not in keeping with the emphasis that they placed on the importance of accounting accurately for variance, specifically when they noted that three estimates of contributions to total variance contained in Jensen's paper added up to 112 %. They wrote: "We have just accounted for 112% of the total variance, which is not possible [p. 506]." This emphasis seems inconsistent with a disregard for excesses of 50% seen in Figure 1 and about 175% (i.e., about 617 compared to 225) for their $f_I = 0.1$ population.

Shortcoming 3, concerning the relationship of the average IQ of children to the socioeconomic status (SES) of their parents, is comparable to Shortcoming 2. (That the *E* factor is intended to apply to the families of the children is clear from page 490 of Light and Smith (1969).) This topic is central to questions underlying studies such as Coleman's report (1966). Jensen (1969) referred to Shuey (1966, p. 520) who cited several studies showing that IQ for Negro children increases much less rapidly with SES than for white children. Shockley's analysis (1969b, p. 89) of data reported by Wilson (1967) was a recent confirmation of this trend.

The shortcomings of the Light-Smith analysis in this regard are shown in Figure 2, where circles show the actual data of Kennedy et al. (1963), $\times$'s represent the hypothetical Light-Smith 1% interaction case, and $+$'s represent 0% interaction case. Ordinates are average IQ for each SES category. The percentage in each SES class for all three populations is given by the differences in end points of the short horizontal line. The SES categories improve from left to right with the cumulative percentages given by the right hand end of the horizontal line. The abscissa value for each SES is plotted at the mean "z" values for the normal distribution scale.

It is at once evident that neither the 0% interaction nor the 1% interaction is compatible with the actual data. A further serious shortcoming of the 1% interaction hypothetical distribution of Figure 2 is the excessively high dependence of average IQ on SES: bottom and top deciles of the actual IQ distribution are separated by less than 10 points compared to 50 IQ points for the hypothetical distribution, a difference of at least a factor of five. The hypothetical curve has an obviously peculiar shape. One notable feature is the decrease in IQ moving from the eighth to the tenth SES category. This dip is probably a consequence of the artificiality programmed into the com-

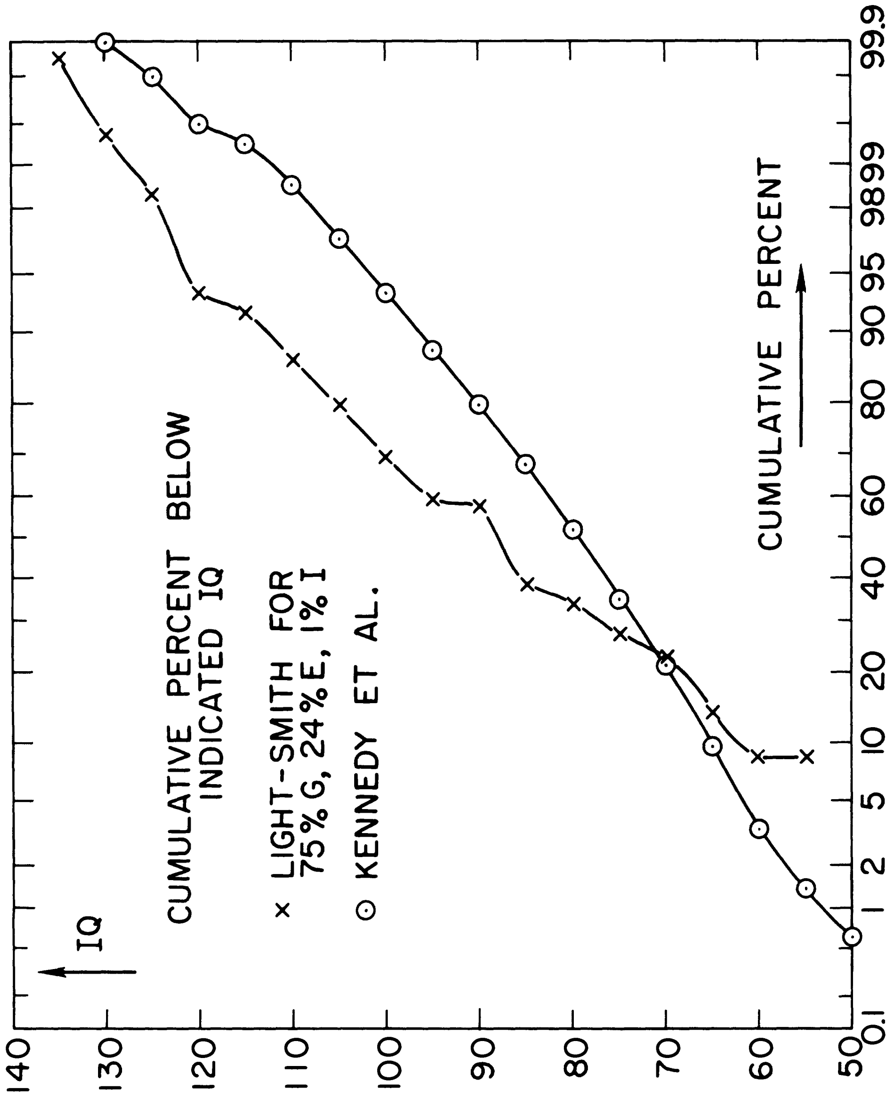

Fig. 1. Comparison of IQ distributions for a normative sample of Negro elementary school children by Kennedy et al. (1963) with the hypothetical population of Light and Smith (1969).

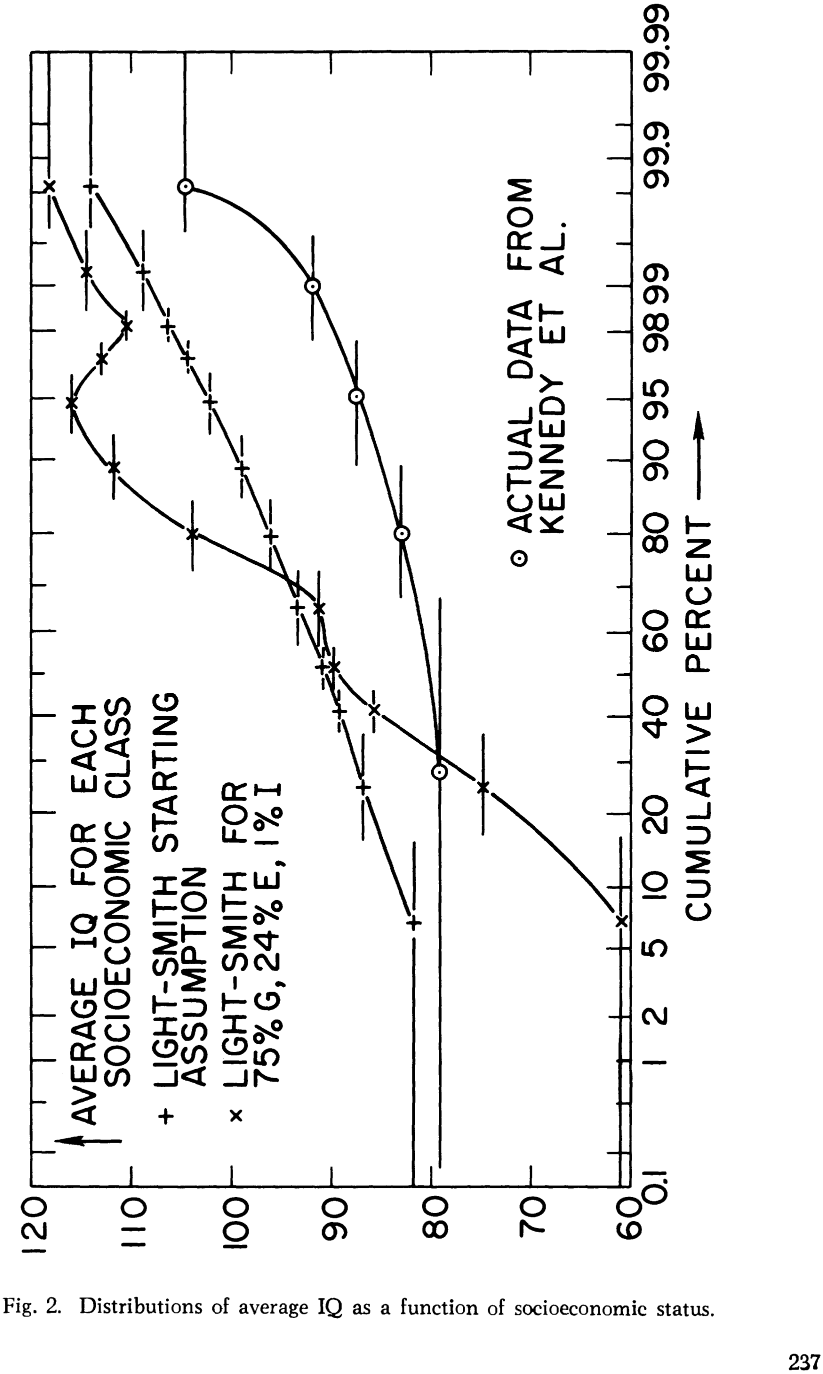

Fig. 2. Distributions of average IQ as a function of socioeconomic status.

putations that were governed by Constraints 1, 2, and 3 but not by Constraint 4.

A comparably significant discordance with actual data is represented by the "starting assumption" or 0% interaction curve of Figure 2.

Thus, from consideration of the five shortcomings, it follows that an effort to produce a model that explains the Negro IQ deficit on an environmental basis failed. Although computational efforts produced a hypothetical population with the desired IQ deficit, the extreme peculiarity of the resultant IQ distribution suggests that the premises on which the distributions were based should be rejected.

Further evidence for this conclusion is furnished by the fact that the numerical agreement of the computed IQ deficit with actual IQ deficit depends not on fundamental features but instead on the arbitrarily selected number of categories used in the analysis. In respect to this point, Light and Smith noted that: "A larger number of genetic categories (the choice of ten was arbitrary) *increases* the effects reported in this paper, but only slightly [1969, p. 490]." Although this conclusion is probably correct, it is also true that *if the number of genetic and environmental categories are both increased arbitrarily, then the effects can also be increased arbitrarily.* Light and Smith based their 12 SES categories on Census Bureau classifications. Evidently, there is no theoretical reason why that number should not be increased arbitrarily in constructing hypothetical populations. Then, as discussed in the next section, IQ deficits many times larger than the required 15 IQ points can readily be explained. Furthermore, the 15 points are seen to be approximately what would be expected for a table of 120 cells.

Simple Analytic Model of "Malicious Coincidence"

The underlying mathematical principles that enabled Light and Smith to compute a value for Negro IQ deficit that duplicated the experimental value, while rejecting the possibility that genetic factors were involved, can be illustrated analytically in terms of a more symmetrical case than the one that Light and Smith considered. As a "simplest case" example, consider a square array in which all members of a population, P, may be classified into n^2 cells, $C\alpha_j$, where α $(= 1, \ldots, n)$ defines the environmental class and j $(= 1, \ldots, n)$ defines the genetic class. For all allocation schemes considered, assume (as did Light and Smith) that each genetic class or column of cells contains P/n individuals. For mathematical simplicity, however, the arbitrarily defined environmental categories based on Census data are not used; instead, assume that these environmental classes or rows of cells are also selected so that each contains P/n individuals. As did Light and Smith, assume initially that there is no correlation between α and j so that each cell, $C\alpha_j$, contains $P\alpha_j$ individuals where $P\alpha_j = P/n^2$, i.e., each cell contains the same fraction, n^{-2}, of the population. This may be called the *uniform distribution* case; it corresponds to Light and Smith's starting assumption or 0% interaction case.

Assume next (again as in the Light and Smith calculation) that all individuals in $C\alpha_j$ have the same IQ, composed additively of an environmental contribution, E, a genetic component, G, and an interaction component, I:

$$IQ_{\alpha j} = 100 + E_\alpha + G_j + I_{\alpha j} \quad . \qquad [1]$$

The conditions that Light and Smith imposed are that E_α and G_j are normally distributed and contribute prescribed fractions, f_E and f_G, of the variance, V_p. A fraction, $f_I = -f_E - f_G$, of the variance arises from I. In keeping with Light and Smith, the $I\alpha_j$ values are chosen subject to Constraint 3. Constraint 3 is satisfied if I averages to zero and has zero covariance with E and G for the uniform distribution case. These conditions are satisfied by requiring that

$$\sum_\alpha I_{\alpha j} = \sum_j I_{\alpha j} = 0. \qquad [2]$$

Equation 2 is seen at once to lead to $< I > = 0$, where $< \ >$ means averaged over P. Furthermore, for the uniform distribution case, the relationships $< EI > = < GI > = 0$ also follow from Equation 2:

$$< GI > \equiv \sum_j G_j \sum_\alpha I_{\alpha j} \ / \ n^2 = 0 \quad . \qquad [3]$$

Light and Smith also used the constraint of Equation 2 that $\sum_\alpha I_{\alpha j} = 0$.

(The exact conditions that apply when the cell populations depend on α are more complicated. The model treated here estimates the maximum ΔIQ_{MC} that can be produced by cooperation between interaction and allocation for an interaction that does not affect a uniform distribution.)

Next consider two populations, one uniformly distributed and the other arbitrarily allocated to the cells subject to Constraints 1 and 2 expressed in the form

$$\sum_\alpha P_{\alpha j} = P \ / \ n = \sum_j {}_{\alpha j} \quad . \qquad [4]$$

Equation 4 is equivalent to Light and Smith's requirement that their malicious allocation alter neither the genetic nor the environmental distribution for Negroes. It can be proven that the interaction, I, and the

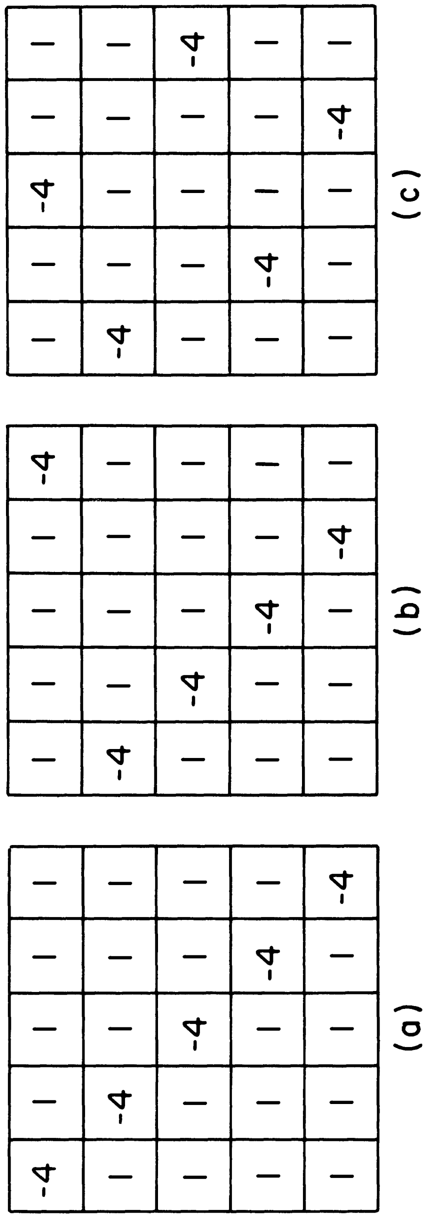

Fig. 3. Simplest cases examples of interaction term $I_{\alpha j}$ for n^2 array with $n = 5$.
(a) Simplest array of chosen squares.
(b) "Inverse-malicious" allocation.
(c) A random pattern interaction.

allocation can be chosen so as to reduce the average IQ of the reallocated population by

$$\triangle IQ_{IM} = - [(n-1)f_I]^{1/2}\sigma_P \quad , \qquad [5]$$

where $\sigma^2_P \equiv V_P$.

This can be done, as represented in Figure 3, by arbitrarily selecting n "chosen" cells, no two of which lie in the same row or column. The following values for the $I_{\alpha j}$ components are assigned:

$$I(\text{chosen cell}) = -\lambda \quad I(\text{other cells}) = \lambda/(n-1) \quad . \qquad [6]$$

The variance, V_I, for I can be made equal to $f_I V_P$ by choosing $\lambda = [(n-1)f_I]^{1/2}\,\sigma_P$ so that

$$V_I \equiv <I^2> = \lambda^2 \left[1 + \frac{1}{n-1}\right] /n = \lambda^2/(n-1) = f_I V_P \quad . \qquad [7]$$

This choice also satisfies Equation 2 so that $<I> = <EI> = <GI> = 0$, and so that I gives the correct fraction of the uniform population variance, V_P. Figure 3 represents three possible examples for $n = 5$, $\lambda = -4$, and $V_I = 4$; as explained below, all three cases give the same $\triangle IQ_{MC}$.

The population is now maliciously allocated with a fraction, $1/n$, in each of n cells selected to maliciously coincide with the same chosen n cells of Figure 3. This choice does not alter the fractions allocated to each environment or genetic class; each of these fractions is obviously $1/n$. However, the IQ of every individual of the population now receives the full negative contribution of the most negative $I_{\alpha j}$, so that ΔIQ_{MC} is $-\lambda$ (as may be verified by comparing Equations 4 and 6).

This n^2 model is obviously an oversimplification of the more complex numerical situation to which Light and Smith applied a computer program. Nevertheless, it does estimate with fair accuracy the numerical values that Light and Smith obtained for their 10×12 column array both for $f_I = 0.01$ or 1% and for $f_I = 0.10$ or 10%. For this comparison, their 10×12 rectangular model is represented by using an average n of 11 in the n^2 model considered here. When $\sigma_P = 15$, Equation 5 gives $\Delta IQ_{MC} = -4.75$ and -15 for $f_I = 0.01$ and 0.10, respectively. In order to compare these values with the $\triangle IQ_{MC}$ of Light and Smith, the contribution of the racial differences in distribution over environment, $\triangle IQ_E$, must also be determined. For the G, E, I variance composition of 0.75, 0.25, and 0.00, the $\triangle IQ_E$ value is -8.74. Consequently, for 0.75, 0.24, 0.01 and for 0.75, 0.15, 0.10, the $\triangle IQ_E$ values are reduced from -8.74 by the factors $(0.24/0.25)^{1/2} = 0.98$ and $(.15/0.25)^{1/2} = 0.77$ so as to give -8.60 and -6.80. These values are utilized to obtain Table 3. It should be noted that the $\triangle IQ_{MC}$ values of Light and Smith do increase by a factor of $\sqrt{10} = 3.16$ in going from $f_I = 0.01$ to $f_I = 0.10$. Inspection of their Table 3A (1969) that gives $I_{\alpha j}$ values for $f_I = 0.10$ suggested that this table approaches less closely the ideal form of Figure 3 (they could have used 3.17 times Table 2) and thus represents a less effective utilization of I to produce $\triangle IQ_{MC}$.

Table 3

Comparison of $\triangle IQ_{MC}$ Values of the Simple Analytic Model with Light-Smith Computer Programmed Results

Light and Smith				Equation 5
f_I	$\triangle IQ_{tot}$	$\triangle IQ_E$	$\triangle IQ_{MC}$	$\triangle IQ_{MC}$
0.00	—8.74	—8.74	—0.00	— 0.00
0.01	—13.19	—8.60	—4.59	— 4.75
0.10	—17.41	—6.80	—10.61	—15.00

The mathematical irrelevancy of the malicious aspect of Light and Smith's allocation is obvious from these considerations. Figure 3a illustrates the simplest choice of $-\lambda$ squares along the main diagonal. Figure 3b presents an "inverse-malicious" choice in which each individual is assigned to an environmental status better than his genetic status. (The odd square at the extreme upper right can be eliminated if values $-\lambda$ and $\lambda/(n-2)$ are used for an $(n-1)^2$ sub-square.) Finally, Figure 3c represents a case of random choice of chosen-square locations. Obviously, each of these interaction patterns will produce exactly the same $\triangle IQ_{MC}$ when malicious coincidence occurs with the matching population allocation. Thus the malicious allocation feature of assigning Negroes to lower environmental than genetic categories stressed in the Light-Smith analysis is irrelevant to the magnitude of the effect. In contrast, their choice of the 10×12 scale of the array is highly significant quantitatively. Since the possible magnitude of $\triangle IQ_{MC}$ is proportional to $(n-1)^{1/2}$, it can be arbitrarily increased by increasing n.

Meaningless Questions Vs. Research Proposals on the Morally Important Question

It is natural to consider a model with a very large number of cells to overcome the shortcomings inherent in Light and Smith's 120-cell model.

The use of more cells would certainly permit satisfaction of all four of the constraints. However, that such a procedure per se is logically unsatisfying can be appreciated by noting that it could explain away a real genetic difference. For example, if one of Light and Smith's cells is subdivided into smaller cells and *I* is assigned within the cell in an interaction pattern like that of Figure 3, then malicious coincidence of the distribution within that cell could lower mean Negro IQ for that cell compared to mean white IQ. If this were done for all 120 cells, the result would be a smooth IQ distribution on the 120-cell scale, free of the shortcomings associated with Figure 1. (In fact, the degrees of freedom in such a program could probably "explain" almost any desired feature.) This smooth distribution could duplicate perfectly on the 120-cell scale an arbitrarily large downward genetic offset. Thus, Light and Smith's methodology could be used, even if a genetic offset did exist, to argue the case for subtle, immeasurable, but significant environmental causes not detectable at the crude level of the Census Bureau's SES categories. In fact, Light and Smith suggested such possibilities by noting that "SES underestimates the disparity between blacks and whites [1969, p. 490]."

Thus, unless some operationally defined means of assessing the subtle differences that might exist for interaction within cells of the 10 x 12 array can be devised, methodology based purely on analysis of variance puts the question of genetic differences, so significant for important national programs, in the class that Bridgman (1927, p. 28) defined as a "meaningless question."

Jensen's arguments on the probability that genetic factors are involved in white-Negro differences depended not only on variance considerations but on other relevant observations, regarded as items of evidence rather than as proofs.

Obviously, the racial aspect of the human quality problem demands the highest levels of ingenuity and intellectual integrity. Scriven was appalled (1970, p. 546) at the "level of discussion" of the "academy" on these "morally important" questions. (Regarding moral importance, see also Shockley, 1969d.) Scriven himself did not raise the level of discussion when he wrote (1970, p. 456): "The *primer* of political and moral reasoning involves understanding that worth of people and their rights do not depend on IQ." The word "depend" discounts the significant positive correlations that exist between IQ and all other quantifiable or orderable traits that have been studied—correlations that have significantly lower correlation coefficients for Negroes than whites (Shockley, 1970a).

Scriven discounted the grim question, "Is Quality of U. S. Population Declining?" (Shockley, 1965, p. 68), and the fear that genetic enslavement (Shockley, 1967, p. 1771) may well be viewed by future generations as our society's greatest injustice to Negro Americans (Jensen, 1969, p. 95). Scriven's bland rejection of the genetic threat (see Shortcoming 5 above) is apparent in his fourth point (1970, p. 547-548): "Fourth, the biological definition of genetic differences is not very significant socially. . . . The discovery that some children do not learn to enjoy or play music from the usual methods of teaching is *simply a challenge to find new ways to teach them* [emphasis mine]." Why did Scriven choose music rather than the three R's in which Negro shortcomings are so disturbing to educators? Why "simply a challenge to find new ways to teach"? Why not a search for causes?

The black minority's agonizing disadvantages are a challenge that demands diagnosis of the genetic factors that Scriven (here he is in step with the academy that he condemns) discounts. The case put forward by "life scientists" that the environment-heredity uncertainty is a basic indeterminancy at the present state of our knowledge is weakened by the fact that their analyses seem characterized by a lack of attempts to imagine significant conceptual experiments (Shockley, 1969a). At present only 7% of the Negro scores on the Armed Forces mental tests exceed or overlap the median white score. Fifty years ago, the overlap was 13% (Shockley, 1967, p. 1768).

On a number of occasions, I proposed "conceptual experiments" that constitute research on methodology to reduce the environment-heredity uncertainty, including racial and ethnic aspects (Shockley, all references). In particular, I proposed the use of "tracer genes" to measure racial mixtures of Negro-white hybrid populations and individuals and to correlate these mixtures with IQ (Shockley, 1966b, 1970b, 1970c, 1971a, 1971b, 1971c).

A recent analysis (Shockley, 1971) of gene frequencies emphasizing Duffy's Fy^a, called "Caucasian gene" by Reed (1969), and emphasizing the *Gm* system, indicated that the Oakland, California population has a standard deviation in percentage of Caucasian ancestry of about 20% and a mean value of 23%. Preliminary research suggested that an increase of 1% in Caucasian ancestry raises Negro IQ an average of one point for low IQ populations (Shockley, 1971a).

It should be kept in mind, however, that no conclusive evidence has been presented. In responding to a recent questionnaire, the majority of 23 presidents of predominantly Negro colleges indicated that black students at their schools are academically advantaged by attitudes towards racial differences; consequently, comparing racial mix differences with achievement differences might refine or reject the preliminary estimate that a one point increase in average "genetic" IQ occurs for each 1% of Caucasian ancestry, with diminishing returns approaching 100 IQ (Shockley, 1971b).

To fail to use this method of diagnosis for fear of being called a racist is irresponsible. It may also be a great injustice to black Americans.

If those Negroes with the fewest Caucasian genes are in fact the most prolific and also the least intelligent, then genetic enslavement will be the destiny of their next generation. The consequences may be extremes of racism and agony for both blacks and whites (Shockley, 1971a).

Another new research technique (Stodolsky & Lesser, 1967) employs intelligence patterns (i.e., relative performance levels on four tests: verbal, reasoning, numerical, spatial) that show pronounced ethnic differences in school children with ethnic patterns substantially invariant to socio-economic level. Application of this technique to illegitimate Negro orphans from the ghetto (in their birth environment, they would have had low scores with verbal highest and numerical lowest) who were adopted into middle-class Jewish families (typically receiving very high scores with numerical markedly higher than reasoning or spatial) might enable a definitive test of such hypotheses as Washburn's (1962) that in equal environments American Negroes might surpass whites (Shockley, 1968b).

If what I fear is true, our society is being profoundly irresponsible. Our nobly intended welfare programs may be encouraging dysgenics—retrogressive evolution through disproportionate reproduction of the genetically disadvantaged. This national illness probably occurs for whites as well as blacks, but it may be easier to diagnose for the black because of the research possibilities offered by the Caucasian gene effect.

I sincerely and thoughtfully believe that attempts to demonstrate that American Negro shortcomings are preponderately hereditary is the action most likely to reduce Negro agony in the future. That the equality of intelligence potential for Negroes is not scientifically accepted is attested to by publicly recorded views of at least two of the most recent past presidents of the American Psychological Association (Garrett, 1970; Shockley, 1967b). Harlow conjectured: "It is my opinion and the opinion of many psychologists that the average intelligence scores of people labelled black are lower by about one standard deviation than the average of those labelled white and I believe at least half this difference is related to genetic variables [Shockley, 1967b]." Thorndike (1940) also discussed this. I believe that there is an intellectual endeavor that might provide a basis for remedies for the growing national agonies associated with Negro frustration. The Negroes themselves, I believe, would be the greatest beneficiaries. I propose a serious scientific effort to establish by how much the distribution of hereditary potential for intelligence of our black citizens falls below whites. Furthermore, if it is scientifically impossible to prove any deficit whatever, then establishing the underlying causes of this impossibility would be of enormous value to mankind. If it can be scientifically demonstrated that the average Negro deficit is zero, then the contribution of this new knowledge to overcoming prejudice would be great in influencing responsible, thinking men. If differences are found, then social actions can be based on sound methodology rather than emotionally prejudiced racism (Shockley, 1969a, pp. 84-85).

Summary

Light and Smith (1969) claimed to prove that no genetic deficit is necessary to explain why American Negroes have an average IQ of 85 compared to 100 for whites. Their quantitative analysis utilized a computer program that distributed a hypothetical population into 120 classifications defined by 10 genetic and 12 environmental categories. By assuming (*a*) that 1% of the variance of IQ arises from an interaction term and (*b*) that a malicious allocation concentrates Negroes into lower environmental categories than genetically equal whites, they devised a hypothetical Negro population that explained how the observed deficit of about 15 IQ points could occur even though the Negro population was genetically equal to the white population.

Shortcomings in the work of Light and Smith and new research proposals, none of which they treated, are summarized below.

1. The malicious allocation feature emphasized by Light and Smith (assigning genetically superior Negroes to inferior environments) is not essential to explaining the 15 IQ point deficit obtained from their model. The same quantitative result can be obtained from a model with a "beneficent allocation." Their results arose from a malicious coincidence of interaction and distribution.

2. Their quantitative success in predicting correctly the magnitude of the deficit of 15 IQ points is actually a mathematical artifact that resulted from their arbitrary selection of a 10×12 array for their computations; if their methods had been applied to a 1000×1200 arary, a 50 point deficit could have been produced.

3. Their hypothetical population's IQ distribution has many peculiarities: it is far from normally distributed and has a variance of 340—far larger than their stated objective of $15^2 = 225$, which is itself much larger than the value of 160 based on the best existing data.

4. A fourth shortcoming is an unrealistically high correlation between genetic potential for intelligence and social class.

5. A logical consequence of Shortcoming 4 is that dysgenics will result from the disproportionately higher birth rates of lower socioeconomic status Negroes as a consequence of the higher heritabilities of intelligence implied by Shortcoming 4. Thus, the Negro genetic intelligence distribution, even if it is identical with whites in a given generation, will be lower in the next generation.

All of these peculiarities are inconsistent with both established facts and current sociological thought. They are, in effect, absurdities that follow from Light and Smith's ingenious computational development of their premises. The Light and Smith analysis thus offers a reductio-ad-absurdum proof, or at least an item of evidence, against their premise that American Negroes do have genetic potential for intelligence equal to that of whites.

6. Reduction of the racial aspects of the environment-heredity uncertainty about the origin of the American Negro's social and intellectual deficits is "morally important" (Scriven, 1970). Methodology for such research is probably already accessible but, unfortunately, is not being applied.

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